



## POTATOES

## Record Belgian Potato Patch Growth, But Challenges Loom

9TH APRIL 2019



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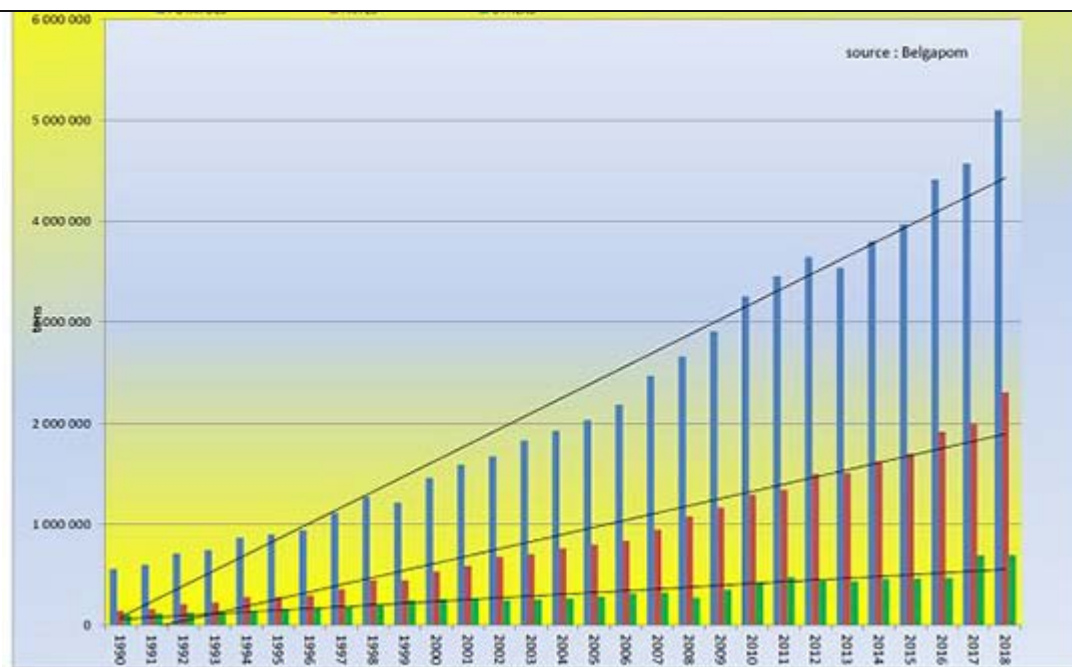


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More than five million tons of potatoes were processed in Belgium during 2018, setting an all-time record and registering the sharpest annual increase since the 1990s. The use of potatoes as a raw material rose by 11.6%, which was by far the greatest increase in the history of this growing segment of the Belgian food industry.

Berlare-based Belgapom, the association representing the Belgian potato trade and processing sectors, notes that last year's tonnage marked a whopping 1,000% increase from the average per annum volume of 500,000 tons processed into frozen fries, mashed potato products, flakes and granules less than three decades ago.



Belgium currently ranks as the largest exporter of frozen potato products on the planet, shipping value-added spuds to over 150 countries from 18 processing plants. Output of frozen fries in 2018 hit 2,073,747 tons, up from 1,770,298 tons in 2017. Refrigerated, or chilled fry tonnage, was 231,734 last year, compared with 226,796 in 2017. The figures for mashed potato products, croquettes, chips, flakes and other items were 695,321 tons in 2018 and 690,159 tons in 2017.

The term “Belgian fries” is increasingly recognizable among consumers around the world, who regard it positively along with other Belgian food and beverage fare including chocolate, waffles, beer and ale. It took the coordinated efforts of Belgium’s potato production and marketing cluster to make it happen.

In addition to growers, for whom potatoes have become the most important source of revenues within the nation’s arable farming field, service providers and suppliers of machinery have also experienced remarkable growth. They are increasingly leading global players in innovative product introductions and technology advances.

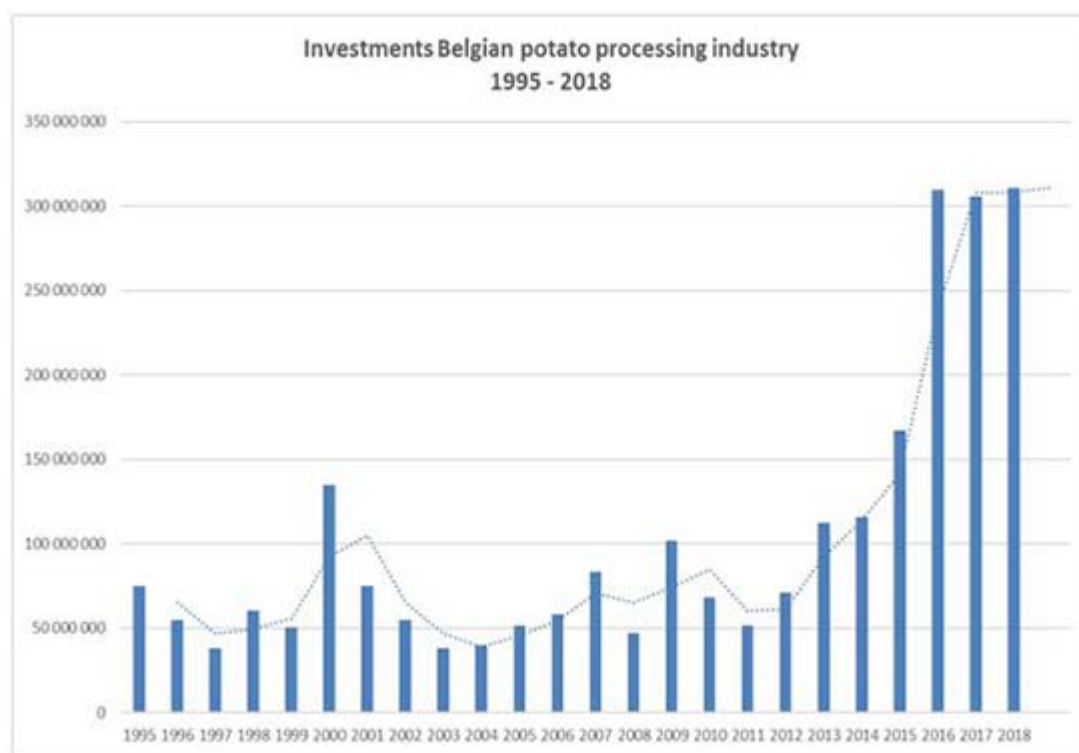
The Belgian potato processing industry is based in the heart of the European production belt. It can thus not only draw from a deep regional pool of talent and expertise, but is also



## Rising Investment, Jobs, Sustainability

Investments in the future continue to be made, both with regard to quality and quantity. Sustainability is the recurring theme through it all. Efforts are being made in the area of the sustainable cultivation of potatoes, environmentally friendly production and logistics.

The processing sector's employment rate has also charted remarkable growth, showing an increase of 8% compared to 2017. At present, 4,762 blue- and white-collar workers are gainfully engaged in highly automated factories and offices.



As for the foreseeable future, the sustainable growth of Belgium's potato processing industry seems assured. In 2018 there were record investments in the area, amounting to almost €311 million.

The reasons for this remarkable evolution are firstly the continued rising demand for potato products on the global market. Growing middle classes in Asia and South America are stimulating appetites for convenience foods, including Belgian fries.



2017-2018 growing season, following a record potato harvest. Despite the setback of the 2018-2019 season, which coped with exceptional drought and repeated heat waves, a large supply of potatoes became available in the second half of 2018. As quite a number of batches could not be kept, in consultation with the growers it was decided to process them in the autumn of 2018.

In addition, the Belgian processing companies are also increasingly investing in promotion and developing their commercial network. One example of this is the campaign in Southeast Asia in cooperation with VLAM, APAQ-W and the European Commission. It has led to better familiarity with the story of “Belgian fries, from the heart of Europe” in Vietnam, Thailand and other countries in that part of the world.

## Not All News Good

Meanwhile, the prolonged drought and high temperatures during the 2018-2019 growing season caused extensive damage to the Belgian potato chain. Not only will the low yield of the 2018 harvest probably have a major impact on the business results of all national players, but the confidence in this strong, largely family-run sector of SMEs developed over many years has been shaken.

Agricultural organizations and Belgapom have as much as possible stimulated dialogue between the companies executing contracts.



They are also continuing to focus on achieving a trade organization for the potato sector that should provide a fixed base for this dialogue.

“Trade and industrial sectors have furthermore adapted their quality requirements as part of the solution to the problems, although admittedly this has led to shorter fries,” reported Belgapom.

The high potato prices on the free market led to a rising price for finished products, which did not have a favorable impact on the Belgian competitive position vis-à-vis other producing nations.





European Commission to make a formal end to the anti-anti-dumping measures of a number of countries,” stated Belgapom. “Not only do they damage the companies involved, in addition an unjustified negative image is affecting this dynamic sector, one which developed into a global player without systematic support from the government.”

The difficult circumstances of the 2018-2019 season also have an impact on the amount and quality of the seed potatoes supplied, which could very well affect the next season.

Finally, the sector is also regarding the imminent decision of the European Commission to no longer permit the sprout inhibitor CIPC with great uncertainty.

“This substance has been in use since time immemorial,” stated Belgapom. “Recent studies will perhaps result in its authorization being revoked. Luckily the sector itself, in collaboration with Flanders Food, has already taken the initiative to examine alternative substances with the Reskia research project (low-residue sprout inhibition). However, it is still necessary to learn how to handle this in practice and the sector will be confronted with significant investments in potato storage.”

Belgapom has called on the Flemish and Walloon authorities to assist and support their producers in this effort. The sector expects full cooperation from Europe to also find a solution for risks as a result of the historical contamination of warehouses.

## WatchITgrow Support

Within the framework of sustainable development of the sector, Belgapom and its companies are offering their full support to VITO's WatchITgrow platform. This instrument, that makes use of satellite data and numerous other information sources, is the successor to the Belspo Ipot project that Belgapom helped to set up.



The trade association has called on its members to pay a premium to producers who, within the framework of their contract enter their parcels via WatchITgrow before 2019 and add the necessary cultivation data.

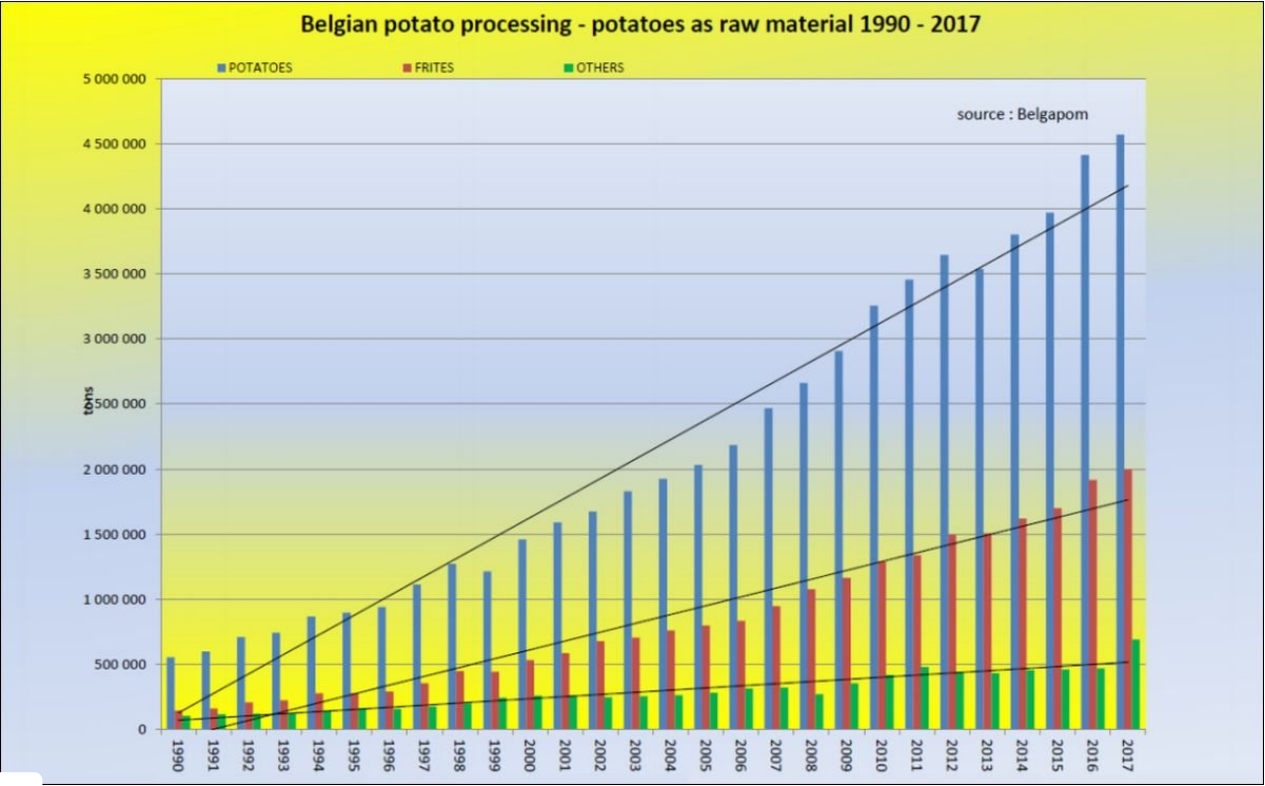
The data is used by VITO to develop growing advice controlled by AI (artificial intelligence). For the next two years, growers can make use of the online growing advice that will be further developed year after year. After that, a fee will be charged for the system, but it will also continue to further develop its advice and warnings.

Access to the harvest prognosis model is limited to just the grower, who is free to share it with buyers if desired. It should be pointed out that VITO is the only party that has direct access to this data.

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Potato Processing in Belgium from 1990 -2017, including potatoes used for processing and production of french fries (Courtesy: Belgapom).

Mar 16, 2018

» record year of 2016 for the Belgian potato processing industry continued into 2017, according to Belgapom, the Belgian potato trade and processing industry association.

During the past few years, the Belgian potato industry developed into one of the fastest growing sectors in the Belgian food industry. Partly thanks to the significant investment in capacity and quality, this trend continued in 2017. Thus last year 4.57 million tonnes of potatoes (+ 3.6 %) were processed into fries, crisps, croquettes, flakes, granules and other potato products.

What is noticeable in 2017 is the exceptional increase in products other than fries (crisps, croquettes, mash products, flakes, etc.), which evolved from 468,513 to 690,159 tonnes (+ 47.5%).

The share of frozen and fresh fries rose from 1.91 million tonnes to 1.99 million tonnes (+ 4.3 %), however the share of fresh refrigerated fries fell by 3.5 %.

For the season 2017-2018 statistics show with 5,11 million tons of potatoes an absolute record harvest for Belgium. This increase in resulting from the increase in planted area, the choices of varieties and the influence of weather conditions. The figures published by Belgapom relate to the calendar year of 2017, which spans two potato seasons (2016-2017 and 2017-2018).

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May 27, 2018 to May 31, 2018



<div></div> <div>The Belgian potato processing industry in 2015 – 2017</div>			
	2015	2016	2017
Number of processing plants	17	18	18
Number of workers :	2.780	3.257	3.467
Number of employees:	757	858	943
<b>Investments:</b>	€ 167.207.415	€ 309.775.177	€ 305.513.247
<b>Raw material :</b>			
Potatoes :	3.970.595 t.	4.414.390 t.	4.571.297 t.
Flakes :	6.934 t	6.300 t.	6.039 t.
<b>Finished product :</b>			
Frozen fries :	1.472.150 t.	1.681.332 t.	1.770.298 t.
Refrigerated fries :	226.475 t.	234.694 t.	226.796 t.
Mashed potato products, croquettes, chips, ...			
Flakes and others ,...	460.475 t.	468.513 t.	690.159 t.

World Potato Congress 2018 /  
ALAP 2018

Potato Processing in Belgium 2015-2017 (Courtesy: Belgapom)

But what is certainly fanning the optimism in the sector is the fact that in 2017 the record sum of over 305 million euros invested in the potato-processing sector was almost equalled (-1.3 %). Employment in the sector once gain also grew by 7.1 % (4,410 units).

According to the latest statistics, Belgium remains by far the largest exporter of frozen potatoes in the world in 2017 with 2.2 million tonnes. The share of third countries continues to increase.

Promotional activities

the eve of the national holiday in 2017, all the competent authorities recognised the ‘frietkot culture’ as national intangible cultural heritage. On that occasion, Prince Laurent of Belgium granted the mandate of “ambassador of the Belgian frietkot culture abroad” to James Bint, the famous cartoon character who analogously with his homonym ‘James Bond’ has a ‘license to fry’.

Last year, the figure of James Bint was used to start the promotion campaign for ‘Belgian fries, from the heart of Europe’ in southeast Asia. By participating in trade fairs and press events, the Belgian fry producers try to demonstrate the authenticity and quality of the Belgian fries in this fast-growing market of 557 million consumers.

 (Click picture to watch video)



James Bint: 8 steps to fries heaven (Courtesy: [jamesbint.be](http://jamesbint.be))

Highlighted Company



Belgapom



Vlaams Centrum voor Agro- en  
visserij Marketing (VLAM)

Where



 Belgium

Illustration from the brochure [Original Fries](#)

fortunately, these dossiers have also got other South American countries thinking out making use of this procedure, even if there is no reason to do so at all.

gapom and the European federation EUPPA have urged the European Commission to rease the pressure to end such practices, where apparently there is no hesitation in raisifying a dossier even during the process.

Sustainable growth

Not only has the Belgian sector chosen to press ahead to guarantee the sustainability of its national potato production by setting up further forms of cooperation via the Potato Branch Organisation, which is to be baptised during Interpom Primeurs (25-27 November 2018).

But Belgapom also supports international cooperation projects within the potato sector in developing countries.For example the project Coalición Chuño by TRIAS in collaboration with a number of other partners such as ILVO, VTI, VLTl and Rotary Torhout, which supports the construction of the first artisanal chuño factory in the world in Peru (a century-old technology for freeze-drying potatoes).

This project will be presented to the whole world as an example of development aid through potatoes during the [World Potato Congress in Cuzco \(27-31 May 2018\)](#).

Source: Belgapom

Related Companies

[Agristo NV](#)



Agristo is a manufacturer of frozen prefried french fries and potato specialties.  
Agristo operates 3 production plants (and is working on the construction of a 4th)



As of today, after all the supply of potato products in Vietnam, Indonesia, the Philippines, Malaysia and Thailand above all comes from North America.

The campaign – with the support of the European Commission – is being carried out by VLAM in cooperation with APAQ-W, FIT and AWEX and will continue in 2018 and 2019. There are events planned in the near future in Singapore, Manilla, Bangkok, Hanoi and Ho Chi Minh city.

In the week of 9-15 May, the Central World Bangkok – one of the largest shopping centres in the world – will be dominated by “real Belgian fries”.



Original Belgian Fries

For one week, Belgian fries will be offered for tasting and during the weekend of 11-13 May, the famous Belgian frietkot manager, Eddy Cooremans, will be present to fry and recommend Belgian fries. What is more, a real-life James Bint will provide additional entertainment with his text balloons. This event is also being linked to social media and B2B events such as the Thaifex trade fair.

### Increasing protectionism

But on the other side of the world, a threat is emerging. Belgian (and European) fries risk becoming the victim of protectionist reflexes that threaten international trade.

After unjustified antidumping measures by the Brazilian government (the legal complaint against this by the European companies is still pending), a decision by the Colombian government is soon also expected about a similar case.

The dossier resembles a Swiss cheese with just as many holes (which was also confirmed by the European Commission), but a negative decision here can still lead to unjustified import levies.





# Record investments in the Belgian potato-processing sector

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16 June 2018



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 (/EN) potatoes (+ 3.6 %) were processed into fries, crisps, croquettes, flakes, granules and other potato products. **BELGIAN POTATO PRODUCTS (/EN/BELGIAN-POTATO-PRODUCTS)** **AGENDA (/EN/AGENDA)**

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But what is certainly fanning the optimism in the sector is the fact that in 2017 the record sum of over 305 million euros invested in the potato-processing sector was almost equalled (-1.3 %). Employment in the sector once again also grew by 7.1 % (4,410 units).

According to the latest statistics, Belgium remains by far the largest exporter of frozen potatoes in the world in 2017 with 2.2 million tonnes. The share of third countries continues to increase.

[www.belgapom.be \(https://belgapom.be/en/home/\)](https://belgapom.be/en/home/)



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(<https://www.vlam.be>)

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May 22, 2019

## Why Belgium is the world's largest exporter of frozen fries

By Melanie Epp | Contributing Writer

It's no secret that Belgians love their fries. In fact, the mere mention of "frietjes" can lead the most reserved Belgian to wax poetic, inspiring lengthy, almost romantic discussions on the best local "frituur" or how mayonnaise should be served: slathered on top or on the side.

To Belgians, though, the potato is so much more than just a means to make fries. It is a household staple that's integral to their culture, their landscape and their economy.

### The world's largest frozen potato exporter

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only did the processing sector break the record, it was also the sharpest annual increase on record since the 1990s.

In 1990, the country turned approximately 500,000 tons of potatoes into fries, mashed products, chips, granules and flakes. Last year, by comparison, the sector reported a 1,000% increase, making Belgium the largest exporter of frozen potatoes in the world.

Processed potato products are shipped from Belgium to more than 150 countries around the world, providing a net trade value of more than €1.75 billion (\$1.97 billion) each year.

According to Belgapom, the Belgian potato trade and processing industry association, in the French-speaking region of Wallonia, low cereal prices and a sharp decline in the cultivation of beets has made the potato one of the most important crops produced. Processing alone accounts for some 5,000 jobs and thousands of indirect jobs in the region.

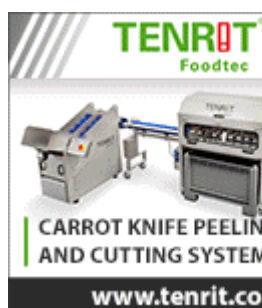
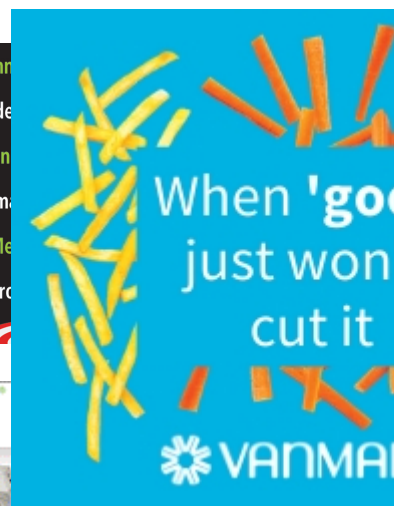
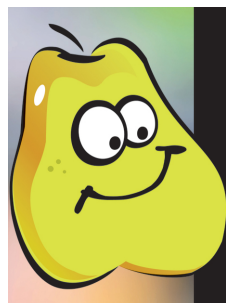
Belgium was able to achieve this incredible growth due to increased demand for potato products on the world market. In Asia and South America, a growing middle class is driving demand for convenience products, including Belgian fries.

Despite the setback of the 2018-19 growing season — which was greatly impacted by a lengthy drought followed by intense heat waves — a record harvest in the second half of the 2017-18 growing season contributed to the large supply of potato products.

The future for the processing sector looks bright as well, as 2018 also saw significant investment, reaching a total of \$350 million.

## Belgian production in numbers

Both the soil and the climate of northwestern Europe where Belgium is situated are perfect for potato production, which is why the region produces some of the highest yields in the

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value of €350 and €550 million euros (\$394 and \$620 million).

With the aim to improve quality and quantity, Belgian farmers continue to invest in sustainable cultivation practices and logistics.

One of those investments is a digital platform called **WatchITgrow**, which was launched to support growers in monitoring arable crops. WatchITgrow combines satellite data with weather data, soil data, IoT data and field data that is provided by the grower to make decisions that help increase yields.

The data collected is analyzed and used to provide growers with more timely and personalized advice. Growers who collect and submit crop-related data are eligible to receive a financial bonus of €250-750 from their buyer. With this financial support, the buyers hope to encourage farmers to use new digital technologies. Doing so will help them to strengthen the country's agricultural sector.

To help growers improve quality, companies like **Mydibel**, which develops, produces and commercializes potato products, puts together test fields for variety research. By cultivating various varieties under similar soil and climatic conditions, the company gains valuable practical knowledge on plant distancing, plant depth and fertilization, among other things. It also allows them to compare promising new varieties, like Bintje, Fontane and Challenger.

According to Belgapom, it's not entirely good news, though. Prolonged drought and high temperatures felt throughout the 2018-19 growing season have caused extensive damage to the potato supply chain. Low yields are likely to impact the bottom lines of many a business throughout the supply chain.

Wherever possible, Belgapom has worked to foster communication between growers and the companies that execute their contracts. Belgapom says that trade and industry have adapted their quality requirements in order to



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The difficulties faced in the 2018-19 growing season will continue to be felt in 2019, as the amount and quality of seed potato was also impacted.

Belgapom is looking to an imminent decision on the use of the sprout inhibitor CIPC (chlorpropham) by the European Commission as another potential setback. Should it have its authorization revoked, Belgian farmers would no longer have access to CIPC. The sector has been examining alternative solutions, but is not yet ready for such a monumental change. Not only will it require training, but also significant investment in potato storage.

Despite the challenges ahead, stakeholders across the supply chain remain positive. While the development of the processing sector will continue to work to meet global demand, some of the supply may need to come from neighboring countries.

In the meantime, Belgium's major players continue to work together in order to support sustained growth and investment in what has come to be part of their national identity alongside waffles, chocolate and beer.

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ALEMANIA					
PERIODO	AÑO	SEMESTRE	VOLUMEN (KG)	VALOR (MILES US\$ FOB)	PRECIO DE EXPORTACIÓN A REINO UNIDO (US/KG)
Denuncia y Dumping COL	2016	I SEMESTRE	3.184.366	\$ 3.197	\$ 1,00
		II SEMESTRE	2.987.051	\$ 3.011	\$ 1,01
	2017	I SEMESTRE	3.786.986	\$ 3.819	\$ 1,01
		II SEMESTRE	3.810.539	\$ 3.963	\$ 1,04
Derechos Antidumping COL	2018	I SEMESTRE	3.141.183	\$ 3.262	\$ 1,04
		II SEMESTRE	3.180.267	\$ 3.433	\$ 1,08
	2019	I SEMESTRE	2.630.362	\$ 3.490	\$ 1,33
		II SEMESTRE	2.790.089	\$ 3.793	\$ 1,36

BÉLGICA					
PERIODO	AÑO	SEMESTRE	VOLUMEN (KG)	VALOR (MILES US\$ FOB)	PRECIO DE EXPORTACIÓN A REINO UNIDO (US/KG)
Denuncia y Dumping COL	2016	I SEMESTRE	88.205.615	\$ 71.006	\$ 0,81
		II SEMESTRE	99.135.676	\$ 77.182	\$ 0,78
	2017	I SEMESTRE	132.816.827	\$ 108.795	\$ 0,82
		II SEMESTRE	112.317.226	\$ 99.539	\$ 0,89
Derechos Antidumping COL	2018	I SEMESTRE	116.077.835	\$ 106.017	\$ 0,91
		II SEMESTRE	127.413.368	\$ 112.483	\$ 0,88
	2019	I SEMESTRE	149.228.618	\$ 136.837	\$ 0,92
		II SEMESTRE	150.506.029	\$ 137.613	\$ 0,91

PAISES BAJOS (HOLANDA)					
PERIODO	AÑO	SEMESTRE	VOLUMEN (KG)	VALOR (MILES US\$ FOB)	PRECIO DE EXPORTACIÓN A REINO UNIDO (US/KG)
Denuncia y Dumping COL	2016	I SEMESTRE	155.951.923	\$ 143.162	\$ 0,92
		II SEMESTRE	160.327.115	\$ 140.153	\$ 0,87
	2017	I SEMESTRE	161.905.176	\$ 151.070	\$ 0,93
		II SEMESTRE	184.817.421	\$ 178.893	\$ 0,97
Derechos Antidumping COL	2018	I SEMESTRE	178.891.373	\$ 180.649	\$ 1,01
		II SEMESTRE	183.101.514	\$ 180.098	\$ 0,98
	2019	I SEMESTRE	181.666.600	\$ 185.586	\$ 1,02
		II SEMESTRE	177.434.376	\$ 177.780	\$ 1,00

Fuente: TRADEMAP- Cálculos Sistemas de Información y Estudios Económicos Fedepapa-FNFP

ALEMANIA					
PERIODO	AÑO	SEMESTRE	VOLUMEN (KG)	VALOR (US\$ FOB)	PRECIO DE EXPORTACIÓN A COLOMBIA (US/KG)
Denuncia y Dumping	2016	I SEMESTRE	1.322.580	\$ 917.165	\$ 0,6935
		II SEMESTRE	1.317.730	\$ 980.482	\$ 0,7441
	2017	I SEMESTRE	884.990	\$ 661.402	\$ 0,7474
		II SEMESTRE	808.360	\$ 601.711	\$ 0,7444
Derechos Antidumping	2018	I SEMESTRE	495.460	\$ 354.151	\$ 0,7148
		II SEMESTRE	393.370	\$ 289.699	\$ 0,7365
	2019	I SEMESTRE	69.660	\$ 57.465	\$ 0,8249
		II SEMESTRE	232.980	\$ 183.804	\$ 0,7889

BÉLGICA					
PERIODO	AÑO	SEMESTRE	VOLUMEN (KG)	VALOR (US\$ FOB)	PRECIO DE EXPORTACIÓN A COLOMBIA (US/KG)
Denuncia y Dumping	2016	I SEMESTRE	11.069.997	\$ 7.871.874	\$ 0,7111
		II SEMESTRE	13.338.939	\$ 9.607.905	\$ 0,7203
	2017	I SEMESTRE	11.937.122	\$ 9.027.229	\$ 0,7562
		II SEMESTRE	10.790.326	\$ 8.837.770	\$ 0,8190
Derechos Antidumping	2018	I SEMESTRE	16.166.896	\$ 12.140.291	\$ 0,7509
		II SEMESTRE	16.122.187	\$ 11.739.917	\$ 0,7282
	2019	I SEMESTRE	15.611.929	\$ 12.529.418	\$ 0,8026
		II SEMESTRE	17.995.090	\$ 13.485.863	\$ 0,7494

PAISES BAJOS (HOLANDA)					
PERIODO	AÑO	SEMESTRE	VOLUMEN (KG)	VALOR (US\$ FOB)	PRECIO DE EXPORTACIÓN A COLOMBIA (US/KG)
Denuncia y Dumping	2016	I SEMESTRE	2.768.848	\$ 2.050.254	\$ 0,7405
		II SEMESTRE	4.181.880	\$ 3.202.991	\$ 0,7659
	2017	I SEMESTRE	3.352.857	\$ 2.595.273	\$ 0,7740
		II SEMESTRE	4.611.649	\$ 3.563.754	\$ 0,7728
Derechos Antidumping	2018	I SEMESTRE	6.634.686	\$ 4.930.423	\$ 0,7431
		II SEMESTRE	4.157.602	\$ 3.178.916	\$ 0,7646
	2019	I SEMESTRE	5.028.320	\$ 3.972.220	\$ 0,7900
		II SEMESTRE	6.620.263	\$ 5.219.965	\$ 0,7885

Fuente: DIAN- Cálculos Sistemas de Información y Estudios Económicos Fedepapa-FNFP



ALEMANIA					
PERIODO	AÑO	SEMESTRE	PRECIO DE EXPORTACIÓN A REINO UNIDO (US/KG)	PRECIO DE EXPORTACIÓN A COLOMBIA (US/KG)	MARGEN DE DUMPING
Denuncia y Dumping COL	2016	I SEMESTRE	\$ 1,00	\$ 0,69	44,8%
		II SEMESTRE	\$ 1,01	\$ 0,74	35,5%
	2017	I SEMESTRE	\$ 1,01	\$ 0,75	34,9%
		II SEMESTRE	\$ 1,04	\$ 0,74	39,7%
Derechos Antidumping COL	2018	I SEMESTRE	\$ 1,04	\$ 0,71	45,3%
		II SEMESTRE	\$ 1,08	\$ 0,74	46,6%
	2019	I SEMESTRE	\$ 1,33	\$ 0,82	60,8%
		II SEMESTRE	\$ 1,36	\$ 0,79	72,3%

BÉLGICA					
PERIODO	AÑO	SEMESTRE	PRECIO DE EXPORTACIÓN A REINO UNIDO (US/KG)	PRECIO DE EXPORTACIÓN A COLOMBIA (US/KG)	MARGEN DE DUMPING
Denuncia y Dumping COL	2016	I SEMESTRE	\$ 0,81	\$ 0,71	13,2%
		II SEMESTRE	\$ 0,78	\$ 0,72	8,1%
	2017	I SEMESTRE	\$ 0,82	\$ 0,76	8,3%
		II SEMESTRE	\$ 0,89	\$ 0,82	8,2%
Derechos Antidumping COL	2018	I SEMESTRE	\$ 0,91	\$ 0,75	21,6%
		II SEMESTRE	\$ 0,88	\$ 0,73	21,2%
	2019	I SEMESTRE	\$ 0,92	\$ 0,80	14,3%
		II SEMESTRE	\$ 0,91	\$ 0,75	22,0%

PAISES BAJOS (HOLANDA)					
PERIODO	AÑO	SEMESTRE	PRECIO DE EXPORTACIÓN A REINO UNIDO (US/KG)	PRECIO DE EXPORTACIÓN A COLOMBIA (US/KG)	MARGEN DE DUMPING
Denuncia y Dumping COL	2016	I SEMESTRE	\$ 0,92	\$ 0,74	24,0%
		II SEMESTRE	\$ 0,87	\$ 0,77	14,1%
	2017	I SEMESTRE	\$ 0,93	\$ 0,77	20,5%
		II SEMESTRE	\$ 0,97	\$ 0,77	25,3%
Derechos Antidumping COL	2018	I SEMESTRE	\$ 1,01	\$ 0,74	35,9%
		II SEMESTRE	\$ 0,98	\$ 0,76	28,6%
	2019	I SEMESTRE	\$ 1,02	\$ 0,79	29,3%
		II SEMESTRE	\$ 1,00	\$ 0,79	27,1%

Fuente: TRADEMAP- Cálculos Sistemas de Información y Estudios Económicos Fedepapa-FNFP



## FEATURED CONTENT

## After Flying High in 2019, Belgian Potato Sector Now Taking Coronavirus Attack Flak

12TH APRIL 2020

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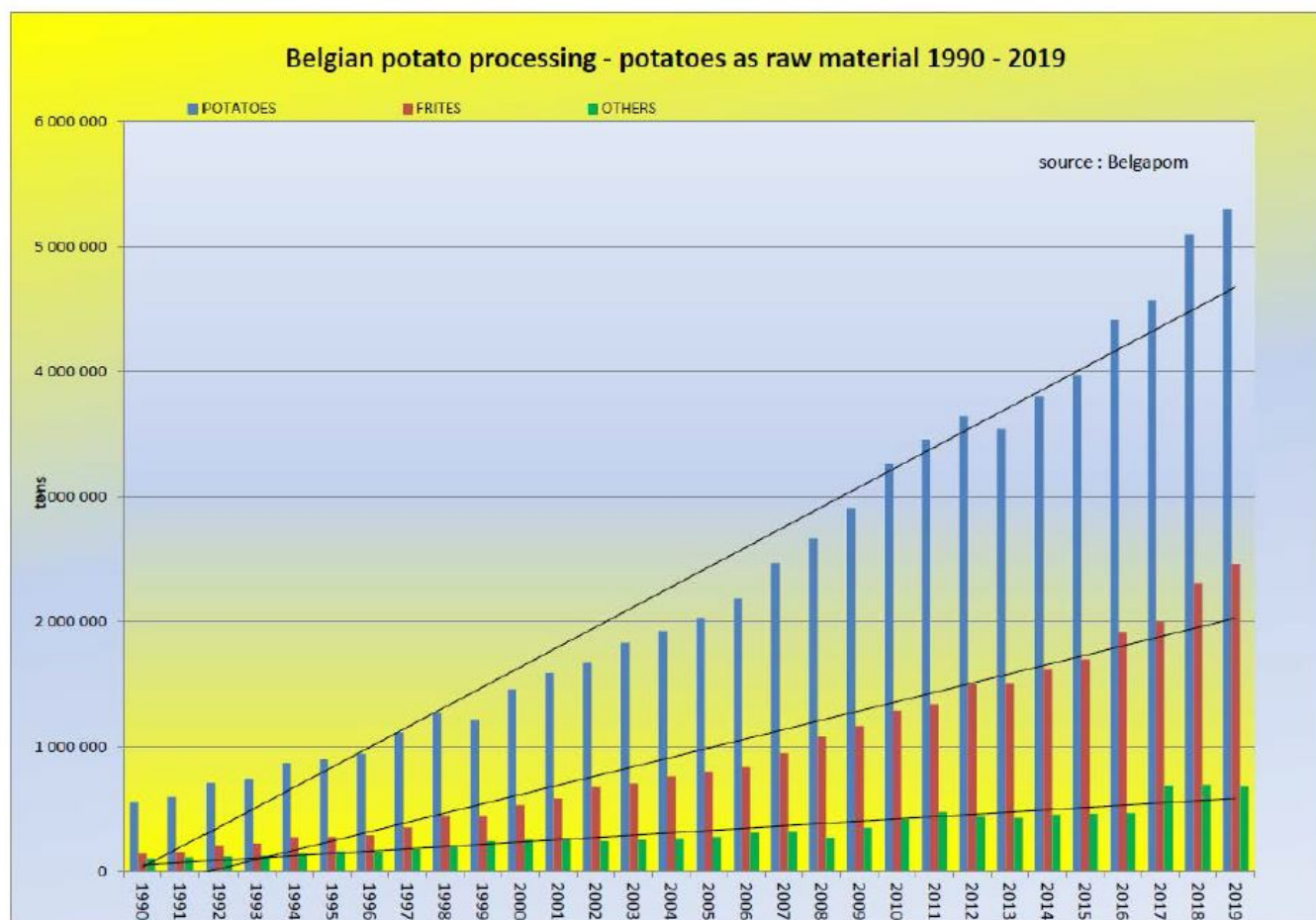
Last year, despite difficult potato growing conditions due to extreme heat and drought, increased production of frozen fries again powered growth for the Belgian potato processing industry. Prospects this year, however, are not looking good due to the



of the 1.7 million potatoes that were infected, but instead the more dreaded novel coronavirus (SARS-CoV-2) contagion that has spread from Wuhan, China to cause death and disruption worldwide.

First, let's review the positive report of yesteryear's positive performance. According to Belgapom, the Berlare-based Belgian potato trade and processing association, in 2019 almost 5.3 million tons of potatoes were transformed into fries, mashed potato products, crisps, flakes and granules of precooked spuds. That amounted to an increase of 3.8% compared to 2018 figures.

Last year, 2,231,000 tons of frozen fries were produced (up 7.5% compared to 2018). The production of non-frozen fries (230,314 tons) and other potato products (684,810 tons) fell slightly by 0.5 and 1.6 % respectively.





The number of employees working in the sector rose from 4,762 to 4,991 last year. Investments amounted to €289,219,240. Frozen fries dominated exports, with shipments of 2,680,086 charting an increase of 8.1% compared to 2018. The value was €1,935,181 million, up 18.2 % more than the previous year. This increase due in part to the higher prices of raw materials, since 2019 was in the middle of two difficult growing seasons as a result of extremely hot and dry summers.

### The Belgian potato processing industry in 2017 – 2019

	2017	2018	2019
Number of processing plants	18	19	19
Number of workers :	3.467	3.701	3.866
Number of employees:	943	1.061	1.135
Investments:	€ 305.513.247	€ 310.923.634	€ 289.219.240
<b>Raw material :</b>			
Potatoes :	4.571.297 t.	5.101.522 t.	5.295.483 t.
Flakes :	6.039 t	5.630 t.	5.305 t.
<b>Finished product :</b>			
Frozen fries :	1.770.298 t.	2.073.747 t.	2.230.926 t.
Refrigerated fries :	226.796 t.	231.734 t.	230.314 t.
Mashed potato products, croquettes, chips, ...			
Flakes and others ,...	690.159 t.	695.321 t.	684.810 t.

What is remarkable about the above statistics is that Belgium is the only country in Northern Europe that showed an increase in exports during 2019, according to Belgapom.

### Now, the Bad News

*While the prospect for the 2020 had been positive, all has changed with the negative impact the coronavirus pandemic, which has brought the shutdown of QSR restaurants, snack bars and other*



can cancel the problem of movement of their citizens in an effort to curb the further spread of the killer bug.

Among much negative economic fallout following the outbreak of SARS-CoV-2 and subsequent unleashing of deadly Covid-19 respiratory disease in Central China late last year and well past the conclusion of the Lunar New Year holiday period in Asia was a huge backload of containers not being unloaded in Chinese ports. This led to logistical problems for European potato exporters, as well as many other food trading industries.

Then, come mid-March, reported Belgapom: “The virus started to appear everywhere in Europe and local authorities proceeded with lockdowns. The problems kept mounting in the potato sector. Restaurants and professional kitchens closed, and after a short period of hoarding the fall in demand in supermarkets became noticeable. At the beginning of April, the same approach was rolled out all over the world, so that the export of frozen products faced problems...No one knows how long this situation will drag on. The near future is one big question mark. However, it is already clear that the coronavirus will really lay into the 2020 figures of this dynamic sector.”



Noting that there is currently a surplus of approximately more than a million tons of potatoes in the Netherlands, Romain Cools of Belgapom estimates that Belgium’s surplus will likely be in a similar range. As cold storage warehouses fill up with unsold value-added potato products, there is no place to store new output. As such, new production is being drastically curtailed.

Philippe Debruyne of Aviko, the Dutch potato processing company that ranks as the fourth biggest producer in the world, recently commented: “Our fries production is partly at a standstill. We will continue to make the other potato specialties, but at a slower pace because our employees have to work at a safe distance from each other.”



approximately 2.5 million tons of tubers on hand, of which two-thirds cannot be sold. While they are reaching out to the European Union for support, thus far none has been forthcoming.

“Corona is impacting all sectors. Brussels is not going to regard this as a priority,” said Carola Schouten, Minister of Agriculture, Nature and Food Quality in the Netherlands.

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## Potato Pilot Center

# Assessment of the Belgian potato stocks: quantities in stock on February 1st, 2019

Assessing the stocks currently for sale is a key element to apprehend the evolution of the markets. For the 22nd consecutive year, a survey was carried out by Fiwap, Carah and Inagro/PCA among 223 Belgian potato producers. In Wallonia, 92 farmers accepted to take part in the survey, with a representative proportion for each province (Brabant: 13, Liège: 8, Namur: 12, Hainaut: 59). In Flanders, 131 farmers growing potatoes for consumption were contacted via a telephone survey.

### 1. Evolution of the stocks from the 2018 harvest until February 1st, 2019

In Belgium, combining the regional results, the situation appears as follows:

Table 1: Evolution of the stocks in Belgium - production 2018 (132 producers in Flanders + 91 producers in Wallonia): in % of initial production.

Belgium	All conservation varieties	Bintje	Fontane	Other varieties
Area in 2018 (ha)	86,507 ha	16,877	33,909	35,720
Supply departure field	15%	13%	10%	22%
Supply between harvest and November 1st, 2018	4%	6%	2%	5%
Supply between November 1st, 2018 and February 1st, 2019	25%	37%	23%	23%
In stock on February 1st, 2019	56%	44%	66%	50%
free contract	11% 45%	15% 29%	15% 51%	6% 44%

On February 1st, Belgian producers still had 56% of the initial harvest of conservation potatoes in stock (all varieties). It is less than last year (60%), and less than in February 2017 or the average of the last 3 seasons (58%). The free share (volumes not covered by any contract) is at an all-time low, at 11% of the initial production. 1 potato out of 5 currently in stock remains to be sold.

The stocks of Bintje are particularly low, at 44% of the initial harvest (1/3 only is free). The last time such low proportions were recorded was back in February 2012. The average of the past 3 years is 60%. The glassy issues evidently cleared important volumes of Bintje since the harvest.

Nearly 2/3 of the initial Fontane production are still in stock (66%), and half of the initial harvest for the other varieties. These proportions are similar to the past 3 years (averages of 65% and 49% respectively). The free shares are very low: 1 potato out of 6 in Fontane, and 1 potato out of 8 for other conservation varieties.

**Bintje:** Bintje sales escalated this season because of the glassy potatoes which rapidly compromised conservation. 37% of the initial harvest was cleared from early November to early February, compared to 20-25% in the past 4 years...

**Fontane:** Fontane sales reached 23% of the initial harvest between November and February (3 months), like in the past 2 years (21%), with a majority of contracted volumes (15%) and a minority sold freely (8%). The clearing pattern is comparable to 2016-2017.

**Other conservation varieties:** the period from November to February helped evacuate 23% of the initial production, like in the 2017-2018 and 2015-2016 seasons, but a lot more than in 2016-2017 (17%). The evacuation concerned 19% of the initial harvest for contracts, and 4% for the free volumes.

## 2. Reminder of the initial production in 2018

According to the Fiwap/PCA estimates based on Statbel (ex-INS) and on the regional PAC figures, the total surfaces of conservation potatoes were up 2.1%. Bintje reportedly regressed by 28%, while Fontane surfaces went up 23%. The very low average yield (37.7 t/ha) brought the total Belgian production to 3.26 million tons (early potatoes excluded), which is 1.5 million tons less than in 2017. Despite an additional 5,000 ha, the 2018 harvest did not reach the low 2016 harvest.

Table 2: Estimates of conservation potato productions (1,000 tons) (sources: Fiwap/PCA/Carah/Inagro):



Production (in thousands of tons rounded up to 10,000t)	2011	2012	2013	2014	2015	2016	2017	2018	Evolution 2018 vs. 2017
Bintje	2,110	1,440	1,640	1,680	1,360	1,050	1,180	560	-52.5%
Fontane	410	330	580	950	1,060	1,020	1,620	1,380	-14.8%
Other varieties	1,260	1,060	1,110	1,640	1,370	1,540	1,900	1,320	-30.5%
Total conservation production	3,780	2,840	3,330	4,260	3,790	3,620	4,700	3,260	-30.6%

### 3. Tonnage estimate of Bintje in stock and multiannual comparison

Graph 1: Evolution of Bintje stocks in Belgium - production years 2011 to 2018 – initial production, November stock, February stock, April stock (except 2018), annual sowing (ha – source: regional PAC declarations) and average FIWAP/PCA price of the free market for the season (partial in 2018).

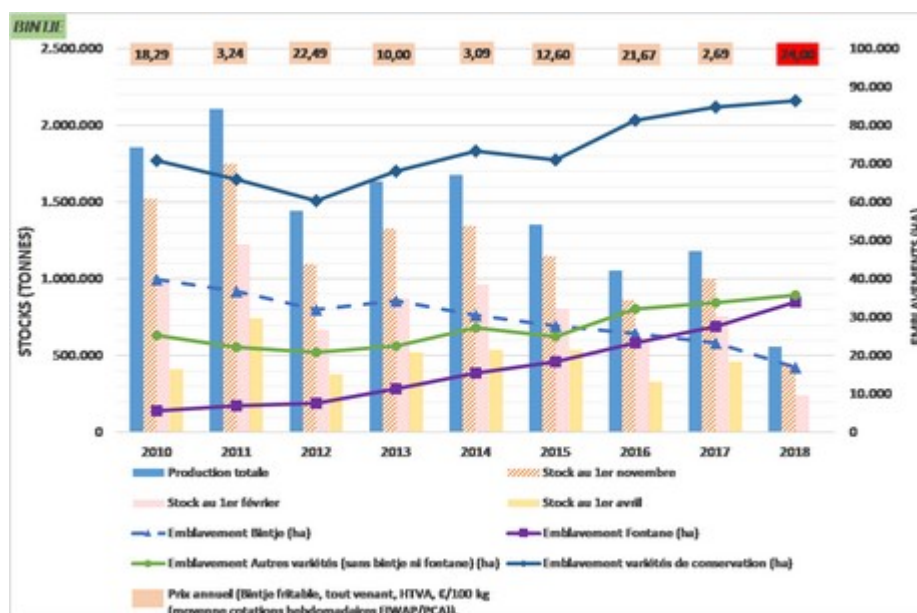


Table 3: Bintje: stocks in Belgium in early February

Bintje - harvest year	2011	2012	2013	2014	2015	2016	2017	2018
in stock in early February	2012	2013	2014	2015	2016	2017	2018	2019
in % of initial production	58	46	53	57	60	58	64	44
in thousands of tons	1,220	670	970	960	810	610	760	240

Bintje stocks have never been so low: with only 240,000 tons, they are 3 times lower than last year, and 3 times lower than the average of the past 3 years. The survey evaluates free volumes in stocks at only 80,000 tons!

The markets cleared (sometimes urgently) approximately 210,000 tons since the beginning of the season, 2/3 of which contracted. It is more than last year (190,000 tons), which counters the downward trend observed in recent years.

#### 4. Tonnage estimate of Fontane in stock and multiannual comparison

Graph 2: Evolution of Fontane stocks in Belgium - production years 2010 to 2017 – initial production, November stock, February stock, April stock (except 2016), annual sowing (ha – source: regional PAC declarations):

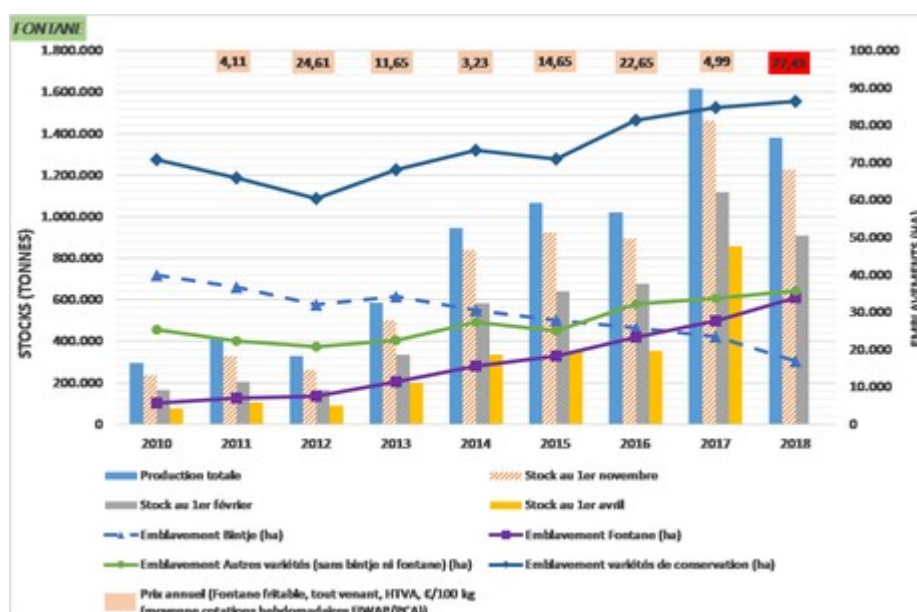


Table 4: Fontane: stocks in Belgium in early February

Fontane - harvest year	2011	2012	2013	2014	2015	2016	2017	2018
in stock in early February	2012	2013	2014	2015	2016	2017	2018	2019
in % of initial production	50	50	57	62	60	66	69	66
in thousands of tons	210	160	340	580	640	680	1.120	910

The Belgian stock of Fontane in early February is estimated at 910,000 tons, which is 210,000 tons less than last year, despite the larger surface areas of nearly 6,500 ha. Of the current stock, only 200,000 tons are left to sell. It is obviously very little: the free tons are almost non-existent! The contracted volumes in stock are about 710,000 tons, which is 110,000 tons more than last year, and 230,000 tons more than the average of the last 3 years. Fontane is now demanded by all factories. 470,000 tons of the Fontane stocks have been cleared since the harvest, which is similar to last year (500,000 tons). In the past 3 years, it was 340,000 to 420,000 tons.

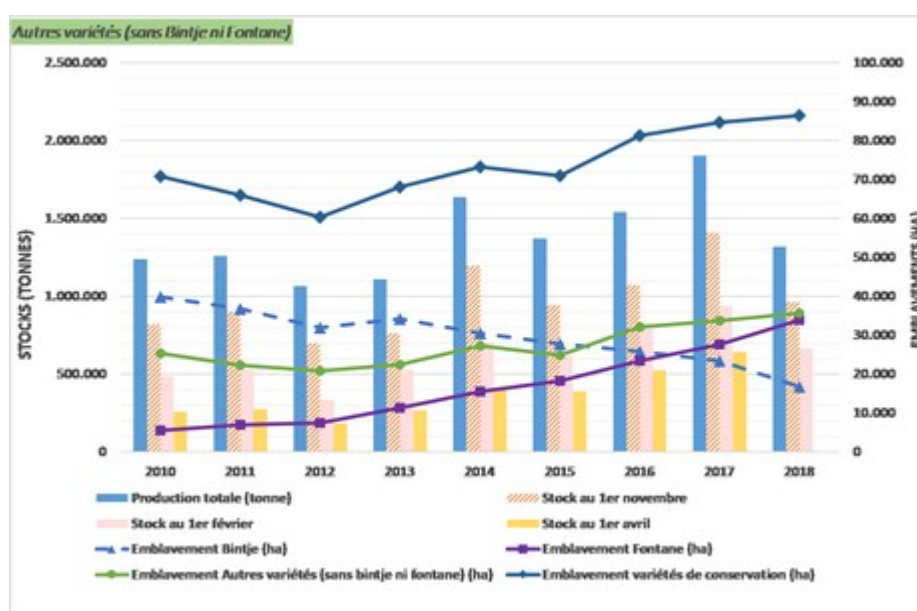
## 5. Multiannual comparison for other conservation varieties

The data from the survey for varieties other than Bintje and Fontane must be evaluated with caution, given the lower sample and the many varieties involved (Challenger, Lady Claire, Markies, Ramos, Magnum, Royal, fresh market varieties).

Table 5: Varieties “other than Bintje and Fontane”: stocks in Belgium in early February

Other varieties - harvest year	2011	2012	2013	2014	2015	2016	2017	2018
in stock in early February	2012	2013	2014	2015	2016	2017	2018	2019
in % of initial production	42	32	47	43	45	53	49	50
in thousands of tons	530	340	520	700	620	820	940	660

Graph 3: Evolution in the stocks of varieties other than Bintje and Fontane in Belgium - production years 2011 to 2018 – initial production, November stock, February stock, April stock (except 2018), annual sowing (ha – source: regional PAC declarations):



The “varieties other than Bintje and Fontane” group produced only 1.32 million tons in 2018, despite a progression of 2,000 ha of the surface area from 2017. We must go back to 2013 to find a lower production in this group (but there were 13,000 ha less at the time...).

The survey shows a stock of +/- 660,000 tons in early February, which is 280,000 tons less than last year, and 160,000 tons less than in February 2017. Barely 80,000 tons of the current stock are free, while 580,000 tons are under contract.

Since the beginning of the season, markets have cleared 660,000 tons of those varieties, a lot less than in the past 3 years (720,000 to 970,000 tons).

## **6. Conclusions:**

With only 1.8 million tons, the Belgian stocks estimated on February 1st are the lowest in 5 years, with a majority of Fontane (900,000 tons, which is half the stocks!), and marginal volumes of Bintje (240,000 tons).

The free volumes are almost non-existent, estimated (all varieties combined) at 360,000 tons, which means 1 potato out of 5 currently in warehouses. Where to find potatoes to fill (if any) the lack of contract delivery? Very few in Belgium evidently, maybe more in France...

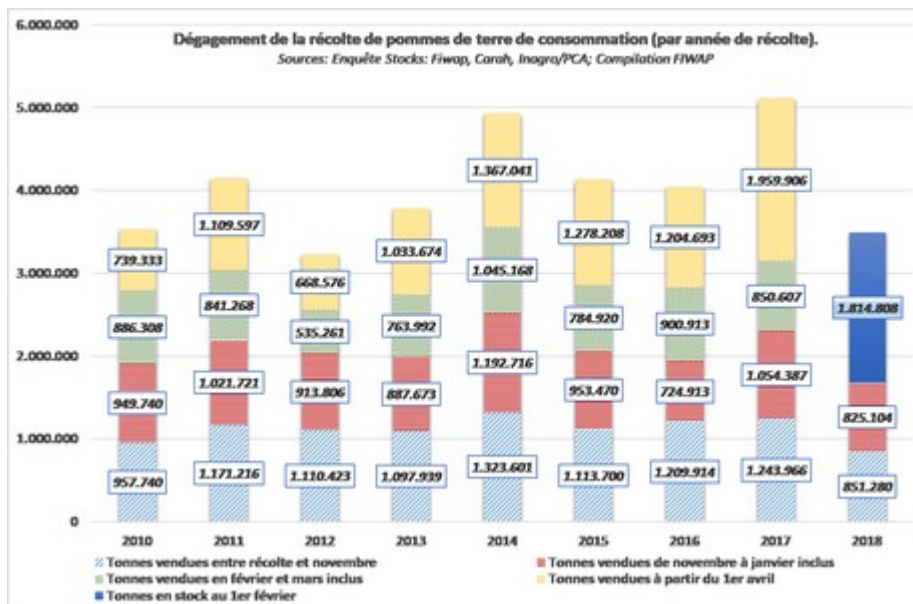
Belgium is ending the season with 1 million tons less than last year. Compared to 2016-2017 (season also based on very low yields), the stock in early February is lower by 300,000 tons.

The demand is clearly adapted to the low production since, all varieties combined, markets cleared only 1.45 million tons of conservation potatoes since the beginning of the harvest. In the last 5 seasons, this figure varied from 1.51 to 2.02 million tons...When the merchandise is rare, we save on everything: nothing will be lost this year (low calibers, deformed).

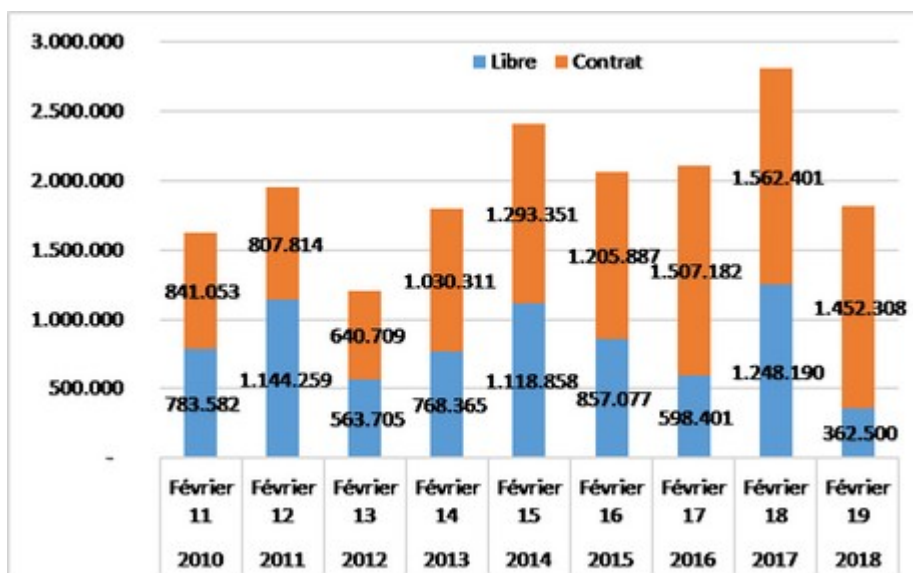
Clearly, factories also went looking for raw material on the dual-use table potato markets (in France mainly), in the starch sector, or even in the large calibers of the Netherlands...But the uncertainty regarding the availability of the raw material most likely led the factories to reduce the sales volumes of finished products as well. Many processing lines did not run at full capacity this season.

The end of the season will be tense on the free markets given the marginal stocks left to sell. The current price level is therefore fully justified. Based on the stock assessment of early February, Fontane (contracted) will constitute most of the factory supply in the coming months, along with the Innovator, Challenger, Markies and Royal varieties.

Graph 4: Clearing of the Belgian harvest of consumption potatoes (early potatoes included):



Graph 5: Quantities for free and contract in February (conservation variety) in tons



The next survey is expected in early April 2019.

For more information:



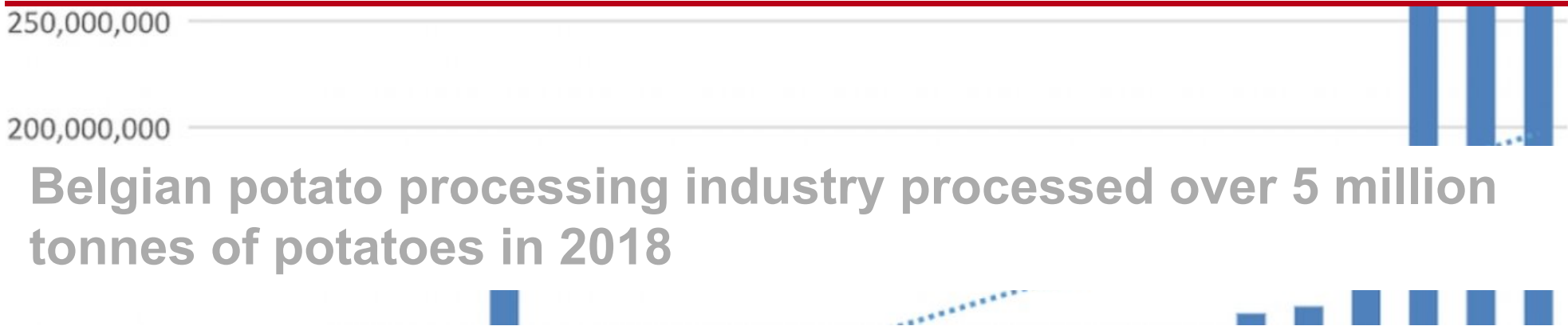
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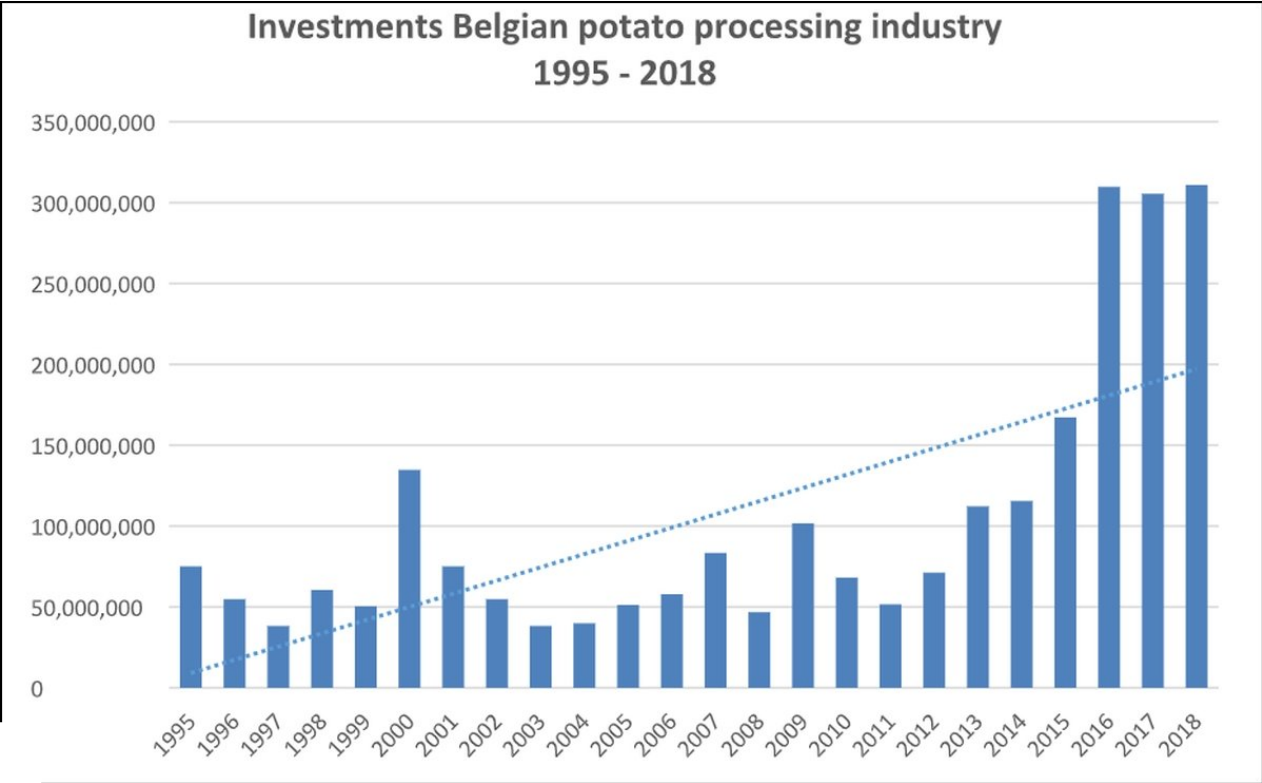




# Belgian potato processing industry processed over 5 million tonnes of potatoes in 2018

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Belgian potato processing industry processed over 5 million tonnes of potatoes in 2018



Investments (in euros) in the potato processing industry in Belgium between 1995 and 2018

Mar 29, 2019

2018, the Belgian potato processing sector experienced record growth in and exceeded 5 million tonnes of processed potatoes.

However, in 2019 the sector is facing major challenges as a result of the poor growing season of 2018 – 2019

Belgapom, the association for the Belgian potato trade and processing industry, can announce that in 2018 the 5 million tonne mark was passed with regard to processed potatoes. This is absolutely a new record and what makes it even more remarkable, is that it is the sharpest annual increase since the nineteen-nineties.

Ter herinnering : in 1990 werd zo’n 500.000 ton aardappelen verwerkt tot frieten, pureeproducten, chips of vlokken en granulaten. 28 jaar later kan de sector een stijging met 1.000 % voorleggen.

As a reminder: in 1990 around 500,000 tonnes of potatoes were processed into fries, mashed potato products, crisps or flakes and granules. 28 years later, the sector can report an increase of 1000 %. In the meantime, Belgium has become the largest exporter of frozen potatoes in the world, exporting to over 150 countries. The term ‘Belgian fries’ is part of our country’s international food image of chocolate, beers and fries.

But the entire Belgian potato chain helped develop the growth: in addition to the farmers, for whom potatoes have become the most important source of revenues within arable farming, service providers and suppliers of machinery also experienced remarkable growth. They are increasingly also becoming global players with innovative products and technology.

The use of potatoes as a raw material rose by 11.6% in 2018. This is by far the sharpest increase in the history of this still relatively new sector of the Belgian food industry.



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### Highlighted Company



operators of the Belgian potato chain, the confidence in this strong, largely family-run sector of SMEs developed over many years also threatened to be shaken up.

The agricultural organisations and Belgapom have as much as possible stimulated dialogue between the companies executing the contracts. They are also continuing to focus on achieving a trade organisation for the potato sector that should provide a fixed base to this dialogue.

Trade and industry have furthermore adapted their quality requirements as part of the solution to the problems, although admittedly this has led to shorter fries. The high potato prices on the free market helped lead to a rising price for the finished products, which did not have a favourable impact on the Belgian competitive position vis-à-vis other production countries.

In addition, the Belgian and European industry is moving heaven and earth to also convince the European Commission to make a forceful end to the unfair antidumping measures of a number of countries. Not only do they damage the companies involved, in addition an unjustified negative image is being created of this dynamic sector, that has developed into a global player without systematic support from the government.

The difficult circumstances of the 2018-2019 season also have an impact on the amount and quality of the seed potatoes supplied, which might also affect the next season.

Finally, the sector is also keeping an eye on the imminent decision of the European Commission to no longer permit the sprout inhibitor CIPC, creating great uncertainty.

The sprout inhibitor CIPC is in use for ages. Recent studies will perhaps result in its authorisation being revoked. Luckily the sector itself in collaboration with Flanders Food has already take the initiative to examine alternative substances with the Reskia research project (low-residue sprout inhibition). However, it is still necessary to learn how to handle this in practice and the sector will be confronted with significant investments in potato storage. Belgapom calls on the Flemish and Walloon authorities to assist and support their producers in this.

The sector expects full cooperation from Europe to also find a solution for risks as a result of the historical contamination of the warehouses.

**Working towards online growing advice via WatchITgrow**

Within the framework of sustainable development of the sector, Belgapom and its companies want to offer their full support to VITO’s WatchITgrow platform. This instrument, that makes use of satellite data and numerous other information sources, is the successor to the Belspo Ipot project that Belgapom helped to set up.

Belgapom has called on its members to pay producers who, within the framework of their contract enter their parcels via WatchITgrow before 2019 and add the necessary cultivation data, a premium for this.

The data is used by VITO to develop growing advice controlled by AI (artificial intelligence). For the next 2 years, growers can make use of the online growing advice that will be further developed year after year. After that, a fee will be charged for the system, but it will also continue to further develop its advice and warnings.

Access to the harvest prognosis model is limited to just the grower – who is free to share it with his buyers if he wants to. It is important to point out that VITO is the only party who has access to this data.

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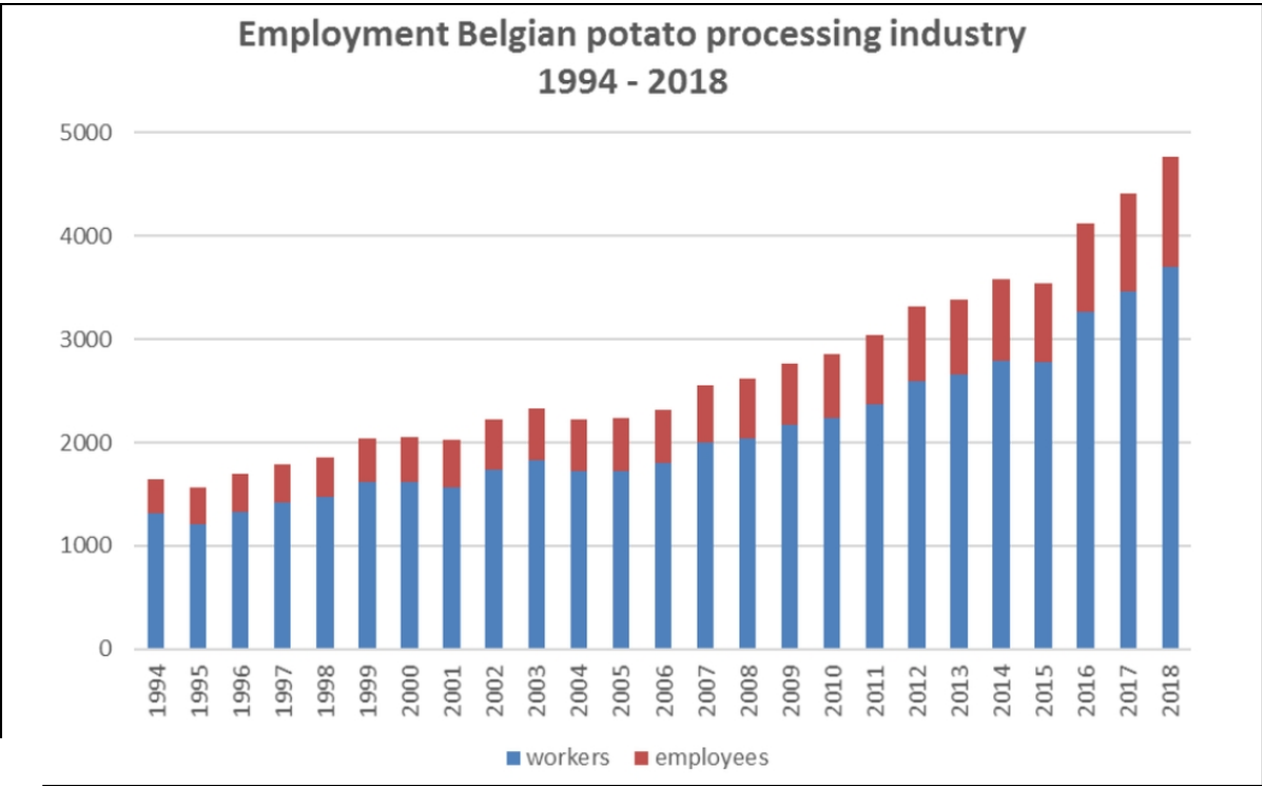


Increase in employment and investments form the basis for further sustainable growth

The sector continues to invest in the future, both with regard to quality and quantity. Sustainability is the leitmotiv through it all. Efforts are being made in the area of the sustainable cultivation of potatoes, environmentally friendly production and logistics.

Employment has also seen remarkable growth with an increase of 8 % compared to 2017. At present, 4762 blue and white-collar workers are employed in this strongly automated sector.

 (Click to enlarge)



Employment in the potato processing industry in Belgium between 1994 an 2018

And for the future, too, the ‘sustainable growth’ of the Belgian potato-processing sector guaranteed, since in 2018 there were once again record investments in the sector for the sum of almost 311 million euros.

The reasons for this remarkable evolution are firstly the continued increasing demand for potato products on the world market. The ever-growing middle classes in Asia and South America is stimulating the demand for convenience food, including Belgian fries.

The Belgian potato-processing industry is located in the heart of the European production area and it can make use of an ever more number of potato professionals and a unique logistical network with international ports nearby.

On the other hand, the Belgian potato sector has made use of the large supply of potatoes in the second half of the 2017-2018 season following a record potato harvest. Despite the setback of the 2018-2019 growing season with the exceptional drought and repeated heatwaves, there was a large supply of potatoes in the second half of 2018. Quite a number of batches could not be kept and – in consultation with the growers – it was decided to process them in the autumn of 2018.

In addition, the Belgian processing companies are also increasingly investing in promotion and developing their commercial network. One example of this is the campaign in southeast Asia in cooperation with VLAM and APAQ-W and the European Commission, that has led to better familiarity with the story of ‘Belgian fries, from the heart of Europe’ in that part of the world too.

Not all good news

However, the prolonged drought and high temperatures during the 2018 -2019 growing season caused extensive damage to the Belgian potato chain. Not only will the low yield of the 2018 harvest probably have a major impact on the business results of all the



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Belgapom is an organisation representing the interest of the Belgian Potato Processing companies

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Vlaams Centrum voor Agro- en visserij Marketing (VLAM)



VLAM, Flanders' Agricultural Marketing Board, is a non-profit organisation promoting products and services of the Flemish agriculture, horticulture, fishery and agro-alimentary sector, including potatoes.

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# Belgian potato processing sector continues growth in 2019

Apr 13, 2020



Belgian potato sector grows again in 2019.

## Growth again in 2019, above all in frozen fries

Last year, despite the difficult growing conditions as a result of the extreme heat and drought during both the 2018-2019 and the 2019-2020 seasons, the Belgian potato-processing industry once again improved the record for processed potatoes.

Almost 5.3 million tonnes of potatoes processed into fries, mashed potato products, crisps, flakes, and granules or precooked potatoes meant an increase of 3.8% compared to the figures for 2018.

(Click to enlarge)

The Belgian potato processing industry in 2017 - 2019



Number of employees:	943	1.061	1.135
Investments:	EUR 305.513.247	EUR 310.923.634	EUR 289.219.240
<b>Raw material:</b>			
Potatoes:	4.571.297 t.	5.101.522 t.	5.295.483 t.
Flakes:	6.039 t.	5.630 t.	5.305 t.
<b>Finished product:</b>			
Frozen fries:	1.770.298 t.	2.073.747 t.	2.230.926 t.
Refrigerated fries:	226.796 t.	231.734 t.	230.314 t.
Mashed potato products, croquettes, chips, Flakes and others ,...	690.159 t.	695.321 t.	684.810 t.

This increase is mainly the result of a rise in the production of frozen fries.

In 2019, 2,231,000 tonnes of frozen fries were produced (an increase of 7.5 % compared to 2018). The production of fresh fries (230,314 tonnes) and other potato products (684,810 tonnes) fell slightly by 0.5 and 1.6 % respectively.

### **Rise in the number of employees and a high degree of investment for the fourth successive year.**

In 2019, the number of employees in the sector rose from 4,762 to 4,991. Even if the investments last year did not round the cape of EUR 300 million, for the fourth successive year the sum of EUR 289,219,240 is in the same order of magnitude.

### **Above all frozen fries responsible for this increase**

In 2019, too, the figures illustrated the Belgian potato chain's dependence on the export of frozen potato products.

Belgium exported 2,680,086 tonnes of products, an increase of 8.1% compared to 2018. The value of these exports was EUR 1,935,181 million, which is 18.2 % more than last year. This increase may be due to the higher prices of raw materials since 2019 was in the middle of 2 difficult growing seasons as a result of the dry and hot summers of 2018 and 2019.

(Click to enlarge)



What is remarkable about these statistics, is that Belgium is the only country amongst its neighboring countries that showed an increase in exports in 2019.

### **What will 2020 bring?**

The prospects for the 2020 season were positive. The potato market was in balance. Both the quotations on the free market and the contract prices offered the potato chain breathing space. The entire European potato sector was focussing on the new situation that had arisen as a result of the traditional sprout inhibitor, CIPC, losing its authorization starting from the 2020-2021 season.

Cleaning warehouses, new sampling methods and the application of new, natural sprout inhibitors filled the agendas of most meetings in the potato chain.

Until the outbreak of the COVID-19 virus in China led to everyone discovering the word 'lockdown'. Containers were no longer unloaded in Chinese ports and this led to logistical problems for European potato exports. But when, mid-March, the virus started to appear everywhere in Europe and local authorities proceeded with lockdowns, the problems kept mounting in the potato sector too.

Restaurants and professional kitchens closed and after a short period of hoarding, the fall in demand in supermarkets became noticeable. At the beginning of April, the same approach was rolled out all over the world, so that above all the export of frozen products faced problems, first as a result of the closure of fast-food chains and later also on other markets.



potato sector.


Source: Belgapom




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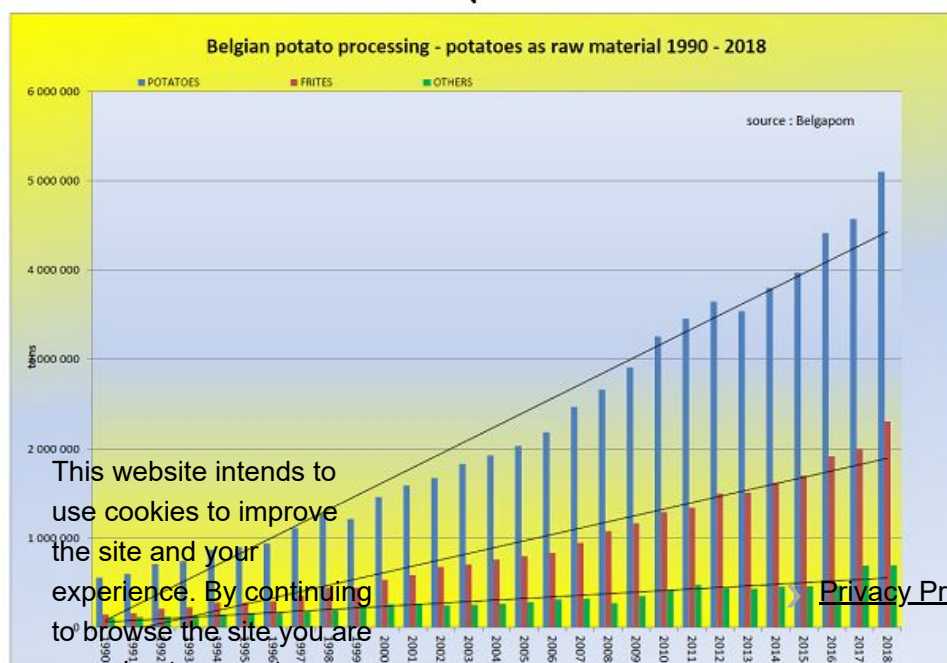
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Belgapom has recently announced that in 2018 the 5 million tons mark was passed with regard to processed potatoes in Belgium. This marks a new record, and according to the association it also constitutes the sharpest annual increase since the nineteen-nineties.



In 1990 approximately 500,000 tons of potatoes were processed into fries, mashed potato products, chips or flakes and granules. 28 years later the numbers have increased with 1000%. At the same time, Belgium has become the largest exporter of frozen potatoes in the world, exporting to over 150 countries. The use of potatoes as a raw material rose by 11.6% in 2018.

increase employment and investments form the base for further sustainable growth

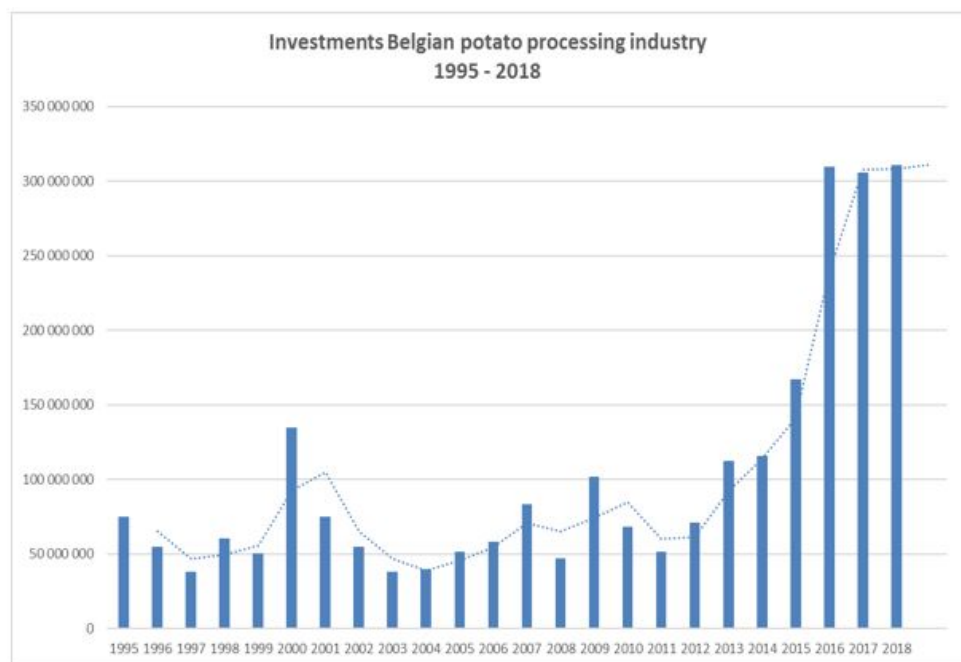
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employment

The potato sector continues to invest in the area of sustainable cultivation of potatoes, environmentally friendly production and logistics. In 2018 there were significant investments in the sector for the sum of almost of EUR311m. The main reason for this evolution is the increasing demand for potato products on the world market. The growing classes in Asia and South America is driving demand for convenience food, including Belgian fries.



On the other hand, the Belgian potato sectors has made use of the large supply of potatoes in the second half of the 2017-2018 season following a record potato harvest. Despite the setback of the 2018-2019 growing season with exceptional drought and repeated heatwaves, there was a large supply of potatoes in the second half in 2018.

The employment rate has also witnessed growth with an increase of 8% compared to 2017. Additionally, the Belgian

processing companies are ramping up investments in promotion and the development of their commercial network. For example, the report highlights the campaign in southeast Asia in cooperation with VLAM and APAQ-W and the European Commission that has led to the promotion of the “Belgian fries, from the heart of Europe” slogan.

### Working towards online growing advice via WatchITgrow

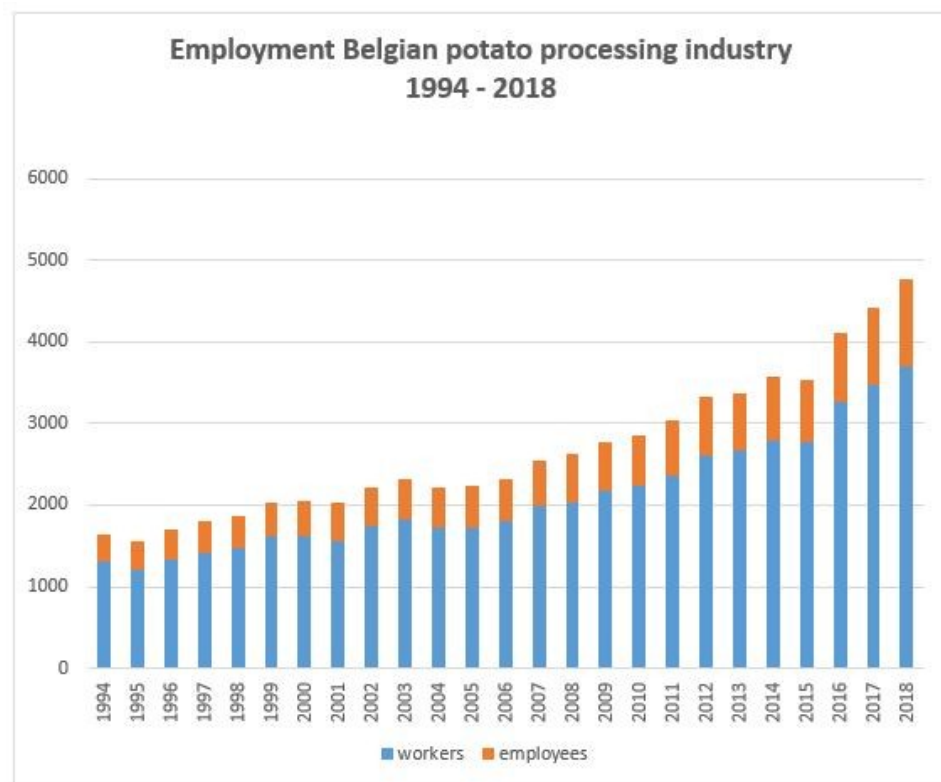
Earlier this year, Belgapom has announced it is backing up by VITO's WatchITgrow platform. The instrument, which makes use of satellite data and numerous other information sources, is the successor to the Belspo-Int project, which Belgapom help set up.

Belgapom has asked its members to pay producers which, within the framework of their contract enter an premium for this. The data is then used by VITO to develop growing advice controlled by AI (artificial intelligence). For the use of cookies.

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years, growers can make use of the online growing advice that will be further developed year after year. Access to the harvest prognosis model is limited to just the grower, who is free to share it with his buyers if he wants to.

Not all is good news

The prolonged drought and high temperatures during 2018-2019 growing season caused extensive damage to the Belgian potato chain. The low yield of the 2018 harvest probably have a major impact on the business results of all the operators of the Belgian

potato chain.

The agricultural organizations and Belgapom have tried to stimulate dialogue between the companies executing the contacts. They are also continuing to focus on achieving a trade organization for the potato sector that should provide a fixed base for the dialogue. The high potato prices on the free market helped lead to a rising price for the finished products, which did not have a favorable impact on the Belgian competitive position compared to other production countries.

The difficult circumstances of the 2018-2019 season also have an impact on the amount and quality of the seed potatoes supplied which could also affect the next season.

The sector will also be affected by the imminent decision of the EU to no longer permit the sprout inhibitor CIPC with great uncertainty. The sector itself with collaboration with Flanders Food has already taken the initiative to examine alternative substances with the Reskia research project (low-residue sprout inhibitor). However, Belgapom warns, it is still necessary to learn how to handle this in practice and the sector will be confronted with significant investments in potato storage.

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### The Belgian potato processing industry in 2016 – 2018

	2016	2017	2018
Number of processing plants	18	18	18
Number of workers :	3.257	3.467	3.701
Number of employees:	858	943	1.061
<b>Investments:</b>	€ 309.775.177	€ 305.513.247	€ 310.923.634
<b>Raw material :</b>			
Potatoes :	4.414.390 t.	4.571.297 t.	5.101.522 t.
Flakes :	6.300 t	6.039 t.	5.630 t.
<b>Finished product :</b>			
Frozen fries :	1.681.332 t.	1.770.298 t.	2.073.747 t.
Refrigerated fries :	234.694 t.	226.796 t.	231.734 t.
Mashed potato products, croquettes, chips, ...			
Flakes and others	468.513 t.	690.159 t.	695.321 t.

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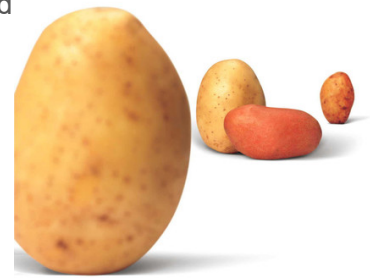
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As a consequence of this situation this season also flowery potatoes for cooking or frying originating from the Mediterranean countries will be found earlier than normal in the shelves of the Belgian supermarkets.



3) **Belgian early potatoes** will be available in the months of July and August. Also this crop is not always suited for packing and selling on the fresh market : the potatoes are being harvested 'green', which results in a very thin skin, which makes them not suited for sorting, washing and packing. Also these potatoes head to the factories to be washed, peeled, cut, fried and refrigerated. These early varieties are being used for fritery shops, restaurants and production of frozen products. Fresh early potatoes, with a thin skin from local production remain a niche product on Belgian markets, with a limited demand.

Belgian professional packers and their growers assure the consumers of a top product all year round. Despite falling back in the summer months (a period with a lower consumption of fresh potatoes) they are responsible for the fact that on annual basis more than 70 % of all purchased fresh potatoes are of Belgian origin (source : GfK / VLAM).

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10/04/2020

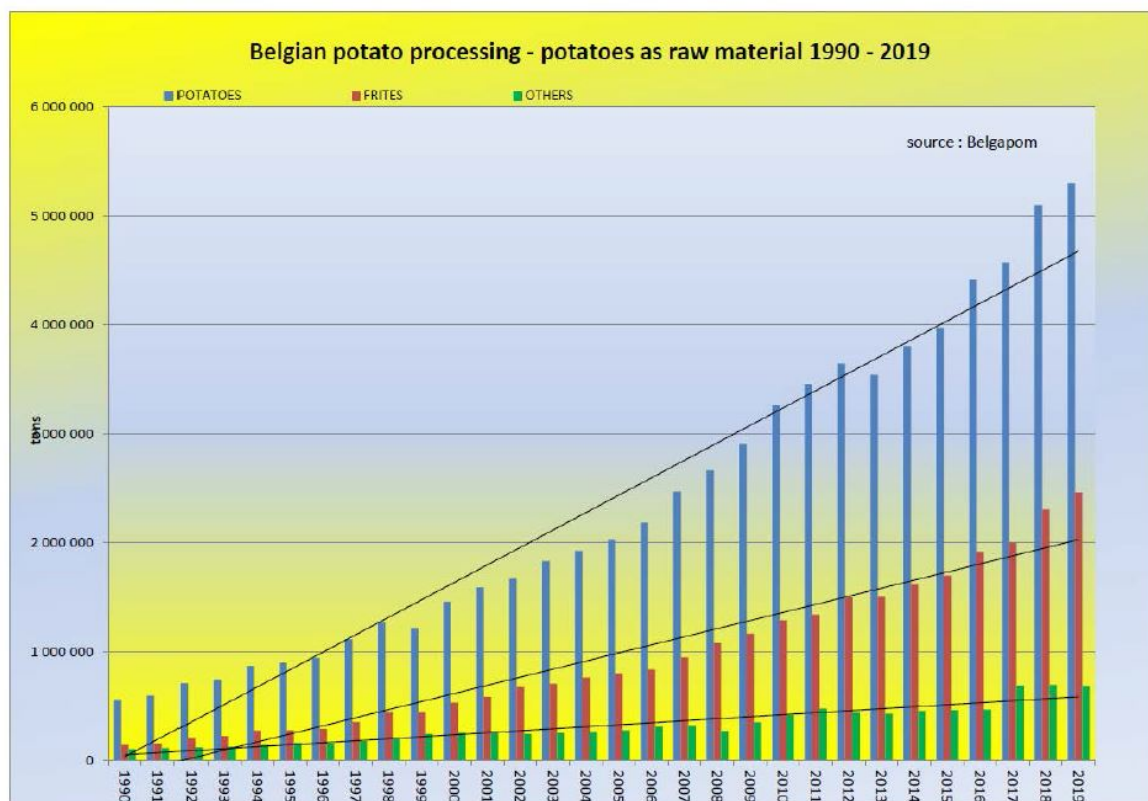
## Belgian potato sector grows again in 2019. However, corona crisis will lay into the 2020 figures.

### *Growth again in 2019, above all in frozen fries*

Last year, despite the difficult growing conditions as a result of the extreme heat and drought during both the 2018-2019 and the 2019-2020 seasons, the Belgian potato-processing industry once again improved the record for processed potatoes. Almost 5.3 million tonnes of potatoes processed into fries, mashed potato products, crisps, flakes and granules or precooked potatoes meant an increase of 3.8% compared to the figures for 2018.

This increase is mainly the result of a rise in the production of frozen fries.

In 2019, 2,231,000 tonnes of frozen fries were produced (an increase of 7.5 % compared to 2018). The production of fresh fries (230,314 tonnes) and other potato products (684,810 tonnes) fell slightly by 0.5 and 1.6 % respectively.



### ***Rise in number of employees and high degree of investment for fourth successive year***

In 2019, the number of employees in the sector rose from 4,762 to 4,991. Even if the investments last year did not round the cape of € 300 million, for the fourth successive year the sum of € 289,219,240 is in the same order of magnitude.

### ***Above all frozen fries responsible for this increase***

In 2019, too, the figures illustrated the Belgian potato chain's dependence on the export of frozen potato products.

Belgium exported 2,680,086 tonnes of products, an increase of 8.1% compared to 2018. The value of these exports was € 1,935,181 million, which is 18.2 % more than last year. This increase may be due to the higher prices of raw materials, since 2019 was in the middle of 2 difficult growing seasons as a result of the dry and hot summers of 2018 and 2019.

What is remarkable about these statistics, is that Belgium is the only country amongst its neighbouring countries that showed an increase in exports in 2019.

### ***What will 2020 bring?***

The prospects for the 2020 season were positive. The potato market was in balance. Both the quotations on the free market and the contract prices offered the potato chain breathing space. The entire European potato sector was focussing on the new situation that had arisen as a result of the traditional sprout inhibitor, CIPC, losing its authorisation starting from the 2020-2021 season. Cleaning warehouses, new



sampling methods and the application of new, natural sprout inhibitors filled the agendas of most meetings in the potato chain.

Until the outbreak of the Covid-19 virus in China led to everyone discovering the word “lockdown”. Containers were no longer unloaded in Chinese ports and this led to logistical problems for European potato exports. But when, mid March, the virus started to appear everywhere in Europe and local authorities proceeded with lockdowns, the problems kept mounting in the potato sector too. Restaurants and professional kitchens closed and after a short period of hoarding, the fall in demand in supermarkets became noticeable. At the beginning of April, the same approach was rolled out all over the world, so that above all the export of frozen products faced problems, first as a result of the closure of fast-food chains and later also on other markets.

No one knows how long this situation will drag on. The near future is one big question mark. However, it is already clear that the Covid-19 virus will really lay into the 2020 figures of this dynamic sector.

There is hope that step by step life will return to normal, which will also once again offer perspectives for the potato sector.

### The Belgian potato processing industry in 2017 – 2019

	2017	2018	2019
Number of processing plants	18	19	19
Number of workers :	3.467	3.701	3.866
Number of employees:	943	1.061	1.135
Investments:	€ 305.513.247	€ 310.923.634	€ 289.219.240
<b>Raw material :</b>			
Potatoes :	4.571.297 t.	5.101.522 t.	5.295.483 t.
Flakes :	6.039 t	5.630 t.	5.305 t.
<b>Finished product :</b>			
Frozen fries :	1.770.298 t.	2.073.747 t.	2.230.926 t.
Refrigerated fries :	226.796 t.	231.734 t.	230.314 t.
Mashed potato products, croquettes, chips, ...			
Flakes and others ,...	690.159 t.	695.321 t.	684.810 t.

20/01/2020

## Interbranch organization for the potato sector takes off in Belgium

# Belgian potato-processing sector experienced record growth in 2018

Belgapom, the association for the Belgian potato trade and processing industry, can announce that in 2018 the 5 million tonne mark was passed with regard to processed potatoes. This is absolutely a new record and what makes it even more remarkable, is that it is the sharpest annual increase since the nineteen-nineties. As a reminder: in 1990 around 500,000 tonnes of potatoes were processed into fries, mashed potato products, crisps or flakes and granules. 28 years later, the sector can report an increase of 1000 %. In the meantime, Belgium has become the largest exporter of frozen potatoes in the world, exporting to over 150 countries. The term 'Belgian fries' is part of our country's international food image of chocolate, beers and fries. But the entire Belgian potato chain helped develop the growth: in addition to the farmers, for whom potatoes have become the most important source of revenues within arable farming, service providers and suppliers of machinery also experienced remarkable growth. They are increasingly also becoming global players with innovative products and technology. The use of potatoes as a raw material rose by 11.6% in 2018. This is by far the sharpest increase in the history of this still relatively new sector of the Belgian food industry.

## **Increase in employment and investments form the basis for further sustainable growth**

The sector continues to invest in the future, both with regard to quality and quantity. Sustainability is the leitmotiv through it all. Efforts are being made in the area of the sustainable cultivation of potatoes, environmentally friendly production and logistics.

Employment has also seen remarkable growth with an increase of 8 % compared to 2017. At present, 4762 blue and white-collar workers are employed in this strongly automated sector.

And for the future, too, the 'sustainable growth' of the Belgian potato-processing sector is guaranteed, since in 2018 there were once again record investments in the sector for the sum of almost 311 million euros.

The reasons for this remarkable evolution are firstly the continued increasing demand for potato products on the world market. The ever-growing middle classes in Asia and South America is stimulating the demand for convenience food, including Belgian fries. The Belgian potato-processing industry is located in the heart of the European production area and it can make use of an ever more number of potato professionals and a unique logistical network with international ports nearby.

On the other hand, the Belgian potato sector has made use of the large supply of potatoes in the second half of the 2017-2018 season following a record potato harvest. Despite the setback of the 2018-2019 growing season with the exceptional drought and repeated heatwaves, there was a large supply of potatoes in the second half of 2018. Quite a number of batches could not be kept and – in consultation with the growers – it was decided to process them in the autumn of 2018.

In addition, the Belgian processing companies are also increasingly investing in promotion and developing their commercial network. One example of this is the campaign in southeast Asia in cooperation with VLAM and APAQ-W and the European Commission, that has led to better familiarity with the story of 'Belgian fries, from the heart of Europe' in that part of the world too.

### **Working towards online growing advice via WatchITgrow**

Within the framework of sustainable development of the sector, Belgapom and its companies want to offer their full support to VITO's WatchITgrow platform. This instrument, that makes use of satellite data and numerous other information sources, is the successor to the Belspo Ipot project that Belgapom helped to set up.

Belgapom has called on its members to pay producers who, within the framework of their contract enter their parcels via WatchITgrow before 2019 and add the necessary cultivation data, a premium for this.

The data is used by VITO to develop growing advice controlled by AI (artificial intelligence). For the next 2 years, growers can make use of the online growing advice that will be further

developed year after year. After that, a fee will be charged for the system, but it will also continue to further develop its advice and warnings.

Access to the harvest prognosis model is limited to just the grower – who is free to share it with his buyers if he wants to. It is important to point out that VITO is the only party who has access to this data.

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Belgian potato farmers are facing a surplus of 750,000 tonnes of potatoes this year. Matt Cardy/Getty Images

Belgians are being asked to eat an extra portion of frites each week during the coronavirus pandemic in a bid to help Belgian potato producers, who risk destroying surplus stock due a slump in demand caused by restaurant closures.

The campaign is being led by Belgapom, the country's association of potato producers. Its director, Romain Cools, told CNN that he hopes that by encouraging Belgians to eat more frites at home it will, "enable our processors to avoid food waste by processing more potatoes and store them in our freezers -- which are nearly full now."

Belgians typically **eat frites once a week**, but mainly outside their homes in friteries or restaurants. Coors said this is "contrary to other countries like the United States, where fries are often a side dish for their meals."

Belgian potato farmers are facing a surplus of 750,000 tons of potatoes this year that risk being destroyed because of the measures in place to stop the spread of Covid-19, according to the latest Belgapom data.



industry to avoid food losses, added 6000.

**World's largest frozen fries exporter:** With almost all food outlets closed in the country and across Europe, normal consumption patterns have been disrupted which Belgapom estimates has caused a worldwide decrease in the consumption of fries by 40% since the beginning of the pandemic.

This has huge implications on the Belgian potato growers who are the world's largest exporter of frozen fries -- with the majority of their products going to caterers and professional kitchens in 160 countries around the world.

According to Belgapom's figures, 2.3 million tons of frozen french fries were supplied globally by Belgian producers in 2019.

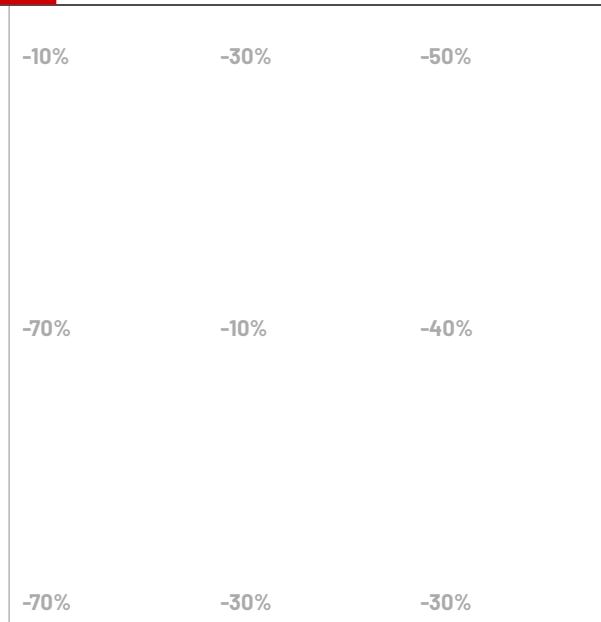
To help citizens use up the extra potatoes, the regional agriculture agency of Wallonia, Apaq-W and VLAM are promoting local and seasonal recipes **through dedicated websites** to use up excess Belgian potatoes and encouraging people to post their dishes on social media.



6:21 a.m. ET, April 26, 2020

## Moscow is "not halfway through" the pandemic as Russia surpasses 80,000 coronavirus cases

From CNN's Mary Ilyushina in Moscow



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## POTATOES

## Belgians Log Record Potato Processing Figures, Investment

21ST MARCH 2018




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The potato processing industry in Belgium recorded another record year in 2017, according to Belgapom, the country's Berlare-based potato trade and production association. According to the latest statistics, Belgium remained by far the largest exporter of frozen potatoes in the world, with 2.2 million tons shipped last year.

During the past few years, the Belgian potato industry has developed  Belgapom logo into one of the fastest growing sectors in the Belgian food business. Partly due to significant investment in capacity and quality, this trend continued in 2017, as 4.57 million



Other potato products:

Noticeable in 2017 was an exceptional increase in products other than fries (including crisps, croquettes, mash and flakes), which increased in volume from 468,513 to 690,159 tons (+ 47.5%).

Output of frozen and fresh fries rose from 1.91 million to 1.99 million tons (+ 4.3%), however, production of chilled fries fell by 3.5 %.

The 5.11 million ton harvest of spuds during the 2017-18 season, a record crop for Belgium, was attributed to an increase in planted area, choice of varieties and weather conditions. The figures published by Belgapom relate to the calendar year of 2017, which spans two potato seasons (2016-17 and 2017-18).

Boosting optimism in the sector is the fact that more than €305 million was invested in the potato processing business in 2017, while employment expanded by 7.1 %.

## Overseas Promotion

On the eve of National Day celebrations on July 21, 2017, “Frietkot Culture” was officially recognized as an intangible part of the country’s cultural heritage. On that occasion, Prince Laurent of Belgium granted the mandate of “Ambassador of the Belgian Frietkot Culture Abroad” to James Bint, the popular James Bond-like cartoon character with a “license to fry.”

Last year, the figure of James Bint was used to start the promotion “Belgian Fries, From the Heart of Europe” campaign in Southeast Asia. By participating in trade fairs and press events, Belgian fry producers demonstrated the authenticity and quality of their products in this fast-growing market of 557 million consumers.



The promotion, with the support of the European Commission, is being carried out by VLAM in cooperation with APAQ-W, FIT and AWEX, and will continue



During of week of May 9-15 “Real Belgian Fries” tasting events will take place at the Central World Bangkok, one of the largest shopping centers in the world. On the weekend of May 11-13 Eddy Cooremans, the well-known frietkot (fry shop) manager, will demonstrate how to properly fry potatoes. In addition, a real-life James Bint will provide entertainment with text balloons.

## Increasing Protectionism

Meanwhile, on the other side of the world, Belgapom reports that fries and other value-added potato product exports from Belgian and other European suppliers to South America are at risk of “becoming the victim of protectionist reflexes that threaten international trade.”

The trade association explained its concern as follows:

“After unjustified anti-dumping measures by the Brazilian government (the legal complaint against this by European companies is still pending), a decision by the Colombian government is soon also expected about a similar case. The dossier resembles a Swiss cheese with just as many holes (which was also confirmed by the European Commission), but a negative decision here can still lead to unjustified import levies. Unfortunately, these dossiers have also got other South American countries thinking about making use of this procedure, even if there is no reason to do so at all.”

Belgapom and the European federation EUPPA have urged the European Commission to increase pressure to end such practices, where, it says, “apparently there is no hesitation in falsifying a dossier even during the process.”

# Belgians urged to double down on fries, do national duty

May 2, 2020

BRUSSELS (AP) — In a country that claims to be the real birthplace of the finger food that Americans have the temerity to call French fries, rescuing the potato industry might easily be a matter of Belgian national pride.

So while a coronavirus lockdown keeps restaurants, bars and many of Belgium's 5,000 frites stands closed, the trade association for the national potato industry is calling on the population at large to do its part by keeping deep fryers fired up on the home front.

Traditionally, Belgians eat fries once a week, and it's always a festive moment," Romain Cools, the Belgapom secretary general, said in a phone interview on Tuesday. "Now, we are asking them to eat frozen fries twice a week at home."

The demand for frozen potatoes has nosedived in recent weeks, and the Belgian industry faces a possible loss of EUR125 million (USD135.5 million), if hundreds of tons of surplus potatoes don't move this year, Cools said.

"This is the first time in my 30-year career that I need to call on authorities for help," he said. "The potato sector is so important. It should be helped because it's a flagship for our whole industry."

As the immediate future remains gloomy, the industry wants to find new ways to move its surplus stock and avoid waste. In partnership with the Dutch-speaking Flemish region of Belgium, Belgapom has set-up a programme to deliver 25 tonnes of potatoes a week to food banks. Businesses are working to export some of their supplies to Central Europe and Africa, where the demand remains high.

The industry is also looking at ways to work with starch factories to find other uses for excess potato stocks, such as feeding livestock or producing green electricity. Both France and Belgium claim to have invented fried string potatoes as a side dish. But the *pomme frites* culture is stronger in Belgium.

Belgians eat 38 kilogrammes of fresh potatoes and six-seven kilogrammes of processed potatoes at home every year, according to Belgium's National Union of Fry-makers. But even if consumers unite in upping per capita consumption of fries, the potato sector won't emerge from the pandemic unscathed.



Manager Pascal Vandersteegen works at his Belgian frieterie, Chez Clementine, in Brussels, during a partial lockdown to prevent the spread of coronavirus. PHOTO: AP

ns561332

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## Coronavirus: Belgians urged to eat more chips by lockdown-hit potato growers

27 April 2020



Coronavirus pandemic



**Belgians are well known for loving chips (frites), often with a big dollop of mayonnaise, but hard-up farmers now want them to eat chips twice a week.**

Romain Cools of the potato growers' union Belgapom presented it as a matter of survival, as a major export sector fears ruin in the coronavirus crisis.

About 750,000 tonnes of potatoes are piled up in Belgian warehouses, as the lockdown has sent orders plummeting.

"Let's all eat chips twice a week, instead of just once," Mr Cools urged.

Since mid-March, restaurants in Belgium and many other markets for potato growers have closed. The cancellation of Belgium's many spring and summer festivals has added to their woes.



Moreover, the international trade in potatoes has been hit. Belgium is one of the world's top exporters of potato products, including frozen chips. It sends more than 1.5m tonnes annually to more than 100 countries.

- [\*\*Belgium unveils plans to lift lockdown\*\*](#)
- [\*\*Is my constant lockdown snacking normal?\*\*](#)
- [\*\*Five ways coronavirus is disrupting the food industry\*\*](#)

One small bright spot in this story is that Belgapom will now deliver 25 tonnes of potatoes a week to food banks in Flanders - produce that will otherwise simply rot, Belgian media report.

"In this way, part of the potato stock will still be used and we can avoid seeing excellent food, for which our farmers have worked so hard, being lost," Flemish Agriculture Minister Hilde Crevits told the Brussels Times.

## More about coronavirus



- A SIMPLE GUIDE: [\*\*How do I protect myself?\*\*](#)
- AVOIDING CONTACT: [\*\*The rules on self-isolation and exercise\*\*](#)
- HOPE AND LOSS: [\*\*Your coronavirus stories\*\*](#)
- VIDEO: [\*\*The 20-second hand wash\*\*](#)
- STRESS: [\*\*How to look after your mental health\*\*](#)

The potato crisis has also hit Hauts-de-France, the neighbouring French region that includes Calais. There, almost 500,000 tonnes of potatoes are still waiting for customers, and will most likely be lost.

A Belgian grower quoted by broadcaster RTBF, John Van Merhaeghe, doubted that he would get any decent offers from potato processing plants for his surplus.

"At best, if they buy any extra it'll be for €15 (£13; \$16) a tonne - 10 times less than the price marked in the contracts. Fifteen euros is the rate they give for turning potatoes into animal feed!"

Another grower, who declined to be named, called on Belgium's federal government to provide aid, saying the Netherlands was providing €50 per tonne for Dutch growers, "and so far we have nothing like that".

Meanwhile, RTBF reports that some surplus stocks might end up as biofuel to generate electricity.

**Watch a report on Italy's lockdown restaurants:**

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Europe

European Association of Remote Sensing Companies

**Sentinels Benefits Study (SeBS)**

## A Case Study

# Growing Potatoes in Belgium

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**The Home of Belgian Fries**



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## Setting the Scene

Antoine settled into his seat in Le Bistro Jourdan alongside his big brother Theo. It was their evening for Fritkot which their parents allowed them once per month. They would go out to one of the many Friteries around Brussels and enjoy the National staple food; Belgian fries with (usually) mayonnaise. Their parents preferred one of the more powerful sauces which were offered; his father liked Samurai but his mother liked the sweet and sour.

The frites came from Maison Antoine across the road. It was their favorite friterie and Theo always joked that it was Antoine's second home! Maison Antoine has been a fixture in Place Jourdan, Brussels since 1948 for take-away snacks and meals. All the local cafes allow their clients to bring their frites into the café to eat with a beer or, in the childrens' case, a coke.

As they sat down, a man at the table next to them looked at Theo and said, *"So you are a spaceman?"* He had noticed the baseball cap that Theo was wearing marked ESA – a souvenir from his recent school visit to the Redu space centre. *"Did you know that satellites help deliver you those frites?"* Theo was astonished to hear that, *"No,"* he replied, *"how on Earth, or rather, how from space do they do that?"*

*"Do you know about Copernicus,"* asked the stranger, *"the European satellite programme?"* Theo said that he did know about it and the Sentinel satellites. *"Then you are very well informed,"* said the stranger. *"So, the Sentinel 2 satellites,"* *"Those are the optical sensors,"* interjected Theo, and the stranger smiled at him, *"Yes, they are, and the images they take over Belgium are used in a system called Watch-it-Grow to provide your Belgian farmers with pictures of their fields where the potatoes are growing so that they know when to water them or when to apply fertilizer. But more importantly, they help the factories which process the potatoes into frites, to know when the crop will be ready and how good it will be."*

*"Knowing about the potatoes before they are harvested, helps the factories plan their production which helps them work more efficiently. Further, by working more closely together, farmers in Wallonie and factories in Flanders can increase the potato crop; meaning more frites for you - and more exports for Belgium."*

*"Wow,"* said Theo, *"all that because of the satellites, and we get to eat more frites."* He looked at his father who smiled and nodded. The stranger got up to leave. As he did so, he placed his card on the table, *"You're a clever young man, if ever you want to know more, or later if you look for a job, drop me a mail,"* and he left the café. Theo's father picked up the card and read *"Josef Aschbacher, ESA Director"* before turning to his son and asked him, *"So, do you want to be a spaceman when you grow up?"*

This story is entirely imaginary, although realistic based on our knowledge gained through the case interviews. The places are real, as are the characters, although the conversation and the situation is entirely fictional.

## Executive Summary

This case looks at the benefits to the Belgian economy coming from an important national sector; potatoes. The importance comes not just because of the farmers growing the crop but also due to the presence of a little-known, world-leading, potato-processing industry.

Sentinel 2 and shortly Sentinel 1 data is used through a service called WatchITgrow (WIG) which is offered to farmers throughout Belgium. It has been developed by VITO and supported by Belgapom and the potato processing industry. Today, WIG provides imagery from Sentinel 2 over Belgium. Farmers can identify their fields and can enter a number of data relative to the field such as planting time, potato variety, fertiliser and chemical applications etc. It allows farmers to build a picture of the field and assists them in their management practices. WIG also contains information on rainfall and supports crop irrigation.

The industry is very keen on WIG because it can help them understand the harvesting, yield and quality of the crop. As WIG matures, this information will become more precise and its value will grow. Benefits will increase due to this “technical maturity” and as more and more farmers use it. However, farmers are more cautious because they fear giving away information to the much more powerful processing industry. Safeguards are being built into the system.

But the information, based upon the satellite imagery and augmented by the other data, can help improve yields by up to 20% and improve the overall quality of potatoes, hence increasing revenues for the farmers and the industry and increase the performance of the Belgian potato sector. Farmers and agronomists can also save time through the availability of better, more recent and wider-area information. Overall benefits are analysed to be around €1m to €1.8m today and can potentially rise to €70m once the application is fully applied and mature.

In addition to the economic benefits, the use of farm management applications using satellite data generates environmental benefits. Improved knowledge of the fields performance (yield) allows better distribution of fertilizer and chemicals both before planting and during the season. This matches the crop need more precisely to the fertilizer application and reduces the excess fertilizer not taken up by the plants and hence reduces the excess nutrients which run-off into surface-water channels and into water supplies.

One further dimension of the case is the current initiative by the Belgian potato sector to create an organizational platform for all the actors to exchange and co-operate. This will an important step towards transparency and building trust between the players but especially between industry and farmers. Can this work? We hope so, and that satellites play a key role in enabling this to happen.

For each case, a value chain of benefits is constructed. The value chain benefits for the case of Growing Potatoes in Belgium is shown below.

## GROWING POTATOES IN BELGIUM



### The Satellite Data

Copernicus Sentinel-2 provides free-of-charge frequent wide-swath, high-resolution multispectral imagery with 13 spectral bands over Belgium. In the future, also Sentinel-1 will be used.



### The Service Provider

VITO has drawn upon the Sentinel data in combination with other data sources to develop the platform WatchITgrow that provides a farm management system and decision-support service to farmers.



### The Primary User

Thanks to better management of inputs, irrigation, field inspections and optimised harvest time, farmers have become more efficient and thus currently save time and costs. With full technical maturity and market uptake, benefits can reach between €60.33m and €85.33m in the future.

€1.195-1.595m pa



### Other Direct Users

Agronomists, consultants and the industry make use of the information to get an overview of crop growth and yield forecasts to better adapt their strategy, planning and logistics, making their operations more efficient.

€150-180k pa



### Secondary Beneficiary

Processors, distributors, exporters and logistics companies will benefit from an increased output by the farmers to produce more fries and export more on the world market.

€425-850k pa



### Tertiary Beneficiary

Supermarkets and shops are not heavily affected economically by the increasing potato yields, though shortage and oversupply can lead to promotion actions.



### End Use Beneficiary

The general public benefits from stable prices, "healthier potatoes", a more efficient use of water and more sustainable environment.

**Total benefits: €1.78-2.6m pa**

## 1 Introduction & Scope

### 1.1 The Context of this study

The analysis of the case study '*Growing Potatoes in Belgium*' is carried out in the context of the '[The Sentinel Economic Benefits Study](#)' (SeBS). This 4-year study is looking to develop cases showing how EO-derived products based on data generated by one or more Sentinel satellites deliver value to society and citizens. The [Sentinel](#) satellites form a crucial part of EU's [Copernicus Programme](#), providing space-based observations on a full, free and open basis. Data coming from the Sentinels – together with other data collected by contributing missions and ground, sea or airborne instruments – is used to support key economic or societal areas such as agriculture, insurance, disaster management, climate change monitoring, etc. Sentinel data are thus a key component of the [Copernicus Services](#), and a crucial source used by companies to deliver products and services helping different users across the Globe.

### 1.2 What is the Case all about?

Potatoes are very important for Belgium! Pommes frites or more appropriately Belgian Fries are at the heart of a very important part of the Belgian industrial sector. As a key grower of potatoes, Belgium occupies an important position on the world stage (8<sup>th</sup> in rank worth around €180m). But as an exporter of processed potato products, Belgium stands at number 1 and in 2017, Belgian exports of potatoes products was worth over €2b to its economy<sup>1</sup>.

Belgium has developed a full processing chain based upon the humble potato and it is this aspect which make the case so interesting. Both potato growers and industrial processors are well-represented, and the strength of the latter is of key importance. As a result, a new service has recently been introduced, developed by VITO and sponsored by Belgapom and Boerenbond (see chapter 4), called Watch-it-Grow (WIG). This service is aimed at farmers to the benefit of the whole industry, to improve yields and reduce costs.

The service Watch-it-Grow (WIG) takes data from Sentinel 2 to provide the farmers with information on the growth in their fields. But it also assimilates many other data which is what makes it particularly interesting for the potato processing industry. For sure, the inclusion of in-situ data is extremely important for the uptake of the application. WIG has now operated for 3 years and is evolving both in technical terms and in business terms as we shall see throughout the case.

Potatoes are one of the few crops not covered by the European Common Agricultural Policy (CAP). For this reason, as well as the fact that both growers and the industry are distributed throughout the country, policies linked to potatoes are largely managed at the federal level. So, the humble potato also plays a political role in this complex country.

---

<sup>1</sup> <http://www.worldstopexports.com/potatoes-exports-by-country/>

The case analysis is based on a number of assumptions which are visible and open to challenge by experts more knowledgeable in the industry than us. Calculating the benefits of the service is already quite hard. Extracting and calculating the value of the satellite data is even harder and assumptions are used quite widely. These are open for challenge and we encourage any reader to contact us at [info@earsc.org](mailto:info@earsc.org) if they think the assumptions are unreasonable for any reason.

### 1.3 How does this case relate to others?

This is the 1<sup>st</sup> case linked to potato growing and the third linked to agriculture; other farming cases are developed for cereal growing in Denmark and Poland. There are some similarities but many differences between cereal and potatoes as crops which will be discussed during this report. The growing seasons differ, the productive parts of the plant differ (over-ground and underground respectively) and the farming practices are different. Nevertheless, they both involve farmers seeking the best return from their agriculture land as well as the use of chemicals on the fields.

But one characteristic stands out, which is the relationship between the players in the value chain. Potatoes are a high value crop, but which is extremely sensitive to disease and to the condition at harvest. The processing industry which turns the potatoes into fries, potato crisps and many other products follows closely the farmer and maintain a close relationship with them. In this respect, the “potato value chain” is fully involved in the use of WIG and has much more to gain than the value-chain for cereals where we see the high value for the farmer, some for the community, but little value extending down the value chain to processors due to the very large market for cereal products.

### 1.4 More About the Study

Each case study analysed in SEBS, focuses on products and services which use data coming from Sentinel satellites, measuring the impact of that product or service throughout the value chain. The starting point is the primary user of the satellite data, followed by a step-by-step analysis whereby the operations of beneficiaries in each subsequent link of the value chain are analysed, all the way down to citizens and society.

In this process, the main aim is to understand and demonstrate the value which is generated using satellite-based Earth Observations (EO) and particularly the data coming from the Copernicus Sentinel satellites. Each case study thus underlines the causal relationship between the use of Copernicus Sentinel satellite data and benefits resulting from their use, including increased productivity, more efficient and environmentally friendly operations, economic gains and improved quality of life, among others. The evaluated and demonstrated benefits can be used by:

- **Decision makers:** Having access to a portfolio of concrete cases where the benefits from the operational use of Sentinel data in decision making are clearly articulated, helps



decision makers not only to justify future investments but also to direct them towards areas that most matter in their country or organisation.

- **Users:** Moving beyond a vague idea of how EO services can support more effective operations requires a concrete understanding of the benefits they can actually bring in similar cases. In this regard, it is both numbers and stories that can resonate with users and attract them to explore further or deeper uses of EO in their operational activities.
- **Service providers:** Solid argumentation around the economic and environmental benefits stemming from the use of EO, coupled with powerful storytelling, can become an effective marketing tool for service providers seeking to promote their solutions and for EARSC to promote the sector.

In the framework of this project, 20 case studies will be developed with reports to be published on each one. The study has started in March 2017 and will end in mid-2021.

## 1.5 Acknowledgements

We wish to thank the following persons for their time spent talking with us to develop the case. In particular, we are grateful to Jürgen Decloedt and Romain Cools who gave us much of the background and introduced us to a number of the experts we have consulted including many informal meetings which took place at the biennial Interpom – the largest trade fair dedicated to the potato in the world!

- Jürgen Decloedt – Business Development Remote Sensing; VITO (Flemish Institute for Technological Research)
- Isabelle Piccard – Senior R&D professional: Remote Sensing, Agriculture; VITO (Flemish Institute for Technological Research)
- Romain Cools – Secretary General, Belgapom
- Nele Cattoor – Regulatory Affairs Manager, Belgapom
- Jean-Pierre Goffart – Head of Central services, CRA-W (Agriculture Research Centre – Wallonie), and Vice-president FIWAP.
- Viviane Planchon – Head of Research Unit, Department for Agriculture and the Environment, CRA-W, (Agriculture Research Centre – Wallonie)
- Yannick Curnel – Scientific Associate, CRA-W (Agriculture Research Centre – Wallonie)
- Koen Vaneyck – Farmer & WatchITgrow user.
- Pierre Lebrun – Agronomist, FIWAP (Walloon Association for Potatoes)
- Daniel Ryckmans – Associate, FIWAP (Walloon Association for Potatoes)
- Maria van de Vin – Agronomist, Agristo
- Steven de Cuyper – Agro Director, Agristo

## 2 Potatoes and the Belgian Economy

### 2.1 The Potato's Importance to Belgium

Although often flying under the radar of the general public, the potato industry in Belgium with its associated sectors and elaborate value chain plays a significant role in the Belgian economy. The potato is the second largest cultivated crop after grain in Belgium and has experienced substantial growth over the last years. Many farmers are switching to growing potatoes, but the real story, lies with the processing industry and the links it has with the growers.

Globally, the sector is evolving significantly. The total world potato production is estimated at 388,191,000 tonnes in 2017 (Source: FAOSTAT, 2019). Until the early 1990s, most potatoes were grown and consumed in Europe, North America and countries of the former Soviet Union. Since then, there has been a dramatic increase in potato production and demand in Asia, Africa and Latin America, where output rose from less than 30 million tonnes in the early 1960s to more than 165 million tonnes in 2007. FAO data show that in 2005, for the first time, the developing world's potato production exceeded that of the developed world. China is now the biggest potato producer, and almost a third of all potatoes are harvested in China and India, see Figure 2-1.

Rank	Country	Potato Production in 2017 in tonnes
1	 China	99,205,600
2	 India	48,605,000
3	 Russian Federation	29,590,000
4	 Ukraine	22,208,200
5	 United States	20,017,400
6	 Germany	11,720,000
7	 Bangladesh	10,216,000
8	 Poland	9,171,730
9	 Netherlands	7,391,880
10	 France	7,342,200
11	 Belarus	6,414,760
12	 United Kingdom	6,218,000
13	 Iran	5,102,340
14	 Turkey	4,800,000
15	 Peru	4,776,290
16	 Algeria	4,606,400
17	 Belgium	4,416,660
18	 Canada	4,410,830
19	 Egypt	4,325,480
20	 Pakistan	4,142,400

Figure 2-1: Global Potato producers - top 20.

Potatoes are an important crop for Europe as well as for Belgium. Total EU production of 56mT in 2017 puts the region in 2<sup>nd</sup> place globally and in the so-called 'European potato belt' including the countries of France, United Kingdom, Germany, the Netherlands and Poland, Belgium stands out

due to its central location and thanks to its highly efficient potato cultivation and highly specialised processing companies at the heart of the belt.

The key to Belgium's leading position is the frozen potato processing industry. To supply the factories, on top of its own large-scale potato production, Belgium imports potatoes from its neighbours to supply these highly specialised processing companies, and, partly as a result, Europe stands second in the world production rankings for potatoes.

Belgium then exports most of the processed, frozen potatoes in the European and world market, profiting from the open borders within the EU Single Market and its central position therein. Thanks to the potato's, or fries', popularity, the potato has thus become a national symbol and also a clearly recognisable cultural object. Figure 2-2 shows Belgium's central position within the potato belt.



Figure 2-2: European potato belt with major processing companies

Economically, the potato sector ties the countries of potato belt closer together as the sector is operating transnationally and the potato business is cultivated on a large scale. In 2014, c. 550,000 ha of potatoes were cultivated in this region – out of that, about 92,000 ha of potato area were harvested in Belgium<sup>2</sup>. The cultivation activities around the potato growing are thus highly concentrated in the region, bringing other key actors of the value chain including processors, traders, washing and peeling companies, packaging, equipment manufacturers, shed

<sup>2</sup> <https://www.potatopro.com/belgium/potato-statistics>

construction, storage facilities, large-scale ventilation systems and many others. This really shows that the potato business is big business in Belgium!

Belgium has a rich potato history and since the end of the 20th century has experienced spectacular growth. In 2012, Belgium ranked No. 23 among the world's potato producing countries, with an output of just over 2.9 million tons. Thanks to an average yield of 42 tons per hectare (2005), the potato is the country's main food crop, even though the cultivated area is less than 5 percent of total farmland. In 2018, the exports of processed potato products continued to grow and passed 5mT for the very first time as a result of strong investment in the sector. This success will bring a challenge to the sector in 2019 as the very dry summer of 2018, reduced the potato crop both in quantity and quality.

In 2017, Belgian potato growers rank 8<sup>th</sup> in Europe and 17<sup>th</sup> in the world with production exceeding 4.4mT for the first time (see Figure 2-3). This is already good for a country the size of Belgium but after processing, Belgium is ranked first for the export of processed potatoes (Figure 2-4) just ahead of the Netherlands; a position which is highly contested between the two countries!

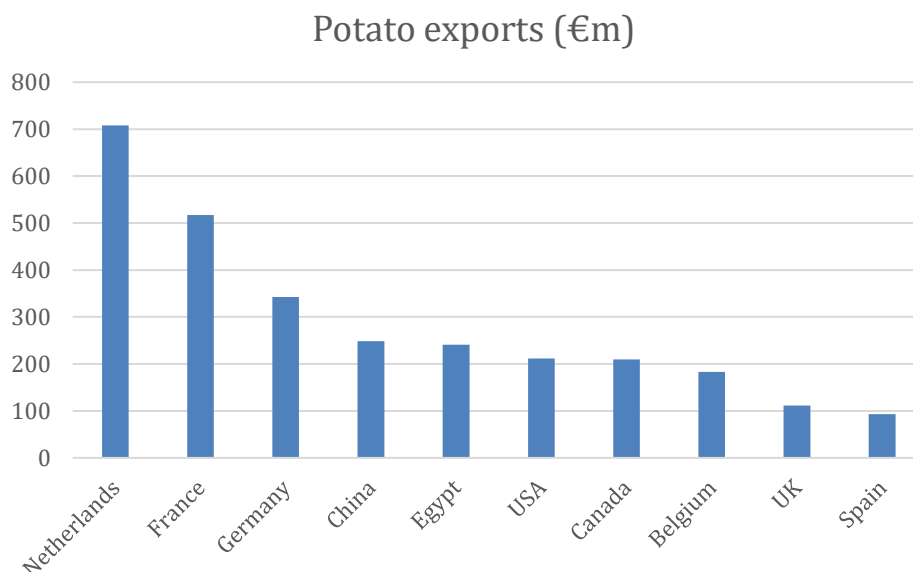


Figure 2-3: Potato exports in 2017 (€m)

The successful formula is made up of the rich soil and the mild climate which are ideal for growing potatoes. These circumstances, combined with professional skill, lead to an excellent quality potato. The perfect basis for a wide range of potato products such as the original Belgian fries, mashed potato, flakes, granules, crisps, etc. which are known far outside Belgium. In 2017, export outside Europe already represented a quarter of the total export of Belgian potato products.

According to Europatat<sup>3</sup>, potatoes belong to the most competitive segments of EU agriculture. In 2017, 62 million tonnes of potatoes were harvested in the EU, up by 12.4% compared to the

<sup>3</sup> <https://europatat.eu/activities/the-eu-potato-sector/>

average of the 5 previous years, and 10.9% compared to 2016. Belgium contributed 8% to this total.

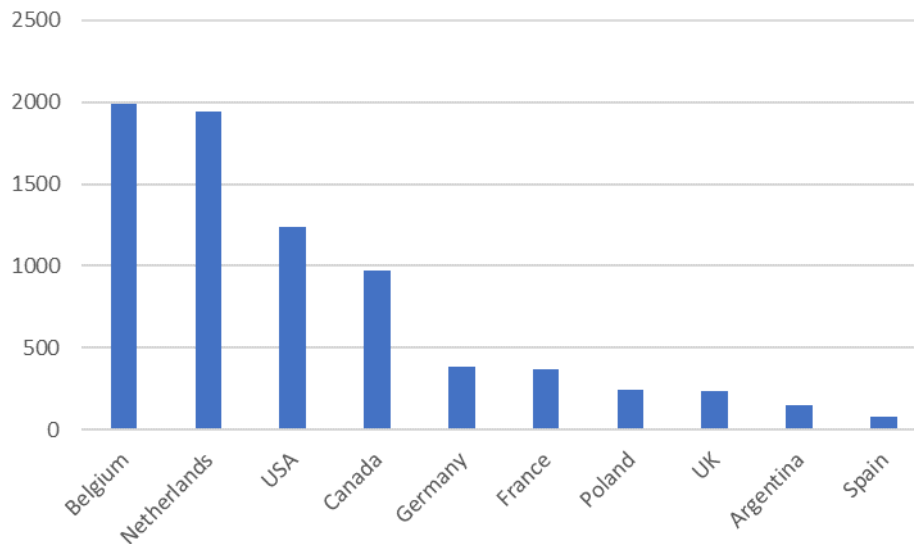


Figure 2-4: Exports of Processed Potato products (€m)

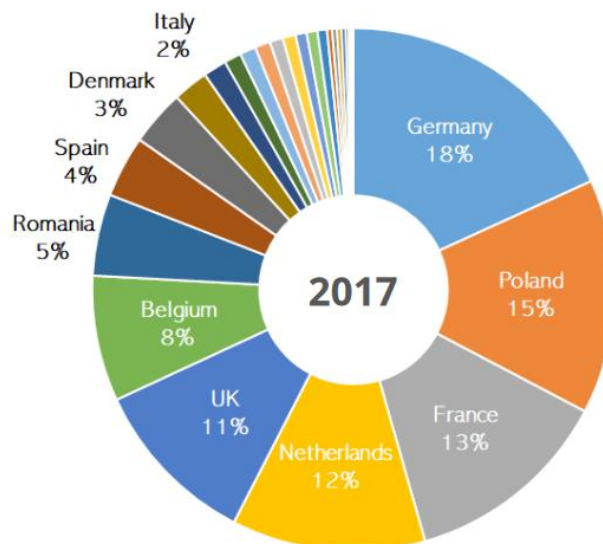


Figure 2-5 Share of Potato Production in the EU. © Europatat Annual Report 2017<sup>4</sup>

The growers and the processing industry are closely linked, creating a cluster in the country and indeed in the region. The synergy and the role that satellite data may play in stimulating growth lies at the heart of our story.

<sup>4</sup> [https://europatat.eu/wp-content/uploads/2018/05/Europatat\\_Annual\\_Report\\_2017-2018\\_web\\_.pdf](https://europatat.eu/wp-content/uploads/2018/05/Europatat_Annual_Report_2017-2018_web_.pdf)

## 2.2 The Potato Sector in Belgium

Potatoes are grown both for the fresh market or for processing into refined products. Even if the former is also an important part of the overall picture, it is the latter which is of greater importance to this case since it generates most of the value-added and is crucial for the Belgian potato cluster.

Around 6-7% of Belgian potatoes are eaten fresh - about 86 percent are processed into crisps, frozen fries, starch and other products. It is important to note that fresh potato market has a very distinct value chain separate from the processing market whereby very specialised farmers work with highly specialised packers and retailers<sup>5</sup>. In 2006, the country exported more than one million tonnes of processed potatoes and 21 000 tonnes of seed potatoes. It also imported more than 1.2 million tonnes of fresh potatoes and 140 000 tonnes of potato products, mainly from France, Germany and the Netherlands. (Source: International Year of the Potato)<sup>6</sup>.

Given the importance of the Belgian potato sector and its long history, the sector has developed a rich institutional and highly organised structure with many research centres and extension services for farmers, interest groups, trade associations and policy-making organisations. An important aspect that is reflected in the organisation of the potato sector is the federal structure of Belgium.

Belgium is a country with three main regions (Flanders, Wallonia and Brussels) and three recognised languages (flemish, french and german). This gives rise to multiple levels and often overlapping governments and administration. The importance of the two major regions, Flanders and Wallonia, means that most types of organisations active in the value chain can be found in both regions along with research and institutional actors. The administrative reform of 2001 had a profound impact and led to the division of many organisations including in the potato sector<sup>7</sup>. As the reform advanced the federalisation of the Belgian state and transferred more competences (including over agriculture and fisheries) from the federal authority to the Communities and Regions, this resulted in the split-up of some federal organisations into a Flemish and Walloon entity.

The potato sector does not "stop" with the potato growers in Belgium. The sector comprises a diverse range of actors that are key to the potato industry and the value chain as we shall describe in chapter 4. Belgian companies are highly specialised, international leaders and highly competitive. The sub-sectors include the processing industry with companies such as Lutosa and McCain, machinery and equipment industry, storage facilities and ventilation systems, potato washing, peeling and cutting as well as packaging.

It is a sector that finds itself at the crossroads between tradition and modernity which seems to be a balancing act. The sector is currently undergoing an evolution towards more specialised farms with more and larger fields. Overall, employment is increasing but the number of workers

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<sup>5</sup> <https://www.dhnet.be/regions/mons/borinage/frameries-le-ministre-di-antonio-sort-du-silence-sur-le-projet-clarebout-5c9e1694d8ad58747730f51c>

<sup>6</sup> <https://belgapom.be/en/blog/>

<sup>7</sup> The Potato in Belgium, the Land of Fries (published by *Belgapom*)



per farm is reducing. It is a sector that is turning increasingly towards professionalisation and mechanisation using tools such as GPS equipment, self-driving tractors, digital tools as well as bigger better equipped machines - a development that is sometimes overwhelming for (often older) less technology savvy farmers. While for instance digital applications or computer-assisted and GPS-controlled machines are used more commonly for higher efficiency and quality levels enabling a more targeted and location specific operations, these new innovations bring new diverse challenges such as digital skills competences on the side of the farmer or heavier machinery risking soil compaction and sealing.

This degree of common interest between the various players in the value-chain as well as those in the coming under different, regional administrations, is leading to an effort to establish a “branch”. This will be an organisation platform bringing together all the interests in the sector. By opening a sustained dialogue, it is hoped that the branch will be able to overcome tensions in the value-chain and allow decisions to be taken which will maximise the production in Belgium, allow more investment in the sector and generate higher exports sales for the country. The branch is in the process of being formed as this report is written.

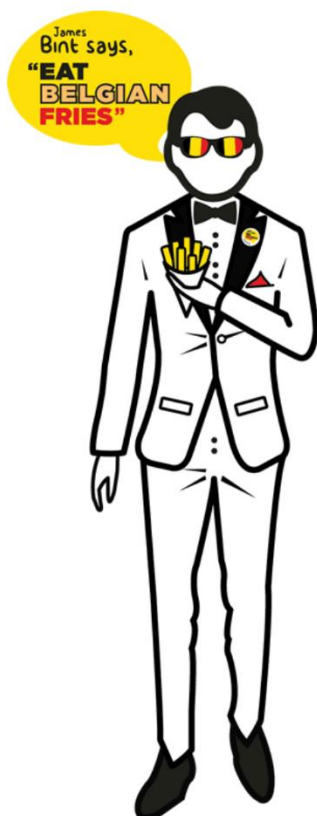


Figure 2-6: James Bint

## 2.3 The Potato Processing Industry

During the past few years, the Belgian potato industry has developed into one of the fastest growing sectors in the Belgian food industry.

While the number of processing plants has remained stable from 2016 to 2018 with one currently under construction<sup>8</sup>, the number of workers and employees has steadily increased over the last three years from 3,257 to 3,701 and 858 to 1,061, respectively as shown in Figure 2-7. On top of that, investments have been increasing greatly and hit a record-breaking level of almost €311m<sup>6</sup> in 2018. This has led to yet another record-breaking year in 2018 when over 5mT were processed.

Trade plays an important part in the potato sector. As local supply cannot satisfy local demand coming from the industry, Belgium imported about 1.587 million tonnes of consumption potatoes in 2013, representing an increase by 61% over 10 years. These large, and constantly increasing, imports function as gap fillers to the Belgian supply for Belgian processing companies which need increasingly

large quantities of raw materials to produce chips, crisps, etc.

At EU-level, potatoes are traded mainly on the EU internal market; however, the sector shows also a competitive advantage internationally, especially in the sub-sectors of seed potatoes and processed products. Furthermore, the EU is a net exporter of

<sup>8</sup> [https://www.belgium.be/en/about\\_belgium/country/history/belgium\\_from\\_1830/formation\\_federal\\_state/fifth\\_reform\\_of\\_state](https://www.belgium.be/en/about_belgium/country/history/belgium_from_1830/formation_federal_state/fifth_reform_of_state)

potatoes: in 2017, it exported 1.2 million tons worth around EUR 500 million. These were mainly seed potatoes (70% in value and 55% in volume) and some crop potatoes (30% in value and 45% in volume). The EU is also a net exporter of processed potatoes<sup>4</sup>.

Belgapom<sup>9</sup> is the recognised association for the Belgian potato trade and processing industry and a major promoter of the sector. In 2015, James Bint “Licensed to Fry” was introduced as the International ambassador of Belgian Fries<sup>10</sup>.

As would be expected given the impact of factors such as weather and climate conditions, exports by the Belgian potato sector fluctuate. In 2017, the volume was 838,000 tons compared to a peak in 2004 of about 900,000 tons. Thanks to its central location in the western European cultivation area, Belgian potato trade is a driving force in the European market. Figure 2-8 shows the global potato trade and the internal EU potato trade highlighting the interconnectedness inside Europe. It also shows the major export markets in South America as well as Southeast Asia.

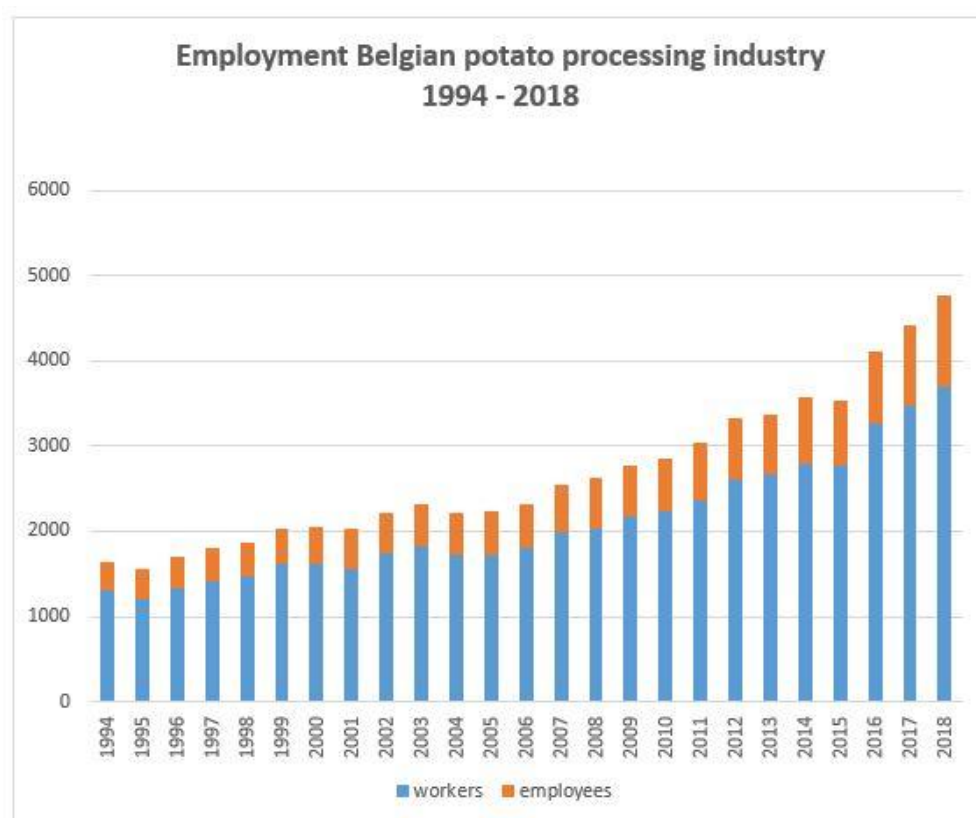


Figure 2-7: Employment growth in the Belgian potato processing industry

<sup>9</sup> <https://belgapom.be/en/home/>

<sup>10</sup> <https://jamesbint.be/>

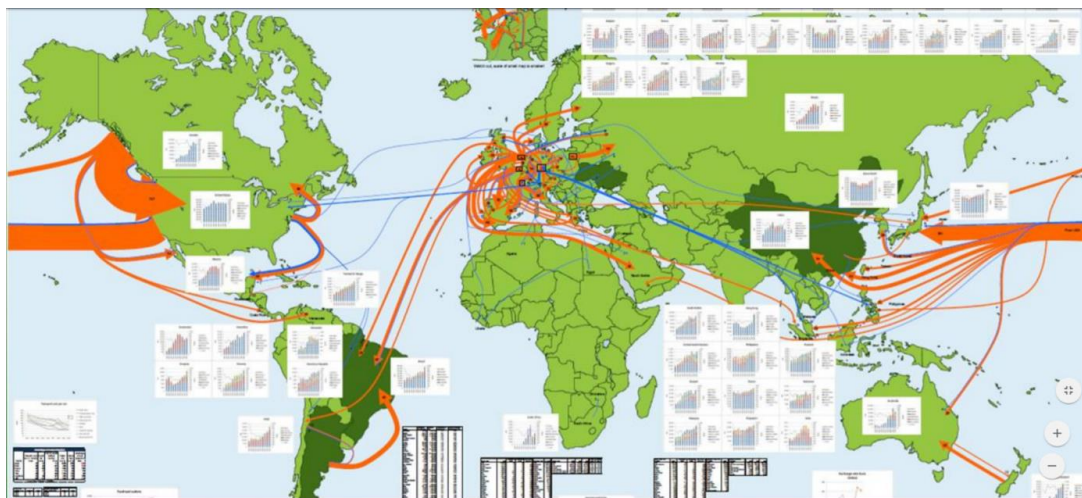


Figure 2-8 World potato trade of processed potatoes<sup>11</sup>

## 2.4 The Potato Growers

Belgium is both in the vanguard of the European potato belt countries as well as the global leader in yield per hectare (ha). In 2014, Belgium potato growers achieved a remarkable yield of over 56 tonnes per ha for all varieties combined and a total of slightly more than 4m tonnes. Whilst the Bintje variety, one of the most common in Belgium, obtained c. 55 tonnes per ha, other very typical varieties such as Fontane, Innovator and Challenger achieved over 60 tonnes per ha. These record levels were underpinned by an increase in the agricultural potato area to about 90,000 ha in 2014 which is considered the maximum by some interviewees for sustainable potato cultivation in Belgium. After two weaker years in 2015 and 2016 due to mainly very wet springs that are detrimental for potato cultivation, 2017 was a record-breaking year with a total of 4.4 million tonnes in Belgium thanks to good climatic conditions, the expansion of the agricultural area (see Figure 2-9) and the high yields per ha.

<sup>11</sup> <http://media.repro-mayr.de/15/573215.pdf>

### Development of Total Potato Area Harvested in ha in Belgium

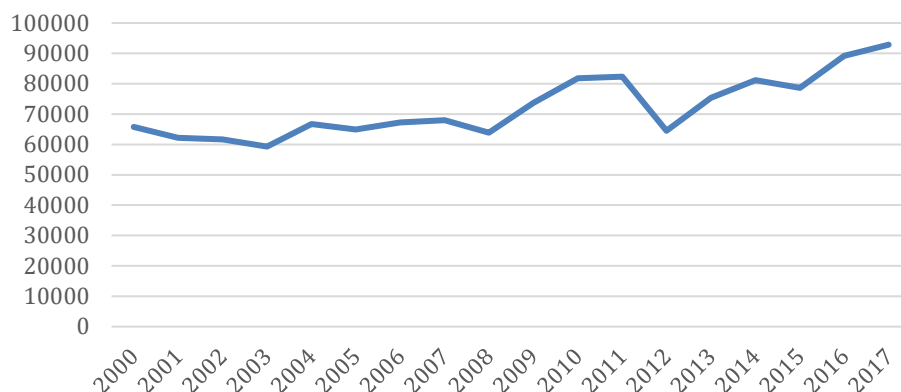


Figure 2-9: Evolution of the potato growing land in Belgium

A factor that considerably benefits the productivity and efficiency of the Belgian potato cultivation is the natural preconditions in Belgium. The temperate maritime climate is ideal since it shields the plants from extreme temperatures and ensures that potatoes find themselves in a long growing season where they are provided with enough rainfall and hence good yields. Moreover, the Belgian soil is ideal for potato plants such as loamy or sandy-loamy<sup>12</sup>.

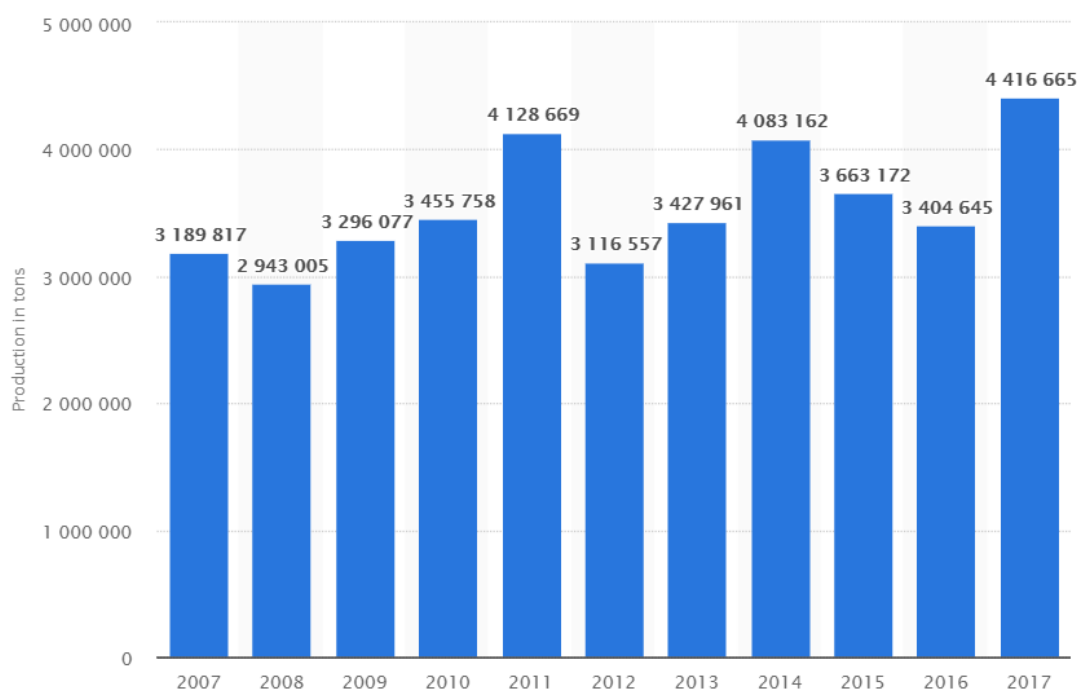


Figure 2-10: Production of potatoes in Belgium from 2007 to 2017 (in tons). © Statista 2019

<sup>12</sup> <https://www.potatopro.com/belgium/potato-statistics>.

It must be noted that potato farmers do not fall under the Common Agricultural Policy (CAP)<sup>13</sup> and hence do not profit from CAP funds. The sector has only very little regulation and follows the principles of a very free commercial market which means that lots of pressure is diverted up the value chain and on to the potato farmers themselves. Since they are being subject to high fluctuations and seasonal changes due to changing weather conditions, high pressure is on the potato farmers to deliver good products.

Given the domination of the Belgian processing companies, within the potato sector and the decline in fresh consumption and exports, potato farmers are under immense pressure to deliver their product at a low price. There is a constant tension between the upstream and downstream parts of this value-chain. Belgian growers cannot meet all the needs of the processing companies which, consequently, import supplies mainly from France, but also from the Netherlands and Germany.

As a result, supplier competition from the potato belt (BE/FR/GER/NL/UK) puts further pressure on Belgian farmers to provide good yields at attractive prices. The Belgian potato sector is also special in the sense that the sector operates through very high numbers of intermediaries and traders who purchase the potatoes from the farmers and then sell them to one of the key actors mentioned above such as processors, packaging companies etc. However, direct sales between farmers and for instance processors – as is already common practice in the rest of Europe – is gaining traction.

Like the fluctuating potato production, the price of the potato in Europe has been fluctuating quite a bit over the last years and is highly variable from year to year both on farmers and consumers markets. The sales price of potatoes not only fluctuates significantly over time, but also across countries and types of potatoes as can be seen in Figure 2-11. Whilst the highest price for potatoes was paid in Greece, Belgian farmers received 4.8 times less than their Greek counterparts.

The Belgian potato season can be divided into two parts. The early season lasts approximately from the end of June to the end of August. The cultivation of early potatoes takes place in sandy soils mainly in Flanders where farmers can choose between a number of early varieties suitable for chips with a shorter growing season. Potatoes that can be kept an entire season if stored professionally are harvested from August to October and then stored from November to the end of June/beginning of July<sup>14</sup>. Some of the processors indeed own storage facilities – the biggest capacities can be up to c. 10,000 tonnes of storage per processor such as the ones from Clarebout. The impact of storage capacities on the negotiations between farmers and processors is probably quite low given that for instance Clarebout processes a total of c. 1,5m tonnes of potatoes per year.

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<sup>14</sup> <https://belgapom.be/en/belgapom-quotation/>.

	Main crop potatoes			Early potatoes			Seed potatoes		
	2013	2014	2015	2013	2014	2015	2013	2014	2015
Belgium	14.8	2.7	10.0	27.3	5.1	12.9	:	:	:
Bulgaria	23.9	20.4	19.8	:	:	:	:	:	:
Czech Republic	22.4	17.7	16.6	31.7	21.4	25.3	25.4	28.8	23.9
Denmark	23.0	24.1	25.6	:	:	:	28.2	28.2	23.0
Germany	24.7	15.4	12.8	52.0	18.0	:	:	:	:
Estonia	:	:	:	:	:	:	:	:	:
Ireland	:	:	:	:	:	:	:	:	:
Greece	53.8	44.8	47.9	57.9	46.5	49.2	29.0	26.4	24.1
Spain	33.9	11.2	19.8	60.4	27.3	35.4	:	:	:
France	67.1	36.7	43.7	141.0	:	139.6	43.1	47.3	38.3
Croatia	22.4	15.5	14.4	42.4	22.6	30.4	64.1	59.6	62.7
Italy	47.3	37.1	35.9	:	:	:	:	:	:
Cyprus	28.8	25.7	:	:	:	:	67.7	64.5	:
Latvia	15.8	15.9	13.6	20.2	27.7	23.8	26.2	29.2	26.6
Lithuania	17.2	15.4	11.5	21.4	21.0	23.5	:	:	:
Luxembourg	38.1	20.8	31.2	:	:	:	17.8	13.1	13.1
Hungary	27.1	19.3	21.6	34.2	23.0	29.9	88.6	:	:
Malta	36.5	28.3	32.7	:	:	:	:	:	:
Netherlands	19.6	10.2	11.5	:	21.1	38.7	27.6	27.9	24.6
Austria	25.6	12.3	18.9	30.6	15.7	22.8	:	:	:
Poland	15.4	12.4	12.2	12.8	10.8	11.8	22.8	25.5	23.0
Portugal	32.8	15.2	18.6	54.0	26.4	28.1	:	:	:
Romania	40.1	34.4	27.0	33.9	25.2	25.0	:	:	:
Slovenia	32.7	16.5	13.1	53.8	28.8	31.6	46.7	:	:
Slovakia	26.1	26.8	24.7	36.9	29.8	32.1	:	:	:
Finland	23.8	14.6	17.7	36.3	45.9	46.2	:	:	:
Sweden	32.5	26.6	27.2	41.4	33.5	35.6	:	:	:
United Kingdom	25.0	17.8	19.6	45.2	38.7	63.6	:	:	:

(:) data not available

Figure 2-11: Annual agricultural selling prices for potatoes (in EUR/100kg). © Eurostat 2019

Potato growers, dealers and processors can sell their potatoes both during the early and the storage season in several ways. There are two main ways to market the potatoes. In production contracts which make up about 70% of production, farmers engage in forward selling meaning they sell a certain amount of the expected potato harvest to the buyer ahead of the start of the growing season. The second option is the more conventional way of the free market (the remaining 30%) where contracts can be concluded with immediate or later delivery (within days or months later, respectively).

The practice to sell forward their crops helps the farmers with cash flow and financing investments, but it also creates risk when conditions and harvests are poor. If their final crop is not sufficient to cover their supply contract, they must go onto the open market and buy in stock to meet their obligations. This encourages potato traders to enter the market and as a result there is quite an open market for potatoes in Belgium which raises strong interest in the price.

For reasons of transparency, several quotations (e.g. from [PCA-FIWAP<sup>15</sup>](#) or [Belgapom<sup>9</sup>](#)) exist in Belgium to inform market players about the latest developments on the free market price of the potatoes. As regards the Belgapom quotation for instance, once a week, a committee of dealers and processors who buy and sell potatoes every day quote the most used price on the day before the quotation for the Bintje variety - as it is the most important variety on the free market. The quotation also offers insights into the general market mood and is a tool for both buyers and sellers to better understand the dynamics of the free potato market. Recently, a quotation is given for the most relevant freely traded fries varieties Fontane and Challenger. The quotations

<sup>15</sup> <https://www.pcainfo.be/fr-fr/Aardappelprijs/PCAFiwap-notering>



are important to create transparency as virtually all market players including growers, dealers and processors are following the market using both contract and free market sales<sup>16</sup>.

## 2.5 Future Growth and Development

Growth in the potato sector in the future will not derive from an extension of the agricultural area for potato cultivation. In the European potato belt, potato cultivation has enlarged to such an extent over the last decades that any further switch from any crop to the potato crop is very likely to result in soil degradation and soil depletion. Thus, a higher output and growth can be achieved through making better and more effective use of the current utilised agricultural areas for potatoes. Currently, Belgian potato fields have an output of between 45-55 tonnes/ha. We have heard in interviews that the estimated maximum output is about 100 tonnes/ha. This higher supply can only result from better, more sustainable and more effective farm management practises.

Furthermore, in the long-term, growth and the demand for products will not be stimulated by the local industry given changing food trends and habits in Belgium, but internationally by a growing Asian market demand with a 'big appetite' for processed potatoes. This means that the international potato trade is likely to intensify over the next decade. It also seems likely that imports of potatoes as well as exports of processed potatoes will increase given increasing global demand. Locally i.e. in Belgium, growth will be driven by even higher market concentration and economies of scale as the sector is witnessing a trend whereby smaller farms are bought up by bigger farming corporations leading overall to less farms with larger fields. Highly specialised companies in the value chain will continue to grow and be the job engine of the potato sector<sup>17</sup>.

The sector is already showing a high degree of maturity and saturation. Further growth may stem from continued professionalisation, specialisation and digitalisation of farms. As we heard during our interviews, extensive cooperative thinking among farmers is not yet visible on a large scale and remains the exception. Sharing expertise and lessons learnt could trigger the dissemination of best practices and stimulate further growth. Furthermore, it has been mentioned that more farmers need to join organisations to stay informed about the latest technological progress and innovations.

## 2.6 Climate and Environmental Considerations

The weather has always been a major factor for farmers driving many daily decisions and strongly affecting the overall farm performance. Changes in the weather and especially long-term changes associated with the climate are possibly already being felt in the potato sector.

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<sup>16</sup> <https://belgapom.be/en/belgapom-quotation/>.

Potatoes are a crop which is very sensitive to abrupt changes in environmental and weather conditions. Potatoes are a very hungry crop and also a thirsty one. But paradoxically, because they lie in the ground, they are equally sensitive to too much water as to too little. For instance, a crop which is flooded will be completely lost if the potatoes lie under water for more than 24 hours. Hence extreme events by way of storms are damaging to the potato crop.

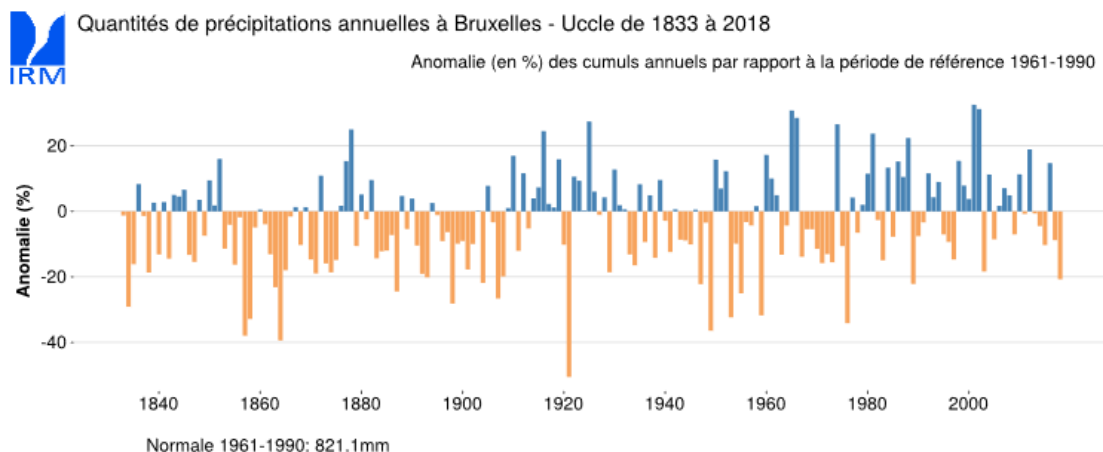


Figure 2-12: Annual rainfall compared to the average reference period 1960-1990<sup>18</sup>.

Figure 2-12 shows the annual average rainfall and the 2 last years with below average. What the average does not show is that the drier periods occurred during the summer when the growing potato most needs water.

Similarly, rising temperatures exacerbate the situation as evaporation is higher and water retention in the soil is poorer. The average temperature for Belgium, shown in Figure 2-13, indicates the rise apparent right across norther Europe.

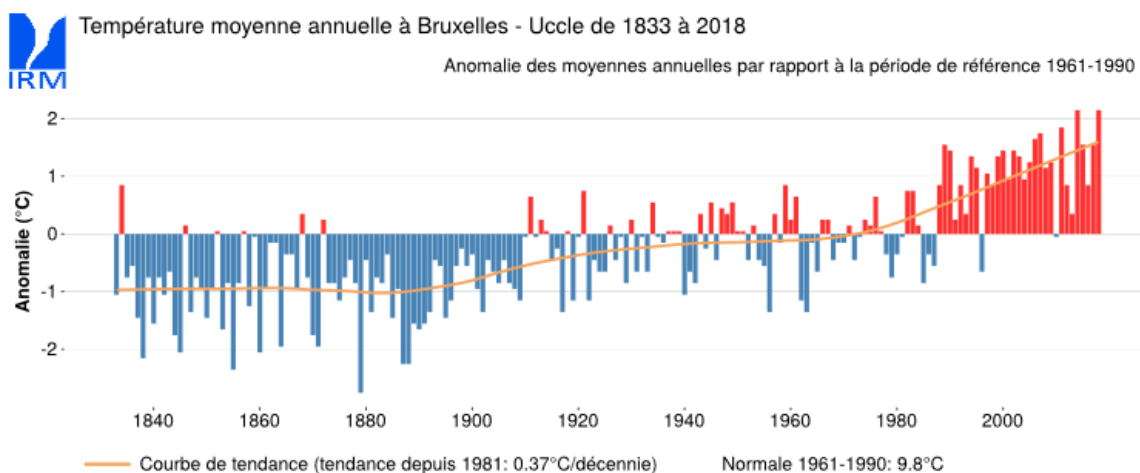


Figure 2-13: Average annual temperature in Belgium 1833 to 2018<sup>18</sup>.

Climate instabilities impact on the yield also in another way. Long and wet periods followed by drought or vice versa induce slowed growth followed by renewed growth: this leads to secondary

<sup>18</sup> <https://www.meteo.be/fr/climat/tendances-climatiques-observees/en-belgique>

tubers growing alongside the main one i.e. it results in 2 small tubers rather than 1 larger one thus reducing the size of the potatoes if not the total mass. This is a major problem for the sector and any help to increase the awareness of the conditions and the likelihood that secondary growths will occur is regarded as extremely beneficial.

Harvesting before a heavy wet period can increase the storage capability of the crop. Extreme weather events place a stress on the potatoes which can seriously impact their resistance to disease during storage. In 2018, the crop was reduced by 30% due to drought. This is leading to investigation into irrigation and the development of necessary infrastructure.

The use of satellite data is anticipated to lead to reduced application of fertiliser by providing more accurate data on the intra-field growth. Fertiliser is applied before the crop is planted at a rate of around 200kg per ha. The experience of the farmer coupled with soil samples will help adjust the rate of application, but which is generally uniform through the fields. Historic data on the field yield can be used to adjust the rate of application. A second application is usually made in June as the leaf growth accelerates and satellite data can help assess how much nutrient to apply and where.

Potatoes are also very sensitive to disease and especially potato blight which can wipe out the crop within a few days of infection. For this reason, much of the research and support has developed for the sector in Belgium to help mitigate against the extreme climatic impacts especially through a better identification of appropriate timing of harvesting. As the impact is so damaging, spraying against blight is made automatically up to 14 times in a single season. Better digital awareness and satellite information can potentially reduce the spraying to a limited degree.

More regular satellite observations will be needed to have a stronger impact on the spraying decisions. One advantage is the ability to observe a wider area and hence to “see” whether blight is affecting crops in the neighbourhood.

At harvest, chemicals are sprayed onto the crops a few days before harvesting begins. This kills the leaves and reduces the volume of the crop making it easier to separate out the potatoes. The current chemical used is to be banned after 2019. Researchers are looking at other means to achieve the same effect, but it remains to be seen whether satellite-derived data can help in this process.

In the next few years, chemical used to prolong storage is likely to be banned and hence the knowledge of the state of the harvest will become even more important as an aid to decision-making.

### 3 The Use of Sentinel Data

#### 3.1 General Introduction

Sentinel imagery is used by farmers and the industry in Belgium as part of a new service called WatchITgrow. WatchITgrow (WIG) is a geo-information platform that has been developed for the Belgian potato sector with the objective of estimating and increasing potato yields in a sustainable way. Through the platform, Belgian potato farmers, agronomists, traders and processors have access to data and information on the growth of different potato varieties comprising Fontane, Bintje and Nicola – the most common potato varieties in Belgium.

The platform centralises several types of data. It combines data coming from the Copernicus Sentinels and other satellites, drones, weather and soil measurements as well as integrates external models to generate yield prediction models. Thanks to the platform, the user can gather information about one or multiple potato fields and is able to:

- Access information on the state of the crop
- Monitor the potato crop in function of growth, health status and development
- Map spatial variability within the field
- Improve yields
- Estimate the harvest date and yields during the season
- Reduce production and quality losses

The platform is the product of the 3-year research project iPot<sup>19</sup>, a collaboration between researchers from Flanders and Wallonia (the Flemish Institute for Technological Research (VITO), the Walloon Agricultural Research Centre (CRA-W) and the University of Liège (ULg)) together with the Belgian potato trade and processing industry association Belgapom<sup>20</sup>. Rebranded as *WatchITgrow* since its operational use, it allows farmers and agronomists to both detect changes in the fields pointing to the conditions of the crop and centralises and compares current data with historical data.

Satellite imagery from the Copernicus Sentinel-2 satellites is used to map the vegetation and especially its change over time. Each time the satellites pass over Belgium, fresh imagery is provided and processed in an automated fashion using machine-learning algorithms to generate up-to-date assimilated vegetation maps which are at the core of the management platform. Other data is being fed into the application such as temperature and rainfall data collected at weather stations and processed by the Belgian Royal Meteorological Institute, in-field data and observations such as location, planting data, planting density etc. with the support of farmers as well as AquaCrop<sup>21</sup>, a crop growth model developed by the Food and Agriculture Organisation of the United Nations (FAO).

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<sup>19</sup> For more information on the iPot research project, see here:

<http://www.belspo.be/belspo/Fedra/proj.asp?l=en&COD=SR%2F00%2F312>.

<sup>20</sup> Here you can trial the application and find more information: <https://watchitgrow.be/en>.

<sup>21</sup> More information on AquaCrop can be retrieved here: <http://www.fao.org/aquacrop>.

Currently, the application is used by about 600 active users comprising farmers, agronomists and the industry. While the current strategy is to build up reference customers first, the application will soon scale-up its geographical coverage and expand into neighbouring countries the Netherlands and Germany.

### 3.2 How do satellites help potato farmers?

Satellites are benefitting agriculture in several ways, initially as a way of estimating crop yields, but increasingly we can see more and more decision support tools for precision agriculture coming on the market that are based on satellite imagery. Optical sensors such as on the Sentinel-2 satellites provide data that enable a precise overview of the cultivated fields, while also being able to distinguish between crop types and determining the health and maturity of the crops. This information does not only help the farmer to make the right decisions in his operations, but also to inform other market players such as agronomists and the industry to provide expected yields or early warning of crop failures so that they can adjust their planning and logistics. Policymakers can use the data to generally improve agricultural policymaking.

As a decision support system, satellite-based applications can be used as an information or management tool that supports and guides the farmer's business or organizational decision-making activities through the practice of precision agriculture. Satellite imagery is used to describe farmer's fields in detail, often combined with geographical information systems (GIS), to allow more intensive and efficient cultivation practices.

Furthermore, farmers are profiting from a satellite (r)evolution that has taken place over the last few years.<sup>22</sup> Satellites have become both more numerous and smaller, and at the same time have increased spatial and temporal resolution providing both more details and more frequent images, respectively. This development has resulted in a trend of satellite images from being previously very expensive to ever cheaper data provision. Moreover, the free and open data policy of the Copernicus programme has made possible the development of many of the EO applications for agriculture such as WatchITgrow and – more importantly – affordable for farmers in the first place.

Satellite imagery provides wide area, synoptic pictures of the potato fields. While the scale of the fields is relatively large, moderate resolutions are working well down to around 10m in scale. Having added commercial imagery from DMC's Deimos-1 satellite with a resolution of 22m previously to increase temporal resolution, WatchITgrow has completely changed to and fully relied on the free imagery from Sentinel-2 since the launch of the Sentinel-2B in 2017. With fresh imagery about every 3-5 days coming from the Sentinel-2 constellation, Sentinel 2-B has helped to mitigate the problem of cloud cover in Belgium. This is clearly a constant disadvantage that the use of multispectral satellites such as Sentinel-2 A and B entails as their optical sensors cannot "look through" the clouds and thus do not provide any useful data at times. On the other hand,

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<sup>22</sup> See [https://watchitgrow.be/sites/watchitgrow.be/files/documents/02\\_watchitgrow\\_launch\\_vito.pdf](https://watchitgrow.be/sites/watchitgrow.be/files/documents/02_watchitgrow_launch_vito.pdf).

the Sentinels' spatial resolution has proven to be working very well for potato monitoring and figure XXX displays the higher resolution of Sentinel 2 compared to Deimos-1.

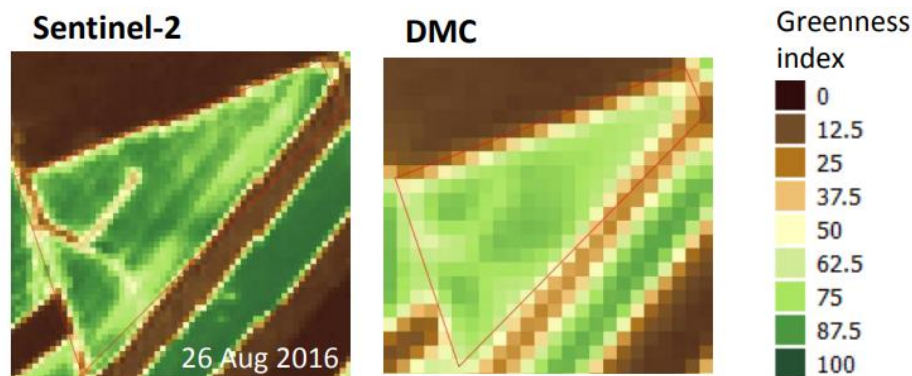


Figure 3-1 Comparison of Sentinel-2 and DMC resolution, processed by WatchITgrow

For the potato farmers, the data coming from satellite imagery is significant and, through WIG, allows them to more efficiently operate their farms as the derived information guide them towards more effective decision-making. The more traditional multispectral, optical imagery from Sentinel-2 provides the farmers with information about the biophysical properties of their potatoes such as health and productivity. In the near future, radar imagery from Sentinel-1 will also provide information on the structural properties of the farmers' potatoes such as canopy development. As Sentinel-1 radar can look through clouds, it will complement the optical imagery and close the gaps resulting from frequent cloud cover in Belgium and enable continuous crop monitoring and hence better decision-making on the part of the farmers (see 3.6 for more information on the future evolution).

Applications based on Earth observation such as WatchITgrow benefit from the free and open data policy of the Copernicus program that provides for imagery at no cost and has made possible applications like WatchITgrow in the first place. Free imagery means that marginal costs are 0 in case of automated solutions unlike cases where imagery has to be purchased from commercial providers. It also means that the application is easily extendable and scalable. The cost, or non-cost, of the imagery is very decisive for the development of geo-information platforms like WatchITgrow and their business model heavily rests on the free availability of high-quality satellite imagery from the Sentinel satellites. Moreover, the sentinel data are an important improvement compared to Landsat 8 with insufficient supply of data for an operational service and too expensive commercial data providers.

Compared to other data sources coming from drones or ground-based sources, satellite data is able to provide for a much higher and faster (and cheaper) coverage of a whole area, and the data collection can be more effective than in-situ measurements. Constant monitoring is crucial to identify risks such as diseases in time and take preventive measures.

### 3.3 The Service - WatchITgrow

#### 3.3.1 Dashboard



The WatchITgrow service has a handy dashboard menu from where farmers can access the various functions of the application. From left to right, farmers can get an overview over the status of their fields, consult the latest yield predictions, temperature and rainfall forecasts as well as receive the latest greenness indices for their acreages.

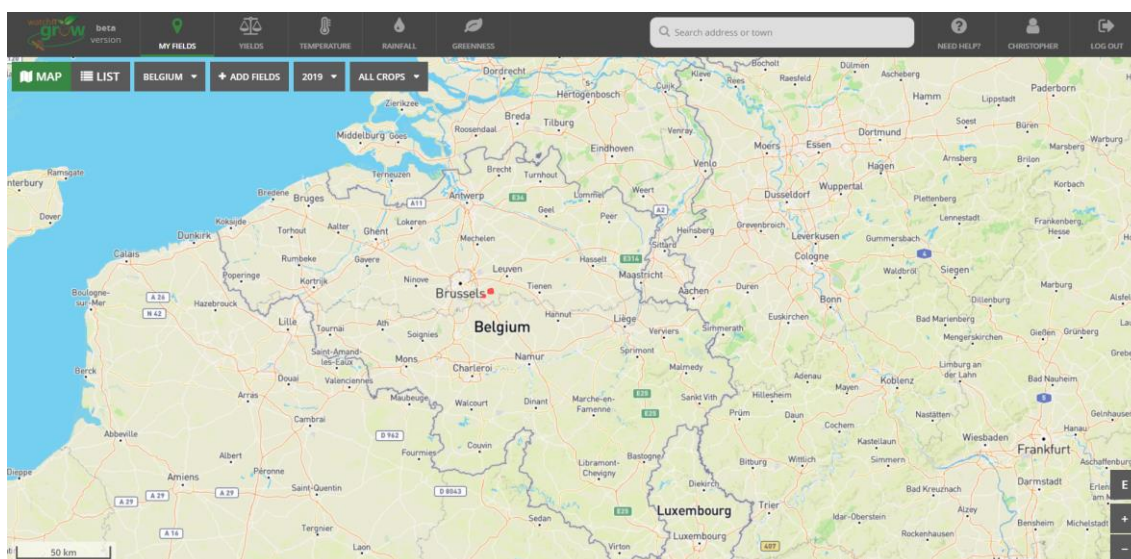


Figure 3-2: Dashboard view of WatchITgrow

### 3.3.2 Fields Overview

WatchITgrow<sup>23</sup> allows the farmer to easily enter field data into the system. The farmer can enter data for several fields at the same time, import field boundaries and information via shape or kml files and choose from a predefined selection list of legally permitted plant protection products. Farmers are able to compare their fields quickly based on growth curves and can examine also a specific field's history. This is especially important for farmers who lease parcels and have no experience with the field's specificities. Thanks to archived Sentinel data and other data sources, WIG can provide information about the specificities of the parcel which helps the farmers in more targeted farming decisions. In addition to potatoes, farmers can also monitor other crops<sup>24</sup> via WatchITgrow such as sugar beet, corn and various vegetables<sup>25</sup>.

<sup>23</sup> You can trial the platform at <https://app.watchitgrow.be/#/login>

<sup>24</sup> The full list of monitored crops includes alfalfa, barley, beans, broccoli, cabbage, cardoon, carrots, consumption potatoes, fiber hemp, flax, grassland, leeks, maize, onions, peas, rapeseed, barley, sorghum, soybeans, spinach, starch potatoes, sugar beets, sunflowers and wheat.

<sup>25</sup> <https://vito.be/en/news/are-you-ready-growing-season-watchitgrow>

Figure 3-3 Specific field overview including expandable parameters

The platform also allows farmers to store the field data including general information such as the variety, planting date, development stage of the crop, harvest date and more specific information on treatments such as the application of fertilisers (incl. date, used machine, type, etc.), crop protection (incl. used machine, type, product, etc.) as well as irrigation (incl. data, source and type of water source, etc.), observed damages (pest, disease, drought, waterlogging, flooding and contamination) and warnings. Potato farmers using the app are also encouraged to take regular yield samples for their potatoes to enable more precise results and improve the algorithms. These samples can be stored and managed in the platform which then visualises expected yields in graphs as per selected parcel. Naturally, the more data the farmers provide for each parameter, the more accurate the models and recommendations of WIG will be to the farmers.

Moreover, farmers can retrieve information regarding the actual specific temperatures over the last three months as well as the historic average temperatures for specific parcels, allowing for insights into current temperature deviations which might result into better treatments and irrigation. The same applies for the field-specific rainfall tab which also indicates the aggregate rainfall sum over the last three months.

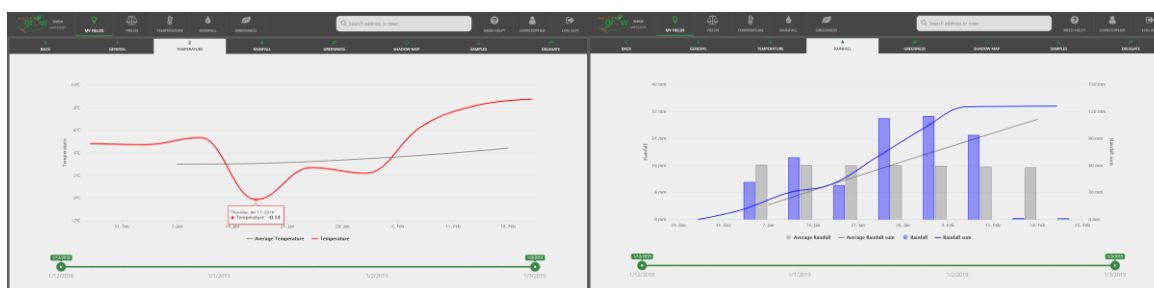


Figure 3-4 Field-specific temperature and rainfall tabs

The greenness index gives the field-specific crop growth and health and lets farmers compare it with regional greenness (more information on the greenness index in the sub-chapter 3.3.5).

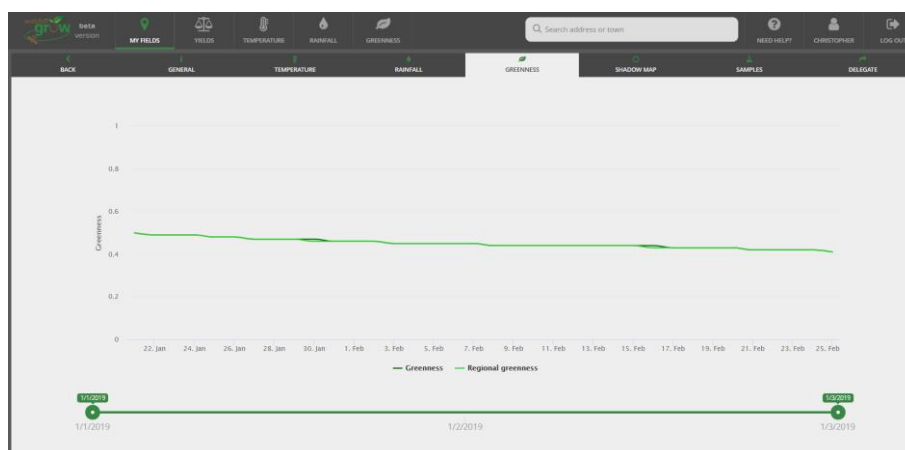


Figure 3-5 Comparison of field-specific and regional greenness index

Since 2018, WatchITgrow features the shadow map that indicates the sunny and shadowed parts of the fields to the potato farmers<sup>26</sup>. This element of the application allows for variable rate planting and adapting planting densities. Through planting less in the shadowed sections, plants absorb more sunlight and receive more water and nutrients as opposed to normal planting density leading to higher yields. As a consequence, farmers profit from both cost savings by planting less seeds and from higher yield results in the shadowed parts of the field. The shadow maps function also as an instrument for generating green zones in the shaded field borders within the frame of the greening obligations<sup>27, 28</sup>.

### 3.3.3 Yield

Besides field-level observations, the platform lets its users also compare yield forecasts for the regional, municipality and province level as can be seen in Figure 3-6.

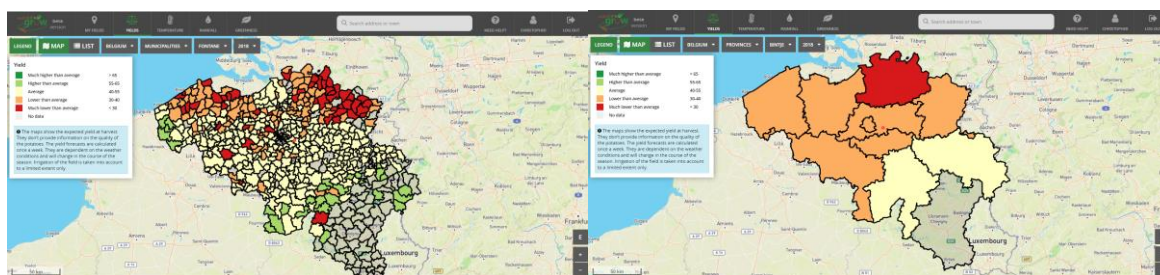


Figure 3-6 Yield forecast for Fontane (municipality level) and Bintje (province level) varieties for 2018 for Belgium

<sup>26</sup> <https://vito.be/en/news/are-you-ready-growing-season-watchitgrow>

<sup>27</sup> See CRA-W activity report 2016-2017-2018: <http://www.cra.wallonie.be/en/2016/1/activity-report>

<sup>28</sup> [https://ec.europa.eu/agriculture/direct-support/greening\\_en](https://ec.europa.eu/agriculture/direct-support/greening_en)

The maps show the expected yield at harvest – they do not provide information on the quality of the potatoes. The yield forecasts are calculated once a week and depend on the weather conditions. Hence, they will change in the course of the season. For yield forecasts, the app takes into account irrigation of the field only to a limited extent.

### 3.3.4 Temperature & Rainfall Tabs

The temperature and rainfall maps which can be selected at the top of the dashboard display the deviation of the actual temperature or rainfall with the average historical temperature or rainfall. They are updated on a weekly basis. The 5 classes in the legend in the top left are defined by analysing the historical meteorological archive from the Belgian Royal Meteorological Institute. For the temperature and rainfall indication, WatchITgrow has divided Belgium into several small grid cells of 5x5km in size for which figures are calculated. The temperature and rainfall data are collected from over 200 weather stations all over Belgium. For temperatures, a simple average is calculated based on the surrounding weather station measurements with a correction for the altitude difference between the station and grid cell centre, whilst rainfall data are gathered directly from the nearest station.

For the potato farmers, information about rainfall and temperature deviations from the average are crucial for more effective decision-making and enable farmers to take appropriate measures in order to maximise yields. Farmers can zoom into “their” grid cells and assess the effects of temperature and rainfall deviations. The legend on the top left tells them how much the deviations are. For instance, if a grid cell is classified as “much warmer/colder than usual” or “much wetter/drier than usual”, it means that the temperature or rainfall in that grid cell belongs to the 20% warmest/coldest or wettest/driest observations in the history of that grid cell. For the other classes the deviations are smaller<sup>29</sup>.

By monitoring the weather data, potato farmers can better assess the risk for production or quality losses at their fields. Figure 3-7 shows the current temperature difference respective to average temperatures at this time of the year. The red colour indicates that current temperatures deviate from average historical rainfall data in most of Belgium whilst the south enjoys normal “average” temperatures (see the white colour). On the bottom, farmers can the temperature differences over the last weeks.

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<sup>29</sup> For more information see <https://watchitgrow.be/en/faq>.

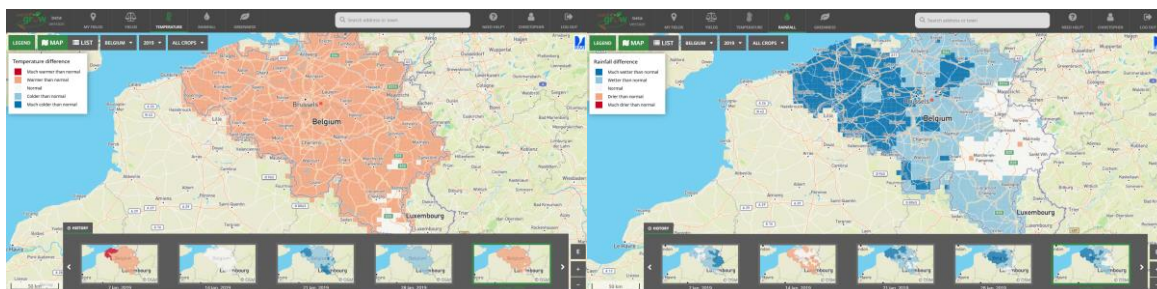


Figure 3-7 Temperature and rainfall difference in Belgium on 4th February 2019

Figure 3-7 shows the rainfall differences with regards to average historical rainfall data. Farmers in the north-west and centre of Belgium can currently expect to have much more rainfall than usual at this time of the year (in the top 20% rainiest observations). While the more central and southern parts of Belgium relatively wetter weather than usual as well, eastern Belgium has average rainfall. The data on the bottom also show that this has been the case throughout the last weeks with the exception of the 14<sup>th</sup> January.

### 3.3.5 Greenness index

The underlying indicator of the WatchITgrow application to measure crop growth is the greenness index (i.e. pixel colour) called **FAPAR** (Fraction of absorbed Photosynthetic Active Radiation). The index represents the fraction of the sunlight that is used for photosynthesis. FAPAR is thus a measure of the crop's primary productivity and is often used as an indicator for the state and evolution of crop cover. The index is also one of the main factors of the application for the development of yield models. As can be seen in Figure 3-9 on the right, low greenness index values (brown colour) mean that there is no crop growing on the field yet (bare soil). On the other hand, when the crop is growing, the greenness index will increase (green colour) until the crop has reached maturity. Then the index will decrease again until harvest.

The greenness graph showing the development of the greenness index enables farmers to closely monitor crop growth during the season. It allows farmers to monitor the development and the current development stage of the potatoes. The green curve in Figure 3-8 depicts the greenness index while the pictures in Figure 3-9 demonstrate what is actually the situation on the field at the same time. The yellow curve shows the progressive development of the tubers. With respect to blight, the greenness index is an imperfect measure due to the rapid rate at which the disease spreads. More frequent observations would help. But it can be useful to monitor conditions over a wider area to detect if neighbouring fields are stricken by blight. In general, the farmers do not take any risk and spray as a preventative measure.



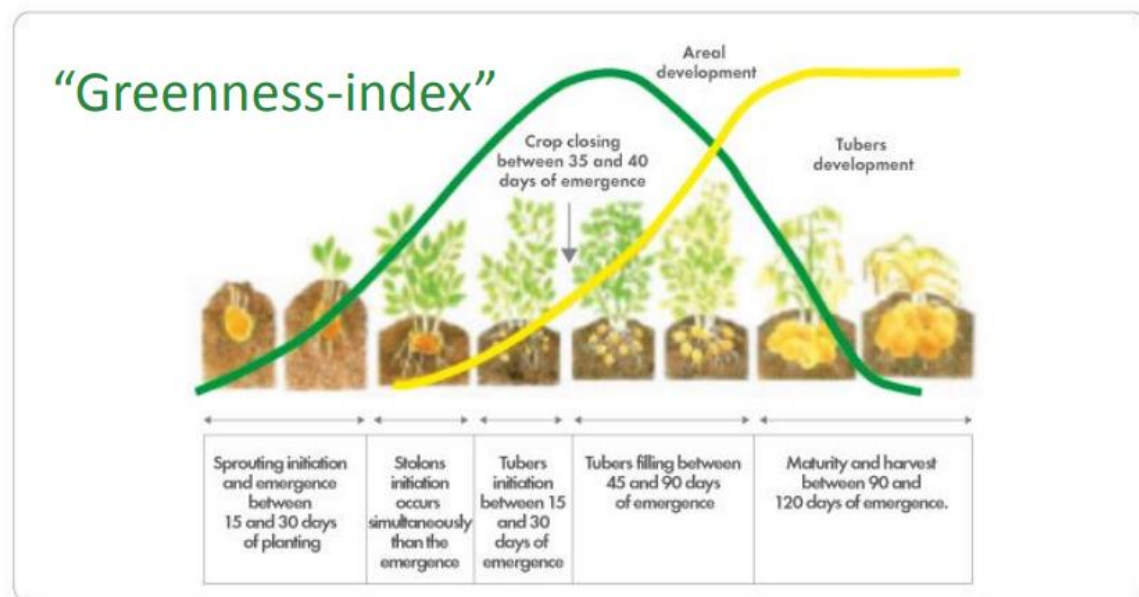


Figure 3-8 Development of the Greenness Index. © VITO 2019

The greenness map allows users to easily identify variability between (benchmarking) and within (precision agriculture) fields. Differences in greenness within a field show that crop growth may be variable within the field and can also point to anomalies. The reasons for this can be diverse and can include (natural) soil heterogeneity, climate induced problems such as drought or water logging and local damages due to pests or diseases, emergence problems, among others.

Figure 3-9 shows variability between fields whereby early varieties are indicated in blue and late varieties are indicated in red. This information is especially important for the processing industry and enables agronomists, traders and industrialists to improve their planning and logistics as they can estimate when and how much the yield will be in the following harvest.

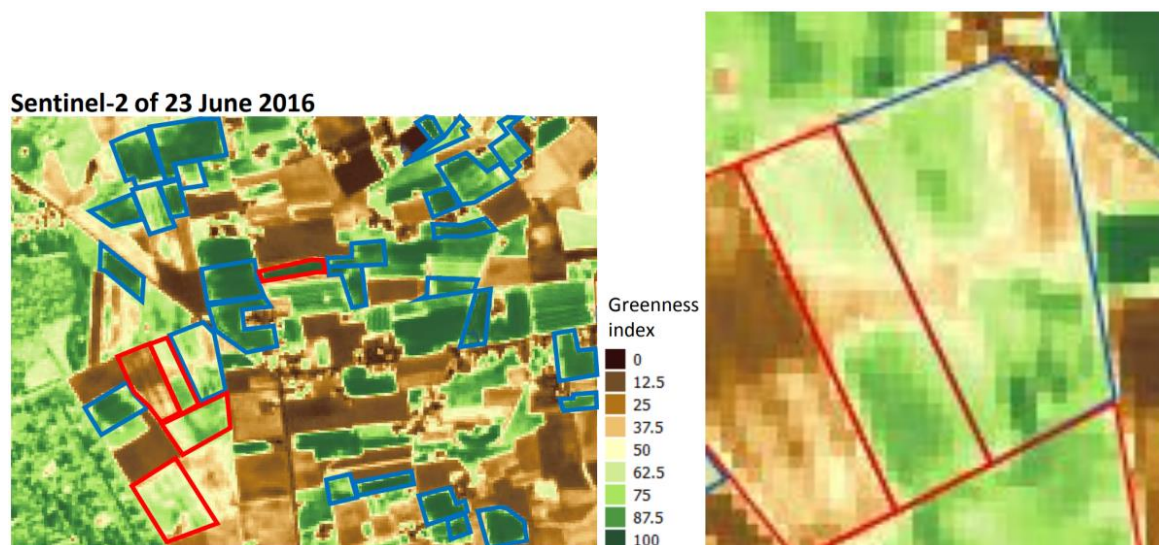


Figure 3-9 Variability between and within fields



Figure 3-9 shows the variability within fields. This kind of information allows farmers to manage their fields more effectively and apply variable rate application (fertilisers, irrigation etc.). For farmers, this is crucial in order to make cost savings in inputs, increase yields, produce higher-value potatoes and use their fields in a more sustainable way. Since leasing fields is common practice in the potato sector and in agriculture in general, farmers might not be familiar with the specificities of a certain leased field at the beginning. Through the app and the archived data and historical satellite imagery, farmers can become acquainted more easily with the field and its specificities.

### 3.4 Future Evolution of WatchITGrow

#### 3.4.1 New Features

WatchITgrow is constantly developing and incorporating new features to improve the application and support the farmers in their daily decisions and operations. Currently, farmers are developing a larger collaborative approach between the various key stakeholders of the Belgian potato sector with the objective to share increasingly more volumes and more accurate data with the platform. As more data will be integrated into the web platform, developers expect the application to become more and more precise. This will also increase other features of the application and for instance result in more accurate yield estimations. Combining several crop growth simulation models including meteorological data, soil map data and crop data will further increase accuracy in yield estimations. Furthermore, the supply of potato samples and quality assessments regarding tuber dry content and size is crucial for the industry and the developers to improve the algorithms of WatchITgrow.

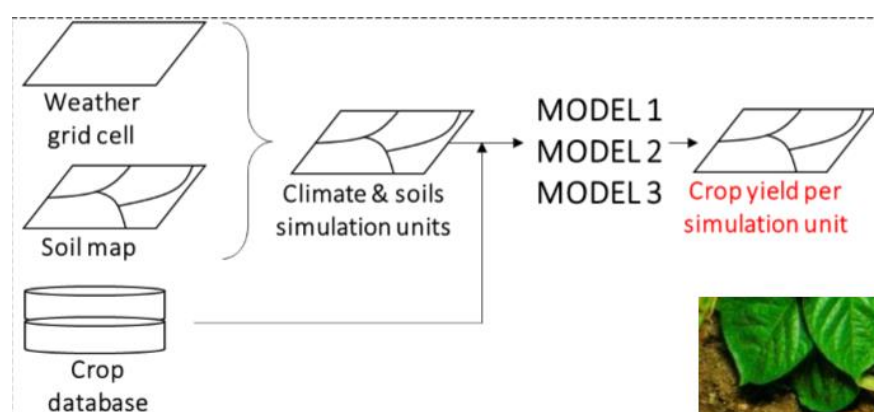


Figure 3-10 The Future of WatchITgrow: combining crop growth simulation models

WatchITgrow is currently the basic piece of a larger puzzle for potato crop monitoring in Belgium. Further pieces are developed in other research projects or web platforms, are interlinked with

WatchITgrow and will be integrated in the application soon. These research projects focus, among others, on

- nitrogen fertilisation recommendations,
- a warning system for major potato diseases such as late blight,
- a warning system for irrigation scheduling and
- links with official databases on cropping practices such as Phyto Products or VEGAPLAN.

In general, WatchITgrow will link further external data sources to the WatchITgrow application and continue to develop the deep learning algorithms that the application is based upon. This will lead to yield improvement advice.

Moreover, VITO is actively looking for international partnerships and cooperation (for instance at the World Potato Congress in Peru) to further improve and develop the application<sup>30</sup>. As potato cultivation is practised on a global scale, international exchange and cooperation in order to exchange of best practises and innovative techniques can lead to a further improvement of the application.

VITO is currently working on a separate project with the Soil Service of Belgium<sup>31</sup> in Louvain, an independent research and advisory institute for agriculture, horticulture and the environment, regarding the improvement of soil sampling and irrigation advice. The research results will soon be integrated into the WIG as well.

One impact which will be explored further is the potential for WIG to help create a level playing field in Belgium. There is a strong imbalance of power between farmer and the processing industry which restricts the information flow. By bringing the different players together onto the same platform, WIG can offset this imbalance and create conditions which can optimise the overall production of potatoes and potato products in the country.

### 3.4.2 CropSAR

A major limitation regarding the use of Sentinel-2 data within WIG is related to Belgium's cloudiness. CropSAR is a new technology, developed by VITO, in order to overcome this problem<sup>32</sup>. VITO has found a solution using the Sentinel 1 radar which can "see" through clouds. A unique algorithm combines radar and optical satellite data from Sentinel-1 and -2, respectively and makes possible measurements also on cloudy days. Based on this new algorithm, VITO has already received crop data during cloudy conditions. CropSAR is expected to considerably improve crop monitoring and forecasting, thus advancing the application considerably and enhancing the benefits for potato farmers and the potato industry as a whole. The technology will be integrated into WatchITgrow by the growth season of 2019.

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<sup>30</sup> <http://www.gfiaeuropa.com/wp-content/uploads/2017/07/JURGEN-DECLOEDT-Vito.pdf>

<sup>31</sup> <https://www.bdb.be/>

<sup>32</sup> Ibid.

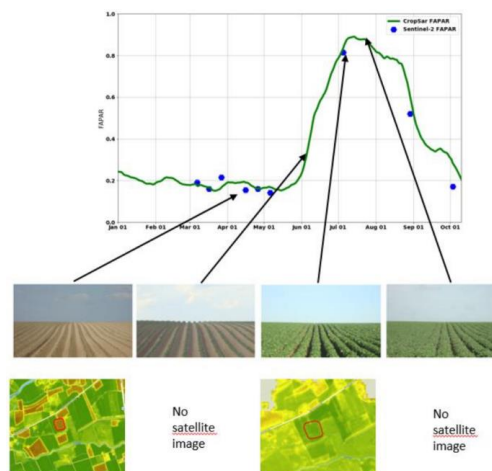


Figure 3-11 Comparison of original FAPAR and CropSar FAPAR

CropSAR will stop the application's dependency on clouds and will always provide data. Many EO-based applications were unsuccessful due to severe problems with cloud cover and associated limits of the applications. The new technology will provide for a continuous view on all fields and supply farmers with constantly available data on their potatoes' health parameters. It will facilitate more reliable information on crop status as well as input for disease warning systems.

The next stages in the development will see the upscaling from field to plant zone level. Moreover, the data from Sentinel-1 and -2 will be combined with other optical data sources such as Sentinel-3 and on very high-resolution data from commercial suppliers such as Planet, Airbus etc. Following further adjustments to the methodology, CropSAR will be integrated into WatchITgrow as an operational solution in the coming months<sup>33</sup>.

### 3.4.3 Financial Incentive Programme

In 2019, VITO reached an agreement with Belgapom and the Belgian farmers' union (Boerenbond Belge) whereby the potato processors have committed to investing 859,000 Euros into a financial incentive scheme. The funds will be used as a stimulus for potato farmers to register and start using the WatchITgrow application. A farmer willing to become an active user including to provide data on field management practices will receive between 250 and 750 Euros. The scheme is designed to support the market uptake and widespread use of WatchITgrow in Belgium. The amount of 859,000 Euros shows the confidence of the potato processing sector in the application and its expected promising impact on the potato industry as a whole. For the potato processing industry, the app is promising as the use by potato farmers can result in higher yields, higher quality potatoes (and thus higher prices) and a positive brand image as stakeholders in the value chain can claim to contribute to more sustainable farming, thus gaining a competitive edge over rivals in the sector<sup>34</sup>.

<sup>33</sup> <https://vito.be/en/news/monitoring-potatoes-growth-and-health-through-all-weather-circumstances>

<sup>34</sup> <https://vito.be/en/news/boerenbond-belgapom-and-vito-together-towards-digital-agriculture>

In a recent agreement among the WIG stakeholders, it was decided that farmers will not pay for WIG in the upcoming two years while Belgapom and the Belgian Farmers' Union have agreed to pay VITO to further improve the application and integrate new features. In the course of 2019, Belgapom and the Belgian Farmers' Union have pledged to support farmers in getting acquainted with the platform and help them in collecting all crop-related data. The platform is hosted by VITO guaranteeing data-privacy, data-security and data access.

Furthermore, it is planned to create an overarching umbrella organisation for the potato sector in which all relevant stakeholders from the value chain as well as public bodies and research institutes shall be represented to allow for a faster exchange between the market players and address the imbalance of power by better integrating the farmers' views. For this reason, the Belgian Farmers' Union has been cooperating more closely with the WIG stakeholders to address the concerns of farmers regarding the sharing of data entered into the platform.

#### 3.4.4 Extension of the Service

Satellite data is also used to monitor the potato crop in the Netherlands and can be used throughout the potato growing belt. Belgapom is active promoting the capabilities of the Belgian potato industry around the world in S. America and in Asia. Sentinel data is inherently global, and the service can be applied in those regions.

A Horizon2020 project named DataBio<sup>35</sup> also enables VITO to extend the service to the Netherlands and Italy and enlarge the potential customer base. Through the project, both new crops are being incorporated and new features will be tested to be integrated into the platform later on and provide a better service to users.

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<sup>35</sup> <https://cordis.europa.eu/project/rcn/206584/factsheet/en>

## 4 Understanding the Value Chain

### 4.1 Description of the Value-Chain

Having covered the service and the macro environment in which it is embedded, we will now look into its impact on the value chain it functions in: what parties are concerned and what subsequent effects does the availability of satellite-derived information cause in their interactions? In this chapter we look at the role each is playing in the value-chain whilst in the next chapter we shall look at the value being created.

Central to our methodology – in this case and in past and future ones – is the value chain originating from the use of satellite data. It is the basis for the analysis of the value generated by the availability of the Sentinel data. The value chain displays a set of ‘tiers’ representing subsequent users of satellite-based services (and their subsequent users and so on). Each tier connects to a different form of information (packaged in the form of a service), which can still be related to Sentinel data<sup>36</sup>.

Figure 4-1 shows the value chain analysed in this case. It starts with tier 1, the service provider VITO which supplies potato farmers with crop growth and variable rate maps through WIG. Besides the farmers, the potato processing industry, their agronomists as well as independent consultants directly use the application to receive up-to-date information and market intelligence about expected yields (forming tier 3). The farmers’ produce is then sold to tier 4 where mainly potato processors, but also other highly specialized value-adding key players such as packagers, washing and peeling companies, storage facility and ventilation manufacturers benefit from higher yields and consequently a higher demand for their services and products. The resulting potato products are then sold to supermarkets and shops in Belgium and globally through distributors and finally reach the end beneficiaries, being the citizens and consumers.

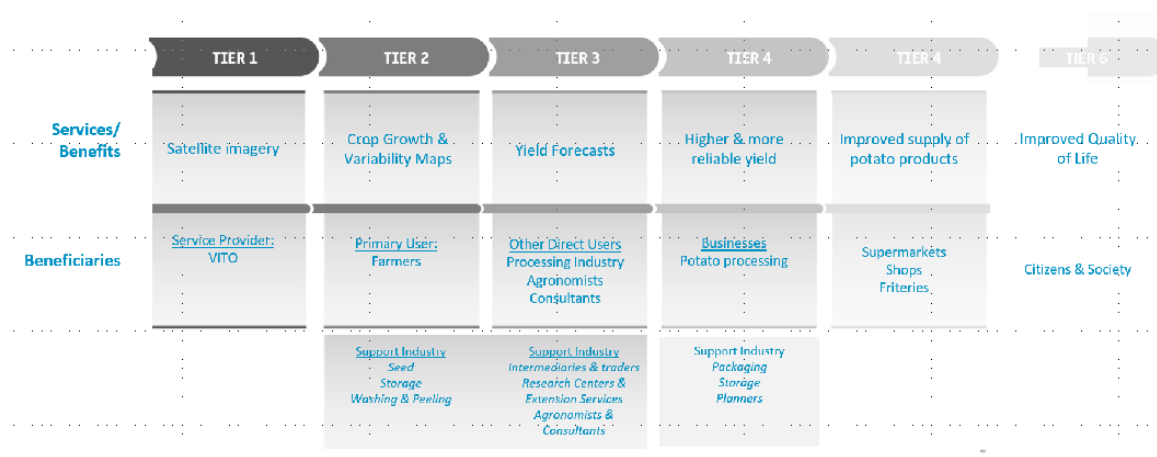


Figure 4-1 Value chain of the Belgian potato sector

<sup>36</sup> Annex 2 contains further details on the concept of the value chain and our methodology.

We deliberated on whether to place the processing industry at the primary user of the service. In many ways they are the drivers and are certainly the reason that there is a wider dimension than is the case for other farming cases. The processing industry are investing in WIG and encouraging the farmers to use it. This should lead to significant country-wide benefits.

However, we felt that the picture is more understandable if we follow the classical value-chain from farmer to processor and hence the value chain is drawn and will be analysed in that way.

## 4.2 The Actors

Beginning with the service provider VITO, we have conceptualised this value chain mainly around the primary user, i.e. the farmer, and the main beneficiary of the use of Sentinel data by the farmers, i.e. the processing industry. However, as will be seen below, the potato sector in Belgium is a well-organised and highly concentrated sector that comprises numerous (research) organisations and highly specialised companies that supply and support both the farmers and the industry. In a way, they (will) benefit from the use of WIG and certainly need to be mentioned here as well in order to give a comprehensive picture of the way the potato takes from field to fork.

### 4.2.1 Tier 1: Service Provider – VITO

WatchITgrow has been developed within a joint collaborative research project called iPot<sup>37</sup> financed by the Belgian Science Policy Office (BELSPO) between several partners including the Flemish Institute for Technological Research (VITO), the Walloon Agricultural Research Centre (CRA-W) and the University of Liège (ULG) as well as Belgapom representing the Belgian processing industry. Whilst research continues and more features will be added in the future, VITO is now responsible for operations, maintenance, customer service and market uptake of the platform.

Placed under the policy domain of the Department of Economy, Science and Innovation (EWI) of the Flemish Government, VITO is a Flemish research organisation in the area of cleantech and development. Having sustainability as their guiding principle, VITO is involved in a number of research fields including health, energy, chemistry, materials and agriculture in which remote sensing plays a major role. In each of the fields, VITO provides scientific advice and technological innovations that support the transition to a sustainable world and counter major societal challenges such as climate change, food security, raw materials scarcity, sustainable energy supply and an ageing population. By doing so, VITO promotes both the future vision of Flanders<sup>38</sup> and the United Nations Sustainable Development Goals<sup>39</sup>. VITO cooperates with companies, either directly or in partnership with industry networks such as the spearhead clusters and business

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<sup>37</sup> For more information see here: <http://www.belspo.be/belspo/Fedra/proj.asp?l=en&COD=SR%2F00%2F312>

<sup>38</sup> <http://financeflanders.be/sustainability>

<sup>39</sup> <https://www.un.org/sustainabledevelopment/sustainable-development-goals/>



organisation. In Flanders and by extension internationally. VITO also works closely with European scientific communities and international institutions.

As a public-owned company, VITO's revenues of 172 million Euros (2017) were coming from both own resources (contract research and patents) and grants from the Flemish government. Around 75 out of a total of 842 employees are working in the remote sensing team. The remote sensing team works on several remote sensing-related services and products. Besides WatchITgrow, VITO remote sensing specialists work on services towards more intelligent fruit cultivation<sup>40</sup>, Terrascope<sup>41</sup> (the Belgian national access point to the Copernicus, PROBA-V and SPOT VEGETATION satellite data) and MapEO<sup>42</sup>, a drone-based crop growth optimisation service.

This shows that VITO is well experienced in the processing of satellite data and skilled to develop and derive services from satellite imagery data. The WatchITgrow platform has been enabled with the availability of the Copernicus Sentinel data and especially Sentinel-2. Before the launch of Sentinel-2B, Deimos images were acquired in the gaps between Sentinel-2A images to provide better update frequency and supplement the Sentinel-2A acquisition cycle over Belgium.

#### 4.2.2 Tier 2: Primary User – Farmers

The primary users and beneficiaries of the WatchITgrow (WIG) platform are the potato farmers who use it directly to inform and help them with farm management. They may also share it with their consultants and agronomists and the processing industry is trying to encourage data to be shared further. This is one goal of the “branch” organisation that is being established.

The availability of data and information provided by WIG has been a game changer for the operations of farms. Whilst much of the data is coming from the farmers or other sources, the satellite data is the key to making WIG stand out as a farm management tool for the whole sector. The use of farm management applications has changed the role of the farmers from a more traditional one to a technological savvy and thus has impacted heavily on the way the farmers operate their potato fields. Naturally, these developments take time whereby some farmers are at the vanguard of technology adoption ('innovators' and 'early adopters') while others are very slow or even reluctant to adopt any digital, modern decision support systems.

Moreover, whilst the number of farms is decreasing, the average size of farms has been increasing over the last decades. On top of that, farmers have increasingly less employees and workers available to them who are often unskilled or inexperienced in potato cultivation and more specific plant problems. WIG can help the farmers by targeting scouting as they know where and when problems occur.

WIG supports farmers in getting a general overview over the state of their fields, and direct viewing and scouting of the fields on a daily basis is not needed anymore. WIG can also help the

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<sup>40</sup> <https://vito.be/en/remote-sensing/intelligent-fruit-cultivation>

<sup>41</sup> <https://terrascope.be/en>

<sup>42</sup> <https://mapeo.vito.be/>

workers in giving guidance and thereby add great value to the farm. Satellites can provide imagery on a sufficiently regular basis that anomalies can be detected, without having to be in the field. Currently, fresh imagery is provided every 3-5 days depending on cloud cover. With the add-on CropSAR<sup>43</sup>, WIG will be able to provide data and information in between these days and will allow to monitor potato growth and health even more closely. In the far future, it is likely that different data sources will be merged giving a comprehensive picture of the state of the fields with data coming from in-situ self-driving tractors, drones and satellites.

Farmer often do not own the fields which they farm for potatoes; they are leased or swapped with other farms specialising in other crops. This allows farmers to specialise in specific crops and to reach further to find additional fields which they can then cultivate. A four-year crop rotation is now mandatory for farms in Belgium, so one of the most important features for the farmer is the field history which is contained within WIG. As the tool becomes used over longer periods and builds up a history of cropping, so the value will grow.

#### 4.2.3 Tier 3: Other Direct Users

Farmers are supported through a wide range of actors who are benefiting from the use of WIG by the farmers.

##### a) Processing Industry

The processing industry appear twice in the value chain both as direct users of the WIG system and as beneficiaries of the results it brings to the primary users; the farmers. The processing industry is made up of over 40 companies in Belgium; some are family-owned, and others owned by major international brands ie McCain owns the Lutosa factories and markets under its own name as well as the Lutosa and Igloo brands. The processors turn the raw potatoes into mostly frozen but also some chilled products (fresh potato for fries). Other major players are Agristo, Clarebout and Farm Frites.

The sector has grown significantly in recent years, driven by a number of family-owned businesses. Recently, some consolidation has concentrated the sector to 18 main processing plants with some in the hands of multi-national owners. The growth in employment over the last 25 years is shown in Figure 2-7 and some statistics coming from the sector are shown in Table 4-1.

The table also shows the volumes of some of the key products and the remarkable growth to over 5mT of potatoes processing in 2018. Many different products are made including hash browns, formed products like potato croquettes, dehydrated potato products like flakes, granules, potato wedges (with or without rosemary) and sliced potato crisps. The sector is very innovative, and it is quite extraordinary what can be done with the humble potato!

The processing industry and their (independent) agronomists can benefit from direct use of the WIG platform in two ways.

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<sup>43</sup> For more information see subchapter 3.6.2.

- First of all, the industry has a great interest in having as much knowledge and up-to-date information about the current state of the potato crops as possible. Information entered into WIG allows the factories to understand the provenance and quality of the potatoes that they will receive. Presently, information on the crop type and origins, planting, spraying, and harvesting is collected by each processor. Farms with contracts are obliged to provide this information which is quite similar to that required by the regional and federal authorities. Hence WIG provide a common database of crop information and saves time and reduces entry errors. Farmers are wary of this as we shall discuss in chapter 5.
- Based on knowing expected yield forecasts provided by WIG, processors can adjust and improve their planning and logistics for the non-harvesting season when potato supply will go down. Some processors possess special storage facilities where they keep the potatoes throughout the year to have a constant supply for their processing machines. Thus, they can afford to buy the potatoes when potato quotations go down. Planning the production is of critical importance. Different potato types are better suited to different end-products. Agronomists are visiting their contracted and other potential suppliers on a regular basis during the growing season to assess the crop.

The Belgian potato processing industry in 2016 – 2018			
	2016	2017	2018
Number of processing plants	18	18	18
Number of workers :	3.257	3.467	3.701
Number of employees:	858	943	1.061
<b>Investments:</b>	€ 309.775.177	€ 305.513.247	€ 310.923.634
<b>Raw material :</b>			
Potatoes :	4.414.390 t.	4.571.297 t.	5.101.522 t.
Flakes :	6.300 t	6.039 t.	5.630 t.
<b>Finished product :</b>			
Frozen fries :	1.681.332 t.	1.770.298 t.	2.073.747 t.
Refrigerated fries :	234.694 t.	226.796 t.	231.734 t.
Mashed potato products, croquettes, chips, ...			
Flakes and others	468.513 t.	690.159 t.	695.321 t.

Table 4-1: Some statistics of the potato processing industry

#### b) Intermediaries and traders

In Belgium – unlike in most other European countries – farmers sell part of their produce and potato stocks to so-called traders which can be subdivided into three categories. **Packers** take care of the washing, drying and packing processes. With packing stations all over the country they are a valuable and increasingly important part of the value chain. **Exporters** are the second category of traders and are responsible for shopping and selling fresh and processed potatoes abroad in Southern Europe and increasingly distant regions in Africa and Asia. Thirdly, there are **intermediaries** whose main business is to buy from many small-scale farmers. They function as a bridge between the farmers and the processing industry locally or abroad. In most European countries, this intermediate stage has disappeared, and farmers directly sell their produce to processors or local consumers as fresh potatoes. However recently, there has been a trend towards a direct selling model in Belgium too as it has been widely recognized that intermediaries and traders add limited value to the final product and can easily be skipped<sup>44</sup>.

#### c) Research centres and extension services

The Belgian farmers benefit from a rich research landscape and numerous extension services who can support the farmers in their farm management and in particular in the use of WatchITgrow. Their task is to provide for a rapid and efficient flow and dissemination of information as well as to facilitate technology adoption in the potato cultivation sector. This structure of the Belgian potato sector makes for a more dynamic and integrated sector and is certainly one of the reasons for the competitive advantage of the sector. Research centres are in close contact with the farmers and help them extract the most benefits out of the application.

In Flanders, the PCA<sup>45</sup>, the Interprovincial Testing Centre for Potato Cultivation, as well as Inagro<sup>46</sup>, an independent agency of the province of West Flanders, work on practical research, provision of advice and information dissemination for farmers. They also advise potato farmers on crop protection and the latest developments in the sector. In Wallonia, this support is provided by CARAH<sup>47</sup>, the Centre for Agronomy and Agro-industry of the Province of Hainaut, as well as FIWAP<sup>48</sup>, the Walloon potato chain. Further crucial actors in the sector are ILVO<sup>49</sup>, a research institute for agriculture, fisheries and food, that used to be one entity together with CRA-W, the Walloon Agricultural Research Centre before the 2001 reform. On top of this, several universities engage in research at the intersection of remote sensing and agriculture/potato cultivation such as the University of Liège and Ghent.

Currently, there are two key research projects in Belgium dedicated to the potato sector. The first is WatchITgrow and the second is called RESKIA which is looking at the issue raised by the use of Chlorpropham (CIPC) as a growth inhibitor – extremely important to the storage life of potatoes. CIPC has been recognised as a possible health risk<sup>50</sup> and may be banned by the European Union.

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<sup>44</sup> Belgapom (2018). *The potato in Belgium, the land of fries*,

<sup>45</sup> <https://www.pcainfo.be/Over-PCA>

<sup>46</sup> <https://leden.inagro.be/>

<sup>47</sup> <http://www.carah.be/>

<sup>48</sup> <http://www.fiwap.be/>

<sup>49</sup> <https://www.ilvo.vlaanderen.be/language/en-US/EN/Home.aspx>

<sup>50</sup> <http://www.cipccompliant.co.uk/regulation/>

Potato storage is essential to enable processing to be planned all-year-round and to keep seed potatoes fresh to the point of use. RESKIA is a collaborative effort amongst many of the research institutes to find alternative storage methods.

d) Agronomists and consultants

Farmers are not experts in all aspects of crop management and can either turn to organisations mentioned above, or to professional independent agronomists and consultants. Their advice can comprise various aspects of farming and include for instance technical assistance regarding the farm machinery to use and especially new technologies being incorporated into it such as variable rate planting, shadow maps, digital rate maps, positioning and automatic controls, or it may concern planting and harvesting date for potato cultivation, crop problems and possible treatments and simply the interpretation of information provided by WIG. Sometimes, processors make available their own agronomists in support of farmers.

e) Other actors

Other key actors are the *Boerenbond*<sup>51</sup> (Farmers' Union) and the *Algemeen Boerensyndicaat*<sup>52</sup> (General Farmers' Syndicate) who both represent the interests of the farmers vis-à-vis policymakers and other institutions. Belgapom, that is also part of the WIG project, is the body that represents the processing industry<sup>53</sup>. Belgapom plays a very active marketing role to promote the Belgian industry around the world. Recent agreements have been made in Latin America and in Asia to help grow the export business. Further, many European associations exist to promote the potato growers and processors and to defend their interests.

#### 4.2.4 Tier 4: Potato Processing Industry

In tier 4, we consider the secondary economic benefits from the use of the WIG platform, i.e. the businesses which are better served and can operate more effectively<sup>54</sup>. We consider this only for businesses located in Belgium although there will be some benefits for businesses overall in the European potato belt. The main beneficiaries here are the potato processors which we have already discussed as part of tier 3. Other secondary beneficiaries come from the support industry who, as a result of a higher yield, have more processed potatoes to "store", "package", "distribute", "transport" etc.

As well as the direct benefit derived from using WIG, the processors also benefit through an increased yield as the platform should enable potato farmers to take better decisions that will eventually result in a higher produce. WIG has the potential to provide a system to underpin the

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<sup>51</sup> <https://www.boerenbond.be/>

<sup>52</sup> <http://www.absvzw.be/>

<sup>53</sup> For a comprehensive overview of key actors on regional, national, European and global level, consult *The potato in Belgium, the land of fries*, pp. 180-81.

<sup>54</sup>

[https://www.food.be/companies?search\\_api\\_fulltext=&field\\_company\\_filter%5B432%5D=432&field\\_company\\_filter\\_1%5B432%5D=432&field\\_company\\_filter\\_2%5B432%5D=432&field\\_main\\_category=All&field\\_sub\\_category=All&field\\_product\\_category=All&field\\_company\\_countries=All](https://www.food.be/companies?search_api_fulltext=&field_company_filter%5B432%5D=432&field_company_filter_1%5B432%5D=432&field_company_filter_2%5B432%5D=432&field_main_category=All&field_sub_category=All&field_product_category=All&field_company_countries=All)

formation of a national “branch” organisation in Belgium. By enabling transparency, confidence and exchange between all the players in the value chain, the “branch” can increase the overall yield from the farms so providing the factories with more raw material. This has a direct benefit on the Belgian economy by increasing the size of the sector and generating increased exports.

In 2014, the Belgian industry recorded a volume of 3.8 million tonnes of processed potatoes, mainly to frozen chips. A large portion of this is exported globally, making Belgium the largest exporter of frozen potato products. This record volume comprised almost 1.4 million tonnes of frozen chips and 455,000 tonnes of other products (puree, croquettes, flakes and crisps among others). Overall, the figures showed an increase of 6.9% compared to the previous year<sup>55</sup>. The potato processing industry is a major driver of the Belgian industrial agri-food sector and employs about 3,600 employees on a permanent basis as well as support numerous indirect jobs (tertiary suppliers). The industry concentrates increasingly on exports and on expanding into remote regions such as Asia. It is a sector that is relatively resistant to economic downturns and experiences increasing employment rates and investments<sup>56</sup>.

#### 4.2.5 Tier 5: Supermarkets, Shops and Friteries

Supermarkets and shops are the main retailers that sell processed potatoes. Naturally, they are interested in a reliable and stable supply of potatoes and potato products that, if possible, are produced in more environmentally friendly ways. A major beneficiary of processed potatoes is the food service industry made up of the hospitality, catering and convenience sector who comprise thousands of restaurants that overwhelmingly serve fries. Moreover, tier 5 also features the famous Belgian culture of fritkot/frituur/friteries (chips shops) which need a reliable supply of their main offer: processed potatoes i.e. chips. The economic factor may not play such a big role overall in Belgium. However, there are 5,000 local friteries (one for every 2,500 Belgians) and they certainly play their part in the socio-cultural landscape in Belgium and benefit from a stable supply of processed potatoes.

#### 4.2.6 Tier 6: Citizens and Society

Belgian citizens have for long been one of the biggest consumers of fresh and processed potatoes per capita in the world. As you can see in Figure 4-2, the average Belgian consumed around 95 kg of fresh and processed potatoes in 2013. Looking at the long-term trend however, the average consumption has been in steady decline since 2000 with some temporary ups and downs. This long-term trend can be ascribed to new food trends and dietary patterns, for instance due to the spread of less potato-heavy foods from Asia or other regions in the world<sup>57</sup>. Moreover, major strategies against food loss and waste over the last years have helped to fight food loss and waste effectively resulting in an apparent consumption decrease while in fact consumers buy and eat

<sup>55</sup> <https://www.thebulletin.be/belgium-largest-exporter-frozen-potatoes>

<sup>56</sup> Belgapom (2015). *The potato in Belgium, the land of fries*, p. 98.

<sup>57</sup> <https://www.helgilibrary.com/indicators/potato-consumption-per-capita/belgium/>



what they really need. The European Platform on Food Losses and food waste<sup>58</sup> describes many measures being taken and more under consideration. The EU and the EU countries are committed to meeting [Sustainable Development Goal \(SDG\)](#) 12.3, adopted in September 2015, which targets to halve per capita food waste at the retail and consumer level by 2030, and reduce food losses along the food production and supply chains.

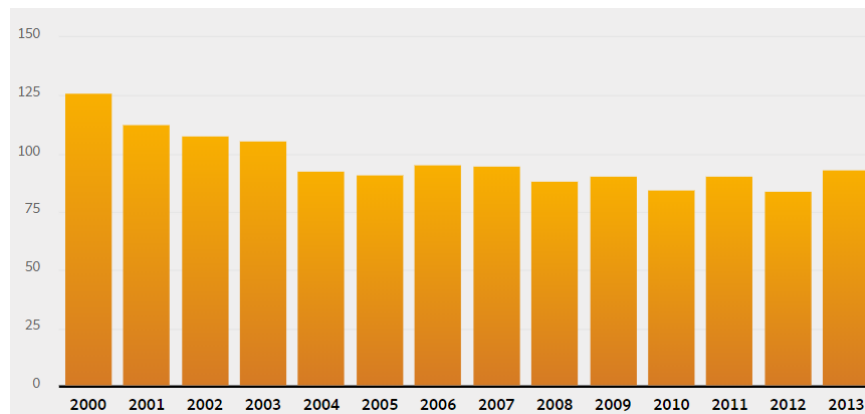


Figure 4-2 Belgian Potato Consumption (kg/capita). © FAO Statistics

Nevertheless, Belgians still rank among the biggest potato consumers in Europe and the potato is set to remain a major staple food for Belgians for the future. Thus, a more reliable supply of fresh and processed potatoes along with more sustainable farming practises thanks to the use of WIG is certainly in the interest of Belgian citizens. Moreover, whilst fresh and home consumption is under pressure, processed and out of home consumption is gradually increasing which is why job growth mainly occurs in the processing industry<sup>59</sup>.

#### 4.2.7 Other Beneficiaries

We noted earlier the complex nature of the administration in Belgium with 3 regions, 3 language regions and a federal level. The interest in potatoes acts to unify the country at Federal level.

Satellite data makes no distinction for political boundaries and indeed, due to its neutral, wide-scale view has the ability to promote co-operation. It is one of the major factors linked to the ambition to form a national level platform (referred to as the branch) where a synoptic view available by the use of satellite data. The platform will be a critical factor to promoting transparency and developing trust between the various actors in the value chain.

<sup>58</sup> [https://ec.europa.eu/food/safety/food\\_waste/eu\\_actions/eu-platform\\_en](https://ec.europa.eu/food/safety/food_waste/eu_actions/eu-platform_en)

<sup>59</sup> [https://watchitgrow.be/sites/watchitgrow.be/files/documents/01\\_watchitgrow\\_launch\\_belgapom.pdf](https://watchitgrow.be/sites/watchitgrow.be/files/documents/01_watchitgrow_launch_belgapom.pdf)

## 5 Assessing the Benefits.

### 5.1 Overview

The benefits of the use of Sentinel data are felt in several tiers of the value chain and can provide an overall support to a more effective production of potatoes and especially potato products in Belgium. As we have found for other agriculture services, the full potential is far from being realized for 2 reasons;

- The service is only used by a limited number of farmers and hence the market penetration is low at present.
- The quality of the service will improve with time and there is a build-up of data regarding the fields. This will take many years as crop rotation means a field will only be used once every 4 years and the variation in meteorological conditions means that several growth years are required before a true picture is built up.

Hence, the approach - which has been used in other agriculture cases – whereby the value of the benefits will be assessed for the system as used today and then extrapolated for the future according to a greater market uptake and a more mature technology. The analysis is based on a number of assumptions which are visible and open to challenge by experts more knowledgeable in the industry than us.

In addition, the role of the satellite data varies between crops and some contrasts will be developed in the discussion in this chapter. Calculating the benefits of the service is already quite hard. Extracting and calculating the value of the satellite data is even harder and assumptions are used quite widely. These are open for challenge and we encourage any reader to contact us if they think the assumptions are unreasonable for any reason.

The overall benefits of Earth observation-based products and services can generally be summarised as the following, either directly as a result of using the service by farmers or indirectly by stakeholders in the value chain profiting from the effects of the farmers' use of the service that are passed down the value chain:

- Efficiency and productivity gains
- Increase in quality of the potatoes
- Better resource management and monitoring
- Integrated impact assessment
- Improved planning and strategy building
- Improved transparency<sup>60</sup>
- More sustainable cropping

As we shall see, benefits can accrue in both qualitative and quantitative forms. Qualitative benefits are for instance a better knowledge of the market or also social organisation which might lead to better cooperation between farmers and faster knowledge diffusion. Clearly, they are

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<sup>60</sup> GeoBuiz 2018 Report

positive but hard to measure. Quantitative benefits are relatively easy to measure and can result for instance if farmers' save one round of chemicals spraying per season.

Finally, In our study – as we did in previous ones and will do in future ones - we are concentrating on the positive economic effects brought about by the availability and subsequent usage of the Sentinel data in the value chain. In most cases, there are both winners and losers. For example, cost savings are usually associated with loss of employment. In general economic theory, this is overall a good thing as labour becomes devoted to more effective use so driving greater value for society.

Put differently, innovation and subsequent economic benefits will partly come at expense of some of the existing beneficiaries, especially in the short-term. However, recent studies demonstrate that 'on balance' and at the macro level, once the change is adapted to, there is a distinct positive effect. Annex 3 holds some further observations hereon.

However, for this particular case, there are no real losers as it would seem that the hours saved by the use of WatchITgrow can be deployed more effectively in the sector leading to overall productivity and yield volume gains.

## 5.2 Benefits along the Value-Chain

### 5.2.1 Tier 1: Service Provider – VITO

VITO, the service provider of the application, does not benefit economically from the development of WatchITgrow as at this stage WIG is not a commercial product. The study at the origin of WIG was largely financed through public funding, though also the partners involved invested money in the IPot project. With the creation of WIG, Belgapom and Boerenbond are financing – together with VITO - the integration of new features into the application and all stakeholders involved have agreed to offer WIG for free on the market for the next two years to support a faster market uptake.

The members of Belgapom (processors & traders) agreed to pay a premium to farmers that register their contracted crop on the WIG website, including all information (field registration and yield). The program schedules that farmers will have to pay a contribution by ha after 2 years. By then new features will also be added to the application.

VITO are seeking to make WIG available in other countries and their role as operator is still not determined. Hence the main benefits to VITO come from increased R&D activities which we shall not include as benefits from the application of the WIG service.

### 5.2.2 Tier 2: Primary User – Farmers

There are currently 600 active users of the application of which the majority are farmers. Other users are agronomists, consultants and the industry. Our primary focus in this section shall lie on

the benefits generated by the farmers' decisions based on the application. As explained above, benefits can be created through qualitative and quantitative ways. The next paragraph will focus on the quantitative benefits followed by a discussion of the qualitative benefits to the farmers.

### Quantitative Benefits:

- (a) *Saving time on scouting:* In the case linked to Farming in Denmark<sup>61</sup>, one of the main benefits to the farmers came from reducing the time they need to spend each week in the growing season for scouting their fields for signs of stress. This was for cereal crops; is this also applicable for potatoes?

In fact, the management of potatoes differs significantly from cereals. Potatoes are a high-value crop with a strong risk of blight causing a complete or very serious loss of the crop. When blight strikes its effects are rapid and consequently, farmers spray potatoes as a preventative measure throughout the growing season. We discussed whether the WIG surveillance of fields could help reduce the number of sprayings?

Farmers spray up to 15 times i.e. every 7 to 10 days during a season against potato blight and other pests. It is binary: if blight enters a field, then the whole crop is lost very quickly so farmers take a precaution and spray so frequently to be on the safe side. Moreover, the farmers receive advice from the PCA (Interprovincial Testing Centre for Potato Cultivation) on the likelihood of blight. This could however change in the future when the WIG application improves, gains a higher level of technical maturity and farmers gain trust in its capabilities so that sprayings are less frequent and thus farmers spend less time on field inspections.

- (b) *Savings on chemicals:* WatchITgrow and the satellite data may help extend the interval between sprays if conditions look good. Diseases which are detected early in the season can be managed whilst late in the season the impact can be managed (ie by early harvesting). It is when the disease strikes during the main growing season that the problem is greatest. Consultation led to the view that 1 to 2 sprayings could potentially be saved during a season once there is confidence in the system. But this would not apply to the whole area planted so this should be discounted for the part-area of the farm.

The cost of chemicals is around €20/ha and €15/ha for labour cost for each spray. The average potato area per farm is 17ha (<https://europatat.eu/activities/the-eu-potato-sector/>) giving an average spray cost of €340 for chemicals and €255 for labour. We shall assume that 50% of the fields will be able to sustain the reduced number of sprays. In calculating the total potential saving for the whole of Belgium, we shall assume that 20% of the farms will not adopt WIG due to size or simple technology resistance. We shall later reduce further the benefits assigned to the use of satellite data recognising that whilst it is a key component of WIG it is not the only data being used.

		Potential Savings
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Sprays saved per season		1	2
Average potential saving / per pray	€595	€595	€1190
Number of farm users of WIG	420		
Percentage of fields sustaining the reduced spray	50%		
Potential savings for farms using WIG		€125,000	€250,000
Total Number of farms in Belgium	5000		
Less percentage which will not adopt WIG	20%		
Potential saving for 50% farms in Belgium		€1,190,000	€2,380,000

Table 5-1: Potential savings due to reduced spraying enabled by WIG.

(c) *Increased yield*: It is considered that, through a more efficient use of inputs, potato fields in Belgium will have a greater yield; it is one of the major goals of the project. At the moment, it is too early and the mechanism to develop the shared approach is missing. As a result, there is no noticeable increase in the yields due to WIG. As more data is added, the WIG partners estimate that a 3% increase in yield is possible with the system as it is today. if more (or almost all) potato farmers make a comprehensive use of the platform. Once the technical maturity becomes higher and more years of data have been gathered, then a potential 15-20% increase is considered possible. However, to remain conservative a gain of 10%-15% has been used in these analyses.

	Min	Max
Total potato yield in Belgium	3,000,000tonnes	4,400,000tonnes
Increase by 3%	90,000tonnes	132,000tonnes
Average price per tonne (2009-2017)	€90	€90
Value of 3% increase in production yield	€8.1m	€11.9m
Crop increase by 10%	300,000tonnes	440,000tonnes
Value of 10% increase in production yield	€27m	€39.6m
Value of 15% increase in production yield	€40.5m	€59.4m

Table 5-2: Value of yield increase by using WIG

Note this is the value of the yield increase as a result of using a mature WIG. The value of the Sentinel data as a component of WIG is still to be factored in and will be significantly less.

(d) *Optimum harvesting*: WIG gives recommendations to farmers about the optimal time of harvesting in order to get the biggest output from the fields. Potatoes have to be harvested before senescence kicks in and total output starts to decrease again. WIG supports farmers in choosing the best date of harvesting. This benefit certainly could come with the improvement in other factors and we have taken a figure of 1% as representing the increased yield due to better timing of the harvest.

	Min	Max
Value of total crop	€270m	€395m
Increase of 1% in yield on total crop	€2.7m	€3.95m
Today, 420 farmers / 10% of crop	€270k	€395k

Table 5-3: Benefit of improved timing of harvesting

## Qualitative Benefits

(e) *Quality of Potatoes*: Better knowledge of the cropping conditions will lead to increases in the quality of potatoes making them of higher value to the processing industry. We have discussed the issue of splitting of potatoes due to irregular irrigation and a loss of size of potatoes reducing their suitability to produce fries. This has been reported by many of those with whom we have spoken. Whilst there will be a clear economic benefit, we have not been able to place any specific value on this aspect although it is clearly there.

(f) *Water*: For many of the farms, one field is surveyed at the start of the growing season and the results act as a reference for the others. The water level and soil wetness differ considerably from the one field to the others, but the farmer needs to understand the relationship between the reference field and the others they are cropping.

The Interprovincial Testing Centre for Potato takes soil samples, looks at leaves, the local climate and many other factors. This information is used by the farmers to compare with other fields and to decide whether irrigation is needed. WIG can improve this service by providing more precise conditions for the fields and hence improve the extrapolation and reduce water use.

Today, water for irrigation is coming largely from nearby rivers and streams. These sources do not provide enough water in dry years and, with increasing areas of land devoted to potatoes, we understand that the irrigation policy is being examined in Belgium following the two last dry seasons. Whilst WIG will help monitor the impacts of the policy, and there should be benefits from this in the future through reduced water use, there are no benefits today and this element has not been included in the WIG benefit calculations.



- (g) *Environmental gains:* Many concerns are felt today by policy makers and citizens alike regarding the increased application of chemicals on farmland and the possible impact on health through their presence in crops and in drinking water. This is leading to new legislation controlling the application of pesticides, fungicides and fertilisers.

As discussed in chapter 2.6, fertilisers are usually applied once before planting (at nominal 200kg/ha) and a second time around early June as the leaves form. Currently, farmers treat the fields as homogeneous entities although fields are usually highly heterogeneous with diverse needs for chemicals in different locations of the field. Knowledge of the field performance over previous years together with the measurements taken from the satellite images, will allow variable rate maps to be produced. This will reduce the amount of fertiliser applied which will be more matched to the plants needs. More precise application leads to a much better take-up and heavily reduced excess in the soils. Consequently, the amount of fertiliser leaching into the environment and surface-water sources is strongly reduced.

The same holds true for irrigation requirements. More efficient water use on the field i.e. only where it is really needed can lead to reduced use of water or of pesticides. At the moment, this benefit is likely to be only marginal since farmers pre-emptively spray the fields against potato blight to avoid risk, but, as a greater understanding is developed of the relationship between satellite measurements and disease, then earlier and more accurate application of chemicals should result. Earlier application means less chemical is needed so reducing the amount which leaches into the environment.

These benefits are not quantified.

- (h) *Farm awareness:* WatchITgrow will certainly give an unprecedented overview of a farmer's fields and operations and raise awareness to the farmers for their farm characteristics which may lead to improved decisions in the long-run<sup>61</sup>. This factor was also found in the Denmark case. Having a digital picture of their entire farm encourages the farmers to think more holistically about their management practices. This can lead to overall greater efficiency.

Moreover, the stakeholders from WIG have emphasised the social factor of WIG during the interviews have aimed at bringing the farmers closer together who have so far operated mainly in isolation from each other so as to advance a more cooperative attitude in the potato sector to foster knowledge exchange and the sharing of experience. This notion of learning from other farmers has been backed by data from WIG.

Neither of these benefits are quantified.

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<sup>61</sup> See also the SEBS case 'Farm management in Denmark' regarding farm awareness: <http://earsc.org/Sebs/all-cases/>

- (i) *Digital awareness/digitalisation*: WIG has the potential to stimulate an awareness of digital tools available to farmers and generally support digitalisation in the farming sector, thus functioning as a catalyst for the uptake of digital tools. Digital tools and instruments are estimated by many organisations to bring huge economic benefits to farmers and the farming sector in general<sup>62</sup>. Thus, getting acquainted with WIG may also make farmers more open towards other digital tools that hold a lot of potential to farmers.

There will be an added value of WIG as this becomes linked to automated precision agriculture tools e.g. on harvesters. Online images of harvested potatoes, linked to the WIG registration and information, could help the operators in the value chain to decide on the usage of the crop (directly processed or storable for a longer time). As such food waste can be prevented. This shows some of the potential growth in benefits for WIG as a result of technological developments.

- (j) *Accidents/emergencies*: WIG provides warnings to farmers in case of abnormal events in the fields such as storms, burst pipes, etc. The application can detect such emergencies so that farmers can take actions or even preventive actions before such occurrences in order to mitigate negative effects on the yields and minimise field damages. This can save money and time and is also helpful for insurance and damage claims.

- (k) *Supervising distant fields remotely*: As farm sizes grow and farmers rent rather than own the fields they are farming, so the distances travelled to operate and manage those fields becomes greater. In consequence, farmers risk to spend more time traveling to fields whether it is for scouting, spraying or other field operations. Mainly farmers with an aggregate size of 400-600ha have very scattered fields. The remaining farmers usually have their fields relatively concentrated around their home base.

Further, many of the tasks, such a spraying, planting and harvesting, are sub-contracted leading to less direct engagement with the fields leading to an increased need to scout but less opportunity to do so. Sub-contracted labour has much less knowledge of local conditions nor the history of the fields making it necessary for the farmers to visit and help them make more focused visits. WIG can reduce some of this time spent by the farmer to travel to fields.

An optimised field registration and communication of the field registration field in the value chain can support farmers in this regard and provide continuously the opportunity for farmers to check and monitor the status of the fields from their desk. The field registration file can be linked to other schemes such as the food and plant & IPM scheme

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<sup>62</sup> <https://www.biooekonomie-bw.de/en/articles/dossiers/digitisation-in-agriculture-from-precision-farming-to-farming-40/>

Vegaplan. A digitalized file can be easily shared to third parties in the value chain (buyers) and controlled for distribution.

- (I) *Knowing the history of a field:* Many farmers benefit from the archived satellite data that WIG provides. They do not know the potential of some of their fields for potato cultivation as they have to stick to regulations regarding crop rotation. Furthermore, some farmers lease the fields and do not know the specific characteristics of the field. In this case, WIG can provide them with information and data about fields' performance in recent years so that the farmer can take better decisions and actions on his fields. This in turn should lead to a better output and higher produce.

Generally, one must note that at this stage WIG does not directly benefit the quality of the potatoes. It does so indirectly since for instance disease outbreaks can be detected faster and thus controlled more effectively. The greatest benefit currently derives from an increased yield as well as other factors described above.

### 5.2.3 Tier 3: Other Direct Users

Farmers are not the only direct users registered at the WIG platform. Agronomists, consultants and the industry make use of the information provided by WIG as well in order to get an overview of crop growth and yield forecasts. However, it has to be noted that, they do not have access to the individual data the farmers entered. They do have access to more general aggregated information. Nevertheless, this information is crucial for the industry as the more information they possess the better they can adapt their strategy, planning and logistics, making their operations more efficient.

Agristo has 6 agronomists working in Belgium, the Netherlands and northern France whilst other Belgian companies such as Ecofrost, Lutosa, Mydibel and Clarebout have fewer agronomists employed. In total, the potato processing industry has around of 40-50 agronomists working for it.

These agronomists visit the farms and assess the state of the crop and check how the farmers' potatoes are doing so having better information on how much the yield will be and when the crop will be ready to bring to the factory. Their expertise is important for planning the cycle of operations in the factories.

An average agronomist drives about 90,000 km per year. By using WIG we estimated (in discussions with agronomists) that they can save about 30% of their journeys, saving fuel costs, time and saving the environment. The time set free by this is not saved labour cost but can be used for more productive purposes. According to the Moniteur Automobile in Belgium<sup>63</sup>, the cost of running a moderate sized car comes out at around 18c per km using the figure in the table

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<sup>63</sup> <https://www.moniteurautomobile.be/conseils-financiers/prix-de-revient-au-km-par-mois.html>

below. This includes the fixed overheads and we shall take the marginal cost to be 12c (9c for fuel and 3c for wear and tear to the car).

Fuel cost (€/l):	1.30
Fuel use (l/100km):	7
Annual Distance (km):	90,000
Cost per km	18c
Marginal running cost per km	12c
Total annual cost for each agronomist	10,800
Saving of 30% by using WIG	3,600
Annual savings for 40 agronomists	144,000
Annual savings for 50 agronomists	180,000

Table 5-4: Driving costs saving by agronomists

If agronomists can save up to 30% of their journeys, this means the average agronomist can save around 3,600Euros each year. For the 40-50 agronomists working for the industry, a total economic benefit emerges of **€ 144,000 pa** to **€ 180,000 pa**. The time set free may result in further economic benefits as time previously spent on the car can be utilised in more productive ways.

We do not assign any value to time being saved or reducing numbers of agronomists. Whilst field inspections will be reduced, engagement with farmers will need to increase. Hence, we consider an overall efficiency gain as agronomists spend less time driving between widely spread fields and more with the farmer addressing measures related to yield and quality of the crop.

Sometimes a specific role is played by middlemen or traders which could increase with the trend towards more contract policies between farmers and processors. This is where a farmer contracts, early in the season, to supply a certain quantity of potatoes (see section 2.4) which can lead more and more towards a one on one relationship between (larger) farmers and their buyers. Consequently, more involvement of agronomists making use of the satellite data can be expected in the upcoming years. The project to start up a Belgian branch organization for the potato sector could strengthen the relationship in the Belgian potato value chain and result into more professionalism – including more agronomists – in the future.

#### 5.2.4 Tier 4: Potato Processing Industry

Global demand in potatoes and potato products is increasing. New investments in factories will lead to an increased demand for potatoes. Processors, distributors, exporters and logistics companies will also benefit from an increased output by the farmers. They can use the greater

produce to produce more processed chips, export more on the world market and/or transport more produce into other countries. This results in a better commercial position and possible higher revenues for those companies. If with the current technical maturity an increase of 3% is possible and farmers make full use of the application, then processors should be able to increase their output by 3% as well.

As mentioned above, it has been announced recently that processors are ready to invest in a faster market uptake by farmers. Paying € 250-750 per farmer for using WIG and covering about 20% of potato farmers, the industry is investing together about € 850k. One can reasonably assume that the industry is prepared to do so since they expect that through the use of WIG by farmers the return of investment to them will be a minimum of € 850k over the next (at least) two years. It is difficult to estimate the time period when the industry expects to have fully recovered the investment.

A small economic benefit derives also from the fact that through WIG the industry knows what quantity and quality to expect from a certain farmer and field, improving efficiency and productivity. In the case of homogeneous fields and consequently potatoes both costly sorting and machinery settings adjustments are next to zero before processing. In contrast, more heterogeneous potatoes need laborious sorting and a change of the processors' machineries' settings which makes productions more expensive.

A disturbing factor for this evolution could be the fact that producers have often contracts with several buyers in trade and processing industry. Setting up a scheme as WIG demands investments, also from the buyers. Some are willing to do so, whilst others might just wait and profit. This will be a driver to strengthen one on one relationships between farmers and their buyers. Starting a project like WIG seems easier in Northern America, where big processors have already installed a one on one relationship with farmers in the neighbourhood of their processing facilities. The more diffuse network in Belgium and Europe doesn't make things easier.

Assessing the value to the processors would be a hard analysis to make. Fortunately, we have a good first indication from the investment of 850k which is being made by the processors into the use of WIG by the farmers. It is anticipated that this will be taken up by 20% of the farmers in Belgium so more or less the current user base of WIG. In general, as a first approximation benefits are shared so 850k investment would lead to 1.7m of benefits; both figures over 2 years.

If this were to become adopted across the whole industry, probably through adoption of regulations or market-based rules driven by the "branch" platform, the benefits would be 5x i.e. 4.25m up to 8.5m.

But the processors will also benefit from an overall increase in yields by Belgian growers. We saw earlier that between 15% and 20% of gain is anticipated once WIG has been fully developed and adopted. The market value of the processed potatoes is 2.2b. But, whilst this increase can help drive the processors business, only a fraction of this will be a benefit since potatoes could be sourced from elsewhere. We shall take a net benefit of 5% for the processors which leads us to

the results shown in xxx which we assign to an overall better control of the production ie improved process management.

	Today		Full Adoption	
Investment by processing industry	425k		4.25m	
Benefits deriving from investment	425k – 850k		4.25m -8.5m	
Yield increase			15% - 20%	
Revenue increase based on 2.2b			330m – 440m	
Share of benefits from increased production	5%			
	Today	Full Market	Full Technology	Full Market & Technology
Value of benefit	425k - 850k	4.25m -8.5m	1.6m – 2.2m	16.5m – 22m

Table 5-5: Benefits for the processing industry

### 5.2.5 Tier 5: Supermarkets, Shops – and Friteries

Supermarkets and shops are not heavily affected economically by the increasing potato yields, though shortage and oversupply can lead to promotion actions, especially by retailers. Since food patterns and new trends emerge as a result of globalization, the consumption of processed potatoes and chips in Belgium is estimated to either stay stable or experience slight decline over the next years. Supermarkets are thus interested in having a stable supply, satisfy the demand that is there and profit from a positive image through the decreasing use of chemicals on the part of the farmers. Furthermore, the 5,000 chip shops that are satisfying the Belgian need for chips can be sure of a stable supply of their main offering. On the other hand, the potato crop remains strongly linked to nature and the weather conditions. Contracts are being made before potatoes have been harvested. When “accidents occur” due to exceptional drought and heat – as in the 2019 crop – processors are confronted with higher raw material prices, which cannot be translated to the retail trade. WIG could contribute to better understanding of both historic trends and future predictions and offer at least a partial solution for this blindness.

### 5.2.6 Tier 6: Citizens and Society

The general public benefits in several ways from the services offered by WIG. As just mentioned, the societal food patterns have changed and so the demand for processed potatoes such as chips is slowly decreasing. Thus, a higher output of processed potatoes may benefit citizens if it means prices stay stable in view of climate change-induced extreme weather events or even decrease thanks to economies of scale. More interesting for the general public is most likely the decreasing use of chemicals in the fields that can enter the soil and ground water. Moreover, a more efficient



use of water generates savings. The general public thus benefits from more healthy potatoes and a more sustainable environment rather than financially.

### 5.2.7 Other Beneficiaries

The project to establish a cross-sector, and cross-administration platform known as a “branch” has been mentioned earlier in chapter 2. If successful, the platform will allow a more optimum sharing of benefits along the value chain and especially between the farmers and the processing industry. In time, this will allow the full benefit of Sentinel use to develop the Belgian potato industry both from the farmers perspective to maximise the homegrown crop and from the industry to increase their supply chain. This potential has been considered in looking at the overall benefits of the use of WIG.

## 5.3 Summary of Benefits

The summary of the quantitative benefits calculated is shown in Table 5-6 below. As indicated earlier, the benefits today are only a fraction of the potential benefits coming across the country as a result of using WatchITgrow. The benefits may seem high, but this must be considered in the context of the whole potato sector in Belgium to which WIG will contribute significantly.

Each benefit is shown against the tier in the value chain to which it applies. Hence the value of WIG today along the whole value chain (tiers 1,2,3,4) is assessed to be between €1.87m and €2.2m distributed according to the different impacts.

Today, WIG is addressing around 10% of the market in Belgium. It is being used by around 420 farmers out of a total of 5000. But there are always likely to be some farms which do not adopt the new technology and we have assumed a market uptake of 80% is the maximum potential. Hence, if the system were to be applied to this whole market then the benefits would be as shown in the second column headed “full market”. These are assessed at €16.4m to €24.4m.

Tier		Today	Full Market	Full Technology	Full Market & Technology
1	Service provision	No direct financial benefit			
2	Reduced chemicals	125k	1.19m	250k	2.38m
	Increased Yield	800k – 1.2m	8.1m – 11.9m	4.5m – 7.9m	40m – 59m
	Better timing of harvest	270k	2.7m	395k	3.95m
3	Reduced agronomist kilometrage	150k – 180k			
4	Improved process management	425k- 850k	4.25m - 8.5m	1.6m – 2.2m	16.5m – 22m

TOTALS (min)	€1.78m	€16.4m	€6.9m	€63 m
TOTALS (max)	€2.6m	€24.5m	€10.9m	€87.6m

Table 5-6: Benefits in Euro coming from the use of WIG

Many of the benefits of WIG are yet to be realised as more data needs to be assimilated by the system and exchanged with the various players. A greater degree of trust and sense of mutual benefits are necessary so that the different actors work more closely together to realise the maximum potential. This is the goal of the “branch” platform.

We have given this the term “technology potential” as it is this realisation which will drive the full potential of the technology. This alone, applied to the current users, would lead to benefits of €6.9m to 10.9m across the whole of Belgium.

Finally, if both these potentials can be reached in full then the benefits are assessed as being €77m to €107.6m.

These calculations have been made for the WIG system to which satellite (Sentinel) data contributes. How much of this can we attribute to the satellite data?

Satellite data is at the heart of the system and, although other data sets are highly important, they would be difficult to apply if it were not for the satellite imagery providing the framework. Consequently, we consider that the benefits of the Sentinel satellite data are at a minimum 50% of the total and could be as high as 80% of the total. Applying this to the minimum and maximum figures given in Table 5-6, we arrive at the results shown in Table 5-7.

	Today	Full Market	Full Technology	Full Market & Technology
Totals for WIG (min)	1.78	16.45	6.90	63.05
Totals for WIG (max)	2.63	24.48	10.93	87.58
Total for Sentinel (min) - 50%	0.89	8.23	3.45	31.53
Total for Sentinel (max) - 80%	2.10	19.58	8.74	70.06

Table 5-7: Benefits (in mEuro) from the use of the Satellite data

It shows that the benefit today, due to the use of the Sentinel data as a part of the WatchITgrow platform, is between €0.9m and €2.1m which can rise to €8.2m to €19.6m with a full penetration of the market in Belgium. As the technology improves, more data is entered into the system and a co-operative platform or “branch” is created, the benefits rise sharply to a potential of €31.5m to €70m. This is shown illustratively in Figure 5-1.

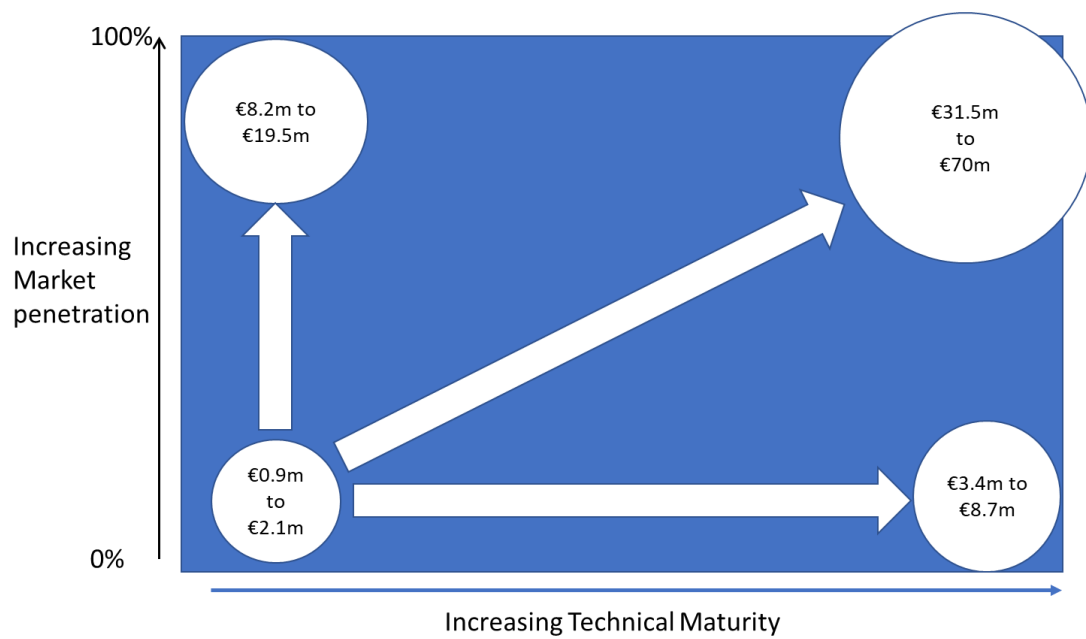


Figure 5-1: Representation of the potential benefits of using Sentinel data for Growing Potatoes in Belgium

## 6 Conclusions

### 6.1 Summary of Findings

The potato industry is an important part of the Belgian economy due to the presence of suitable fertile farmland (in the potato belt of northern Europe) and a processing industry that is number 1 in the world. Hence it is fertile ground also for the development of a digital platform which can help the sector to become more efficient.

The WatchITgrow service developed by VITO provides farmers with information on their fields and crops. Imagery from Sentinel 2 lies at the heart of the system which also integrates data coming from the Belgian meteorological service, data entered by the farmers themselves and potentially data from in-situ sensors or even drones in the future.

The data is used by the farmers, the processing industry and other actors in Belgium. As a result, there are some cost savings but also a potentially significant increase in yield. The benefits are calculated as being €1m to €2m today and could rise to as much as €70m in the future, if/when more farmers will use it and technological advancements will have been implemented.

That benefits are so high in Belgium is due to the presence of the processing sector which is several times larger than the growers. This creates benefits along the value-chain and not just focused on farmers as has been the case in other agriculture cases of Farm Management in Denmark. The downstream sector benefits from an increased local source of potatoes as well as better quality potatoes which can be processed into higher value processed products.

WIG, and the use of satellite technology, are also having an impact on the organisation of the sector. We have seen elsewhere, largely outside of SeBS cases, that the ability to develop a synoptic, wide-scale picture enables diverse organisations to overcome barriers to co-operation. The whole sector in Belgium is currently coming together to exchange and discuss the future and to improve overall production processes and revenues. It is not just the satellite data which makes this happen, but we are convinced that it is a strong factor for increased co-operation between the industry, the farmers, and the other stakeholders in the sector. Belgapom, as a common entity is playing a strong role here.

### 6.2 The Impact of Sentinel Data

The Sentinel data lies at the heart of WatchITgrow and whilst other data also plays an essential role in the performance of the system, the regular satellite updates are what make it work. Currently based on Sentinel 2 optical data, Sentinel 1 radar data will be introduced giving an additional source of information which is independent of the weather conditions.

Whilst WIG embraces many different data sources, including that coming directly from the farmers, the satellite imagery provides wide-scale updates on the field and crop conditions. The value of the satellite data in the overall system is high and we have estimated that between 50% and 80% of this would be lost if the satellite data would not be available.

In the future, other satellite data such as high spectral resolution could be introduced as could better data on soil moisture conditions (which can partly be derived from Sentinel 1). These may add to the overall value of the service to save farmers time, reduce losses and to increase yields.

More frequent observations and faster delivery could also enhance the role the Sentinel data could play. However, more work is needed to assess the capability to detect blight in time to react. The disease spreads very rapidly but greater sharing between farmers across Belgium could enable a more effective treatment to become possible.

### 6.3 Widening the Perspective

Potatoes are grown in many countries and the use of Sentinel's data and of applications like WIG could be extended to those quite easily. There are of course legislative and technical hurdles to adapt to different countries, but the technology is quite portable. In fact, VITO and the industry association Belgapom are already working hard to promote Belgian products elsewhere in the world.

The top 20 potato growing countries (see Figure 2-1) are potential targets for the export of the technology although the top 3 (China, India, Russia) will all be difficult to address. Just in Europe, Belgium is producing about 8% of the crop and if we simply scale the benefit of the use of satellite data across Europe we have a figure today of between €10m and €25m and with realisation of the full potential of the system an impressive €450m to €1b. Of course, not all of this would be possible given that the same leverage effects with the processing industry as exist in Belgium are not present in all countries, but even so a benefit of several €100m should be possible. And, whilst the processing industry is a driver it is also a barrier in that the farmers do not trust them. Hence, in other countries where there is no tension in the value-chain, there may be lower barriers to achieving the full potential.

Other root crops may also be addressed with perhaps sugar beet being the closest in nature to potatoes. Europe has significant production capability for sugar beet and a service could easily be extended.

Rank	Country	Production (million tonnes)
1	 Russia	51.36
2	 France	33.79
3	 United States	33.49
4	 Germany	25.50
5	 Turkey	19.46
6	 Ukraine	14.01
7	 Poland	13.52
8	 Egypt	13.32
9	 China	8.09
10	 United Kingdom	5.69
<b>Total</b>	World	<b>277.23</b>

Figure 6-1: Global sugar beet production (2016)<sup>64</sup>

## 6.4 Final Thoughts

The story of the use of Sentinel data to support potato crop production in Belgium is indeed an interesting one. We see, as in earlier cases, the potential to deliver considerably more economic benefit as the technology becomes more mature and it is taken up by more farmers. Today only around 1 to 2% of the potential is being realised.

Belgium differs from many countries with the presence of a world-leading potato processing industry which acts as the spur for investment in the application WatchITgrow and the consequent use of Sentinel data. The industry is not fully aligned today due to unequal power within the value-chain and due to the political/administrative set-up in Belgium. So, it is particularly interesting that the use of satellite data and WatchITgrow is forging new alliances with the formation of a national level “branch” to provide a neutral platform for exchange between all the key stakeholders.

There is significant potential to expand the use of the Sentinel data to support potato farming and improve production, as well as reducing inputs, in Belgium and then elsewhere in the world.

<sup>64</sup> Source: Wikipedia/FAO statistical office.



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## Annex 2: General Approach and Methodology

This is the seventh case to be analysed which looks at the value being created by the use of Sentinel data. It follows the same basic methodology<sup>65</sup>, established during a previous study, which follows a value chain for the use of a single EO service. Additionally, the analysis includes a look at the environmental impacts.

For each case, a value chain is established with a service provider and a primary user. The value-chain is validated with these two key players. Through a combination of desk and field research we develop our understanding of all the actors in the value chain, the role that they play and how they may benefit through the use of the satellite-derived products.

Once written, the draft report is then shared with all the persons with whom we have spoken and their comments are incorporated or a further discussion is held to establish common understanding. At the end of this process, the report is made public.

For each new case, a comparison of details of the methodology which has been used will update our perspective on the overall methodology to be used for future cases. What have we learned from this case?

In this case the following points stand out:

- There are strong similarities between the use of Sentinel data to support farm management for different crops. The fundamentals are very close but the context and business model does vary.
- In this case, the processing industry is a strong driver and could have been considered as the primary user. Much of our discussion was with the Association Belgapom which represents this part of the sector.
- The potential for increase in value is high. Both the market penetration and the technical maturity will improve so driving higher potato yields, better information for the industry and overall production in Belgium. It seems likely that these characteristics will be present in all agriculture cases.

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<sup>65</sup> SeBS Methodology; June 2017.

### Annex 3: Winners... and losers?

The creation and subsequent usage of Sentinel data down the value chain has a significant economic impact. Quite prominently, product and process innovation based on the availability and subsequent application of the data, lead to positive effects where new products and services emerge and existing processes can be run more effectively and efficiently. Conversely of course, there are also consequences on some of the previous beneficiaries. For instance, revenues might be shifted and jobs displaced and sometimes even destroyed, creating technological unemployment. In the current study, for example, some workforce might have been lost in reducing the site inspections while savings from farmers certainly translates into loss of revenues for the agro-chemical industry.

As we have shown in our study 'Winter navigation in the Baltics' as the captains on the icebreakers in the Baltics could suddenly rely on Sentinel based ice charts providing a fully synoptic picture of the ice, the helicopter pilots they traditionally relied upon, became abundant.<sup>66</sup> Similarly, in our study 'Forest Management in Sweden' the Swedish Forest Agency could reduce the number of forest inspectors, as Sentinel data allowed for a reduction of in situ inspections.<sup>67</sup>

How technological progress and innovation are related to employment has been an area of fierce debate for centuries. From fairly recent studies appear that product innovation spark new economic activities, creating new sectors, more jobs, whereas process innovation<sup>68</sup> is more job destroying, although market mechanisms can sometimes largely compensate for the direct job losses, mitigating the ultimate impact on demand for labour. Such price and income compensations can derive from a decrease in wages, leading to an increase in demand for labour or the effects of new investments (enabled by accumulated savings) creating new jobs elsewhere. Obviously, the speed and impact of such effects are highly dependent on the flexibility of markets, the level of competition, demand elasticity, the extent of substitutability between capital and labour and, of course, possible institutional rigidity.<sup>69</sup>

A German study on the co-evolution of R&D expenditures, patents, and employment in four manufacturing sectors concluded that patents and employment are positively and significantly correlated in two high-tech sectors (medical and optical equipment and electrics and electronics)

but not in the other two more traditional sectors (chemicals and transport equipment).<sup>70</sup> Similarly, a study using a panel database covering 677 European manufacturing and service firms over 19 years (1990–2008) detected a positive and significant employment impact of R&D expenditures only in services and high-tech manufacturing but not in the more traditional manufacturing sectors.<sup>71</sup> Another study found a small but significant positive link between a firm's gross investment in innovation and its employment based on longitudinal data set of 575 Italian manufacturing firms over 1992–1997.<sup>72</sup>

Clearly, this tells us that the ultimate 'net' impact of innovation – both at product and process level - brought about by the availability of new technology, such as Sentinel data, will be closely related to the market and institutional settings in which they become effective. However, on the whole the conclusion seems justified that the 'negative' effects, in the form of possible loss of employment, is largely outweighed by the positive economic effects throughout the value chain.

Accordingly, in this study – and likewise for the past and future ones - we will concentrate on the positive effects brought about by the availability of the Sentinel data throughout the value chain. That there are also (temporary) 'negative' impacts is a given, but the net effect at macro level will always be positive.

## Annex 4: About the Authors



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# Potato – processing

## STRATEGIC INVESTMENT PLAN

2017-2021





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# Introduction

**This Strategic Investment Plan (SIP) is the roadmap that helps guide Hort Innovation's oversight and management of individual levy industry investment programs. The SIP lays the foundation for decision making in levy investments and represents the balanced interest of the particular industry from which the levy is collected. The very important function of the SIP is to make sure that levy investment decisions align with industry priorities.**

Hort Innovation is the not-for-profit, grower-owned research and development (R&D) and marketing company for Australia's \$9 billion horticulture Industry.

As part of the role Hort Innovation plays as the industry services body for Australian horticulture, the organisation is tasked by the Australian Government with working alongside industry to produce a strategic plan for investment of levies in industry R&D and marketing activities.

Each individual levy industry investment strategy also speaks to the future growth and sustainability of the Australian horticulture industry as a whole. The SIPs are produced under the umbrella of the Hort Innovation Strategic Plan, which takes a whole-of-industry view in setting its direction, as it considers broader agriculture government priorities for the advancement of Australian horticulture.

The process of preparing this SIP was managed by Hort Innovation and facilitated in partnership with Industry Representative Bodies and Strategic Investment Advisory Panels (SIAPs). Independent consultants were engaged to run the consultation process, to gather the advice from stakeholders impartially and produce a plan against which each levy paying industry can be confident of its strategic intent.

Hort Innovation has valued the support, advice, time and commitment of all stakeholders that contributed to producing this SIP, especially processing potato growers.

## The processing potato SIP

Owners of processing potatoes – the person who owns the potatoes when processing begins – in the processing potato industry pay levies to the Department of Agriculture and Water Resources (DAWR), who is responsible for the collection, administration and disbursement of levies and charges on behalf of Australian agricultural industries.

Agricultural levies and charges are imposed on primary producers by government at the request of industry to collectively fund research and development (R&D), marketing, biosecurity and residue testing programs.

The levy rate on processing potato is 50 cents per tonne.<sup>1</sup>

Hort Innovation manages the processing potato levy funds proportion directed to R&D (49 cents per tonne). Separately, Plant Health Australia (PHA) manages plant health programs (1 cent per tonne). In 2015/16, total processing potato R&D levy receipts were approximately \$405,000.

Hort Innovation has developed this SIP to assist in strategically investing the collected processing potato levy funds in the priority areas identified and agreed by the industry. The ability to deliver on all the articulated strategies (and investments) in an impactful manner will be determined by the ability of the statutory levy to provide the resources to do so.

This plan represents the Australian processing potato industry's collective view of its R&D needs over the next five years (2017 to 2021). This plan has been developed in consultation with Australian processing potato levy payers through a synthesis of direct consultation with research providers and industry thought leaders and two workshop sessions with Hort Innovation's processing potato Strategic Investment Advisory Panel (SIAP). The stakeholders consulted are listed in **Appendix 1**.

The processing potato SIAP has responsibility for providing strategic investment advice to Hort Innovation. Both Hort Innovation and the panel will be guided by the strategic investment priorities identified within this plan. For more information on the processing potato SIAP constituency please visit Hort Innovation's website at [www.horticulture.com.au](http://www.horticulture.com.au).

## Market failure considerations

The intent of the R&D levy funding program is to invest in areas where there is market failure or under-investment by private businesses because they cannot capture all of the benefit gained from such investment, such as investing in structural change or where there is a public benefit beyond commercial advantage to individuals. Economists term this as 'externalities'. As such, the focus in this SIP is on pre-competitive R&D. At the request of the SIAP, this SIP focuses on on-farm production and productivity issues and does not deal with supply chain, product innovation and other factors beyond the farm-gate.

<sup>1</sup> <http://www.agriculture.gov.au/ag-farm-food/levies/rates/potato>



# Potato – processing

## STRATEGIC INVESTMENT PLAN 2017-2021 AT A GLANCE

### POTENTIAL IMPACT OF THIS PLAN



Based on an estimated investment of \$3.59 million over the next five years.

### Major opportunities

- To take advantage of the world's best scientific knowledge in potato agronomy and pest and disease management
- The growing demand for potato products in nearby South-East Asian markets
- The potential to leverage Australia's horticultural levy system to grow skills.

### Major challenges

- Biosecurity incursion especially psyllid
- Global oversupply and dumping in the Australian market eroding prices
- Appreciation of the Australian dollar which will drive imports
- Decreased consumption due to greater awareness of health risks
- Higher input costs in all categories relative to competing countries
- Lower and more variable yield than competitors
- Lack of economies of scale and capital utilisation
- Some resistance by growers to better position themselves for the developing global realities of the sector
- Inconsistency in the quality of agronomic advice
- Business and whole-of-farm management skills
- Lack of profitability constraining re-investment.

OUTCOMES	STRATEGIES
Industry has access to the world's best agronomic information and networks, resulting in increased productivity	Compile a database of knowledge sources from local and overseas centres of excellence
	Assist our research community to establish/tap into global virtual scientific community on potato research
	Identify gaps where the global science does not cover Australian specific issues or challenges
	Initiate projects to fill any gaps identified in the previous strategy
Growers are serviced by professional agronomists with best practice potato expertise, resulting in improved industry skills and knowledge	Introduce annual visiting fellow program
	Run subject specific professional training workshops for consulting agronomists (consider accreditation scheme)
	Supply advisors with information and materials that simplify and summarise the science in a format that growers can relate to (so-called 'muddy boots science')
	Establish a social media network facilitated by industry experts and professional advisors within the processing potato community (ensure adequate funding to maintain)
	Develop soil management resource kit with practical and cost-effective tools
	Develop a calendar of coordinated program of regional field days and/or trials, specifically for processing growers (in cooperation with industry suppliers)
	Develop Skype or web-based advisory platforms/tools so growers located in remote areas also have access to visiting experts and any industry training on offer



# Potato – processing

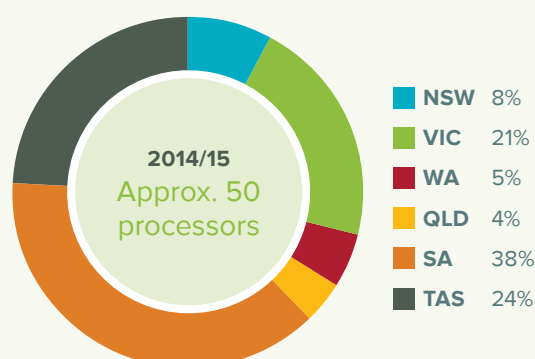
## STRATEGIC INVESTMENT PLAN

### 2017-2021 AT A GLANCE

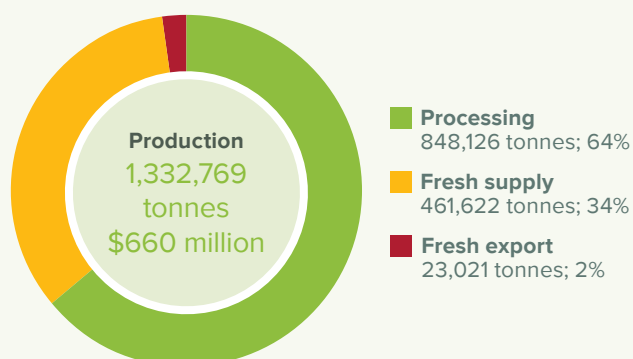
OUTCOMES	STRATEGIES
Losses from pest and disease are reduced, resulting in improved quality and increased marketable yield	Encourage use of PreDicta Pt, a DNA based soil testing service, and support R&D to extend application to pink rot and Potato cyst nematode (PCN)
	Establish appropriate, prioritised R&D and extension programs for highly rated pest and diseases
	Expand pest trapping program and develop national response plan and biosecurity manual for phylloxera and other threats (as per Tasmania)
	Support wider industry efforts to increase the quality of certified seed throughout the supply chain in order for it to be fit-for-purpose
	Initiate project with chemical companies to gain a better understanding of chemical efficacy and compatibility of active ingredients
	Include integrated pest management (IPM) as a core subject area in the regional field days program
	Review current soil surveillance systems

OUTCOMES	STRATEGIES
Precision agriculture and related technologies/ systems become standard practice, resulting in reduced cost of production	Run regional 'future farming' workshops as part of proposed extension projects
	Ensure industry is engaged with other Hort Innovation precision agriculture programs such as robotics at University of Sydney
	Identify blockers to commercial adoption of precision agricultural systems and other technologies then initiate priority projects in response
	Establish potato precision agriculture Community of Practice or information resource
Collaboration across the supply chain to achieve cultural change has resulted in improved economic sustainability	Provide scholarships for agribusiness professional development courses
	Introduce Next Gen program including overseas study, mentoring, internships, and basic business skills for growers, scientists and advisors
	Initiate project to identify and communicate alternative business models to growers
	Initiate and communicate self-assessment tool for web-based benchmarking on yield and cost such as the University of Idaho web-based tool
	Build a processing potato-specific information digital database
	Initiate extension program in natural resource management, best practice land use and sustainability

#### Industry size and production distribution



#### Potato supply chain and value 2014/15





## SECTION ONE

## Context

## The Australian processing potato industry

## Crossover with the fresh potato SIP

There is a high degree of crossover between the processing potato SIP and the fresh potato SIP. Both plans essentially focus on on-farm productivity and management, meaning that the performance issues and the strategic responses in both plans are very similar, and in some cases, identical. Therefore, it is envisaged that where there are similar projects, there be cross-sectoral investment and joint oversight of the projects.

## Industry overview

The processing potato industry includes French fry and related fried products; potato snacks such as crisps and other value-added products; and dry potatoes and ready-to-serve potato products. Levies are applied to the industry: 90 per cent of levies are accounted for by French fry and related fried products and crisping potatoes. The Potato Processing Association of Australia (PPAA) records indicate that there are 49 registered processors, with Simplot Australia; McCain Foods Australia; Smiths (PepsiCo); and Snack Brands Australia being the largest organisations.

## Production across the supply chain

There is a lack of detailed and accurate data on the processing potato sector. Virtually all production data relating to potatoes covers the entire category and does not break down to processing sub-category. Industry has access to better quality intelligence, but for reasons of commercial confidentiality it is not publicly available. The best available estimates used in this plan have been compiled in collaboration with the SIAP members and the PPAA, as well as seeking expert opinion from industry networks.

The PPAA estimates the total production of processing potatoes to be at around 840,000 tonnes. This includes 540,000 tonnes of varieties for frozen processing, and 240,000 tonnes for crisping. It is estimated that a further 30,000 to 40,000 tonnes of crisping potatoes are exported. Field production volume is believed to be relatively flat. While the number of growers has declined, the average tonnage per grower has increased due to industry rationalisation, largely driven by a trend for processors to reduce suppliers.

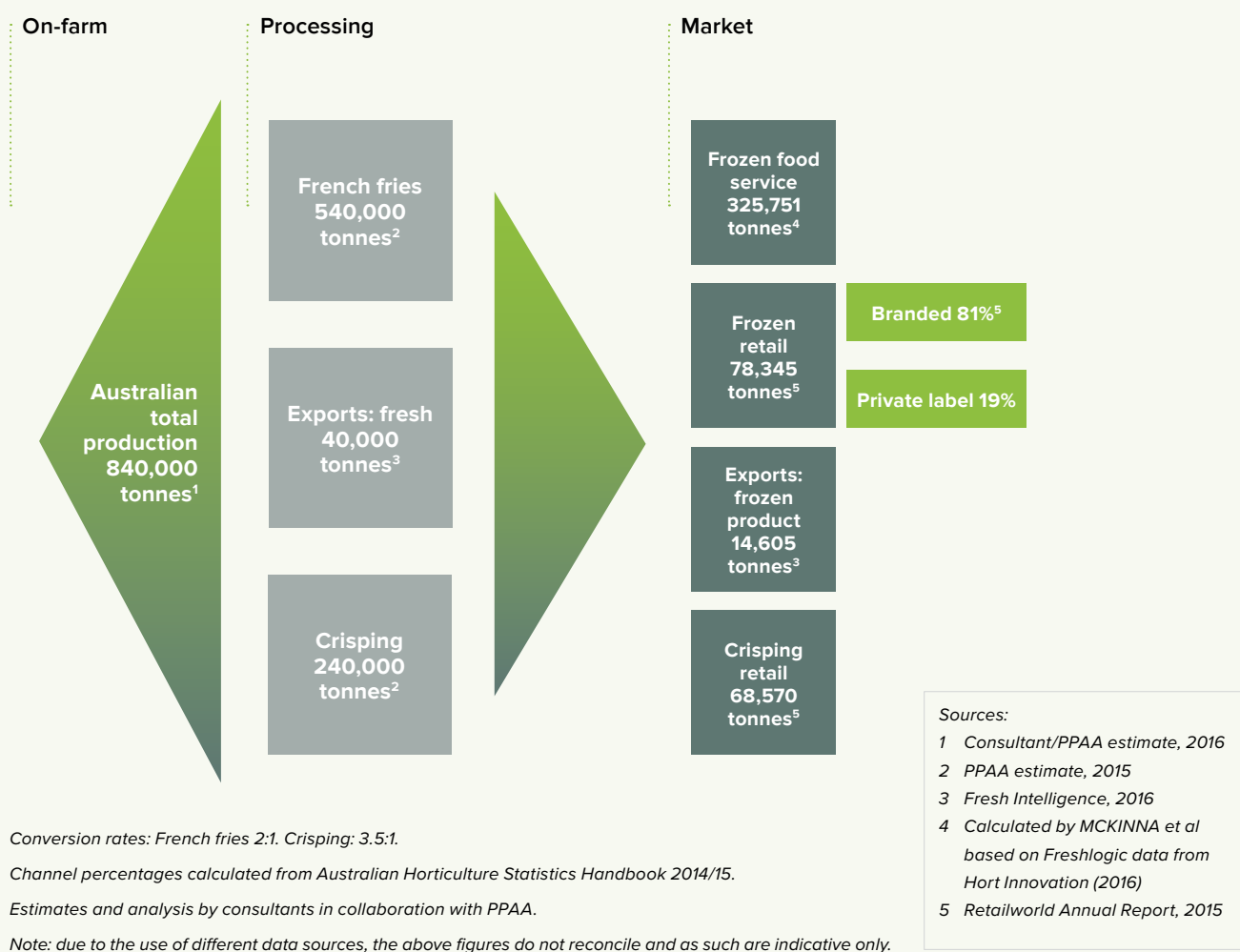
Simplot Australia and McCain Foods Australia are the two main producers of French fries in Australia. Product grown in Tasmania by Simplot Australia is supplied to their factory at Ulverstone whilst McCain Foods Australia has processing facilities at Smithton in Tasmania and Ballarat in Victoria. In addition to local sourcing, product for McCain Foods Australia is also procured from the Penola region in South Australia and Riverina in New South Wales.

There are around five significant crisping processing factories located throughout Australia. These are mostly along east coast locations in Sydney, Brisbane, Adelaide and a smaller facility in the Yarra Valley. Because it is less desirable to store crisping potatoes, they are sourced from a wide geographic growing area nationwide and have an extended growing season as crisping processors need to source freshly harvested potatoes year round.

The vast majority of processing potatoes procured by the major processors are sourced on an annual contract basis, subject to yearly price negotiations.

In addition to the major processors noted above, a growing number of smaller-scale regional processors are emerging that service small and gourmet quick service restaurant (QSR) chains and independent outlets. A number of these are located within traditional potato growing areas such as Gembrook in Victoria and Manjimup in Western Australia and have emerged as growers who have vertically integrated their operations.

**Figure 1: Processing potato production snapshot**

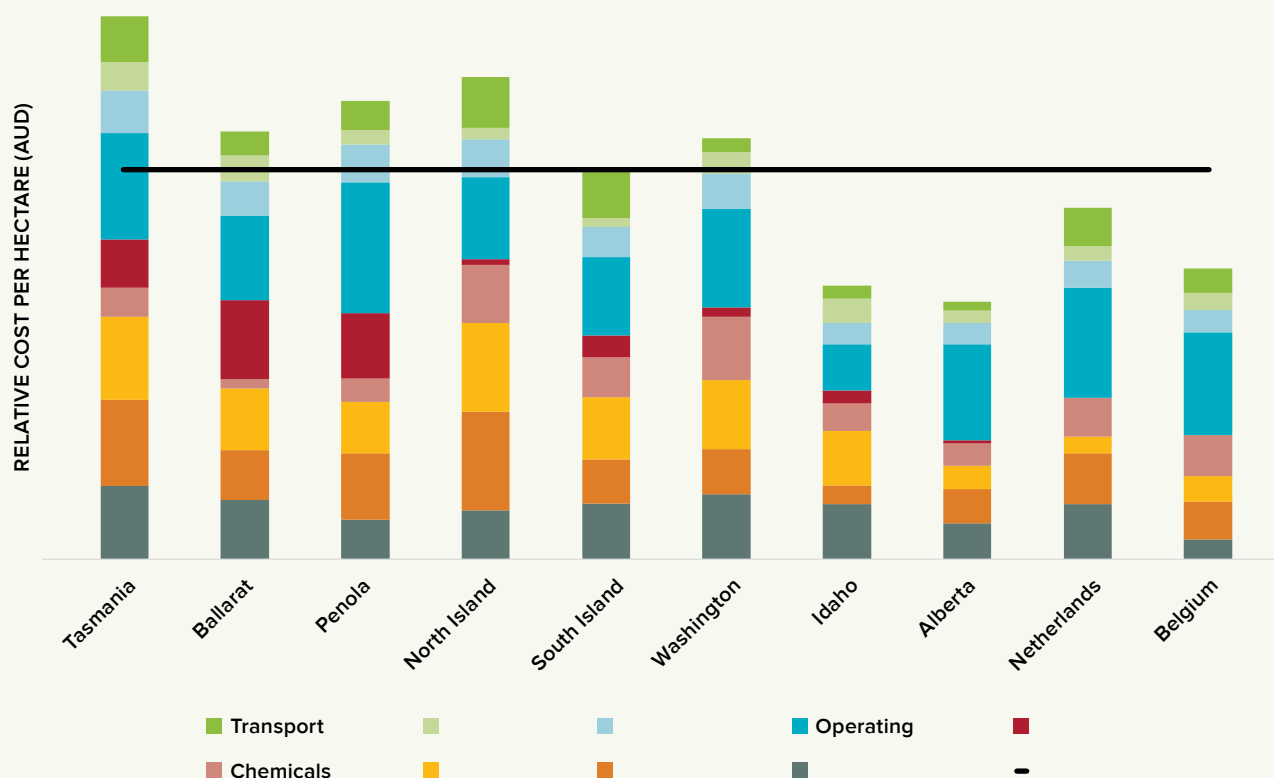


## Cost of production

Processors' internal benchmarking indicates that Australia's average cost of potato production is up to 50 per cent higher than the United States and Europe. As the major processors are part of multinational businesses, they are benchmarked against their counterparts globally, and are therefore able to report that the cost of raw processing potatoes is higher in Australia than in most other plants. It is important to note that the supply situation in China differs to other markets as there is a shortage of raw potatoes – it is more cost-effective to import finished product from the United States. Various studies have also been conducted in Australia on the cost of processing potatoes. **Table 1** outlines relative cost differences.

**Table 1: Average processor price** (Source: Mark Heap, Simplot, 2016)

Country	Processor price USD	Comments
USA	(160 to 170) 208	Typical, but with some open market variation
India	147 to 190	Open market extremely volatile and frozen processors must contract 100 per cent
China	230 to 300	Prices vary depending on end market. Mostly grown to contract. QSR raw potatoes are in short supply so growers are paid a premium. Grower input costs are higher due to the greater need for chemicals.
Europe	176	Extremely volatile, depending on weather during growing season. A large volume of non-contract, open market influence
Australia	230 to 250	All contracted, price varies a little according to tuber quality

**Figure 2: Relative processing costs: global comparison***(ABS (2015) and ABARES (2014) Australian vegetable growing farms: An economic survey, 2012–13)***\*Notes:**

Actual costs have been removed from this graph for reasons of commercial confidentiality.

The calculation includes depreciation and finance costs. Costs were originally calculated at USD 0.74.

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A global benchmarking study by commissioned by McCain Foods Australia in 2011 shows that Australia has higher costs in almost every cost component of processing potato production. Although this study is now outdated, the relativities will not have changed.

There are a number of factors contributing to Australia's higher cost of production and this is explained in **Table 2**:

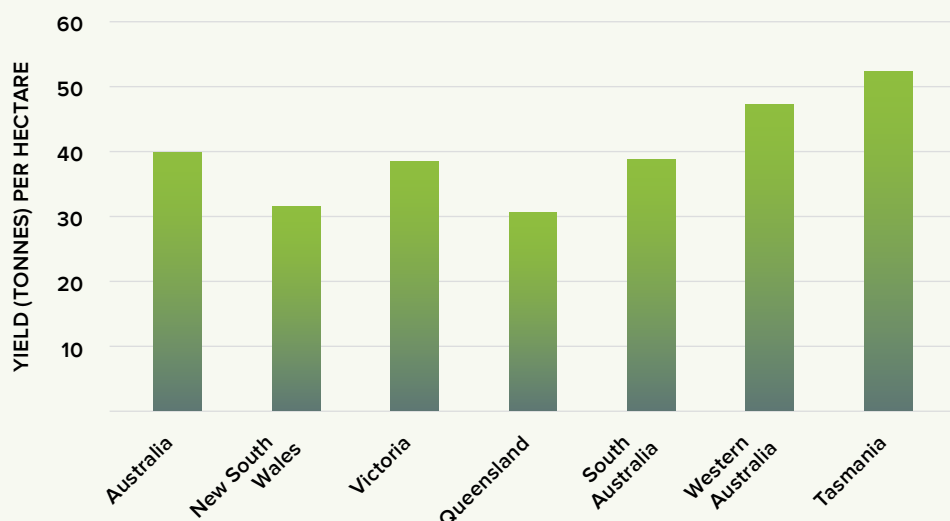
**Table 2: Contributors to the high cost of potato production in Australia**

Cost area	Issue
Labour	Australia's labour costs are more than double those of competitor countries when penalty rates and flow-on costs are included. Furthermore, the smaller scale of potato production results in lower rates of labour productivity.
Yield	Although Australia's best growers are achieving yields similar to the best growers overseas, the average is considerably less and varies greatly seasonally, regionally and even within paddocks.
Input cost	Australia has substantially higher input costs that is largely due to scale and the amount of competition in key areas such as chemicals, fertiliser, fuel and equipment.
Seed	Seed accounts for 20 per cent of cost of production but has a huge bearing on yield. 80 per cent of processing growers are using certified seed. Seed cost is higher than other countries and availability is often an issue due to seasonal conditions.
Scale	Australian average acreage is smaller than New Zealand, United States and Canada. The economies of scale in potato production are substantial, particularly with equipment utilisation and the ability to justify the biggest and best technology.
Farming models	In Europe, small-scale disadvantage can be offset by farming models such as use of contractors, machinery collectives, collective farming and cheaper land. Australian growers are reluctant to adopt alternative business models.
Geography	A large proportion of processing potatoes are grown in areas of undulating hills such as Tasmania and Ballarat which are subject to high rainfall that limit the ability to use large-scale equipment, therefore, slowing the speed of operation.



**Figure 3: Potato yields per hectare by state 2013/14**

(Source: ABS (2015) and ABARES (2014) Australian vegetable growing farms. An economic survey 2012-13. Haydn Vale research report 2014/15.)



## Processing potato yields

As noted in **Table 2**, with some exceptions, Australian yields are lower on average than other producing nations. The Australian Bureau of Statistics (ABS) data does not separate yields by type of potato or production use, therefore, the data below includes ware potatoes, French fry and crisping potatoes, all of which have differing benchmarks.

Australian potato yields vary considerably by region, season, time of year, grower and also, across a particular paddock. Overall yields are highest in Tasmania as a result of the better growing conditions and the fact that the state's growers predominantly produce for frozen processing. The varieties used in frozen production have higher yields than fresh or crisping potatoes. Official average yield for all potatoes (ware and processing) in 2013/14 was 40 tonnes per hectare, but some Tasmanian and Ballarat growers are achieving 60 to 70 tonnes per hectare and higher. The average yield is around 55 tonnes per hectare for frozen processing potatoes, which is significantly lower than the performance of North America and New Zealand. Crisping growers tend to achieve a lower average yield of 40 tonnes per hectare which is due to the cultivars; the quality that is required for the crisping process; the wide range of country where they are grown; their requirement to be grown year-round; and that there is a wider use of in-ground storage.

The key factors impacting yield variability include:

- Soil health and types
- Quality of seed
- Pest and disease load
- Fertiliser management
- Water management
- Access to agronomic expertise
- Grower skill
- Weather and climate change.

Processors indicate that there is a major opportunity to lift average yield in processing potato production in Australia, particularly, by reducing yield variability through better management practices.

## Market overview: French fries

Total consumption of potatoes in Australia is in long-term decline, however, processing potatoes that are grown for frozen products are increasing in share, largely because of the convenience and appeal of the QSR offering.

Frozen potato product categories are extremely price sensitive and highly competitive. This results from them being primarily sold through QSRs and supermarkets. However, market growth is twice the rate in value growth than in volume growth, indicating a shift from commodity fries to higher value specialty products such as coated products and wedges. Private label product accounts for 19 per cent of retail share and is increasing at the expense of branded product.

The QSRs are dominated by McDonalds and Yum! Brands Inc. As these global organisations employ exacting standards and tender for supply of French fries regularly, Australian companies must be price competitive at a global level. French fries can be easily and cost-effectively sourced by sea-freight, and it can often be cheaper for organisations to source frozen products from overseas, rather from within Australia. The predominant supply companies for these QSR organisations in Australia are Simplot and McCain Foods Australia. Both have processing facilities globally and frequently source product from the most cost-effective country to fulfil Australian contracts.

Numerous smaller producers from Europe are gaining market share at the lower end of the fast food market, such as fish and chip shops and small, independent hamburger chains. As a result, import share of total frozen potato products is growing whilst exports are relatively flat. Australia is facing strong competition on the domestic French fry market from imports from New Zealand, North America and Europe.

**Table 3: Frozen potato domestic retail market**

(Source: Retailworld, 2014)

Potato (frozen) value/volume	
Grocery value	\$224.6m
Value change	+ 3.2 per cent
Grocery volume	61,184 tonnes
Volume change	+ 1.6 per cent

Potato (frozen) segment percentage share		
	Value	Volume
French fries	39.1%	48.3%
Specialty fries	35.9%	30.9%
Potato specialties	25.0%	20.8%

Potato (frozen) corporate percentage share		
	Value	Volume
Simplot	39.1%	32.7%
McCain Foods Australia	38.7%	34.8%
Private label	19.3%	31.3%
Others	2.9%	1.2%

Despite the consumer shift to higher value specialty products, private label still accounts for 31 per cent of sales volume, exemplifying the price competitiveness in this category. Although much of the private label product is imported, the two major Australian retailers are consciously shifting more private label contracts to domestic suppliers because of consumer pressure and in light of low Australian dollar forecasts. Even with the recent pressure on supermarkets to support 'Australian grown', it does not apply to frozen potato categories to the same extent as frozen vegetables.

## Market overview: crisping category

The crisping category is highly competitive even though it has low exposure to import replacement. As the product is lightweight but very bulky, crisps are costly to transport. As a result, most snack products, except specialty snacks, are produced in close proximity to where they are consumed.

The snack market is growing strongly both in terms of volume and value. Potato snacks are predominantly retailed through supermarket and route trade channels such as petrol stations, convenience stores and cafés. Speciality snacks make up a significant proportion of the market – these include products like Kellogg's Pringles. Kellogg's holds more than 10 per cent market share but does not process in Australia.

## Domestic market overview: potato snacks

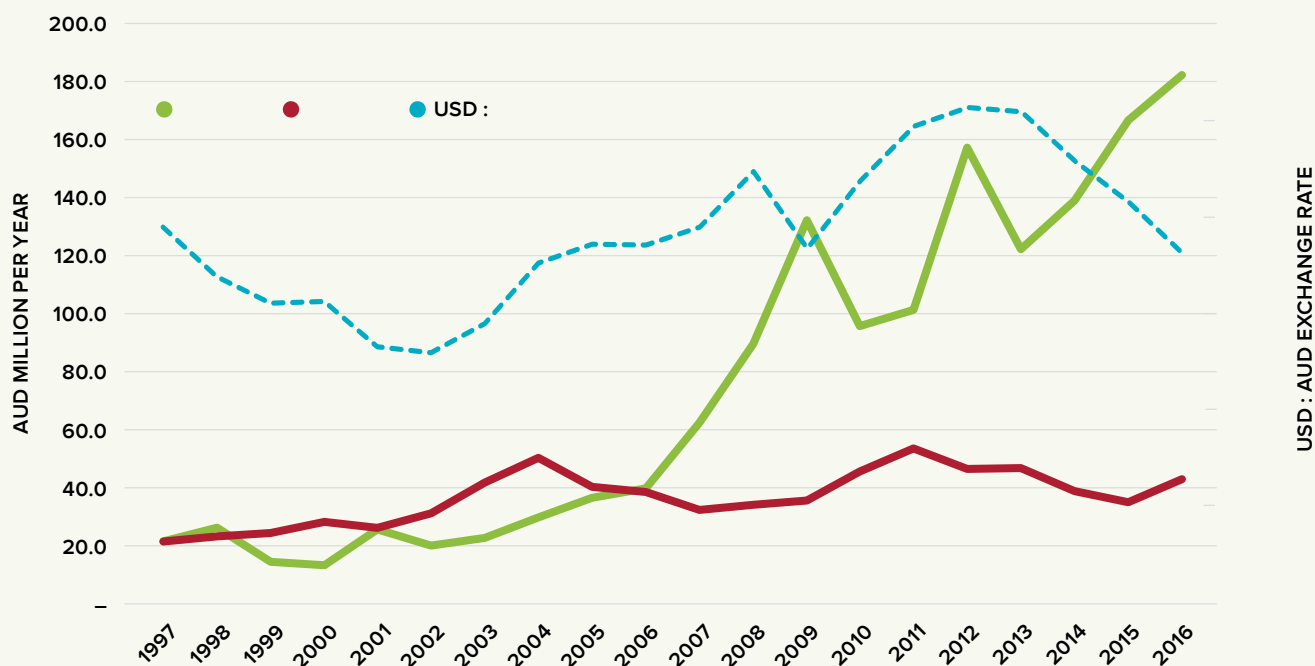
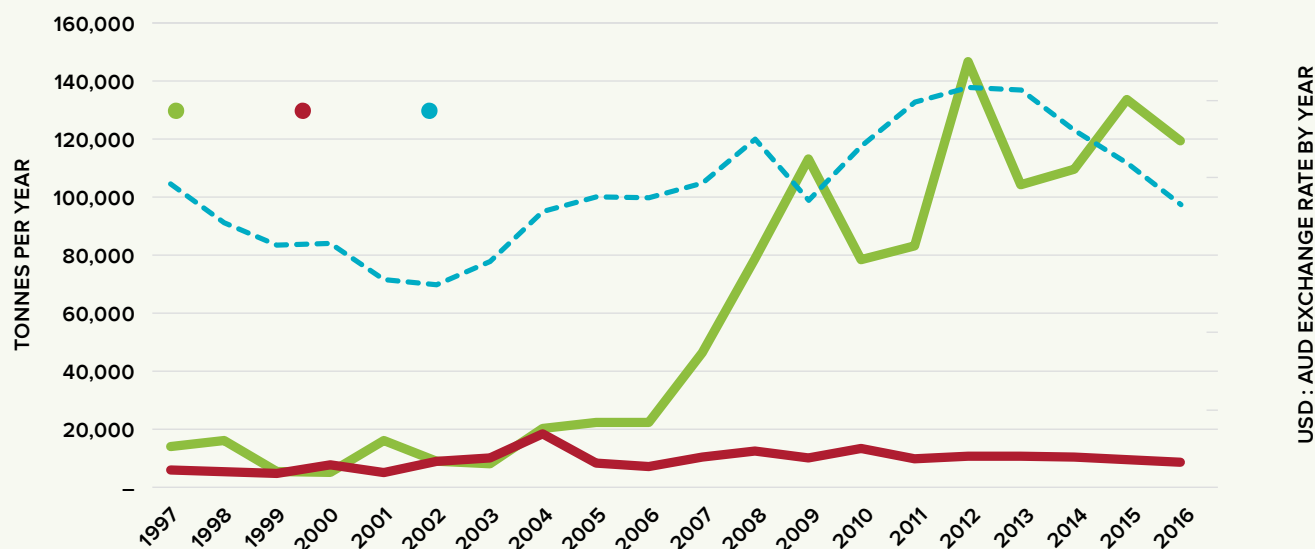
**Table 4: Salty snacks domestic retail market**

(Source: Retailworld 2014.)

Salty snacks (potato)	
Grocery value	\$524.4 million
Value change	+12 per cent
Grocery volume	33,495.9 tonnes
Volume change	+9.9 per cent

Salty snacks (potato) corporate percentage share		
	Value	Volume
PepsiCo	53.2%	52.2%
Snack Brands Australia	29.5%	30.2%
Kellogg's	10.1%	8.9%
Private label	6.8%	8.6%
Others	0.3%	0.2%

*Note: The data does not include route trade channels that are a significant channel for snack products.*

**Figure 4: Global markets – potato products total imports and exports by value 1997 to 2016***(Source: ABS data via Global Trade Atlas. Analysis: Fresh Intelligence analysis, 2016)***Figure 5: Global markets – export vs import frozen prepared potato product (French fries) – USD***(Source: ABS data via Global Trade Atlas. Analysis: Fresh Intelligence analysis, 2016)*

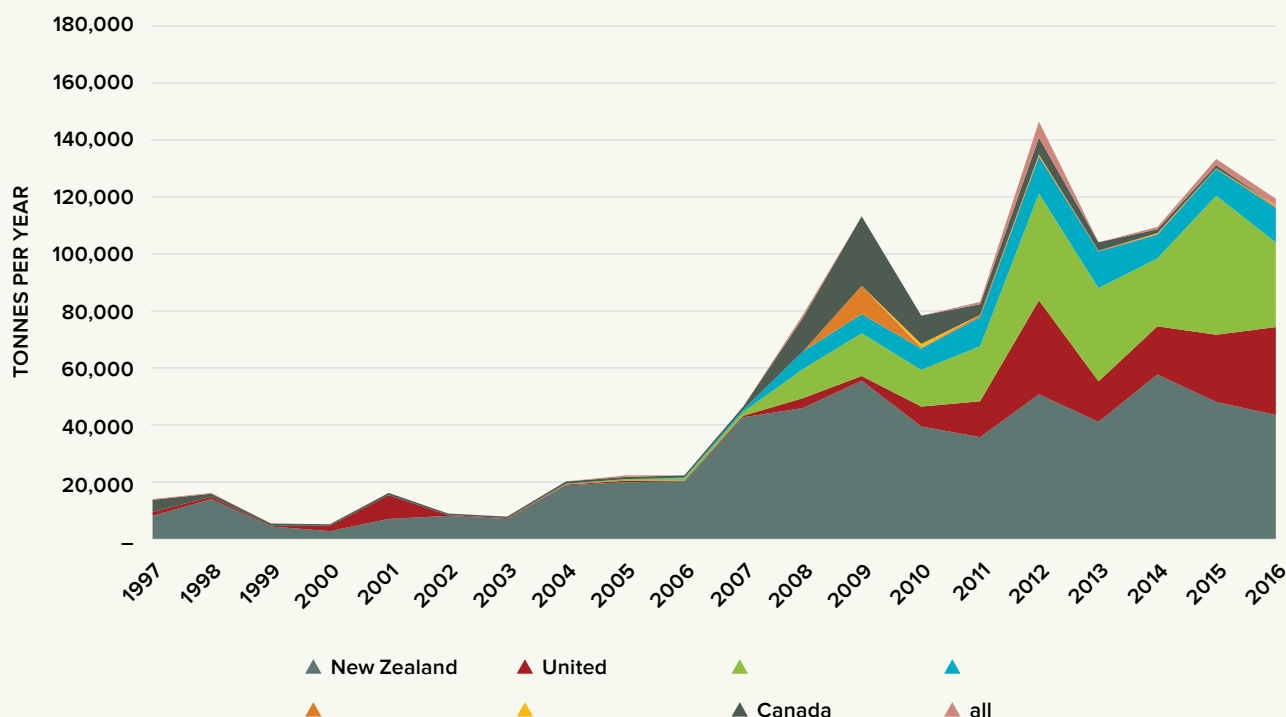
Salty snacks that are produced by well-known and trusted brands hold a much larger market share than private label.

As the majority of potato snack products are retailed through supermarkets and retail channels, and there is an upward trend in supermarket growth and value, a higher rate of value growth can be gained by trading up to higher value, specialty products.

Total imports of potato products have increased steadily over the last 20 years, while exports have remained relatively static. Volumes are sensitive to exchange rates and this is indicated by blue dotted line in the **Figure 4**.

Snack product import is highly sensitive depending on the global supply situation and exchange rate. In times of oversupply, exporting countries are known to 'dump' product on some markets at low prices.



**Figure 6: Global markets – frozen prepared potato product (French fries) imports by supplier 1997 to 2016***(Source: ABS data via Global Trade Atlas; Fresh Intelligence analysis, 2016)*

## Australian trade in frozen potato products

Australia has been an importer of frozen potato products since 2006. Imports are increasing strongly whilst Australian exports are declining. New Zealand is Australia's largest supplier of imports, followed by the United States and Europe. Oversupply in Europe can often lead to dumping of low-cost frozen products on the Australian market. Strategic investment by the Belgian government in frozen food processing has created a powerhouse in frozen categories – many smaller processors who are more agile than the major processors can capitalise on niche markets in Australia relatively easily with a lower cost product.

Australia has strong levels in local manufacture of potato snacks, however, imports are also significant. Much of the specialty product (such as Pringles) are manufactured offshore. The low volume of imports, in terms of tonnage, is misleading, as most potato snacks are low weight.

Import volumes predominantly reflect inter-company trading strategies of multi-national processors and exchange rate fluctuations.

Import levels of crisping potatoes peaked in 2013 when the Australian dollar was above parity.

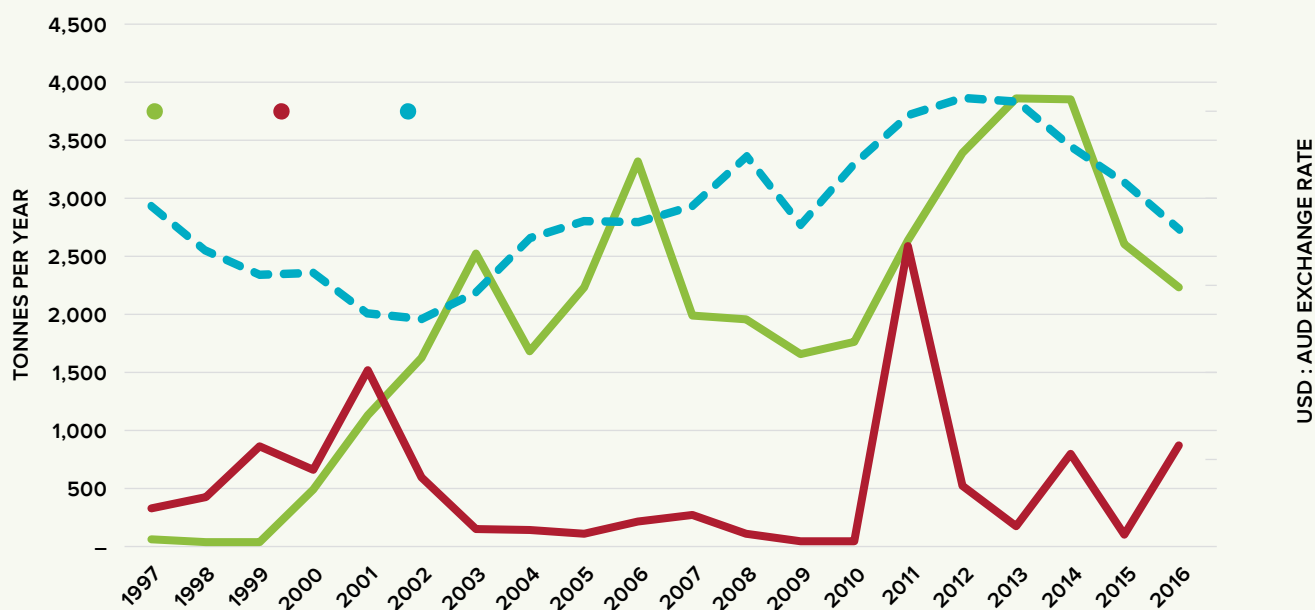
## Situation summary

The data analysis highlights the following key points:

1. The frozen processing potato sector is showing modest growth and the crisping potato sector is demonstrating strong growth.
2. Despite overall market growth, Australian market share is relatively flat because imports are growing. The frozen processing potato sector is losing market share to imports from New Zealand, North America and European producers who are cheaper. However, the crisping processing potato sector has less exposure to import competition because of high freight costs and short shelf life of the products. As crisping products are usually retail products, they cannot be as easily dumped on export markets in the way that frozen products can be.
3. Australia has a substantially higher cost (per hectare and per tonne) of processing potatoes because of:
  - » Lower average yield
  - » Higher input costs
  - » A smaller scale
  - » Lower capital utilisation
  - » More difficult growing conditions
  - » High labour costs.
4. With limited prospects to lower costs, R&D strategic focus needs to be on increasing yield per hectare and placing emphasis on consistency in yield across properties and within fields.
5. Realistically, as Australia's cost disadvantage, opportunities to increase exports are limited (except for near Pacific neighbours for ware potatoes and Asia for crisping potatoes), the focus of the strategy in this respect, must be on protecting the domestic market from import replacements.

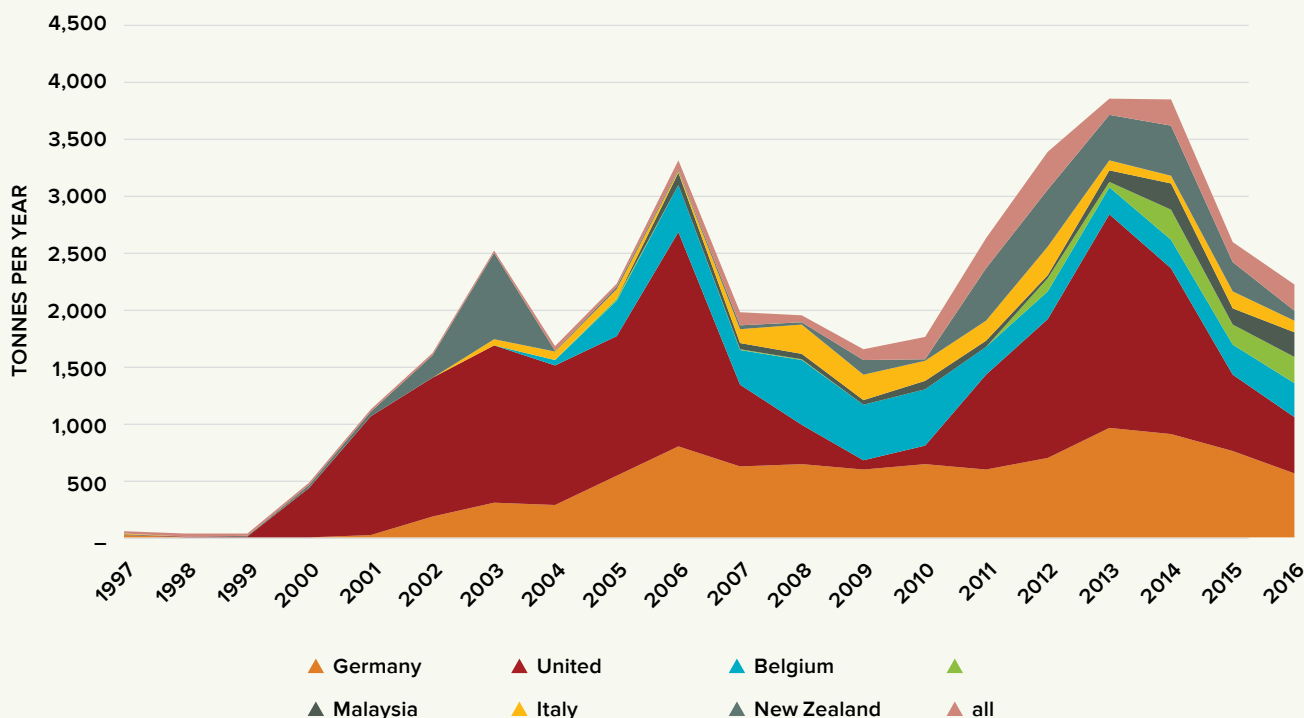
**Figure 7: Export vs import volume non-frozen potato product (crisping) – USD**

(Source: ABS data via Global Trade Atlas; Fresh Intelligence analysis, 2016)



**Figure 8: Non-frozen potato product (crisping) imports by supplier 1997 to 2016**

(Source: ABS data via Global Trade Atlas; Fresh Intelligence analysis, 2016)





## Environmental scan

The purpose of the environmental scan is to identify the factors in the external operating environment that could impact the industry in terms of both opportunities and risks. The analysis is based on a PESTEL framework that systematically reviews the external market forces through Political, Economic, Social, Technological, Environmental and Legal lenses.

### Political impacts

FACTOR	IMPLICATIONS	RISK/OPPORTUNITY
<b>1. Domestic regulation</b>		
<b>Backpacker tax</b>	Potential impact on casual labour supply	Higher labour costs
<b>Review of horticulture award</b>	Increased penalty rates	Higher labour costs
<b>Food labelling</b>	Nutrition or country of origin labelling	Reduced consumption of potato products Potential to drive demand for Australian food
<b>2. Global geopolitics</b>		
<b>South China Sea tension</b>	Disruption to world trade resulting in displaced product exported to receptive markets	Cheap imports of potato products would undermine industry profitability
<b>Brexit</b>	Depreciation of English pound	
<b>United States elections</b>	Growing protectionism in trade	



## Economic impacts

FACTOR	IMPLICATIONS	RISK/OPPORTUNITY
1. Domestic economy delicately balanced		
High levels of household debt	Reduction in consumer spending	Erosion of industry profitability at every level of the supply chain  Greater fluctuation in global exchange rates impacting import/export trade
Increasing current account deficit	Strong likelihood that Australia's AAA credit rating will be downgraded	
Housing market bubble	Shift to lower value products	
Economy not responding to low interest rates	If central banks change strategy and increase interest rates, the cost of borrowing will increase and credit become harder to secure	
Heavy reliance on Chinese economy	Shifts in the Chinese economy could drive the USD upwards and the Australian dollar downwards	
2. Rising costs		
Rising costs of doing business	Difficult to pass on price increases in current environment	Reduced profitability and viability of farming businesses
3. US economy is recovering		
Employment rate rising	USD likely to appreciate	AUD likely to depreciate again which will deter US imports  The cost of US machinery and parts will rise
GDP growth improving	Increased local demand	Less exports
Increased business confidence	Greater investment in capacity	More exports to Australia at lower prices
4. European economy is faltering		
Major economies in Europe delicately balanced	Further devaluation of Euro	Depreciation against AUD will drive imports
5. Food deflation		
Food prices have declined in real terms in most categories: <ul style="list-style-type: none"><li>Global oversupply</li><li>Supermarket power</li><li>Impact of cheap imports</li><li>Growth of private label</li></ul>	Returns to food companies at every level of the supply chain are not keeping up with cost, causing declining profitability	Loss of growers
6. Supermarket dynamic		
Dominance of Coles and Woolworths is under threat from Aldi, Costco and new entrants	Aggressive price war	Increased downward pressure on selling prices
Increasing trading terms	Processors remain under significant trading pressure	Reduced margin and profitability means less ability to invest in brands and increased private label
Growth of private label	Erosion of brand loyalty and brand power	Increased imports  Less brand loyalty

Economic impacts *(continued)*

FACTOR	IMPLICATIONS	RISK/OPPORTUNITY
<b>7. Concentration among global agribusiness supply/ technology companies</b>		
<b>Recent merger and acquisitions:</b> <ul style="list-style-type: none"> <li>• Bayer and Monsanto</li> <li>• Dow and DuPont</li> <li>• China National Chem Corp and Syngenta</li> </ul>	Inputs and technology will become more expensive and availability more restricted  Shift from chemicals to genetics to control pest and disease	Higher import costs  Australia may get secondary access to latest technology
<b>8. Sea freight rationalisation</b>		
<b>Overcapacity in global sea freight has led to bankruptcy amongst shipping companies such as Hanjin</b>	Rationalisation within the sea freight sector  Increased shipping costs	Increased freight costs will deter imports  Exports less competitive

## Social impacts

FACTOR	IMPLICATIONS	RISK/OPPORTUNITY
<b>1. Social licence</b>		
<b>Changed community attitudes empowered by social media are demanding more accountability from corporate Australia</b>	Greater accountability required in: <ul style="list-style-type: none"> <li>• Use of chemicals</li> <li>• Labour practices</li> <li>• Workplace safety</li> <li>• Food miles</li> </ul> Environmental sustainability	Adverse social media reaction can be potentially extremely damaging
<b>2. Provenance</b>		
<b>Consumers are interested in where their food comes from:</b>  <b>Where it was grown; where was it made; who grew and made it; and how</b>	Pressure for more detailed food labelling Pressure for increased whole-of-chain traceability Growth of organics	Added cost and regulation burden Increased support for Australian grown
<b>Increasing trading terms</b>		Reduced profitability the supply chain means less ability to invest in brands
<b>Growth of private label</b>	Erosion of brand loyalty and brand power	Increased imports Less brand loyalty
<b>3. Declining national health</b>		
<b>Australia is in the middle of a health epidemic:</b> <ul style="list-style-type: none"> <li>• Obesity</li> <li>• Type 2 diabetes</li> <li>• Cardiovascular disease</li> <li>• Increased cancer rates</li> </ul>	Increasing pressure by governments to change lifestyle and eating habits because of the spiralling health costs	Increased pressure against heavily processed, high-fat and high-sugar foods
<b>Publicity around acrylamide has the potential to widen awareness</b>	Dangers associated with bowel cancer become more widely publicised	Fried potato products are strongly associated with poor health like soft drinks



## Technological impacts

FACTOR	IMPLICATIONS	RISK/OPPORTUNITY
<b>1. Emerging technologies</b>		
<b>Game changing technologies:</b> <ul style="list-style-type: none"> <li>• Sensing</li> <li>• Big data</li> <li>• Robotics</li> <li>• Drones</li> <li>• Radio frequency identification (RFID)</li> <li>• Near infrared spectroscopy (NIR)</li> </ul> <b>Smart packaging</b>	Will drive efficiency and speed of change	Opportunity for Australia to improve its global competitiveness by reducing labour cost or increasing productivity and yield  Failure to keep up with technology will increase import threat
<b>2. Disruptive technologies</b>		
<b>IT is allowing the entry of disruptive technologies:</b> <ul style="list-style-type: none"> <li>• Smartphone connectivity</li> <li>• Direct-to-consumer and B2B</li> </ul>	Disruption to traditional business models Increased competition Regulators cannot keep up with the pace of change	Increased competition Greater scrutiny and accountability

## Environmental impacts

FACTOR	IMPLICATIONS	RISK/OPPORTUNITY
<b>1. Climate change</b>		
<b>Less reliable rainfall</b>	More reliance on irrigation	Higher cost
<b>Higher temperatures</b>	More crop failures Changed pest and disease profile	Higher risk of issues like psyllid Need for heat resistant varieties
<b>More extreme weather events</b>	More catastrophic crop failures	Increase in isolated summer storms with heavy rain/hail/wind could result in crop damage
<b>2. Water cost and availability</b>		
<b>Impacts of climate change:</b> <ul style="list-style-type: none"> <li>• Less run-off</li> <li>• Environmental water buy-backs</li> <li>• Lowering of underground water table</li> <li>• Declining water quality</li> <li>• Stricter CMA regulations</li> </ul>	Restricted water availability Higher cost of water	In some catchments water may be too expensive for growing potatoes

## Legal impacts

FACTOR	IMPLICATIONS	RISK/OPPORTUNITY
<b>1. Increased red tape</b>		
<b>Increased red tape and compliance burden:</b> <ul style="list-style-type: none"> <li>• Public pressure</li> <li>• Political correctness</li> <li>• Social accountability</li> </ul>	Increased cost of doing business	Threat to viability of marginal agribusinesses  Reduces Australia's competitiveness
<b>2. Food labelling regulations</b>		
<b>Tighter food labelling and consumer protection regulations</b>	Stricter regulations and accountability on food labelling from government	Declining purchase of retail processing potato products because of health warnings on packs

## Strategic risk

The following strategic risks to industry have been identified, together with the required R&D response. The impact of climate change and the threat of psyllid incursions have been identified as the most serious risks, requiring priority attention in this SIP.

STRATEGIC RISK FACTOR	R&D RESPONSE
Reduced consumption of processing potato	<ul style="list-style-type: none"> <li>• Improve eating quality</li> </ul>
Short- and long-term risks associated with climate change	<ul style="list-style-type: none"> <li>• Improve farm management skills</li> <li>• Address through variety selection</li> </ul>
Biosecurity incursion	<ul style="list-style-type: none"> <li>• Monitoring program</li> <li>• Risk plan</li> </ul>
Loss of growers due to unprofitability	<ul style="list-style-type: none"> <li>• Improve global competitiveness</li> </ul>
Dumping of cheap products in the domestic market	<ul style="list-style-type: none"> <li>• Improve global competitiveness</li> </ul>
Appreciation of the Australian dollar	<ul style="list-style-type: none"> <li>• Improve global competitiveness</li> </ul>



## Operating environment

The processing potato industry SWOT analysis	
<b>Strengths</b>	<ul style="list-style-type: none"> <li>• A core group of growers who have a willingness and capability to improve yield by adopting the latest technology</li> <li>• State-of-the-art processing facilities that can compete with the best in the world</li> <li>• Good growing conditions well located relative to processing facilities</li> <li>• Best practice seed quality certification program</li> <li>• Access to quality science and research capability</li> <li>• Global reputation for safe food with integrity in supply chain.</li> </ul>
<b>Weaknesses</b>	<ul style="list-style-type: none"> <li>• Higher input costs in all categories relative to competing countries</li> <li>• Lower and more variable yield than competitors</li> <li>• Lack of economies of scale and capital utilisation</li> <li>• Some resistance by growers to better position themselves for the developing global realities of the sector</li> <li>• Inconsistency in the quality of agronomic advice</li> <li>• Business and whole-of-farm management skills</li> <li>• Lack of profitability constraining re-investment.</li> </ul>
<b>Opportunities</b>	<ul style="list-style-type: none"> <li>• To take advantage of the world's best scientific knowledge in potato agronomy and pests and disease management</li> <li>• The growing demand for potato products in nearby South-East Asian markets</li> <li>• The potential to leverage Australia's horticultural levy system to grow skills.</li> </ul>
<b>Threats</b>	<ul style="list-style-type: none"> <li>• Biosecurity incursion especially psyllid</li> <li>• Global oversupply and dumping in the Australian market eroding prices</li> <li>• Appreciation of the Australian dollar which will drive imports</li> <li>• Decreased consumption due to greater awareness of health risks.</li> </ul>





## The strategic importance of improving yield

Realistically Australia will never be the lowest cost producer of processing potatoes because of high input costs, particularly labour. The best chance of remaining viable and reducing the import threat is by improving yield, which will substantially lower production cost per tonne. There is a limited ability to reduce unit cost of inputs.

A 15 per cent improvement in average yield of processing potatoes for French fry production could reduce the processor contract price from around \$320 per tonne to \$275 per tonne, whilst maintaining grower margins. This would make Australia competitive with New Zealand and more resilient to imports from the United States and Europe.

Yield improvement of this magnitude, which is achievable, will be critical in maintaining the economic viability of the Australian frozen processing potato industry. If Australia lags behind its competition in agronomic performance, it will be under threat from more imports.

Although the issue of global competitiveness is less critical for snacking products (because of freight economics and reduced shelf life) similar yield improvements off a lower base will improve the prosperity of the industry and possibly make Australia competitive in South-East Asia.

Yield growth must not be at the expense of potato quality or it will be counterproductive.

## Performance issues

Following a process of filtering the previous strategic analysis, the following factors have been identified and confirmed with the SIAP as being the most critical performance issues facing the processing potato industry and as such, have formed the strategic response in the SIP:

1. Australia's **low global competitiveness** in French fries
2. The growing **threat of imports**
3. Australia's **high cost of production** for processing potatoes relative to competitors due to:
  - » **Yield (particularly variability of yield)**
  - » **Labour**
  - » **High input costs**
  - » **Scale and capital utilisation**
  - » **Pest and disease pressures**
  - » **Soil health**
  - » **Seed quality**
4. The **inconsistency of agronomic advice** nationwide
5. The **biosecurity threat** particularly from psyllid implications
6. **Industry cohesion:**
  - » **Grower understanding of the global market and the need to change**
  - » **Second tier processors developing niche markets**
7. Future **competition for land** suitable for potatoes
8. Grower **skill and professionalism**.



# 2

## SECTION TWO

# Processing potato industry outcomes

## Industry outcomes

For reasons explained in the above analysis, the strategic imperative of the R&D investment needs to be on improving Australia's competitiveness, with a focus on driving up productivity/yield whilst maintaining quality. Therefore, the intent of this SIP and its outcomes is to create a sustainable, globally competitive processing potato industry, which is profitable at every level of the supply chain.

### OUTCOME 1

#### Industry has access to the world's best agronomic information and networks, resulting in increased productivity

- The Australian processing potato industry is a global, trade-exposed industry. It must become globally competitive to be sustainable. Therefore, it must have access to the world's best scientific knowledge
- Other leading producers are the United States, Canada, the European Union and New Zealand. Although there are regional nuances, generally the issues and challenges are the same
- Realistically, most of the scientific challenges are being addressed somewhere else in the world
- Collectively these countries are spending millions each year on R&D. With much larger industries and substantially larger research budgets they have far greater scientific resources. Much of this information and knowledge is accessible within the scientific community
- It is essential that the Australian industry establish networks and communication channels to tap into this scientific resource and knowledge base.

### OUTCOME 2

#### Growers are serviced by professional agronomists with best practice potato expertise, resulting in improved industry skills and knowledge

- Given Australia's high input cost, it is critical that producers focus on increasing yield. Although the best producers are achieving world's best yields, there is a high level of variability across growers from season to season and within each paddock
- A critical factor in building average yields is to make sure that processing growers have access to the best possible information from around the world
- Growers main source of information is from consulting agronomists including processing company, chemical and fertiliser suppliers or paid consultants. It is therefore essential that consulting agronomists have access to the best information
- Soil health is now recognised as a particular issue that needs to be high on the agenda
- Seed quality has also proven to be a major contributor to yield variability.



### OUTCOME 3

#### Losses from pest and disease are reduced, resulting in improved quality and increased marketable yield

- A large part of the reduced and variable yield problem is due to persistent pests and disease issues, which vary by region and season. They also limit which markets growers can trade into for biosecurity reasons. It is therefore critical that the industry has adequate responses to those that pose the biggest challenges.
- Continued work is needed on the pest and disease challenges prioritised in PPAA member survey:
  - » **Powdery Scab**
  - » **Pink rot**
  - » **Potato virus Y**
  - » **Rhizoctonia**
  - » **Sclerotinia**
  - » **Tomato spotted wilt**
- Soil health has been identified as a major contributor to reduced yield and the PreDicta Pt has proven to be a powerful diagnostic tool. This tool now needs to be expanded to cover other bacteria and geographic areas (and potentially viruses). Its application to PCN could provide important evidence for area freedom
- Current soil surveillance systems also need reviewing
- Tank mix interaction between chemicals and compatibility of active ingredients requires more work and consultation with chemical companies.
- Psyllid (resulting in Zebra Chip) poses a serious threat to both the French fry and crisping sectors. Trapping programs must be continued, plus there needs to be a response plan in case of incursion
- IPM has proven to be a powerful and cost-effective tool in pest and disease control, which is not used as widely as it could be. Relying on agronomists to transfer this particular knowledge maybe problematic when many are incentivised to sell chemicals, so multiple communication strategies will be required.

### OUTCOME 4

#### Precision agriculture and related technologies /systems become standard practice, resulting in reduced cost of production

- Precision agriculture and other technologies offer potential to improve efficiency and lower overall cost of production. There is a suite of technologies that could make a powerful contribution to improved productivity in the processing potato sector including:
  - » **Soil mapping (EM 38) and strategic sampling**
  - » **Yield mapping**
  - » **Crop sensing**
  - » **Variable rate irrigation**
  - » **Variable fertiliser application**
- Although the technology has been around for many years, and most new equipment has precision agriculture technology, it has not been adopted to anywhere near its full potential for a number of reasons:
  - » **Compatibility between various hardware and software applications**
  - » **Some equipment is not commercially proven or ready**
  - » **Lack of support services for equipment**
  - » **Grower knowledge, attitude and confidence in new technology.**



### OUTCOME 5

#### Collaboration across the supply chain to achieve cultural change has resulted in improved economic sustainability

- The processing potato industry is arguably the most globally exposed of any horticultural industry and its long-term sustainability is conditional upon being responsive to change and keeping up with world's best practice
- The return on investment in R&D and extension will not be maximised unless there is a willingness to change and adopt new ideas
- All players in the supply chain need to understand the realities of global competition and the need to take a partnership approach to creating a sustainable industry. In the past relationships have been adversarial, hampering industry's ability to respond to the realities of global trade in processing potatoes
- Sustainability must embrace triple bottom line values – environmental, economic and social
- Productivity gains will not only come from technology and pest and disease management but also new business models and other ideas that have been proven overseas
- A lack of business and financial management skill by growers is a limiting factor to business improvement. Many growers lack skill sets in areas such as cost/benefit analysis and some do not know their cost of production or return on investment.





## 3

## SECTION THREE

# Processing potato industry priorities

## Industry investment priorities

The processing potato industry aspires to create a sustainable, globally competitive potato processing industry that is profitable at every level of the supply chain. The main objective of this SIP is to provide a roadmap that helps guide Hort Innovation's oversight and management of the processing potato industry R&D levy program. The ability to deliver on all the articulated strategies (and investments) in an impactful manner will be determined by the ability of the statutory levy to provide the resources to do so.

OUTCOME 1 – Industry has access to the world's best agronomic information and networks, resulting in increased productivity	
STRATEGIES	POSSIBLE DELIVERABLES
1.1 Compile a database of knowledge sources from local and overseas centres of excellence	1. Completion of global data base resource that identifies all knowledge sources of potato production globally
1.2 Assist our research community to establish/ tap into global virtual scientific community on potato research	2. Establishment of a global virtual community of practice
1.3 Identify gaps where the global science does not cover Australian specific issues or challenges	3. Completion of gap analysis with recommendations for R&D investment
1.4 Initiate projects to fill any gaps identified in 1.3	4. Facilitation of tour by one visiting fellow per year based on an identified research/knowledge gap
1.5 Introduce annual visiting fellow program	

## SECTION 3: PROCESSING POTATO INDUSTRY PRIORITIES

OUTCOME 2 – Growers are serviced by professional agronomists with best practice potato expertise, resulting in improved industry skills and knowledge	
STRATEGIES	POSSIBLE DELIVERABLES
2.1 Run subject specific professional training workshops for consulting agronomists (consider accreditation scheme)	1. Annual R&D workshop and/or field day series based on identified R&D and training adoption gaps
2.2 Supply advisors with information and materials that simplify and summarise the science in a format that growers can relate to (so-called ‘muddy boots science’)	2. Delivery of a set of educative tools for distribution by agronomists that simplify recent research for growers
2.3 Establish a social media network facilitated by industry experts and professional advisors within the processing potato community (ensure adequate funding to maintain)	3. A social media platform serving as a Community of Practice
2.4 Develop soil management resource kit with practical and cost-effective tools	4. Development of a soil management resource kit
2.5 Develop a calendar of coordinated program of regional field days and/or trials, specifically for processing growers (in cooperation with industry suppliers)	5. Development of online communication tool for remote growers to access events, for example, webinars
2.6 Develop Skype- or web-based advisory platforms/tools so growers located in remote areas also have access to visiting experts and any industry training on offer	

OUTCOME 3 – Losses from pest and disease are reduced, resulting in improved quality and increased marketable yield	
STRATEGIES	POSSIBLE DELIVERABLES
3.1 Encourage use of PreDicta Pt and support R&D to extend application to pink rot and PCN	1. PreDicta Pt is made available in all regions for pink rot and PCN
3.2 Establish appropriate, prioritised R&D and extension programs for highly rated pest and diseases including: <ul style="list-style-type: none"> <li>• Powdery scab</li> <li>• Pink rot</li> <li>• Potato virus Y</li> <li>• Rhizoctonia</li> </ul>	2. An updated national response plan and biosecurity manual
3.3 Expand pest trapping program and develop national response plan and biosecurity manual for psyllid and other threats (as per Tasmania)	3. Pathway for wider industry contribution to certified seed projects
3.4 Support wider industry efforts to increase the quality of certified seed throughout the supply chain in order for it to be fit-for-purpose	4. Information packages on chemical compatibility and tank interaction
3.5 Initiate project with chemical companies to gain a better understanding of chemical efficacy and compatibility of active ingredients	5. IPM information packages and presentations
3.6 Integrate IPM as a core subject area in the regional field days program	6. Review report with R&D recommendations on current soil surveillance systems
3.7 Review current soil surveillance systems	



OUTCOME 4 – Precision agriculture and related technologies /systems become standard practice, resulting in reduced cost of production	
STRATEGIES	POSSIBLE DELIVERABLES
4.1 Run regional 'future farming' workshops as part of proposed extension projects	<ol style="list-style-type: none"> <li>1. Future farming workshops</li> <li>2. Precision agriculture extension materials and workshops</li> <li>3. Precision agriculture adoption gap analysis and extension strategy</li> <li>4. Virtual community network or resource for precision agriculture</li> </ol>
4.2 Ensure industry is engaged with other Hort Innovation precision agriculture programs, for example, robotics at the University of Sydney	
4.3 Identify blockers to commercial adoption of precision agricultural systems and other technologies then initiate priority projects in response	
4.4 Establish potato precision agriculture Community of Practice or information resource	

OUTCOME 5 – Collaboration across the supply chain to achieve cultural change has resulted in improved economic sustainability	
STRATEGIES	POSSIBLE DELIVERABLES
5.1 Provide scholarships for agribusiness professional development courses	<ol style="list-style-type: none"> <li>1. 10 scholarships per year</li> <li>2. Next Gen or similar program</li> <li>3. Adoption of new business models such as machinery collectives, rotation specialisation</li> <li>4. Development of a self-assessment benchmarking tool</li> <li>5. Database and digital communications strategy</li> <li>6. NRM extension project</li> </ol>
5.2 Introduce Next Gen program including overseas study, mentoring, internships, and basic business skills for growers, scientists and advisors	
5.3 Initiate project to identify and communicate alternative business models to growers	
5.4 Initiate and communicate self-assessment tool for web-based benchmarking on yield and cost, for example, University of Idaho web-based tool	
5.5 Build a processing potato specific information digital database	
5.6 Initiate extension program in NRM, best practice land use and sustainability	



## Aligning to Hort Innovation investment priorities

In establishing investment priorities, Hort Innovation analysed both historical and current levy and co-investment portfolios and priorities. From this analysis we identified 11 cross-sectoral investment themes. We consolidated these themes further and considered their alignment with the Australian Government's Rural RD&E Priorities and National Science and Research Priorities, to arrive at five investment priorities outlined in **Figure 9**. **Figure 9** also shows how each cross-sectoral investment theme relates to the five investment priorities.

**Figure 9: Hort Innovation's investment priorities**





The alignment of the processing potato SIP outcomes to the Hort Innovation priorities and as a consequence the Australian Government's Rural RD&E Priorities and National Science and Research Priorities is shown in **Table 5**.

**Table 5: Alignment of the processing potato SIP outcomes to the Hort Innovation priorities**

Hort Innovation investment priorities	Processing potato SIP outcomes
Support Industry efficiency and sustainability	<p><b>Outcome 3:</b> Losses from pest and disease are reduced, resulting in improved quality and increased marketable yield</p> <p><b>Outcome 5:</b> Collaboration across the supply chain to achieve cultural change has resulted in improved economic sustainability</p>
Improve productivity of the supply chain	<b>Outcome 1:</b> Industry has access to the world's best agronomic information and networks, resulting in increased productivity
Grow the horticulture value chain capacity	<p><b>Outcome 2:</b> Growers are serviced by professional agronomists with best practice potato expertise, resulting in improved industry skills and knowledge</p> <p><b>Outcome 4:</b> Precision agriculture and related technologies/ systems become standard practice, resulting in reduced cost of production</p>
Drive long-term domestic and export growth	
Lead strategically to enhance the development of the Australian horticulture industry through operational excellence	Enabler



# 4

## SECTION FOUR

# Processing potato industry monitoring and evaluation

### Processing potato SIP monitoring, evaluation and reporting

A SIP program logic and monitoring and evaluation (M&E) plan has been developed for the processing potato SIP. These are informed by the Hort Innovation Organisational Evaluation Framework. The logic maps a series of expected consequences of SIP investment. The M&E plan shows the performance measures that will be measured to demonstrate progress against the SIP and what data will be collected. Progress against the SIP will be reported in Hort Innovation publications and at industry Strategic Investment Advisory Panel meetings.

The SIP outcomes and strategies will be used to inform investments in individual projects to deliver on the SIP. The results of M&E will be used to reflect on the results of investments and in decision-making. Hort Innovation will facilitate the regular review of SIPs to ensure they remain relevant to industry.

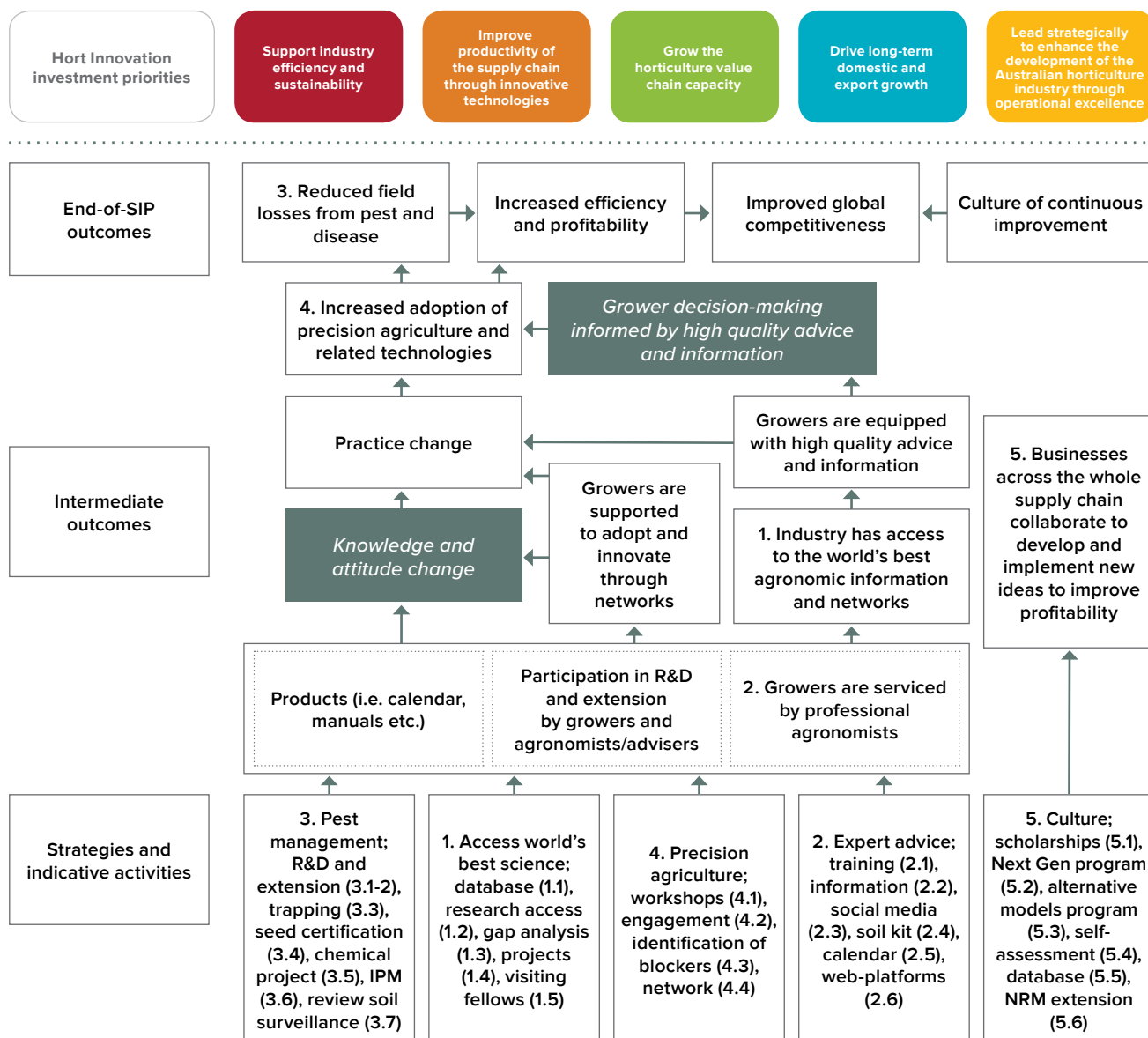
### Processing potato SIP logic

An indicative processing potato SIP program logic is shown below in **Figure 10**. The logic is based on the Hort Innovation SIP logic hierarchy (**Appendix 4**). The shaded boxes are not fully explicit in the strategy but necessary conditions for the achievement of expected outcomes.





Figure 10: Processing potato SIP logic





## Processing potato SIP M&E plan

The processing potato M&E plan is shown in **Table 6**. The table includes key performance indicators (KPIs) and data collection methods both at a macro/industry (trend) level and at more specific SIP level/s.

**Table 6: Monitoring and evaluation plan for the processing potato SIP**

Outcome	Strategies	KPIs	Data collection methods and sources
<b>OUTCOME 1:</b> Industry has access to the world's best agronomic information and networks resulting in increased productivity	1.1 Compile a database of knowledge sources from local and overseas centres of excellence	1. Completion of global data base resource that identifies all knowledge sources of potato production globally	<ul style="list-style-type: none"> <li>Project records/ documentation</li> <li>Synthesis of outputs</li> <li>Grower survey</li> </ul>
	1.2 Assist our research community to establish/ tap into global virtual scientific community on potato research	2. Completion of gap analysis and response	
	1.3 Identify gaps where the global science does not cover Australian specific issues or challenges	3. Visit to Australia by one visiting fellow per year	
	1.4 Initiate projects to fill any gaps identified in 1.3	4. Number of scientific products/resources made available	
	1.5 Introduce annual visiting fellow program	5. Reach of products/ resources	
<b>OUTCOME 2:</b> Growers are serviced by professional agronomists with best practice potato expertise, resulting in improved industry skills and knowledge	2.1 Run subject specific professional training workshops for consulting agronomists (consider accreditation scheme)	1. Participation rates of 50 per cent of agronomists who work in processing potatoes for any extension/training event/materials targeted at agronomists	<ul style="list-style-type: none"> <li>Project records/ documentation</li> <li>Knowledge transfer event evaluation (feedback forms)</li> <li>Grower interviews/ survey</li> <li>Adviser interviews/ survey</li> <li>Social media tracking &amp; analysis (Google Analytics)</li> </ul>
	2.2 Supply advisors with information and materials that simplify and summarise the science in a format that growers can relate to (so-called 'muddy boots science')	2. Participation levels of active agronomists in social media platform	
	2.3 Establish a social media network facilitated by industry experts and professional advisors within the processing potato community (ensure adequate funding to maintain)	3. Completion of soil management resource kit	
	2.4 Develop soil management resource kit with practical and affordable tools	4. Calendar of field based knowledge transfer events/number of events	
	2.5 Develop a calendar of coordinated program of regional field days/trials, specifically for processing growers (in cooperation with industry suppliers)	5. Evidence of increased knowledge/practice change on-farm	
	2.6 Develop Skype- or web-based advisory platforms/tools so growers located in remote areas also have access to visiting experts and any industry training on offer		

Outcome	Strategies	KPIs	Data collection methods and sources
<b>OUTCOME 3:</b> Losses from pest and disease are reduced, resulting in improved quality and increased marketable yield	3.1 Encourage use of PreDicta Pt and support R&D to extend application to pink rot and PCN	<ol style="list-style-type: none"> <li>1. Evidence of an increase in usage rate of PreDicta Pt by processing growers, with a target of 75 per cent of production base</li> <li>2. PreDicta Pt is made available in all regions for pink rot and PCN</li> <li>3. Evidence of an increase in marketable yields due to improved pest and disease practices, with a target of five per cent</li> <li>4. Delivery of an updated national response plan and biosecurity manual</li> <li>5. Delivery of information to industry on chemical compatibility and tank interaction</li> <li>6. Adoption rate of IPM improves by five per cent of growers/production base</li> </ol>	<ul style="list-style-type: none"> <li>• Project records/ documentation</li> <li>• Synthesis of outputs</li> <li>• Grower interviews/ survey</li> </ul>
	3.2 Establish appropriate, prioritised R&D and extension programs for highly rated pest and diseases including: <ul style="list-style-type: none"> <li>• Powdery scab</li> <li>• Pink rot</li> <li>• Potato virus Y</li> <li>• Rhizoctonia</li> </ul>		
	3.3 Expand pest trapping program and develop national response plan and biosecurity manual for psyllid and other threats (as per Tasmania)		
	3.4 Support wider industry efforts to increase the quality of certified seed throughout the supply chain in order for it to be fit-for-purpose		
	3.5 Initiate project with chemical companies to gain a better understanding of chemical efficacy and compatibility of active ingredients		
	3.6 Integrate IPM as a core subject area in the regional field days program		
	3.7 Review current soil surveillance systems		
<b>OUTCOME 4:</b> Precision agriculture and related technologies /systems become standard practice, resulting in reduced cost of production	4.1 Run regional 'future farming' workshops as part of proposed extension projects	<ol style="list-style-type: none"> <li>1. Number of future farming workshops per year/ region</li> <li>2. Industry adoption of precision agriculture technology (number of growers/per cent of production base)</li> <li>3. Completion of precision agriculture adoption gap analysis</li> <li>4. Community of Practice or extension resources for precision agriculture</li> </ol>	<ul style="list-style-type: none"> <li>• Project records/ documentation</li> <li>• Synthesis of outputs extension event evaluation (feedback forms)</li> <li>• Grower interviews/ survey</li> <li>• Adviser interviews/ survey</li> </ul>
	4.2 Ensure industry is engaged with other Hort Innovation precision agriculture programs such as robotics at the University of Sydney		
	4.3 Identify blockers to commercial adoption of precision agricultural systems and other technologies then initiate priority projects in response		
	4.4 Establish a precision agriculture virtual community or information resource for potatoes		



Outcome	Strategies	KPIs	Data collection methods and sources
<b>OUTCOME 5:</b> Collaboration across the supply chain to achieve cultural change has resulted in improved economic sustainability	5.1 Provide scholarships for agribusiness professional development courses	<ol style="list-style-type: none"> <li>1. A Next Gen or similar program implemented</li> <li>2. Self-assessment benchmarking tool developed with evidence of utilisation of the tool by growers</li> <li>3. Online database of processing potato specific information</li> <li>4. NRM and best practice extension project</li> </ol>	<ul style="list-style-type: none"> <li>• Benchmarking data</li> <li>• Project records/ documentation</li> <li>• Synthesis of outputs</li> <li>• Grower interviews/ survey</li> <li>• Adviser interviews/ survey</li> </ul>
	5.2 Introduce Next Gen program including overseas study, mentoring, internships, basic business skills for growers, scientists and advisors		
	5.3 Initiate project to identify and communicate alternative business models to growers		
	5.4 Initiate and communicate self-assessment tool for web-based benchmarking on yield and cost, for example, University of Idaho web-based tool		
	5.5 Build a processing potato specific digital information database		
	5.6 Initiate extension program in NRM, best practice land use and sustainability		

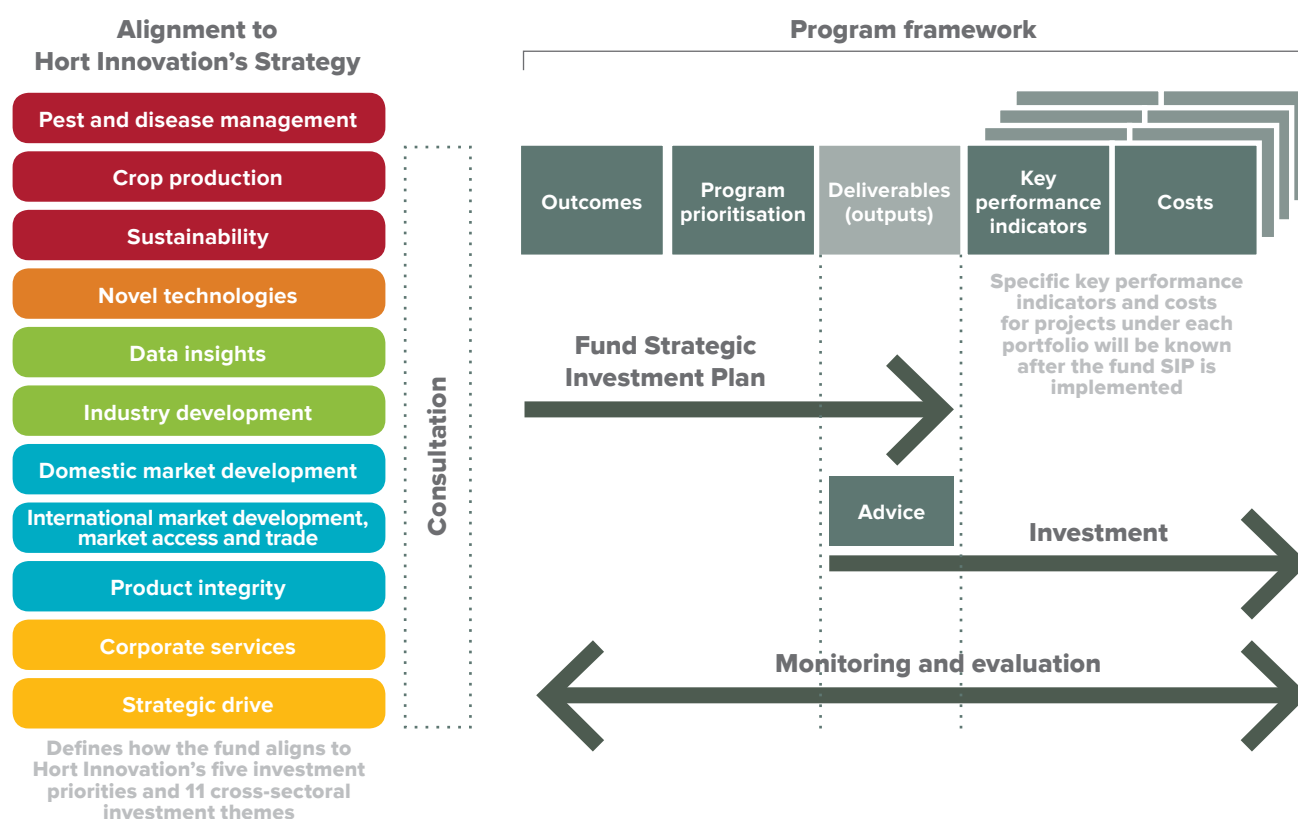


## Reporting

The program framework in **Figure 11** is the mechanism that links Hort Innovation's strategy and investment priorities to the investment process through the industry SIP. SIPs assist Hort Innovation to prioritise and implement the specific industry research, development and extension (RD&E) and marketing programs.

Hort Innovation will use dynamic reporting against our monitoring and evaluation framework to report on investment progress. The contribution of investments to each industry outcome will be reported regularly, including through industry Annual Reports, Hort Innovation's Annual Report and Hort Innovation's Annual Operating Plan.

**Figure 11: Hort Innovation's program framework**





## SECTION FIVE

# Impact assessment

An independent assessment of the potential economic impacts from investment into the processing potato SIP indicated a positive return on investment for the industry (**Figure 12**). The anticipated investment of \$3.59 million over the next five years in R&D and extension activities is expected to generate \$8.26 million in net benefits for processors, and \$3.98 million in net benefits for growers. A total net benefit of \$12.24 million is expected, representing a benefit cost ratio of 3.41 times to the industry.

The assessment draws from a wide range of available data sources, and projects economic impacts over a 15-year period starting from 2016/17. A five per cent discount rate has been applied and all values are adjusted for inflation and presented in 2016/17 dollar terms. The assessment takes a highly conservative approach and the presented figures have been adjusted to account for risks associated with achieving research outputs, expected adoption and impacts.

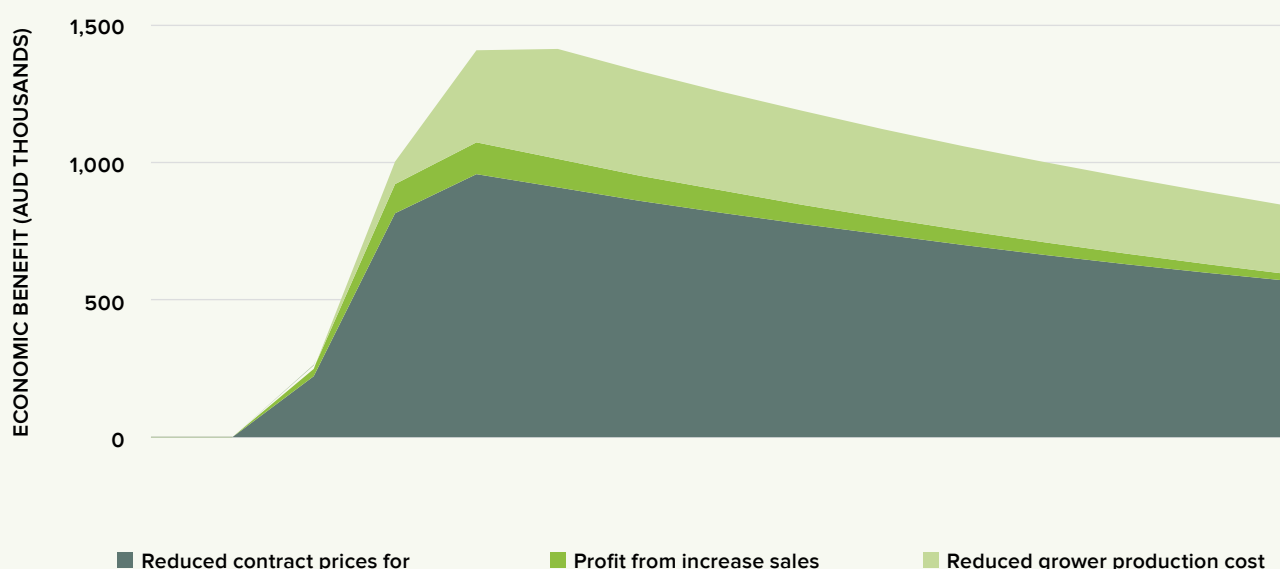
The SIP logic is focused towards end-of-strategy outcomes of improved global competitiveness and increased efficiency and profitability.

Outcomes 1 and 2 are intended to improve dissemination of agronomic advice and global best practice, resulting in practice changes that lead to Outcome 3. This line of SIP research funding is intended to reduce the yield gap by reducing field losses from pest and disease. The resultant improved yield from these outcomes will drive a more globally competitive domestic industry to the benefit of both growers and processors.

Outcome 4 is focused on reduction of costs through the use of new technologies on-farm by growers, resulting in increased efficiency and profitability for growers.

In addition, Outcome 5 is intended to foster a collaborative approach along the processing potato supply chain resulting in an end-of-strategy outcome of a culture of continuous improvement within the industry.

**Figure 12: Economic benefit from investment in the SIP**



The following table provides a summary of the intermediate and end-of-strategy outcomes identified in the SIP logic, with associated impacts. An approximate fund allocation, net economic benefits towards each outcome and the benefit cost ratio is also provided.

**Table 7: Overview of impacts assessed and alignment with SIP targets**

Intermediate outcome	End-of-strategy outcomes	Impacts	Anticipated five year SIP investment	Net benefits (15 years)	Benefit cost ratio
(1) Better access to agronomic information and networks	Improved global competitiveness	Improved average yield enables reduced prices for processors sourcing domestically in AUD	\$2,693,268	\$8,255,742	3.35
(2) Growers serviced by professional agronomists		Improved average yield results in increased production and (profitable) sales volume for growers		\$755,364	
(3) Losses from pest and disease reduced					
(4) Increased use of precision agriculture and related tech	Increased efficiency and profitability	Cost savings in production for growers	\$897,756	\$3,225,338	3.59
(5) Collaboration across the supply chain	Culture of continuous improvement	Helps to drive quantified impacts	Incorporated in above	N/A	N/A
<b>All impacts</b>			<b>\$3,591,025</b>	<b>\$12,236,444</b>	<b>3.41</b>

The quantified impacts associated with Outcomes 1 to 3 include:

- Reduced contract pricing between processors and growers, resulting in a saving for processors. Reduced prices have no impact on grower absolute profitability during the projected period, due to yield improvements driving cost reductions
- Increased production due to yield improvement is sold to processors resulting in increased profits for growers.

Yield improvements may be driven through potential adoption of a variety of existing and new products and processes, including increased use of soil health measurement, chemical improvements and IPM. Improved access to agronomic advice and dissemination of better practice modes through the formation of information sharing networks will form a key part of reducing yield loss and variability due to pests and disease.

The quantified Impact from Outcome 4:

- Reduced cost of production due to reduced input cost for growers, modelled on reductions in the costs attributable to water and fertilisers for processing potato growers due to a conservative increase in adoption of precision agriculture.

Precision agriculture is an existing technology that has been underutilised. R&D and extension will facilitate this increase in uptake by improving product offering compatibility and support, and improving grower knowledge.

Outcome 5 was not a quantified impact:

- The end-of-strategy outcome of a culture of continuous improvement will be a key qualitative goal in driving practice changes aforementioned that will enable the delivery of quantified impacts, however, it was not considered in isolation as generating a net economic benefit. Thus, no quantified impact is associated directly with this intermediate outcome.



# 6

## SECTION SIX

# Risk management

The purpose of this risk section is to highlight any unique or specific risks that qualify the SIP. This is not intended to be an exhaustive risk review of the industry risks which in part are considered in the SWOT. This is also not reflective of the general investment risks which will be considered in the project investment process.

No significant or specific risks were found that may qualify this SIP, however, there is a risk of a lost opportunity to leverage industry R&D funds more effectively, if this SIP is not effectively aligned with the fresh potato SIP.



## APPENDIX 1: Process to develop this SIP

This process for the development of this SIP was as follows:

1. A presentation was prepared to outline a suggested approach to the SIP and to stimulate discussion on the key external factors impacting the industry
2. A workshop was held with the SIAP to approve the project approach and consultation reach
3. Interviews were conducted with the suggested stakeholders
4. A draft SIP was prepared for consideration by the SIAP
5. The draft SIP was presented for testing and discussion with the SIAP in a second workshop session
6. SIAP members provided additional feedback to the draft SIP over the following week
7. The presentation version of the SIP was forwarded to Hort Innovation for feedback
8. The SIAP was converted into the Hort Innovation template.

## APPENDIX 2: Consultation and validation

In addition to a wide body of consultation with processing potato growers during the development of the related fresh potato SIP, the following individuals provided direct input during the development of this plan and their assistance is gratefully acknowledged.

Name	Organisation
Anne Ramsay	Potato Processing Association of Australia
Paul Horne	IPM Technologies
Paul McBeth	Marvel Packers
Josh Opas	McCain Foods Australia
Daniel Grayling	McCain Foods Australia
Tony Gietzel	PepsiCo
Brett Pemberton	PepsiCo
Kathy Ophel Keller	SA Research & Development Institute
Steven Lapidge	SA Research & Development Institute
Mark Heap	Simplot Australia
Peter Hardman	Simplot Australia
Frank Mulcahy	Simplot Australia
Angus Galloway	Simplot Australia
Allan Smith	Snack Brands Australia
Michael Hicks	Snack Brands Australia
Calum Wilson	Tasmanian Institute of Agriculture
Nigel Crump	Victorian Certified Seed Potato Association

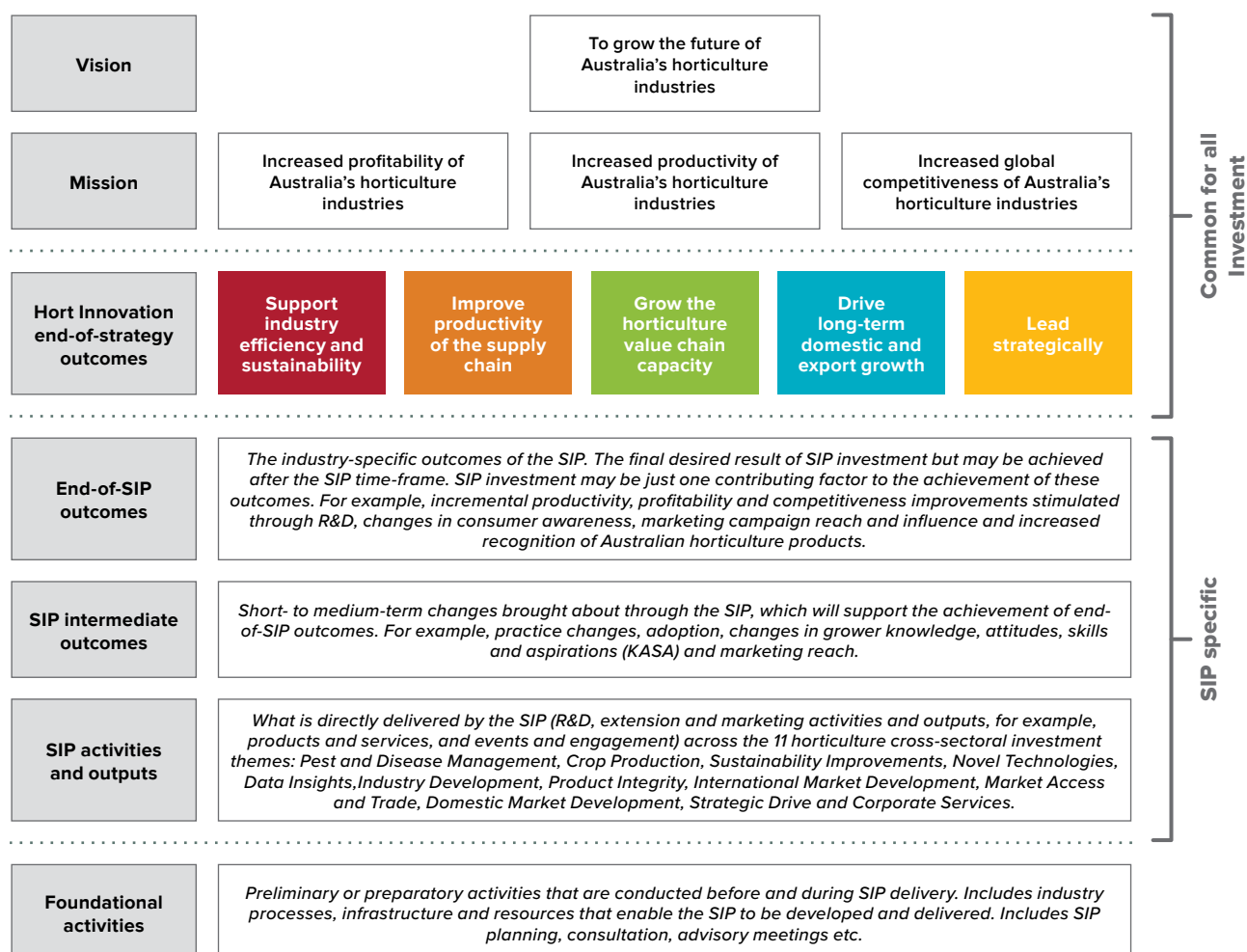


### APPENDIX 3: Reference documents

Title	Author
A review of knowledge gaps and compilation of R&D outputs from the Australian Potato Research Programs, 2015	Kevin Clayton-Greene
Victorian Potato Industry Strategic Plan 2015 – 2020	ViCSPA, Victorian State Government
Australian processing potato industry Strategic Investment Plan 2012 – 2017	Potato Processing Association Australia, AUSVEG, HAL
Adoption of variable rate technology in Queensland's intensive vegetable production systems – June 2016	Queensland Government
Australian Horticulture Statistics Handbook, 2014/15	Hort Innovation, Freshlogic
Australian Bureau of Statistics	
Australian Bureau of Agricultural Resource Economics	
Australian vegetable growing farms. An economic survey 2012-13.	Haydn Vale Research 2014/15
Global Trade Atlas, 2016	
McCain Foods global benchmarking study, 2011	McKINNA et al
Retailworld Annual Report, 2015	Retailworld
Australian vegetable growing farms: An economic survey, 2011–12 and 2012–13, ABARES Research report 14.1 prepared for Horticulture Australia Limited, Canberra, February. CC BY 3.0.	Valle, H, Caboche, T & Lubulwa, M 2014
<b>Notes on additional sources:</b> <ol style="list-style-type: none"> <li>1. Fresh Intelligence was commissioned to conduct additional analysis for this SIP drawing from a combination of the above sources.</li> <li>2. Industry estimates derived during the SIP workshop and from individual SIAP members have been used in the absence of hard data.</li> </ol>	



## APPENDIX 4: Logic hierarchy



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Industry potatoes

## Industry potatoes

Potatoes South Africa. Potatoes South Africa is a non-profit company incorporated under the South African Companies Act No 71 of whose main objective is to serve, protect and promote the interests of the South African potato industry. In terms of its role in the potato industry, Potatoes South Africa operates as an organisation and its structure represents a network of participating role players and individuals who have the development and competitiveness of the industry at heart. Daily Market Prices. Potatoes South Africa Potatoes South Africa is a non-profit company incorporated under the South African Companies Act No 71 of whose main objective is to serve, protect and promote the interests of the South African potato industry.

**VIDEO ON THE TOPIC: Amazing Potato processing machine Modern Agriculture - Automatic Potato Line Cleaning and Packing**



As a reminder: in around , tonnes of potatoes were processed into fries, mashed potato products, crisps or flakes and granules. In the meantime, Belgium has become the largest exporter of frozen potatoes in the world, exporting to over countries. But the entire Belgian potato chain helped develop the growth: in addition to the farmers, for whom potatoes have become the most important source of revenues within arable farming, service providers and suppliers of machinery also experienced remarkable growth.

They are increasingly also becoming global players with innovative products and technology. The use of potatoes as a raw material rose by This is by far the sharpest increase in the history of this still relatively new sector of the Belgian food industry. Increase in employment and investments form the basis for further sustainable growth The sector continues to invest in the future, both with regard to quality and quantity.

Sustainability is the leitmotiv through it all. Efforts are being made in the area of the sustainable cultivation of potatoes, environmentally friendly production and logistics. At present, blue and white-collar workers are employed in this strongly automated sector. Click to enlarge Employment in the potato processing industry in Belgium between an Click to Subscribe! Belgapom is an organisation representing the interest of the Belgian Potato Processing companies.

Read more They built and maintain WatchITGrow. More News on: Dehydrated Potato Products. Share this Page.

## Potato Processing and Uses

Invalid Email. Invalid contact no. Special Symbols Not Allowed. Invalid Security Code. Potato is a major staple food, ranked fourth in terms of global production after wheat, rice, and maize.

Potatoes are used for a variety of purposes, and not only as a vegetable for cooking at home. In fact, it is likely that less than 50 percent of potatoes grown worldwide are consumed fresh. Fresh potatoes are baked, boiled, or fried and used in a staggering range of recipes: mashed potatoes, potato pancakes, potato dumplings, twice-baked potatoes, potato soup, potato salad and potatoes au gratin, to name a few.

Revised October Potatoes *Solanum tuberosum* are the fourth most important food crop in the world and the leading vegetable crop in the United States. NASS Potatoes were first cultivated around B.

## Potato roundtable: 6 challenges facing the potato industry

The potato is a root vegetable native to the Americas , a starchy tuber of the plant *Solanum tuberosum* , and the plant itself, a perennial in the family Solanaceae. Wild potato species can be found throughout the Americas, from the United States to southern Chile. In the area of present-day southern Peru and extreme northwestern Bolivia , from a species in the *Solanum brevicaulis* complex, potatoes were domesticated approximately 7,—10, years ago. Potatoes were introduced to Europe from the Americas in the second half of the 16th century by the Spanish. Today they are a staple food in many parts of the world and an integral part of much of the world's food supply. As of , potatoes were the world's fourth-largest food crop after maize corn , wheat , and rice. Following millennia of selective breeding , there are now over 1, different types of potatoes.

## Belgian potato processing industry processed over 5 million tonnes of potatoes in 2018

Register Log In. Processed potatoes are an important nutritional component of our diets. Almost million tonnes are produced annually, and less than half of the crop is used fresh. The remaining crop is processed into a variety of foodstuff as products including french fries, dehydrated potato flakes, food ingredients, animal feed, potato starch and as a starch source for vodka or alcohol production. Incoming potatoes can vary widely in moisture and other quality measurements, and this variation can complicate the processing parameters required to produce a consistent, high quality end-product.

## Potato Harvesting Machine & Potato Processing Line Mod...



Dear readers! Our articles talk about typical ways to resolve Industry potatoes, but each case is unique.

If you want to know, **how to solve your particular problem - contact the online consultant form on the right or call the numbers on the website. It is fast and free!**

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- [Potato Processing](#)
- [Potato Processing and Uses](#)
- [Potato roundtable: 6 challenges facing the potato industry](#)
- [Belgian potato processing industry processed over 5 million tonnes of potatoes in 2018](#)
- [How the Potato Changed the World](#)
- [U.S. Potato Industry](#)
- [The EU potato sector - statistics on production, prices and trade](#)
- 
- 

## Potato Processing

Home Belgian potato processing industry processed over 5 million tonnes of potatoes in Investments in euros in the potato processing industry in Belgium between and March 29, In , the Belgian potato processing sector experienced record growth in and exceeded 5 million tonnes of processed potatoes.

However, in the sector is facing major challenges as a result of the poor growing season of — Belgapom, the association for the Belgian potato trade and processing industry, can announce that in the 5 million tonne mark was passed with regard to processed potatoes. This is absolutely a new record and what makes it even more remarkable, is that it is the sharpest annual increase since the nineteen-nineties.

RJ Harvey has used potatoes as noodles for spaghetti and pho, frozen hash brown patties in place of bread for sandwiches and potato flakes as breading. Great Lakes Potato Chip Co.

This site requires a JavaScript enabled browser. Potato growers face many challenges in the coming years including uncertainty over the changes in water abstraction rules from the early s and the potential loss of valuable pesticide actives like diquat. So what are the top six technical challenges and how might they be addressed?

## How the Potato Changed the World

Please Note: You have clicked on a link to a website maintained by a third party and are about to leave the Potatoes USA web site. The external link should not be considered an endorsement by Potatoes USA of the third-party web site or the company or organization that owns it, and Potatoes USA is not responsible for the accuracy or nature of the content of the linked web site. From seed to harvest, the U. The use of certified seed potatoes contributes to a healthier potato crop and helps farmers reduce their ecological impact.

United States. Smaller Region. Northern America. Similar Region. The Potato Sector Although the potato was grown in South America for millennia, the first potato patch in North America was only planted in , in New Hampshire the first french fries were served at the White House during the Presidency of Thomas Jefferson some 80 years later. In , the United States harvested

## U.S. Potato Industry

To view all updated statistics, download the Potato Statistical Yearbook. Nutrition information. Click here to view an electronic version of the Potato Statistical Yearbook. To download a. The links below contain frequently requested potato market data including U. How did the humble spud rise to prominence as the fifth most important crop worldwide after wheat, corn, rice and sugar cane?

Mar 29, - The potato processing industry in Belgium registered record growth and processed over 5 million tonnes of potatoes in However, in

When potato plants bloom, they send up five-lobed flowers that spangle fields like fat purple stars. By some accounts, Marie Antoinette liked the blossoms so much that she put them in her hair. Her husband, Louis XVI, put one in his buttonhole, inspiring a brief vogue in which the French aristocracy swanned around with potato plants on their clothes. The flowers were part of an attempt to persuade French farmers to plant and French diners to eat this strange new species.

## The EU potato sector - statistics on production, prices and trade

Home Belgian potato processing industry processed over 5 million tonnes of potatoes in Investments in euros in the potato processing industry in Belgium between and March 29, In , the Belgian potato processing sector experienced record growth in and exceeded 5 million tonnes of processed potatoes.

The 52 million tonnes of potatoes harvested across the EU in was about one-third This article describes the potato sector in the European Union. A range of agricultural data from a number of Eurostat agricultural statistics farm structure survey , annual crop production statistics, agricultural prices and economic accounts for agriculture are used, as well as trade and industrial production statistics, to depict the various stages in the process of bringing potatoes from the field to the market. Potato production is mainly concentrated in seven Member States; Belgium, Germany, France, the Netherlands, Poland, Romania and the United Kingdom accounted for about three-quarters of the area planted

Potatoes South Africa.

- Насколько я знаю Стратмора, это его дела. Готова спорить на любые деньги, что он. Чутье мне подсказывает. - Второе, что никогда не ставилось под сомнение, - это чутье Мидж.

- Идем, - сказала она, вставая.

Наверняка, - объявил Бринкерхофф. Фонтейн молча обдумывал информацию. - Не знаю, ключ ли это, - сказал Джабба. - Мне кажется маловероятным, что Танкадо использовал произвольный набор знаков. - Выбросьте пробелы и наберите ключ! - не сдержался Бринкерхофф.

Фонтейн повернулся к Сьюзан.

Но это не все, сэр. Я запустил антивирус, и он показывает нечто очень странное. - Неужели? - Стратмор по-прежнему оставался невозмутим. - Что показалось тебе странным.

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**exceeded 5 million tonnes of processed potatoes.**

## **Belgian potato-processing sector experienced record growth in 2018**

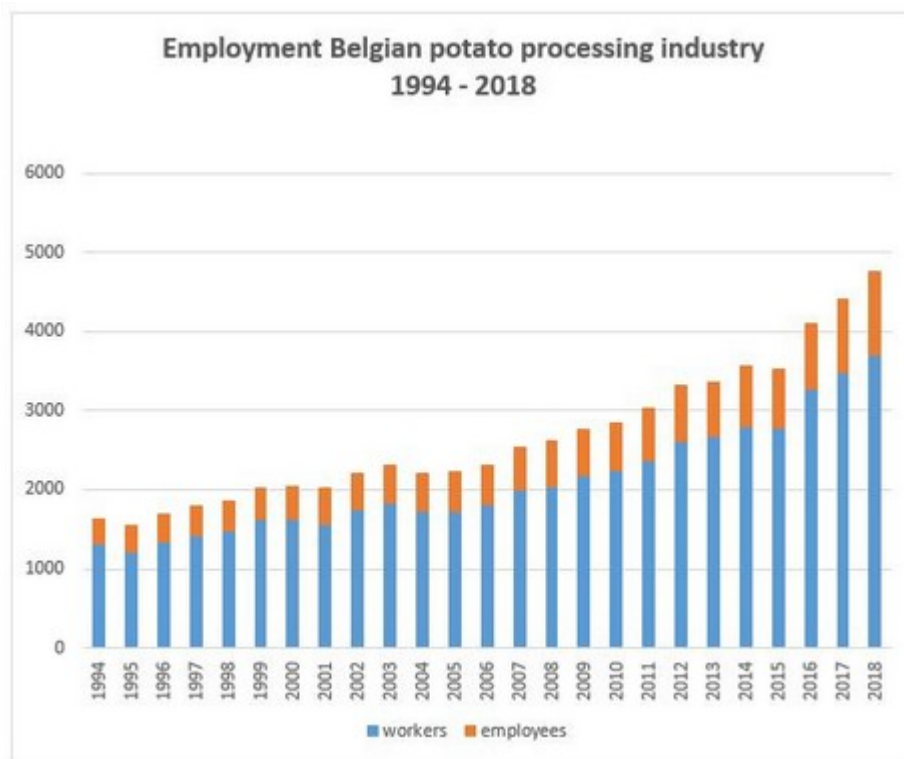
Belgapom, the association for the Belgian potato trade and processing industry, announced that in 2018 the 5 million tonne mark was passed with regard to processed potatoes. This is absolutely a new record and what makes it even more remarkable, is that it is the sharpest annual increase since the nineteen-nineties. As a reminder: in 1990 around 500,000 tonnes of potatoes were processed into fries, mashed potato products, crisps or flakes and granules. 28 years later, the sector can report an increase of 1000 %.

The use of potatoes as a raw material rose by 11.6% in 2018. This is by far the sharpest increase in the history of this still relatively new sector of the Belgian food industry.

### **Increase in employment and investments form the basis for further sustainable growth**

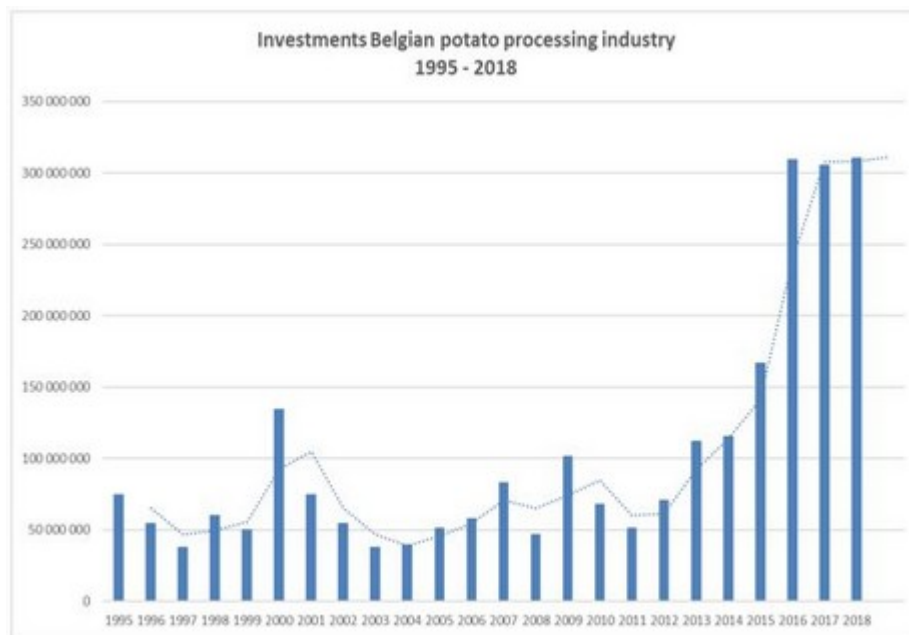
The sector continues to invest in the future, both with regard to quality and quantity. Sustainability is the leitmotiv through it all. Efforts are being made in the area of the sustainable cultivation of potatoes, environmentally friendly production and logistics.

Employment has also seen remarkable growth with an increase of 8 % compared to 2017. At present, 4762 blue and white-collar workers are employed in this strongly automated sector.



The Belgian potato-processing industry is located in the heart of the European production area and it can make use of an ever more number of potato professionals and a unique logistical network with international ports nearby.

On the other hand, the Belgian potato sector has made use of the large supply of potatoes in the second half of the 2017-2018 season following a record potato harvest. Despite the setback of the 2018-2019 growing season with the exceptional drought and repeated heatwaves, there was a large supply of potatoes in the second half of 2018. Quite a number of batches could not be kept and – in consultation with the growers – it was decided to process them in the autumn of 2018.



### Not all good news

However, the prolonged drought and high temperatures during the 2018 -2019 growing season caused extensive damage.

Not only will the low yield of the 2018 harvest probably have a major impact on the business results of all the operators of the Belgian potato chain, the confidence in this strong, largely family-run sector of SMEs developed over many years also threatened to be shaken up.

Belgapom has as much as possible stimulated dialogue between the companies executing the contracts. They are also continuing to focus on achieving a trade organisation for the potato sector that should provide a fixed base to this dialogue.

The high potato prices on the free market helped lead to a rising price for the finished products, which did not have a favourable impact on the Belgian competitive position vis-à-vis other production countries.

For the full report, click here (<https://belgapom.be/en/blog/>).

Romain Cools

**Belgapom**

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Publication date: Mon 1 Apr 2019



## POTATOES

## Record Belgian Potato Patch Growth, But Challenges Loom

9TH APRIL 2019



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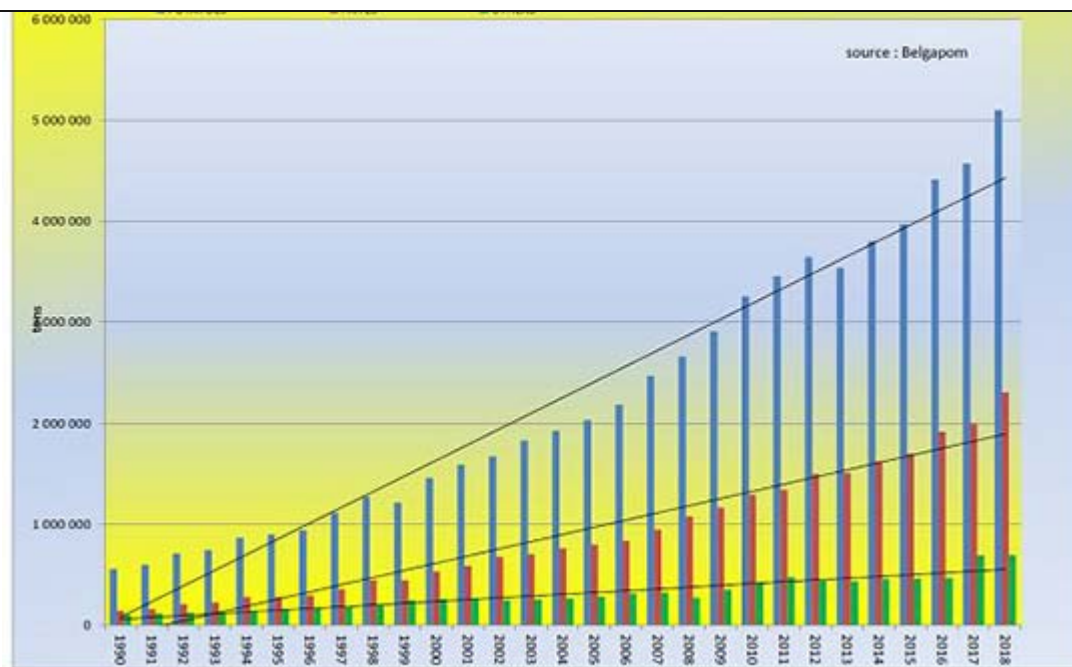
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More than five million tons of potatoes were processed in Belgium during 2018, setting an all-time record and registering the sharpest annual increase since the 1990s. The use of potatoes as a raw material rose by 11.6%, which was by far the greatest increase in the history of this growing segment of the Belgian food industry.

Berlare-based Belgapom, the association representing the Belgian potato trade and processing sectors, notes that last year's tonnage marked a whopping 1,000% increase from the average per annum volume of 500,000 tons processed into frozen fries, mashed potato products, flakes and granules less than three decades ago.





Belgium currently ranks as the largest exporter of frozen potato products on the planet, shipping value-added spuds to over 150 countries from 18 processing plants. Output of frozen fries in 2018 hit 2,073,747 tons, up from 1,770,298 tons in 2017. Refrigerated, or chilled fry tonnage, was 231,734 last year, compared with 226,796 in 2017. The figures for mashed potato products, croquettes, chips, flakes and other items were 695,321 tons in 2018 and 690,159 tons in 2017.

The term “Belgian fries” is increasingly recognizable among consumers around the world, who regard it positively along with other Belgian food and beverage fare including chocolate, waffles, beer and ale. It took the coordinated efforts of Belgium’s potato production and marketing cluster to make it happen.

In addition to growers, for whom potatoes have become the most important source of revenues within the nation’s arable farming field, service providers and suppliers of machinery have also experienced remarkable growth. They are increasingly leading global players in innovative product introductions and technology advances.

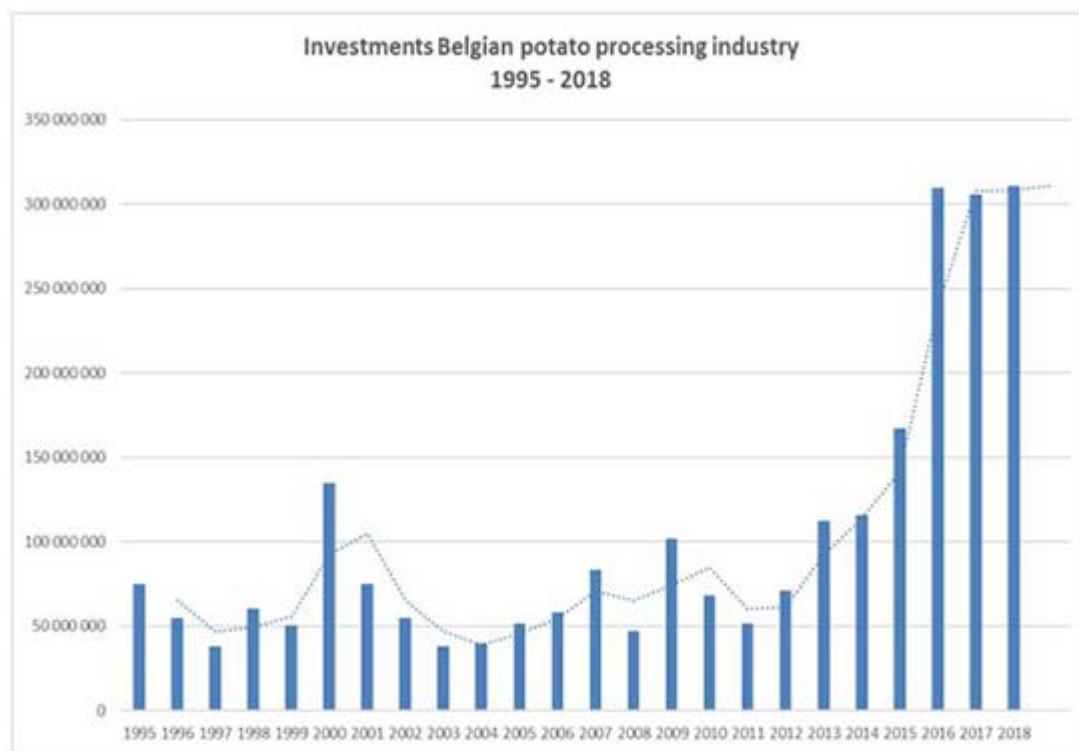
The Belgian potato processing industry is based in the heart of the European production belt. It can thus not only draw from a deep regional pool of talent and expertise, but is also



## Rising Investment, Jobs, Sustainability

Investments in the future continue to be made, both with regard to quality and quantity. Sustainability is the recurring theme through it all. Efforts are being made in the area of the sustainable cultivation of potatoes, environmentally friendly production and logistics.

The processing sector's employment rate has also charted remarkable growth, showing an increase of 8% compared to 2017. At present, 4,762 blue- and white-collar workers are gainfully engaged in highly automated factories and offices.



As for the foreseeable future, the sustainable growth of Belgium's potato processing industry seems assured. In 2018 there were record investments in the area, amounting to almost €311 million.

The reasons for this remarkable evolution are firstly the continued rising demand for potato products on the global market. Growing middle classes in Asia and South America are stimulating appetites for convenience foods, including Belgian fries.



2017-2018 growing season, following a record potato harvest. Despite the setback of the 2018-2019 season, which coped with exceptional drought and repeated heat waves, a large supply of potatoes became available in the second half of 2018. As quite a number of batches could not be kept, in consultation with the growers it was decided to process them in the autumn of 2018.

In addition, the Belgian processing companies are also increasingly investing in promotion and developing their commercial network. One example of this is the campaign in Southeast Asia in cooperation with VLAM, APAQ-W and the European Commission. It has led to better familiarity with the story of “Belgian fries, from the heart of Europe” in Vietnam, Thailand and other countries in that part of the world.

## Not All News Good

Meanwhile, the prolonged drought and high temperatures during the 2018-2019 growing season caused extensive damage to the Belgian potato chain. Not only will the low yield of the 2018 harvest probably have a major impact on the business results of all national players, but the confidence in this strong, largely family-run sector of SMEs developed over many years has been shaken.

Agricultural organizations and Belgapom have as much as possible stimulated dialogue between the companies executing contracts.



They are also continuing to focus on achieving a trade organization for the potato sector that should provide a fixed base for this dialogue.

“Trade and industrial sectors have furthermore adapted their quality requirements as part of the solution to the problems, although admittedly this has led to shorter fries,” reported Belgapom.

The high potato prices on the free market led to a rising price for finished products, which did not have a favorable impact on the Belgian competitive position vis-à-vis other producing nations.



European Commission to make a formal end to the anti-anti-dumping measures of a number of countries,” stated Belgapom. “Not only do they damage the companies involved, in addition an unjustified negative image is affecting this dynamic sector, one which developed into a global player without systematic support from the government.”

The difficult circumstances of the 2018-2019 season also have an impact on the amount and quality of the seed potatoes supplied, which could very well affect the next season.

Finally, the sector is also regarding the imminent decision of the European Commission to no longer permit the sprout inhibitor CIPC with great uncertainty.

“This substance has been in use since time immemorial,” stated Belgapom. “Recent studies will perhaps result in its authorization being revoked. Luckily the sector itself, in collaboration with Flanders Food, has already taken the initiative to examine alternative substances with the Reskia research project (low-residue sprout inhibition). However, it is still necessary to learn how to handle this in practice and the sector will be confronted with significant investments in potato storage.”

Belgapom has called on the Flemish and Walloon authorities to assist and support their producers in this effort. The sector expects full cooperation from Europe to also find a solution for risks as a result of the historical contamination of warehouses.

## WatchITgrow Support

Within the framework of sustainable development of the sector, Belgapom and its companies are offering their full support to VITO's WatchITgrow platform. This instrument, that makes use of satellite data and numerous other information sources, is the successor to the Belspo Ipot project that Belgapom helped to set up.





The trade association has called on its members to pay a premium to producers who, within the framework of their contract enter their parcels via WatchITgrow before 2019 and add the necessary cultivation data.

The data is used by VITO to develop growing advice controlled by AI (artificial intelligence). For the next two years, growers can make use of the online growing advice that will be further developed year after year. After that, a fee will be charged for the system, but it will also continue to further develop its advice and warnings.

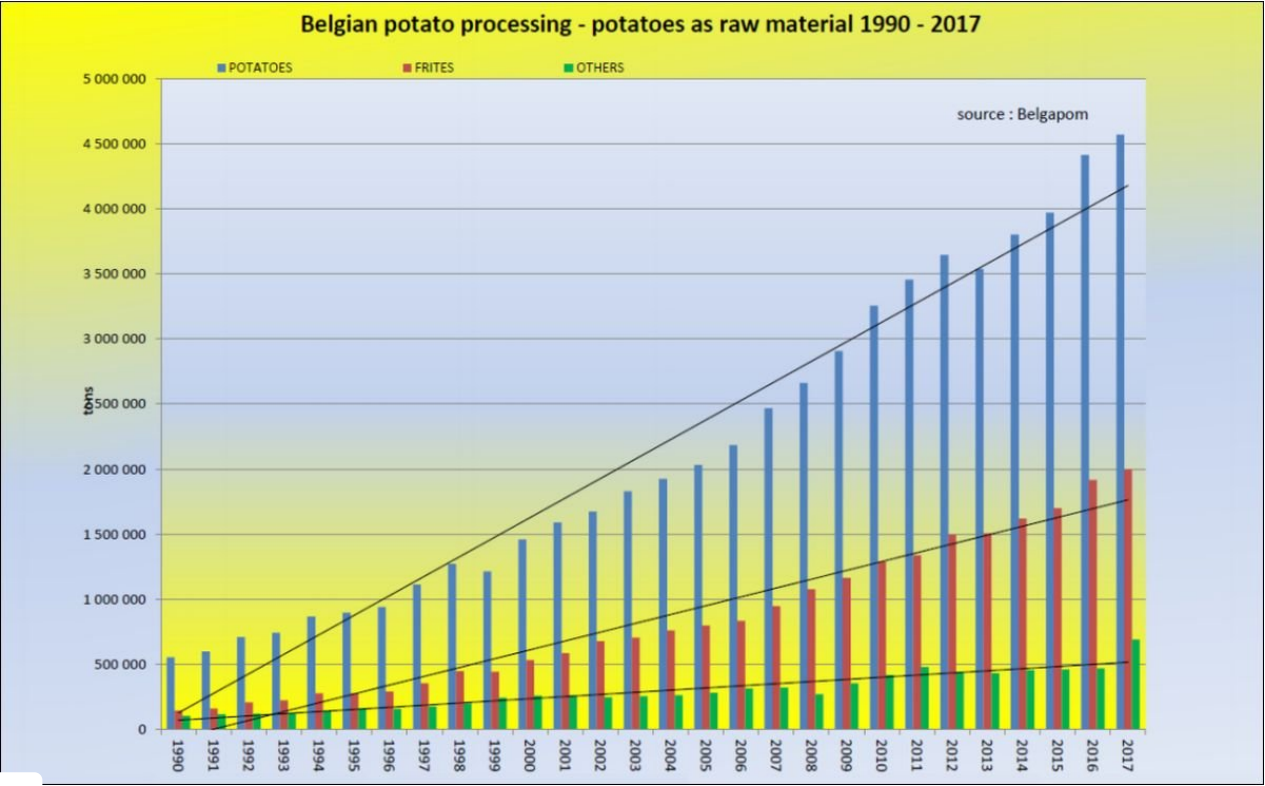
Access to the harvest prognosis model is limited to just the grower, who is free to share it with buyers if desired. It should be pointed out that VITO is the only party that has direct access to this data.

## RELATED POSTS

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# Record Investments in the Belgian Potato Processing Sector continued in 2017

News » [French Fries and Potato Specialties](#) » Record Investments in the Belgian Potato Processing Sector continued in 2017



Potato Processing in Belgium from 1990 -2017, including potatoes used for processing and production of french fries (Courtesy: Belgapom).

Mar 16, 2018

» record year of 2016 for the Belgian potato processing industry continued into 2017, according to Belgapom, the Belgian potato trade and processing industry association.

During the past few years, the Belgian potato industry developed into one of the fastest growing sectors in the Belgian food industry. Partly thanks to the significant investment in capacity and quality, this trend continued in 2017. Thus last year 4.57 million tonnes of potatoes (+ 3.6 %) were processed into fries, crisps, croquettes, flakes, granules and other potato products.

What is noticeable in 2017 is the exceptional increase in products other than fries (crisps, croquettes, mash products, flakes, etc.), which evolved from 468,513 to 690,159 tonnes (+ 47.5%).

The share of frozen and fresh fries rose from 1.91 million tonnes to 1.99 million tonnes (+ 4.3 %), however the share of fresh refrigerated fries fell by 3.5 %.

For the season 2017-2018 statistics show with 5,11 million tons of potatoes an absolute record harvest for Belgium. This increase in resulting from the increase in planted area, the choices of varieties and the influence of weather conditions. The figures published by Belgapom relate to the calendar year of 2017, which spans two potato seasons (2016-2017 and 2017-2018).

 (Click to enlarge)

- ▶ Blanchers
- ▶ Coolers
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[Dehydrated Potato Products](#)


### Related Events




 Nov 25, 2018 to Nov 27, 2018

Interpom | Primeurs 2018



 May 27, 2018 to May 31, 2018

<div>The Belgian potato processing industry in 2015 – 2017</div>			
	2015	2016	2017
Number of processing plants	17	18	18
Number of workers :	2.780	3.257	3.467
Number of employees:	757	858	943
<b>Investments:</b>	€ 167.207.415	€ 309.775.177	€ 305.513.247
<b>Raw material :</b>			
Potatoes :	3.970.595 t.	4.414.390 t.	4.571.297 t.
Flakes :	6.934 t	6.300 t.	6.039 t.
<b>Finished product :</b>			
Frozen fries :	1.472.150 t.	1.681.332 t.	1.770.298 t.
Refrigerated fries :	226.475 t.	234.694 t.	226.796 t.
Mashed potato products, croquettes, chips, ...			
Flakes and others ,...	460.475 t.	468.513 t.	690.159 t.

World Potato Congress 2018 /  
ALAP 2018

Potato Processing in Belgium 2015-2017 (Courtesy: Belgapom)

But what is certainly fanning the optimism in the sector is the fact that in 2017 the record sum of over 305 million euros invested in the potato-processing sector was almost equalled (-1.3 %). Employment in the sector once gain also grew by 7.1 % (4,410 units).

According to the latest statistics, Belgium remains by far the largest exporter of frozen potatoes in the world in 2017 with 2.2 million tonnes. The share of third countries continues to increase.

Promotional activities

the eve of the national holiday in 2017, all the competent authorities recognised the ‘frietkot culture’ as national intangible cultural heritage. On that occasion, Prince Laurent of Belgium granted the mandate of “ambassador of the Belgian frietkot culture abroad” to James Bint, the famous cartoon character who analogously with his homonym ‘James Bond’ has a ‘license to fry’.

Last year, the figure of James Bint was used to start the promotion campaign for ‘Belgian fries, from the heart of Europe’ in southeast Asia. By participating in trade fairs and press events, the Belgian fry producers try to demonstrate the authenticity and quality of the Belgian fries in this fast-growing market of 557 million consumers.

 (Click picture to watch video)



James Bint: 8 steps to fries heaven (Courtesy: [jamesbint.be](http://jamesbint.be))

Highlighted Company



Belgapom



Vlaams Centrum voor Agro- en  
visserij Marketing (VLAM)

Where



 Belgium



Illustration from the brochure [Original Fries](#)

fortunately, these dossiers have also got other South American countries thinking out making use of this procedure, even if there is no reason to do so at all.

gapom and the European federation EUPPA have urged the European Commission to rease the pressure to end such practices, where apparently there is no hesitation in raisifying a dossier even during the process.

Sustainable growth

Not only has the Belgian sector chosen to press ahead to guarantee the sustainability of its national potato production by setting up further forms of cooperation via the Potato Branch Organisation, which is to be baptised during Interpom Primeurs (25-27 November 2018).

But Belgapom also supports international cooperation projects within the potato sector in developing countries.For example the project Coalición Chuño by TRIAS in collaboration with a number of other partners such as ILVO, VTI, VLTl and Rotary Torhout, which supports the construction of the first artisanal chuño factory in the world in Peru (a century-old technology for freeze-drying potatoes).

This project will be presented to the whole world as an example of development aid through potatoes during the [World Potato Congress in Cuzco \(27-31 May 2018\)](#).

Source: Belgapom

Related Companies

[Agristo NV](#)



Agristo is a manufacturer of frozen prefried french fries and potato specialties.  
Agristo operates 3 production plants (and is working on the construction of a 4th)





As of today, after all the supply of potato products in Vietnam, Indonesia, the Philippines, Malaysia and Thailand above all comes from North America.

The campaign – with the support of the European Commission – is being carried out by VLAM in cooperation with APAQ-W, FIT and AWEX and will continue in 2018 and 2019. There are events planned in the near future in Singapore, Manilla, Bangkok, Hanoi and Ho Chi Minh city.

In the week of 9-15 May, the Central World Bangkok – one of the largest shopping centres in the world – will be dominated by “real Belgian fries”.



Original Belgian Fries

For one week, Belgian fries will be offered for tasting and during the weekend of 11-13 May, the famous Belgian frietkot manager, Eddy Cooremans, will be present to fry and recommend Belgian fries. What is more, a real-life James Bint will provide additional entertainment with his text balloons. This event is also being linked to social media and B2B events such as the Thaifex trade fair.

### Increasing protectionism

But on the other side of the world, a threat is emerging. Belgian (and European) fries risk becoming the victim of protectionist reflexes that threaten international trade.

After unjustified antidumping measures by the Brazilian government (the legal complaint against this by the European companies is still pending), a decision by the Colombian government is soon also expected about a similar case.

The dossier resembles a Swiss cheese with just as many holes (which was also confirmed by the European Commission), but a negative decision here can still lead to unjustified import levies.

