SPECIALTY CROPS

PREMIER TECH

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2020 EDITION

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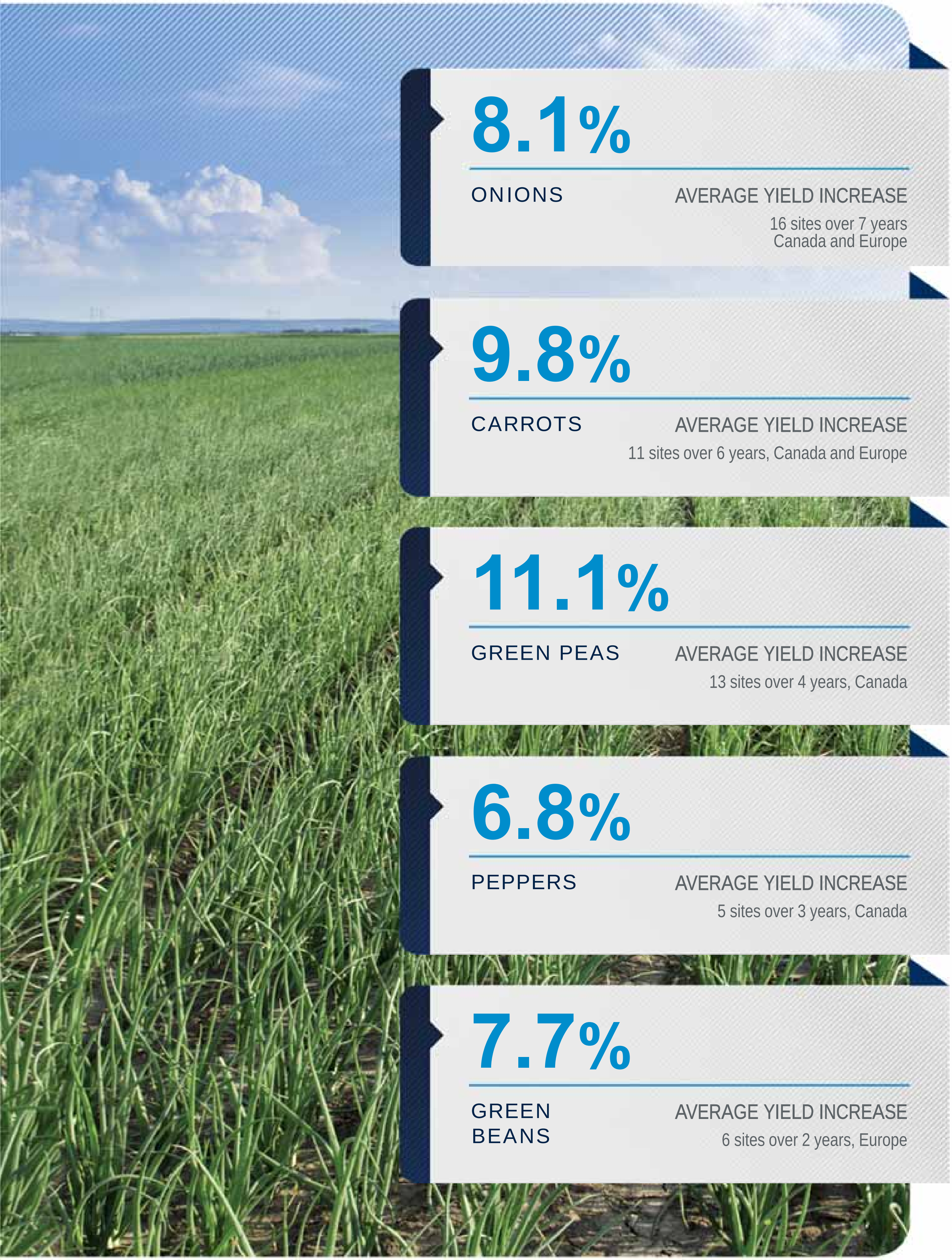
SPECIALTY CROPS

FRUITS & VEGETABLES



8.1%

ONIONS — AVERAGE YIELD INCREASE

16 sites over 7 years
Canada and Europe

9.8%

CARROTS — AVERAGE YIELD INCREASE

11 sites over 6 years, Canada and Europe

11.1%

GREEN PEAS — AVERAGE YIELD INCREASE

13 sites over 4 years, Canada

6.8%

PEPPERS — AVERAGE YIELD INCREASE

5 sites over 3 years, Canada

7.7%

GREEN BEANS — AVERAGE YIELD INCREASE

6 sites over 2 years, Europe

ONIONS

► GROWER SPLIT FIELDS AND PLOT TRIALS[1]

Table 1. **Average increase of marketable yields[2] (t/ha) with AGTIV® SPECIALTY CROPS for different years (2014-2019)**

Year	Number of sites	Yield Untreated	Yield AGTIV®	Yield increase	Yield increase (%)
2014	2	67.7	73.2	5.4	8.0
2015	4	44.3	47.6	3.3	8.7
2016	1	60.7	64.1	3.4	5.6
2017	1	18.2	20.4	2.2	12.2
2018	2	40.0	46.1	6.2	20.3
2019	6	50.3	52,6	2.2	3.3
Total	**16 sites**	**48.3[a]**	**51.8[b]**	**3.5 t/ha**	**8.1%**

[1] Split fields and trials conducted in North America and Europe

[2] Yields without the same letter are statisticly different based on a Tukey HSD test ($p \leq 0.05$).

Table 2. **Average increase of marketable yields[2] (lb/ac) with AGTIV® SPECIALTY CROPS for different years (2014-2019)**

Year	Number of sites	Yield Untreated	Yield AGTIV®	Yield increase	Yield increase (%)
2014	2	60 400	65 307	4 817	8.0
2015	4	39 523	42 467	2 944	8.7
2016	1	54 155	57 188	3 033	5.6
2017	1	16 237	18 200	1 962	12.2
2018	2	35 687	41 129	5 531	20.3
2019	6	44 876	46 928	1 962	3.3
Total	**16 sites**	**41 813[a]**	**45 203[b]**	**3 375 lb/ac**	**8.1%**

[1] Split fields and trials conducted in North America and Europe

[2] Yields without the same letter are statisticly different based on a Tukey HSD test ($p \leq 0.05$).

2019 – MYCORRHIZAL INOCULANT

► PLOT TRIAL

Research department: Antédis

Research site: Issé, Loire-Atlantique department, France

Treatments : a) Untreated;
b) AGTIV® SPECIALTY CROPS • Powder*.

Experimental design: 8 replicated plots per treatment in randomized complete block design

Carrot variety: Santero F1

Previous crop: Spring barley

Seeding details: Seeded April 1st at 80 seeds/m^2 with 32 cm row spacing.

*Products applied according to manufacturer's recommended rate.

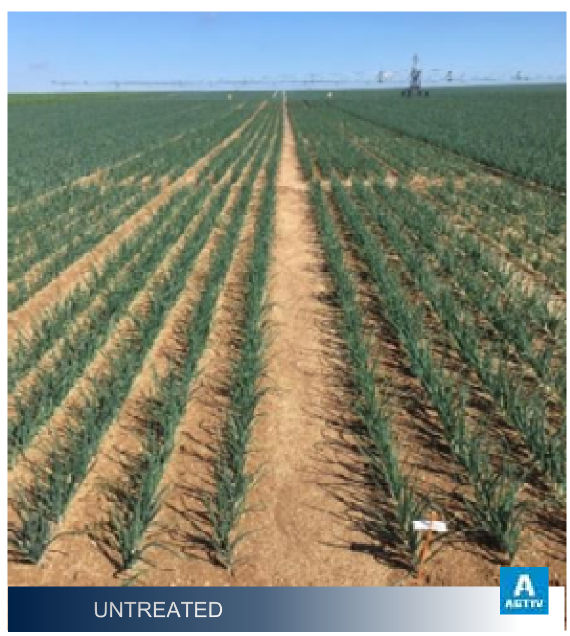
Table 1. **Summary of onions marketable yields per treatment.**

Treatment	Marketable yield (lb/ac)	Marketable yield (t/ha)
Untreated	55 315	62.0
AGTIV® SPECIALTY CROPS • Powder	56 474	63.3

Plot operational notes and rain fall

- Fertilization:
  - Liquid Solution N 39 (19-03-19)
  - AVF K4 (from 20/08 to 25/08 2019)
- Pesticides:
  - In April – Baroud SC and Lentagran
  - In May – Challenge 600, Lentagran 200 and Satarne 200
  - In June - Challenge 600, Satarne 200, Hacrobat M DG, DEFI, Bordeaux mixture and Caiman WP
  - In July – Bordeaux mixture, Dithane M 45, Scala, Acrobat M DG,
  - In August – Bordeaux mixture, Acrobat M DG, Dithane M45
  - In September – ITCAN SL 270
- Harvested September 24th, 2019.

Month	Precipitations (mm)
April	36.4
May	90.6
June	34.4
July	10.6
August	42.9
September	4.6
TOTAL	**219.5**



Better growth on the right with AGTIV®.

PREMIER TECH

EFFICACY REPORT
2018 – MYCORRHIZAL INOCULANT

ONIONS

► PLOT TRIAL

Research partner: Black Creek Research

Research site: Bright (ON), Canada

Treatments: a) Untreated;
b) AGTIV® ON SEED™ mycorrhizal inoculant.

Experimental design: 8 replicated plots per treatment in randomized complete block design.

Onion variety: Catskill

Previous crop: Soybean

Seeding details: Seeded June 7th with Clean seeder at 40 seeds/m of row with 30 cm row spacing.

Table 1. **Summary of onion yields per treatment.**

Treatment	Yield		Marketable Yield	
	(lb/ac)	(t/ha)	(lb/ac)	(t/ha)
Untreated	20 434	22.9	18 467	21.0
AGTIV® ON SEED™ mycorrhizal inoculant	29 179	32.7	26 644	29.8

Plot operational notes and rain fall.

- Fertilization:
  - MAP - 70 kg/ha
  - Potash - 98 kg/ha
  - KMag - 125 kg/ha
  - Urea - 112 kg/ha
- Conventional till
- Pesticides:
  - Venture L (18-06-20)
  - Pardner (18-06-25)
  - Prowl H_2O (18-06-29)
  - Pardner (18-07-05)
  - Prowl H_2O (18-07-15).
- Harvested on October 18th 2018.

Month	Precipitation (mm)
June	91
July	63.1
August	116.6
September	57.8
TOTAL	**328.5**

More developed root system on the right, and plants are larger with AGTIV®.

ONIONS

► GROWER SPLIT FIELDS

Research site: France, Europe

Treatments: a) Untreated;
b) AGTIV® mycorrhizal inoculant.

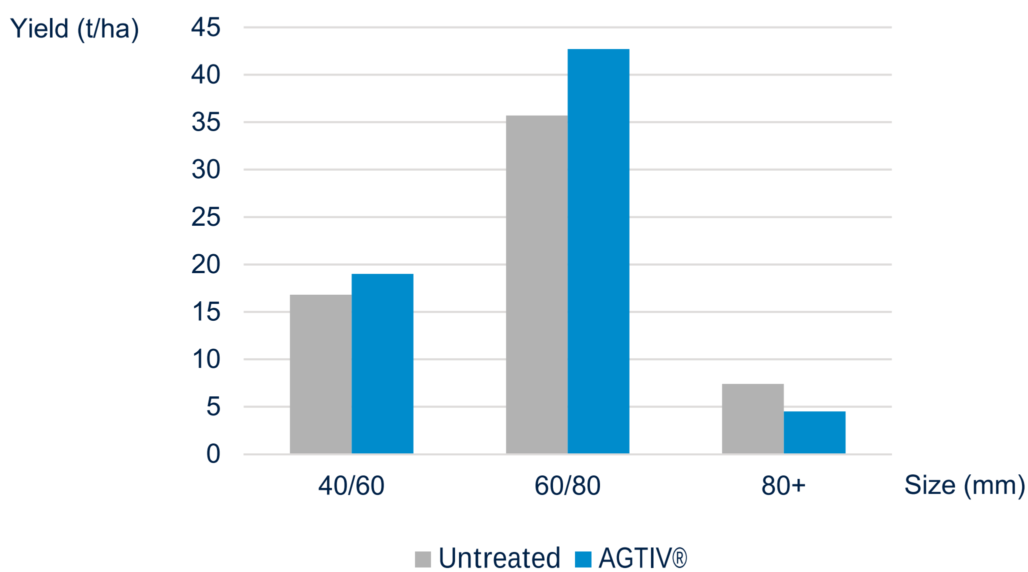
Experimental design: Every data point per field consists in an average of 3 samples each (untreated and AGTIV®).

Variety: Hytunes

Table 1. **Marketable onion yields per treatment.**

Treatment	Yield (lb/ac)	Yield (t/ha)	Bulb number / ha	Difference (%) AGTIV® vs untreated
Untreated	53 441	59.9	531 667	
AGTIV® ON SEED™ mycorrhizal inoculant	59 062	66.2	616 667	+10.5%

Figure 1. **Onion yield (t/ha) by marketable size (mm)**



EFFICACY REPORT
2017 – MYCORRHIZAL INOCULANT

ONIONS

► PLOT TRIALS

Research partners: Black Creek Research and Prisme

Research sites: Bright (ON), Canada – Sandy loam soil
and Napierville (QC), Canada – Black soil, organic

Treatments: a) Untreated;
b) AGTIV® ON SEED™ mycorrhizal inoculant.

Experimental design: Randomized complete block design, 8 replicates.

Table 1. **2017 summary of onion yields and % difference.**

Location	Year	Variety	Untreated		AGTIV® mycorrhizal inoculant		% Yield difference
			(lb/plot)	(kg/plot)	(lb/plot)	(kg/plot)	
Ontario	2017	Frontier	32.2	14.6	34.0	15.4	+5.5%
Quebec	2017	Trailblazer	23.8	10.8	25.4	11.5	+6.3%
Average	**2017**		**28.0**	**12.7**	**29.8**	**13.5**	**+6.2%**

Onion split field with AGTIV® vs untreated.
Plant growth and health is enhanced on the right.

PREMIER TECH

► GROWER SPLIT FIELDS

Research site: France, Europe

Treatments: a) Untreated;
b) AGTIV® mycorrhizal inoculant.

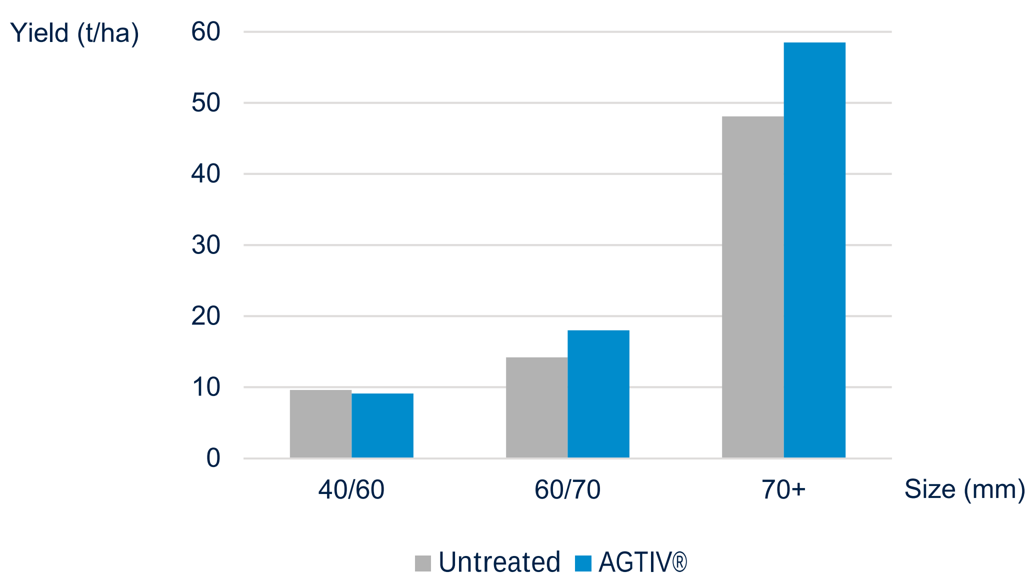
Experimental design: Every data point per field consists in an average of 3 samples each (untreated and AGTIV®).

Variety: SPIRIT

Table 1. **Marketable onion yields per treatment.**

	Untreated	AGTIV® mycorrhizal inoculant	Difference (%) AGTIV® vs untreated
Yield (t/ha)	71.9	85.7	+19.2%
Bulb number / ha	409 877	459 259	+12.0%

Figure 1. **Onion yields (t/ha) by marketable size (mm).**



2019 – MYCORRHIZAL INOCULANT

CARROTS

► PLOT TRIAL

Research partner: Antédis

Research site: Ploërmel, Morbihan department, France

Treatments : a) Untreated;
b) AGTIV® SPECIALTY CROPS • Powder*.

Experimental design: 8 replicated plots per treatment in randomized complete block design

Carros variety: Bolero F1

Previous crop: Ray-grass

Seeding details: Seeded May 24^{th} at 850,000 seeds/ha.

*Products applied according to manufacturer's recommended rate.

Table 1. **Summary of carrot marketable yields per treatment.**

Treatment	Marketable yield (lb/ac)	Marketable yield (t/ha)	Increase
Untreated	87 433 [a]	98.0 [a]	
AGTIV® SPECIALTY CROPS • Powder	96 266 [b]	107.9 [b]	+10.1%

[1] Yields with same letter are not statistically different following a Tukey HSD test at $p \leq 0.05$.

Plot operational notes and rain fall

- Fertilization:
  - 30 m^3 of cattle manure (19-05-21)
- Pesticides
  - Racer ME, Baroud SC and Centium 36 CS (19-06-02)
  - Challenge 600 and DEFI (19-06-26 et 19-08-01)
  - Switch and Heliosoufre (19-08-13)
- Harvested October 28^{th}, 2019.

Month	Precipitations (mm)
May	3.0
June	144.4
July	18.4
August	57.4
September	67.8
October	172.5
TOTAL	**463.5**

CARROTS

▶ PLOT TRIAL

Research partner: Eurofins Agroscience services

Research site: Meneac, Morbihan department, France

Treatments : a) Untreated;
b) AGTIV® SPECIALTY CROPS • Powder*.

Experimental design: 8 replicated plots per treatment in randomized complete block design.

Carrot variety: Bolero F1

Previous crop: Barley

Seeding details: Seeded May 24th at 600,000 seeds/ha with 60 cm row spacing.

*Products applied according to manufacturer's recommended rate.

Table 1. **Summary of carrot marketable yields per treatment.**

Treatment	Marketable yield[1] (lb/ac)	Marketable yield[1] (t/ha)	Increase
Untreated	79 047 [a]	88.6 [a]	
AGTIV® SPECIALTY CROPS • Powder	84 757 [b]	95.0 [b]	+7.2%

[1] Yields with same letter are not statistically different following a Tukey test at p≤0.05

Plot operational notes and rainfall

- Fertilization:
  - Chicken manure 2200 kg/ha (19-04-15)
  - Ammonitrate (19-02-23; 180 kg/ha and 19-03-15; 150 kg/ha)
- Pesticides:
  - Cherokee (19-04-19)
  - Keynote (19-05-08)
  - Baroud, Racer Centium (19-05-25)
  - Signum, Heliosoufre and Bordeaux mixture (19-06-25)
- Harvested October 1st, 2019.

Month	Precipitations (mm)
June	181.1
July	23.3
August	53.6
September	45.7
TOTAL	**303.7**

2018 – MYCORRHIZAL INOCULANT

► PLOT TRIAL

Research partner: Agricultural Development Group Inc.

Research site: Eltopia (WA), USA

Treatments: a) Untreated;
b) AGTIV® ON SEED™ mycorrhizal inoculant.

Experimental design: 8 replicated plots per treatment in randomized complete block design

Carrot variety: Envy

Previous crop: Squash

Seeding details: Direct seeded May 24th at 20 seeds/m of row;
1.3 million seeds per hectare.

CARROTS

Table 1. **Summary of carrot marketable yields per treatment.**

Treatment	Marketable Yield (lb/ac)	Marketable Yield (t/ha)	Marketable Yield (%)
Untreated	12 499	14.0	92
AGTIV® ON SEED™ mycorrhizal inoculant	16 941	19.0	92

Plot operational notes and rain fall.

- Conventional till
- Herbicide:
    - Two maintenance herbicide applications were made on July 13th with Lorox and August 23rd with Nortron
- Harvested on October 8th 2018.

Month	Precipitation (mm)
May	9.9
June	15.25
July	0
August	0
September	0.5
October	20.8
TOTAL	**46.45**

► PLOT TRIAL

CARROTS

Research partner: Black Creek Research

Research site: Bright (ON), Canada

Treatments: a) Untreated;
b) AGTIV® ON SEED™ mycorrhizal inoculant.

Experimental design: 8 replicated plots per treatment in randomized complete block design

Carrot variety: Envy

Previous crop: Soybean

Seeding details: Seeded June 11th with Clean seeder at 50 seeds/m of row;
3.3 million seeds per hectare.

Table 1. **Summary of carrot marketable yields per treatment.**

Treatment	Marketable Yield (lb/ac)	Marketable Yield (t/ha)	Marketable Yield (%)	Reject (%)
Untreated	20 488	23.0	64%	4.75%
AGTIV® ON SEED™ mycorrhizal inoculant	23 244	26.0	69%	3.13%

Plot operational notes and rain fall.

- Conventional till
- Fertilization:
  - MAP - 70 kg/ha
  - Potash - 98 kg/ha
  - KMag - 125 kg/ha
  - Urea - 112 kg/ha
- Herbicide :
  - Lorox FL (480 g/L, 3.25 L/ha, June 12th)
  - Venture L (125g/L, 2L/ha, July 10th)
- Harvested on September 24th 2018.

Month	Precipitation (mm)
June	91
July	63.1
August	116.6
September	57.8
TOTAL	**328.5**

EFFICACY REPORT
2017 – MYCORRHIZAL INOCULANT

CARROTS

► PLOT TRIALS

Research partners: Black Creek Research and Prisme

Research sites: Bright (ON), Canada – Sandy loam soil
and Napierville (QC), Canada – Black soil, organic

Treatments: a) Untreated;
b) AGTIV® ON SEED™ mycorrhizal inoculant.

Experimental design: Randomized complete block design, 8 replicates.

Table 1. **Summary of carrot marketable yields and % difference.**

Location	Year	Variety	Untreated		AGTIV® mycorrhizal inoculant		% Yield difference
			(lb/ac)	(t/ha)	(lb/ac)	(t/ha)	
Ontario	2017	Bolero	36 579	41	38 542	43.2	+5.3%
Quebec	2017	Olympus	28 817	32.3	34 438	38.6	+19.5%
Average	**2017**		**32 653**	**36.6**	**36 490**	**40.9**	**+11.7%**

Carrot split field with AGTIV® vs untreated.
Bigger plants and quicker row closure on the right.

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EFFICACY REPORT
2019 – MYCORRHIZAL & *BACILLUS* INOCULANT

SWEET CORN

▶ PLOT TRIAL

Research partner: Schreiber & Sons

Research site : Eltopia, Washington, USA

Treatments : a) Untreated;
b) AGTIV® ON SEED™ – SPECIALTY CROPS • Film coating + AGTIV® ON SEED™ BACILLUS • Liquid *.

Experimental design : 8 replicated plots per treatment in randomized complete block design

Sweet corn variety: Nirvana

Previous crop : Fallow (2017) and wheat (2018)

Seeding details: Seeded June 4th, 2019 at 30 000 seeds/ac with 75 cm row spacing.

*Products applied according to manufacturer's recommended rate.

Table 1. **Summary of sweet corn yields per treatment.**

Treatment	Yield (lb/ac)	Yield (t/ha)	Increase
Untreated	17 854.0 [a]	20.0 [a]	
AGTIV® ON SEED™ – SPECIALTY CROPS • Film coating + AGTIV® ON SEED™ BACILLUS • Liquid	21 067.7 [b]	23.6 [b]	+18%

[1] Yields with same letter are not statistically different following a LSD test at p≤0.05.

Plot operational notes and rain fall

- Herbicides application on June 22th (Atrazine) and July 22nd (Atrazine + Impact)
- Plots were irrigated and fertilized
- Harvested on September 16th, 2019.

Month	Precipitation (mm)
June	1.95
July	2.44
August	25.62
September	11.94
TOTAL	**41.95**

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EFFICACY REPORT

SUMMARY – MYCORRHIZAL INOCULANT

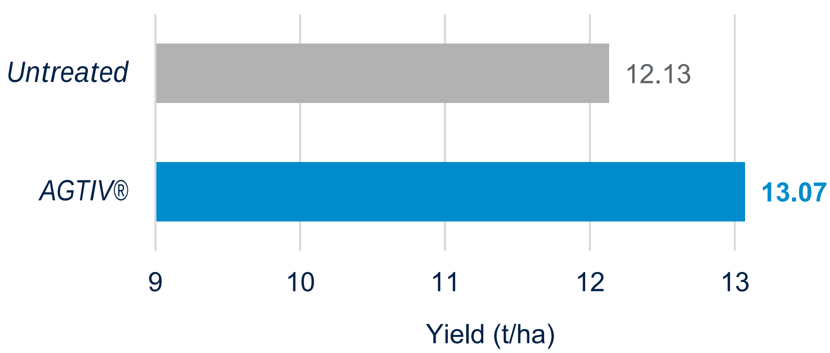
GREEN BEANS

► GROWER SPLIT FIELDS

Table 1. **Average yield increase with AGTIV® mycorrhizal inoculant for different years (2017 and 2018) in France, Europe.**

Variety	Untreated		AGTIV® mycorrhizal inoculant		Difference (%) AGTIV® vs untreated
	(lb/ac)	(t/ha)	(lb/ac)	(t/ha)	
Stanley	13 561	15.16	14 810	16.56	+9.2
Costal	11 865	13.31	12 668	14.24	+6.9
Bamaco	15 167	16.98	16 594	18.57	+9.4
Compass	8 297	9.27	9 635	10.8	+16.5
Paloma	9 546	10.73	9 367	10.47	-2.5
Linex	6 512	7.33	6 959	7.83	+6.8
Average	**10 795 lb/ac**	**12.13 t/ha**	**11 687 lb/ac**	**13.07 t/ha**	**+7.7%**

Figure 1. **Yield increase with AGTIV® mycorrhizal inoculant.**

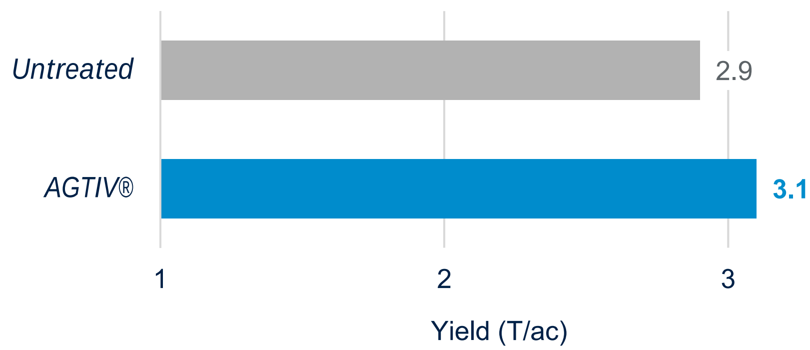


► GROWER SPLIT FIELDS

Table 1. **Average yield increase with AGTIV® SPECIALTY CROPS – PEA • Powder for different years (2015 to 2019) in Ontario and Quebec, Canada.**

Year	Number of sites	Average increase (t/ac)	Average increase (t/ha)	Average increase (%)
2015	4	0.31	0.77	23.3
2016	7	0.08	0.20	3.5
2017	1	0.12	0.30	3.7
2019	1	0.32	0.80	22.6
Total	**13 sites**	**0.17 t/ac**	**0.42 t/ha**	**11.1%**

Figure 1. **Average yield increase with AGTIV® SPECIALTY CROPS – PEA • Powder in Ontario and Quebec, Canada (2015 to 2019).**



Plant growth and health is enhanced on the right, and the leaf area is increased with AGTIV®.

SUMMARY – MYCORRHIZAL INOCULANT

PEPPERS

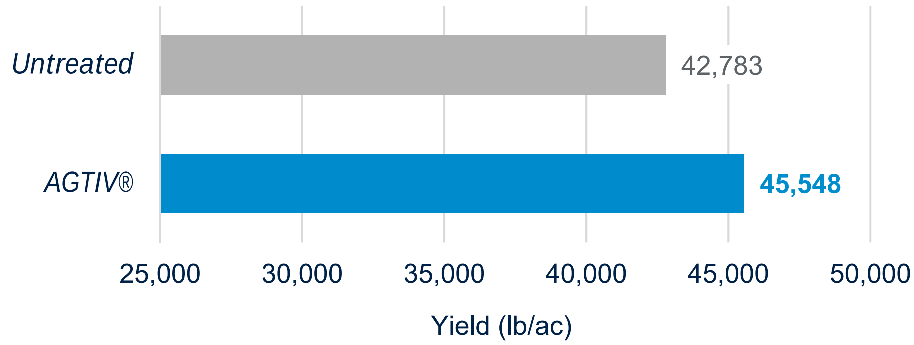
► GROWER SPLIT FIELDS

Table 1. **Average yield increase with AGTIV® mycorrhizal inoculant for different years (2002 to 2016) in ONTARIO & QUEBEC, Canada.**

Year	Number of sites	Average increase (lb/ac)	Average increase (t/ha)	Average increase (%)
2002	2	*	*	5.1
2015	2	2840	3.18	10.0
2016	1	2617	2.93	3.7
Total	**5 sites**	**2766 lb/ac ****	**3.10 t/ha ****	**6.8%**

* Plot trial data for 2002: average increase of 95 g/plant.
** The 2766 lb/ac average refers only to 2015-2016 data.

Figure 1. **Average yield increase with AGTIV® mycorrhizal inoculant in ONTARIO, Canada (2015 to 2016).**



More developed root system, more leaves and bigger fruits with AGTIV®.

PREMIER TECH

Pepper split field with AGTIV® vs untreated.
Plant growth and health is enhanced, and row closure occurs sooner on the right.

Bigger root system with more fibrous roots, and more fruits per plant with AGTIV®.

2016 – MYCORRHIZAL INOCULANT

► PLOT TRIALS

STRAWBERRIES

Research site: Saint-Eustache (QC), Canada

Treatments: a) Untreated;
b) AGTIV® mycorrhizal inoculant.

Experimental design: 3 fields. 3 plots of 7 plants per field. – New strawberry establishment

Table 1. **Strawberry yields (number of fruits/plot) per treatment.**

Treamtent	Ripe fruits	Marketable fruits	Unmarketable fruits
Untreated	16.0	13.6	2.4
AGTIV® mycorrhizal inoculant	18.4	17.1	1.3
% difference AGTIV® vs untreated	**+15%**	**+26%**	**47% reduction**

Larger and bigger plants with AGTIV® on the right.

PTAGTIV.COM

PREMIER TECH

Making a difference, this is what we are all about at Premier Tech. One team driven by a shared passion to deliver solutions that will better the lives of people, businesses and communities.

At Premier Tech, People and Technologies connect in lasting, transformative ways, giving life to products and services that help feed, protect and improve our world.

We are committed to creating sustainable solutions that help bring beautiful gardens to life, increase crop yields, improve the efficiency of manufacturing facilities, treat and recycle water, and much more as we keep innovating.

We are Premier Tech

PEOPLE AND TECHNOLOGIES MAKING A DIFFERENCE

95 years OF PASSION

DRIVING CHANGES TO MAKE A DIFFERENCE

IN 5 BUSINESSES

OUR BRANDS

AGTIV

PRO-MIX

wilson

C-I-L

ALASKAN

CHRONOS

Ecoflo®

Ecoprocess™

OUR DESIRE TO INNOVATE IS DRIVEN BY THE TECHNOLOGIES WE MASTER

At Premier Tech, innovation is in everything we do. Every day, we invest the time and energy necessary to master the science and technology behind the products we offer. This knowledge allows us to connect our technologies with real market needs, creating products that are relevant today — and for years to come.

Here, we not only seek to create new products, we redefine the very process of innovation to deliver upon our ambitions. It's no longer only about delivering transformative solutions, it's about pushing our technologies forward to bring meaningful solutions to life. Ones that can truly make a difference for our clients.

PREMIERTECH.COM

INNOVATION

AN INTEGRAL PART OF PREMIER TECH COLLECTIVE DNA

At Premier Tech, Innovation goes beyond the concept of research and development. More than a process leading to the creation of new products, it is a **state of mind that is strongly embedded in our corporate DNA**. Always seeking to **create unique and addictive experiences** for our clients, we simply never cease to push the boundaries of our abilities, competencies and technological platforms.

Creativity is a mix of knowledge, expertise and passion for unprecedented efficient solutions. Innovation, Research & Development and biological active ingredients have combined forces to put commercial offers to the agricultural market.

We first structured our Innovation efforts and approach back in 1983, driven by the ambition of developing value-added products derived from peat moss through technological advances. Today, **more than 260 Premier Tech team members** are devoted full-time to mastering the technologies behind the next leading-edge solutions that will make a difference to our clients, helping them stand out in their marketplaces.

Driven by a collective Culture and rooted in Values which revolve around our tradition of Innovation, the entire Premier Tech team holds a restless ambition to shake up the status quo and shift industry paradigms. Through the current innovation program IPSO: Innovation in Products-Processes, Services and commercial Offers, we are **constantly challenging the way we do business and how we can improve everything we do**.

This mindset is key to how we operate on a daily basis. Contributing to the loyalty of our clients around the world, it sets the ground rules for how collaborating with Premier Tech turns out to be a contagious experience they are willing to share with others.

We deeply believe that in order to continue to be sustainable and grow our market share, it is essential to never let our innovative spirit rest — to keep pushing forward and eliminate any barriers on the path to bringing new technologies, products and services to life in the marketplace. With the agility to truly make a difference by tapping into our full potential, **we make a difference for our clients' profitability**, and ultimately ensure our continued relevance as a strategic partner.

CELEBRATING DECADES OF

35 years OF EXPERTISE IN ACTIVE INGREDIENTS

Established manufacturer and marketer, Premier Tech builds on innovation and collaboration with local partners and growers to offer reliable high-quality inoculants. Every day, in our labs, facilities, and in the field, highly experienced scientists, engineers, and specialists from various domains collaborate to maximize the outcomes of research and turn them into effective products making a difference on your bottom line.

PRODUCTION

In 2000, Premier Tech set up a world-first endomycorrhizal inoculum plant, developing a new mycoreactor process for industrial scale production. Backed by more than 35 years of expertise in active ingredients, Premier Tech constantly develops and innovates in terms of production of mycorrhizae, rhizobium and other active ingredients:

- No contamination through a strictly controlled and aseptic environment
- Large-scale manufacturing production
- Adapted quality control for each step of the production processes, ensuring consistent high-quality inoculum

PTAGTIV.COM/**en/expertise**

INNOVATION AND VALUE

FORMULATION

Premier Tech's know-how makes it possible to adapt formulations with multiple active ingredients, concentrations and carriers tailored to different crops and application methods. Because a quality inoculant makes all the difference, our proven formulations are based on these important elements:

- **Carrier compatible with the active ingredients**
- **Formulations that guarantee active ingredient viability until use**
- **Quality control at several key points ensuring the performance of active ingredients**
- **Various formulations also tailored for organic production**

APPLICATION

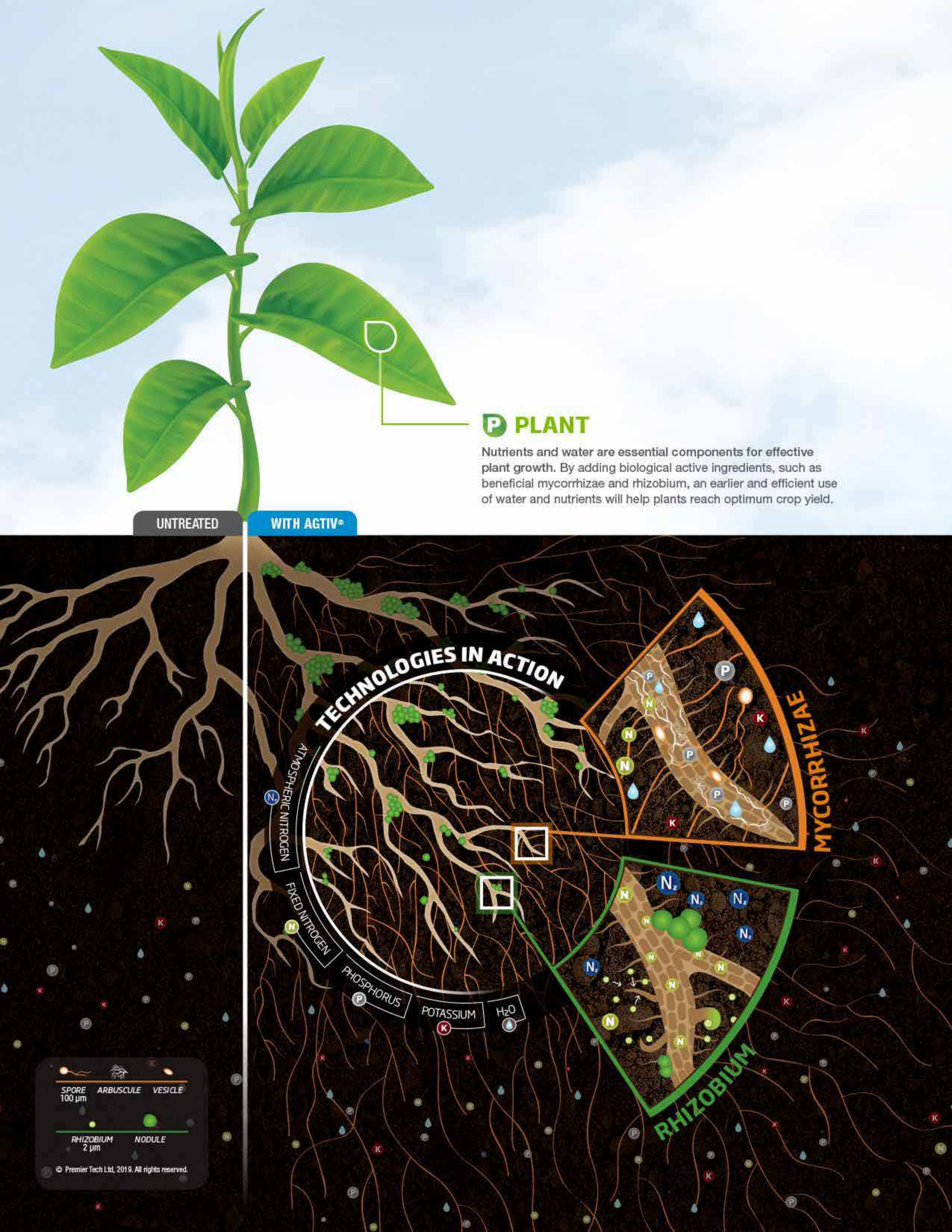
Caring about our clients' performance, each recommendation for product use takes into consideration validation by our field experts and by farmers themselves, which ensures:

- **Effective application rates, at the right time and place, with the right inoculant**
- **Products adapted to growers' equipment**
- **Easy integration into farming practices**
- **Validation of compatibility with other agricultural inputs**

SERVICE

The AGTIV® experience combines highly effective value-added products and the access to a team of field experts dedicated to supporting your growth. From our management team and research project managers to our field specialists, our multidisciplinary team is listening to growers' needs to continuously improve our products and level of service:

- **Technical support for product application, equipment compatibility and field demonstration**
- **Proud promoter of science education and knowledge sharing**
- **Partnership with agriculture retailers throughout Canada, the United States and Europe**



PLANT
Nutrients and water are essential components for effective plant growth. By adding biological active ingredients, such as beneficial mycorrhizae and rhizobium, an earlier and efficient use of water and nutrients will help plants reach optimum crop yield.
UNTREATED
WITH AGTIV®
TECHNOLOGIES IN ACTION
ATMOSPHERIC NITROGEN
FIXED NITROGEN
PHOSPHORUS
POTASSIUM
H2O
MYCORRHIZAE
RHIZOBIUM
SPORE 100 µm
ARBUSCULE
VESICLE
RHIZOBIUM 2 µm
NODULE
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AGTIV

BIOLOGICAL ACTIVE INGREDIENTS

Backed by more than 35 years of expertise in biological active ingredients, Premier Tech masters a unique large-scale manufacturing process that meets the highest quality control standards, allowing you to fully benefit from the highly effective inoculants of our AGTIV® agricultural product line. For stronger growth through better plant resistance to stresses, **higher yields** and superior **crop quality**, you can count on AGTIV®.

M — MYCORRHIZAE +

PTB297 Technology, *Glomus intraradices*

Mycorrhizae are beneficial associations between a mycorrhizal fungus and roots. The mycorrhizal spores germinate in the soil and produce filaments (hyphae) which will enter into root cells. This association will allow the formation of an intra and extra-radical network of filaments that will explore the soil and access more nutrients and water, and transfer them to the plant.

- EXPAND ROOT SYSTEM GROWTH
- ENHANCE NUTRIENT & WATER UPTAKE
- INCREASE TOLERANCE TO STRESSES
- IMPROVE SOIL STRUCTURE

R — RHIZOBIUM =

PTB160 Technology (pulses), *Rhizobium leguminosarum* biovar *viciae*

PTB162 Technology (soybean), *Bradyrhizobium japonicum*

Mesorhizobium ciceri (chickpea)

Rhizobium bacteria live and thrive in symbiosis in root nodules produced by the plant. They are responsible for fixing the atmospheric nitrogen and making it available for the plant.

- FIX NITROGEN & MAKE IT AVAILABLE TO THE PLANT

TRIPARTITE SYMBIOSIS

Tripartite symbiosis is the biological interaction between Mycorrhizae, Rhizobium and the Plant.

By enhancing root system growth and creating a network of filaments, mycorrhizae help plants to uptake more nutrients, such as phosphorus, and increase the nodulation process for the rhizobium.

- INCREASE PROPAGATION OF RHIZOBIUM TO OTHER ROOTS
- HELP FEED THE PLANT
- ENHANCE PHOTOSYNTHESIS

To learn more about the tripartite symbiosis

PTAGTIV.COM/**en/tripartite**

MYCORRHIZAE

EFFICACY – VERSATILITY – COLLABORATION

Why use Premier Tech's mycorrhizae?

Mycorrhizal fungi have existed since the first plants appeared on dry land more than 450 million years ago. AM (Arbuscular Mycorrhizae) symbiosis applies to over 80% of all plants and plays a major role in plant nutrition and productivity. "Over the last 35 years, numerous scientific studies have clearly highlighted the fundamental role that mycorrhizal fungi play in natural eco-systems, and in those managed by man." [A]

How does the technology work? Mycorrhizae develop a network that explores the soil and accesses more nutrients and water to transfer to the plant. The beneficial alliance between mycorrhizal fungi and roots accelerates root development and stimulates plant growth.

Absorption capacity

Premier Tech's mycorrhizal technology makes P more available in the soil, and actively absorbs and transfers it via its filament network (hyphae) directly to the root. The filaments in the soil also have the ability to absorb water and elements such as Cu, Zn, B, Fe, Mn which are important in nodule formation and grain filling.

Mycorrhizae have been shown to improve soil structure by releasing a "biological glue" called glomalin and to increase the presence of other beneficial micro-organisms in the root environment.

"Although mycorrhizal fungi do not fix nitrogen, they transfer energy, in the form of liquid carbon to associative nitrogen fixers." [B]

"Mycorrhiza deliver sunlight energy packaged as liquid carbon to a vast array of soil microbes involved in plant nutrition and disease suppression." [C]

"The absorptive area of mycorrhizal hyphae is approximately 10 times more efficient than that of root hairs and about 100 times more efficient than that of roots." [D]

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PTAGTIV.COM/en/mycorrhizae

Efficient P uptake and transfer

Thonar et al. (2010)[E] compared three species of AMF and observed "*Glomus intraradices*, *Glomus claroideum* and *Gigaspora margarita* were able to take up and deliver P to the plants from maximal distances of 10, 6 and 1 cm from the roots, respectively. *Glomus intraradices* most rapidly colonized the available substrate and transported significant amounts of P towards the roots."

Cavagnaro et al. (2005)[F] found that "*Glomus intraradices* was found to be one of the arbuscular mycorrhizal fungi that was able to control nutrient uptake amounts by individual hyphae depending on differing phosphorus levels in the surrounding soils."

Collaborating Species

The mycorrhizal species used in Premier Tech products (*Glomus intraradices*) is among the most 'collaborative' species in various articles.

"According to the article by Kiers et al. (2011)[G], it has been shown that the different species of mycorrhizae are not equally effective when it comes to transferring nutrients from the soil to the plant. Under controlled conditions, certain species of mycorrhizae have been shown to be more 'cooperative' and to transfer most of the phosphorus absorbed from the soil to the root, while other mycorrhizae species use it or store it as reserve.

"[…] Moreover, when host plants were colonized with three AM fungal species, the RNA of the cooperative species (*G. intraradices*) was again significantly more present than that of the two less-cooperative species (*G. aggregatum* and *G. custos*)" [B]. "This illustrates key differences in fungal strategies, with *G. intraradices* being a 'collaborator' and *G. aggregatum* a less-cooperative 'hoarder'." [G]

Glomus intraradices' versatility in different conditions

There are more than 200 species of AMF (Arbuscular Mycorrhizae Fungi) and Premier Tech offers a versatile species. Selected more than 35 years ago, it has been tested continuously under various conditions and has performed well in a range of soil pH from 5.2 to 8.1.

"*G. intraradices* has turned out to be a "great fungus" in several surveys, and field trials so far has shown it to be equal or superior to mixtures of other fungi." [H]

Indigenous Populations

Some articles demonstrate that mycorrhizal populations in agricultural soils are highly heterogeneous or not sufficient to have the desired beneficial effect.

A survey conducted by Hamel et al. (2008)[I] reported low biodiversity and occurrence of AM fungi in cultivated soils of Saskatchewan. The survey was conducted for 3 years. Dai, M. et al. (2013)[J] noticed that the relative abundance as well as diversity of AM fungal communities is lower in cropland soils of the prairies compared to the roadsides environments which favors diversity.

The recommendation of Premier Tech, approved by Agriculture Canada, to add a mycorrhizal inoculant at the time of seeding stands on 4 points:

- ✓ **The right mycorrhizae for the plant**
  at least 80% of plants can be colonized with *Glomus intraradices*, a collaborative species
- ✓ **Available in the right place**
  on or close to the seed in order to trigger the symbiosis quickly
- ✓ **In the right quantity**
  the proven and registered mycorrhizal rate
- ✓ **At the right time**
  at seeding time to trigger the symbiosis quickly after seed germination

PREMIER TECH

Quick colonizer

It has been shown that plants favour certain species according to their effectiveness.

"We show that order of arrival can influence the abundance of AMF species colonizing a host. These priority effect can have important implications for AMF ecology and the use of fungal inoculant in sustainable agriculture." [K]

Duan et al. (2011)[L] using our *Glomus intraradices* isolate (DAOM181602) with *G. margarita* (WFVAM 21), wrote "Furthermore, *G. margarita* developed slowly compared with G. intraradices when they were inoculated separately and it seems likely that the latter fungus dominated the symbiosis with medic when both fungi were inoculated together." He adds "The positive effect of *G. intraradices* was probably enhanced by its ability to colonize quickly and it may well have contributed a much larger fraction of fungal biomass than *G. margarita*, when both were inoculated together". In conclusion, he writes "When inoculated together *G. intraradices* may have dominated the activity of symbiosis, both in terms of rapidity of early colonization and functionality, including tolerance to disturbance."

Drought resistance

Mycorrhizae increase tolerance to various environmental stresses (diseases, drought, compaction, salinity, etc.), and play a major role in the soil particle aggregation process and contribute to improving soil structure which leads to better water penetration, better aeration, less erosion and leaching.

Benjamin Jayne and Martin Quigley of the University of Denver mentioned that "[…] our meta-analysis reveals a quantifiable corroboration of the commonly held view that, under water-deficit conditions, plants colonized by mycorrhizal fungi have better growth and reproductive response than those that are not." [K] "Most measures of growth are augmented by the symbiosis when plants are subjected to water stress; […]." [M]

It has been found that plants with AMF association display greater hydraulic conductivity in roots and reduced transpiration rate under drought stress. This may be due to their capacity to regulate their ABA levels (abscisic acid – a plant hormone) better and faster than non-AM plants. This establishes a greater balance between leaf transpiration and root water movement in drought situations and drought recovery.[N]

A. Fortin J. A, 2009. Mycorrhizae The new green revolution. Ed. MultiMondes. pp.140.
B. Jones, C. E. 2009. Mycorrhizal fungi -powerhouse of the soil. Evergreen Farming 8:4-5.
C. Jones, C. E. 2014. Nitrogen: the double-edge sword. Amazing Carbon. pp. 8.
D. Jones, C. E. 2009. *loc. cit*.
E. Thonar, C. et al. 2011. Traits related to differences in function among three arbuscular mycorrhizal fungi. Plant Soil. 339: 231 – 245.
F. Cavagnaro, T et al. 2005. Functional diversity in arbuscular mycorrhizas: exploitation of soil patches with different phosphate enrichment differs among fungal species. Plant, Cell and Environment 28: 642 – 650.
G. Kiers et al. 2011. Reciprocal Rewards Stabilize Cooperation in the Mycorrhizal Symbiosis. Science 333:80-882.
H. Trivedi et al. 2007. Organic farming and mycorrhizae in agriculture.I.K. International Publishing House Ltd. New Delhi, pp.290.
I. Hamel, C. et al. 2008. Mycorrhizal symbioses in soil-plant systems of the Canadian prairie. XVI International Scientific Congress of the National Institute of Agricultural Science, November 24-28, La Havana, Cuba.
J. Dai, M. et al. 2013. Impact of Land Use on Arbuscular Mycorrhizal Fungal Communities in Rural Canada. Applied and Environmental Microbiology 79 (21):6719-6729.
K. Gisjbert et al. 2014. Order of arrival structures arbuscular mycorrhizal colonization of plants. New Phytologist. pp. 10.
L. Duan et al. 2011. Differential effects of soils disturbance and plant residue retention on function of arbuscular mycorrhizal (AM) symbiosis are not reflected in colonization of roots or hyphal development in soil. Soil Biol. & Bioch. 43:571-578.
M. Jayne B., Quigley M. 2013. Influence of arbuscular mycorrhiza on growth and reproductive response of plants under water deficit: a meta-analysis. Mycorrhiza 2014. 24:109-119.
N. Aroca et al. 2008. Mycorrhizal and non-mycorrhizal Lactuca sativa plants exhibit contrasting responses to exogenous ABA during drought stress and recovery. Journal of Experimental Botany, Vol. 59, No. 8, pp. 2029-2041. In: Raviv M. 2010. The use of mycorrhiza in organically-grown crops under semi arid conditions: a review of benefits, constraints and future challenges. Symbiosis 2010. 52-65-74.

RHIZOBIUM

FERTILITY – PRODUCTIVITY – COLLABORATION

Why is rhizobium important?

Peas, lentils and soybeans play a big role in a crop rotation by promoting nitrogen fixation (the conversion of nitrogen gas to plant-available ammonium) and returning some nitrogen to the soil. However, these crops can't take all the credit: because it's only possible thanks to a symbiotic relationship between select legumes and rhizobium bacteria.

These bacteria can't fix nitrogen on their own. To do so, they need to colonize the root of a host plant. As in all symbiotic relationships, both the rhizobium and the pulse or soybean plant get something of value from the relationship. For the legume, it is a readily available form of nitrogen (ammonium) as well as important amino acids. The rhizobium get three things in return:

1. **A Home** – the bacteria inhabit the nodules formed by the plant
2. **Food / energy** – provided in the form carbohydrates (heterotrophic bacteria cannot create their own food through photosynthesis)
3. **Oxygen** – which is necessary for respiration

Roots of the rhizobium relationship

Approximately 20%[A] of all legumes form mutualistic relationships with rhizobium. Soybean, peas, clover, lentils and faba beans are among them. Interestingly, Rhizobium species are very plant specific. Pulses form relationships with a rhizobium called *Rhizobium leguminosarum*, while soybeans engage with another member of the family called *Bradyrhizobium japonicum*.

When a rhizobium and a host legume are present, the plant makes the rhizobium aware of its presence by sending out a chemical signal (via flavonoids and isoflavonoids) from the root. This attracts the rhizobium bacteria, which responds by sending out signals of its own, known as Nod factors.[B]

How does the technology work? Rhizobium are a bacteria that live and thrive in symbiosis in root nodules produced by the plant. These nodules house the bacteria responsible for fixing the atmospheric nitrogen and makes it available for the plant.

Nodule formation & nitrogen fixation

The bacteria start the "invasion process" by penetrating the root-hair wall and enter the plant cells. This primes a gene within the plant that initiates the root nodulation. Within these nodules, the rhizobium differentiate into a non-motile form, which go to work fixing the raw atmospheric nitrogen (N_2) into plant accessible ammonium. They achieve this by producing nitrogenase enzyme, which starts the conversion process, consuming a great deal of energy. Maximum N-fixation is reached when the plant is sufficiently nodulated.

Ammonium absorption / exchange of services

After the nodule formation, the plant converts the ammonium into amino acids which are exported throughout the plant. At this point, the plant releases the simple sugars and O_2 to the rhizobium bacteria, fulfilling its end of the bargain.

This last step is important, as the presence of free oxygen can stop nitrogen fixation, preventing ammonium (NH_3) synthesis and transfer to the plant. Fortunately, the rhizobium take the oxygen and bind it using a protein called leghemoglobin (was first discovered in legumes and is very similar to the hemoglobin found in human blood). Like blood, leghemoglobins appear red in the nodules, due to the presence of iron molecules.

Legume plants are known to have a lower phosphorus use efficiency. This is a problem, because the process of nitrogen fixation is very energy-intensive for pulse and soybean plants. For this reason, they consume more phosphorus (P) than other plants.

The increased demand can be alleviated thanks to another symbiotic association, the mycorrhizal symbiosis. Mycorrhizae are symbiotic fungi that colonize the roots of most plants, and dramatically improve the plant's ability to absorb phosphorus. The plant will photosynthesize 51%[C] more and grow faster, and the rhizobium will fix more nitrogen if more phosphorus is available. For this reason, having a healthy mycorrhizal association is of particular benefit to pulses and soybeans.

What modulates / influences nodulation?

- Successful infection depends on the competitiveness, specificity, infectivity and effectiveness of the rhizobia.[D]
- Infection rate & effectiveness of rhizobia are influenced by soil low N status and is a necessary requisite to trigger symbiosis.[E]
- Successful infection requires the bacteria to actively colonize root-hair tips (motility) and reach the Quorum sensing of the rhizobium.[F]
- N fixation relies on a cascade of effector molecules – events in multi-steps series of reactions and depend on effector availability, concentration and localization, synchronization, host specificity and environmental factors.

A. Sprent, J. I., 2007. Evolving ideas of legume evolution and diversity: A taxonomic perspective on the occurrence of nodulation. New Phytol. 174:11-25.
B. Giller, K. E., 2001. Nitrogen Fixation in Tropical Cropping Systems 2nd ed. CABI.
C. Kaschuk et al. 2009. Soil Biol. Biochem. 41:1233-1244.
D. Peix A et al. 2010. Key Molecules Involved in Beneficial Infection Process in Rhizobia–Legume Symbiosis. In: Microbes for Legume Improvement, Chapter 3:55-80.
E. Bonilla, I. and L. Bolaños, 2010. Mineral nutrition for legume-rhizobia symbiosis: B, Ca, N, P, S, K, Fe, Mo, Co, and Ni: A review. In: Organic Farming, Pest Control and Remediation of Soil Pollutants, Sustainable Agriculture Reviews, pp. 253-274, E. Lichtfouse (ed.), Springer Netherlands.
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THE TRIPARTITE SYMBIOSIS
HELPS YOU GET BIGGER YIELD

How can the tripartite symbiosis improve crop productivity?

Each phase of the plant growth requires a lot of nutrients and energy to obtain higher yield. *" […] the tripartite interactions between legumes, AMF* [Arbuscular Mycorrhizal Fungi] *and rhizobia cause increases in legume productivity, and the N:P:C supply ratio as influenced by the tripartite symbiotic associations plays a fundamental role in controlling the legume's photosynthetic rate and biomass productivity."* [A]

How do the technologies work? Mycorrhizae develop a network that explores the soil and accesses more nutrients and water to transfer to the plant; rhizobium fixes nitrogen and makes it available to the plant. By working together, they influence positively the plant for increased yield.

A Koele et al. 2014. VFRC Report 2014/1, pp. 1-57.
B Kaschuk et al. 2009. Soil Biol. Biochem. 41:1233-1244.
C Shinde et al. 2016. Int. J. Bioassays. 5:4954-4957.

Help feed the plant

N and P are major nutrients for the plant. *"Tripartite associations of host plants with both rhizobia and AMF* [Arbuscular Mycorrhizal Fungi] *benefit the host plant by increased P uptake through the mycorrhizal association balancing the high input of N through rhizobial N-fixation."* [A] In addition, mycorrhizae reach more water and nutrients needed by legumes such as B, Ca, Cu, Fe, K, Mn, Mo and Zn, key components for energy production.

Higher photosynthesis

When used in combination, mycorrhizae and rhizobium increase the photosynthetic rate by 51%[B]. *"The rate of photosynthesis increased substantially more than the C* [Carbon] *costs of the rhizobial and AM* [Arbuscular Mycorrhizal] *symbioses."* [B] The total increased sugar production by the plant far outweighs the cost to "house" the partners.

Better productivity

Better nutrient use efficiency and bigger biomass result in higher yield from each legume plant (harvest index). For example, "[…] *it has been found that pea plants coinoculated with Rhizobium leguminosarum and AMF* [Arbuscular Mycorrhizal Fungi] *has shown best results regarding plant height, plant dry mass, nodule fresh weight, number of seeds, seed weight, seed yield, number of root nodules, number of pods per plant, average pod weight and pod length* […]". [C]

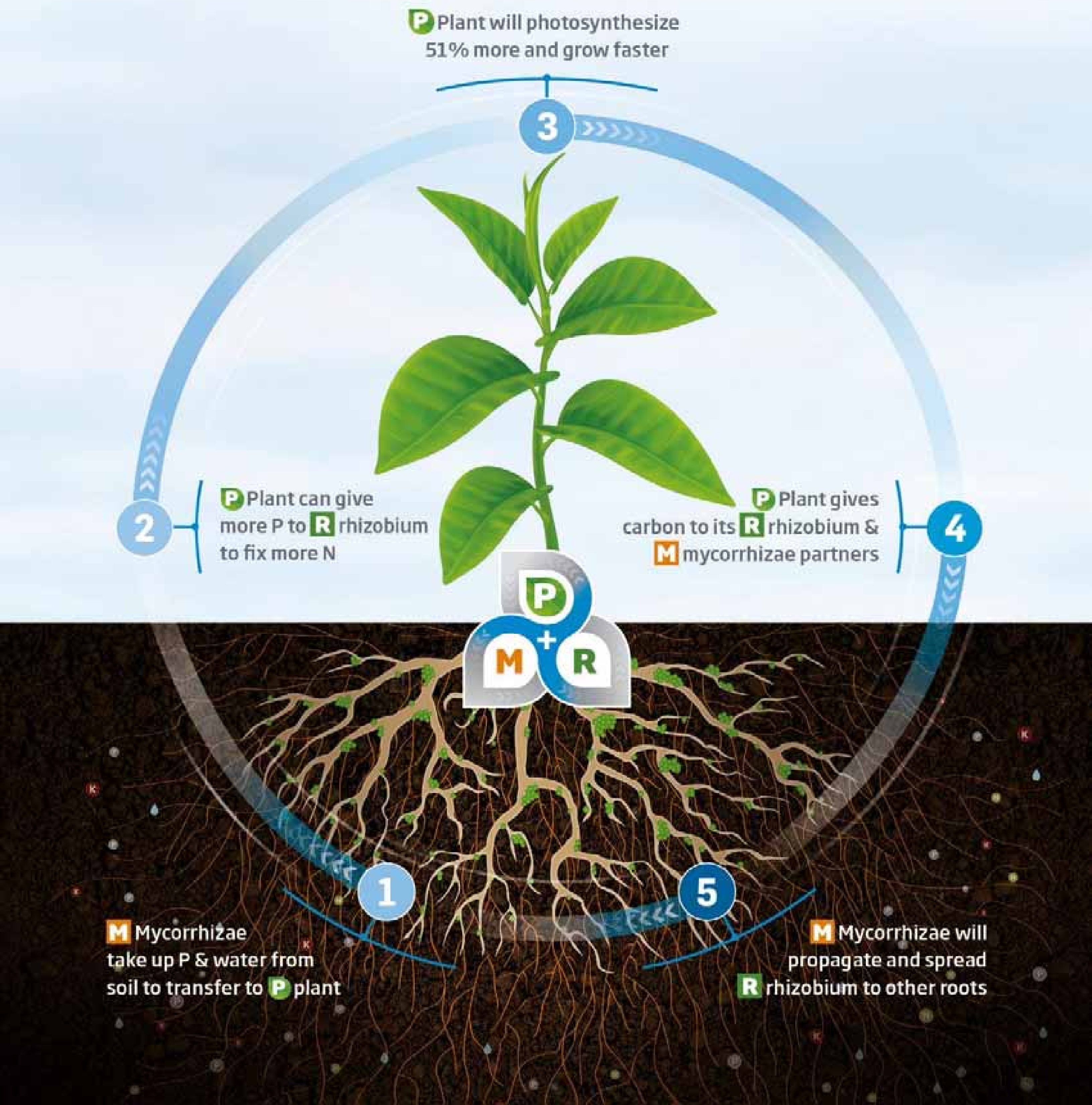
PREMIER TECH

PTAGTIV.COM/en/tripartite

TRIPARTITE SYMBIOSIS

BIOLOGICAL INTERACTIONS BETWEEN MYCORRHIZAE, RHIZOBIUM AND PLANTS

By enhancing root system growth and creating a network of filaments, mycorrhizae help plants to uptake more nutrients, such as phosphorus, and increase the nodulation process for the rhizobium.



THE CANOLA ROTATION INOCULANT

HELPS YOU COUNTER REDUCED YIELD AFTER CANOLA

What affects your soil biology?

Many crop practices (tillage, fallow land, flooding and crop rotation) contribute to decreasing the beneficial biology, such as mycorrhizal fungi population, in your agricultural soils. For example, it is well known that crops following *Brassicaceae* plants (canola and mustard), in a rotation generally tend to demonstrate reduced yield, compared to results when seeded after another crop. It can largely be explained by the relationship (or lack of relationship) between *Brassicaceae* and beneficial microorganisms, such as mycorrhizae[A]. Canola roots exude a toxic compound that reduces populations of those beneficial microorganisms in the soil. Furthermore, the "absence of a mycorrhizal host plant during the fallow period decreases mycorrhizal colonization potential for the succeeding crop and results in P deficiency symptoms in plants that are mycorrhizal dependent, such as corn, soybean, sunflower, and cotton." [B]

A. Gavito, M. E., Miller M. H., 1998. Changes in mycorrhizal development in maize induced by crop management practices. Plant Soil. 198: 185-192.
B. Ellis, J. R., 1998. Plant Nutrition. Post Flood Syndrome and Vesicular-Arbuscular Mycorrhizal Fungi. J. Prod. Agric., Vol. 11, no.2: 200-204.
C. Bagyaraj, D. J. et al. 2015. Phosphorus nutrition of crops through arbuscular mycorrhizal fungi. Current Science, Vol. 108, no. 7: 1288-1293.
D. Jones, C. E. 2009. Mycorrhizal fungi - powerhouse of the soil. Evergreen Farming 8:4-5.
E. Grant, C. A. et al. 2001. The importance of early season phosphorus nutrition. Canadian Journal of Plant Science. 211-224.

Reach more nutrients and water

Sufficient nutrient and water uptake is critical for effective plant growth and ultimately to maximize your yield potential, especially for low mobility nutrients such as P and Zn.[C] By adding a mycorrhizal inoculant, the plant develops a secondary root system (mycorrhizal hyphae) allowing it a larger soil contact surface and thus better to access to nutrients and water. "The absorptive area of mycorrhizal hyphae is approximately 10 times more efficient than that of root hairs and about 100 times more efficient than that of roots." [D]

Ensure early P uptake

"Phosphorus plays a critical role in energy reactions in the plant [such as photosynthesis. Phosphorus is also a key component in building blocs for plant.] Deficits can influence essentially all energy requiring processes in plant metabolism. Phosphorus stress early in the growing season can restrict crop growth, which can carry through to reduce final crop yield." [E] Mycorrhizae make soil phosphorus (P) more available to the plant, and actively absorb and transfer it via the mycorrhizal filament network (hyphae) directly to the root.

Increase your yield potential

By introducing mycorrhizal inoculant close to the seed at seeding, you get the association working early with the full benefits of increased nutrient and water uptake when plants need them. Therefore, get more out of the fertilizer you have already invested into the crop.

PREMIER TECH

PTAGTIV.COM/en/canola

AGTIV® highly effective inoculants make a difference in the field by pushing crops' yield potential and increasing growers' net returns. Lead the way with Premier Tech's expertise for AGTIVated acres.

MYCORRHIZAE & RHIZOBIUM INOCULANTS

► Visit our website for product availability according to the territory and their eligibility for organic use : PTAGTIV.COM/en/products.

Product	Active ingredient	Organic	Application mode: Granular in-furrow	Application mode: Mixing with seeds	Application mode: Liquid in-furrow	Formulation
PULSES (peas, lentils & faba beans)						
AGTIV® PULSES • Powder **F:** Powder (peat) **S:** 4.7 kg (10.3 lb) pail **C:** Peas & faba beans: **16 ha (40 acres)** – Lentils: **24 ha (60 acres)**	M, R	✓		●		
AGTIV® PULSES • Granular **F:** Granules (peat) **S:** 18.2 kg (40 lb) bag – 364 kg (800 lb) tote bag **C:** Peas, lentils & faba beans: Bag: **4 ha (10 acres)** – Tote bag: **80 ha (200 acres)**	M, R	✓	●			
AGTIV® RHIZO • Granular for PULSES **F:** Granules (peat) **S:** 18.2 kg (40 lb) bag – 364 kg (800 lb) tote bag **C:** Peas, lentils & faba beans: Bag: **4 ha (10 acres)** – Tote bag: **80 ha (200 acres)**	R	*	●			
N **AGTIV® RHIZO** • Liquid for PULSES **F:** Liquid **S:** 8 L (8 kg) bag-in-box **C:** Peas, lentils & faba beans: **32 ha (80 acres)**	C, R	✓			●	
SOYBEAN						
AGTIV® SOYBEAN • Powder **F:** Powder (peat) **S:** 4.7 kg (10.3 lb) pail **C:** Soybean: **16 ha (40 acres)**	M, R	✓		●		
AGTIV® SOYBEAN • Granular **F:** Granules (peat) **S:** 18.2 kg (40 lb) bag – 364 kg (800 lb) tote bag **C:** Soybean: Bag: **3.2 ha (8 acres)** – Tote bag: **64 ha (160 acres)**	M, R	*	●			
AGTIV® BRADY • Granular for SOYBEAN **F:** Granules (peat) **S:** 18.2 kg (40 lb) bag – 364 kg (800 lb) tote bag **C:** Soybean: Bag: **4 ha (10 acres)** – Tote bag: **80 ha (200 acres)**	R	*	●			
N **AGTIV® BRADY** • Liquid for SOYBEAN **F:** Liquid **S:** 11 L (11 kg) bag-in-box **C:** Soybean: **16 ha (40 acres)**	C, R	✓			●	
CHICKPEA						
AGTIV® CHICKPEA • Granular **F:** Granules (peat) **S:** 18.2 kg (40 lb) bag – 364 kg (800 lb) tote bag **C:** Chickpea: Bag: **3.2 ha (8 acres)** – Tote bag: **64 ha (160 acres)**	M, R	✓	●			
FORAGES						
AGTIV® FORAGES • Powder **F:** Powder (diatomaceous earth) **S:** 1.6 kg (3.5 lb) pail **C:** Alfalfa, mix forages & grass: **8 ha (20 acres)**	M	*		●		

PTAGTIV.COM/en/products

Product	Active ingredient		Organic	Application mode: In-furrow	Application mode: Seed-piece treatment at the warehouse	Application mode: Mixing with seeds	Application mode: Incorporation into growing media	Application mode: Transplanting	Application mode: Seed treatment	Formulation
FIELD CROPS (cereals, flax & dry beans)										
AGTIV® FIELD CROPS – ○ • Powder **F:** Powder (peat) **S:** Case of 4 x 800 g (4 x 1.75 lb) pails **C:** Cereals, flax & dry beans: **32 ha (80 acres)** per case Alfalfa, mix forages & grass: **16 ha (40 acres)** per case	M		✓			●				
AGTIV® FIELD CROPS • Powder **F:** Powder (diatomaceous earth) **S:** 2 kg (4.4 lb) pail **C:** Cereals, flax & dry beans: **16 ha (40 acres)**	M		*			●				
AGTIV® FIELD CROPS • Granular **F:** Granules (zeolite) **S:** 18.2 kg (40 lb) bag – 364 kg (800 lb) tote bag **C:** Cereals, flax & dry beans: Bag: **3.2 ha (8 acres)** – Tote bag: **64 ha (160 acres)**	M		✓	●						
AGTIV® FIELD CROPS • Liquid **F:** Liquid (spores in suspension) **S:** Case of 2 x 950 ml (2 x 32 fl. oz) bottles **C:** Cereals, flax, beans & pulses: **16 ha (40 acres)** per case	M	C	✓	●						
POTATO										
AGTIV® POTATO • Liquid **F:** Liquid (spores in suspension) **S:** Case of 2 x 950 ml (2 x 32 fl. oz) bottles **C:** Potato: **8 ha (20 acres)** per case	M		✓	●	●					
GREEN PEAS										
AGTIV® SPECIALTY CROPS – PEA • Powder **F:** Powder (peat) **S:** 2.4 kg (5.3 lb) pail **C:** Green peas: **8 ha (20 acres)**	M	R	✓			●				
SPECIALTY CROPS										
AGTIV® SPECIALTY CROPS • Powder **F:** Powder (diatomaceous earth) **S:** Case of 4 x 500 g (4 x 1.1 lb) pails **C:** Vegetables, berries & garlic	M		*			●	●	●		
AGTIV® SPECIALTY CROPS • Granular **F:** Granules (peat) **S:** 10 kg (22 lb) pail **C:** Vegetables, herbs, berries & fruit trees	M		✓	●			●	●		
AGTIV® ON SEED™ **F:** Treated seeds **C:** Vegetables and fruits Ask your representative for more details.	M	B	*						●	

F: Formulation
S: Size
C: Crop/Coverage

ACTIVE INGREDIENTS:

- **M MYCORRHIZAE** PTB297 Technology
- **B BACILLUS** PTB180 Technology
- **R RHIZOBIUM** PTB160 Technology (pulses), PTB162 Technology (soybean), *Mesorhizobium ciceri* (chickpea)

N New product

C Combo available

ORGANIC:

✓ For organic use

* Eligibility may vary depending on the territory. Contact us for more details.

TOOLS

Dedicated to offer technical support for product application, field demonstration, equipment and input compatibility, and to promote educational agronomic knowledge, Premier Tech provides various tools on PT**AGTIV**.COM.

EASY TO USE

For an easy integration in your farming practices, access:

- Labels, SDS, organic certificates
- Application videos, charts and rate calculators

PTAGTIV.COM**/en/toolbox**

In addition, to ensure performance through efficient and precise application of its inoculants, Premier Tech recommends the use of approved equipment, such as the AGTIV® Liquid Injection Kit, endorsed by pay-back programs on selected AGTIV® products.

PTAGTIV.COM**/en/equipment**

EFFECTIVE

For the compatibility lists of our active ingredients with various agricultural inputs, such as:

- Pesticides
- Liquid fertilizers

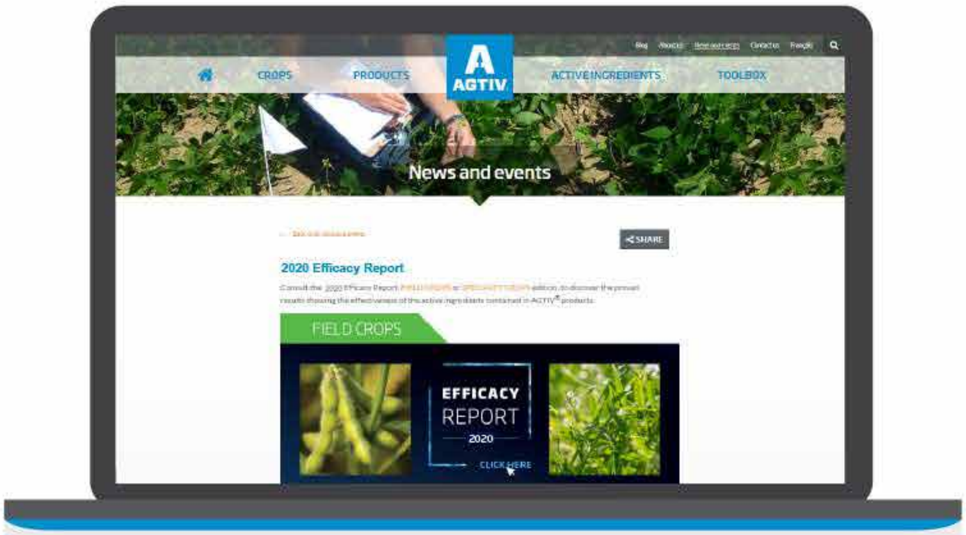
PTAGTIV.COM**/en/compatibility**

AGRONOMIC KNOWLEDGE

Access blog articles on various agronomic topics:

- Soil biology
- Plant health
- Active ingredients, etc.

PTAGTIV.COM**/en/blog**



PROVEN RESULTS

Discover the third-party results proving the effectiveness of the active ingredients contained in AGTIV® products:

- Efficacy report
- Field observations

PTAGTIV.COM**/en/results**

CONTACT OUR DEDICATED TEAM TODAY.
WE CARE ABOUT YOUR SUCCESS!

PREMIER TECH

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