Enervin® Pro

Hit the ground running!

The healthy start for your potato crop.



BASF

We create chemistry



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Best **start** for a **healthy crop**



“Blight is a challenge. But if you’re building the resistance early on and you’re using the right products at the right time, then I think you can get through the difficult conditions.”

Justin Wilderspin, potato grower in the UK



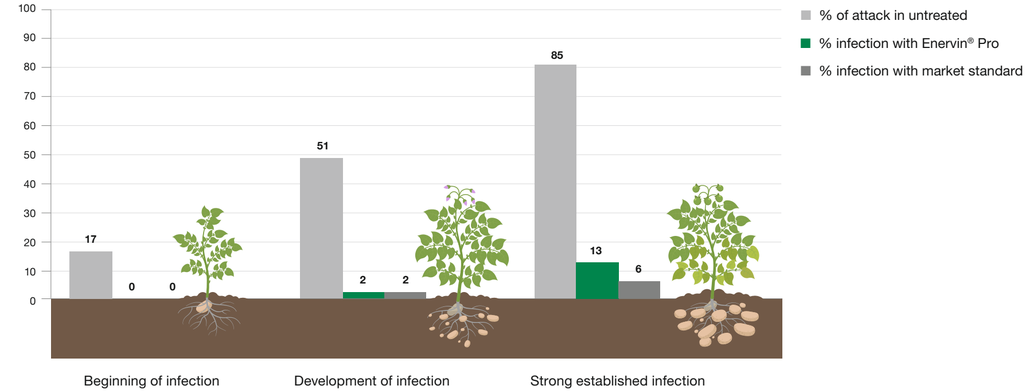
When Enervin® Pro is **most effective**

As observed in the development and registration trials conducted in the Maritime EPPO zone, Enervin® Pro is most effective when applied early in the spray program. This is driven by:

- Strong preventive contact activity of Initium® (Ametoctradin)
- Performance of potassium phosphonate (KHP) is disease pressure dependent (higher activity when disease pressure is lower)
- Potassium phosphonate (KHP) accumulation in the plant grants new growth protection
- Potassium phosphonate (KHP) indirectly acts as a host plant defence inducer, priming defence mechanisms ahead of infection

Best start for a healthy crop

Performance of Enervin® Pro vs. market standard



Summary of data from all Maritime EPPO Zone registration trials included in the CEU (Central European Registration Zone) dossier

Using **Enervin® Pro** early in your programme allows you to take advantage of its full potential!



Best start for a healthy crop

Enervin® Pro **adds value** to your spray programme

Early application of Enervin® Pro allows you to take advantage of all its benefits, optimizing your spray program and using other products when they fit best.

Using Enervin® Pro early in your programme allows you to take maximum advantage of its full benefits and optimizes your spray programme.

	Chemistry	FRAC	Systemic	Particular value	Resistance management value
Mandipropamid	CAA		✪	Local systemic	✪
Cyazofamid	QiI			Tuber blight	✪
Fluopicolide + Propamocarb	Unique active + PPB	✪✪✪✪	✪✪✪	Tuber blight	✪✪✪
Oxathiapiprolin + Benthiavalicarb	Unique active + CAA		✪✪✪	Use in high disease pressure situations	✪✪✪
Enervin® Pro	Unique two actives	✪✪✪✪	✪✪✪✪	Multiple MoA, systemic, protection of growing plant	✪✪✪✪

Source: Internal assessment

Protection of the whole plant



“We‘ve got some varieties that are really prone to late blight. So we need to make sure we got the product of choice for the conditions and pressure that we are under. So, we have to think very carefully when we´re gonna introduce these products into our programme and bolster the programme to hopefully keep this late blight out.”

Justin Wilderspin, potato grower in the UK



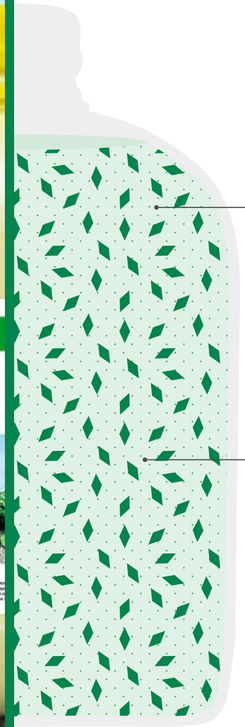
The Enervin® Pro **formulation**

Enervin® Pro combines two complementary active ingredients: Initium® (Ametoctradin) and Potassium phosphonate (KHP), into one optimized formulation.

The formulation is designed to maximize the Potassium phosphonate (KHP) loading for fast uptake in the plant while delivering strong preventative activity and leaf coverage thanks to Initium® (Ametoctradin).

Protection of the whole plant





300 g/L Phosphonic acid equiv. (KHP)
For fast uptake, mobility & SAR

Potassium phosphonate (KHP)

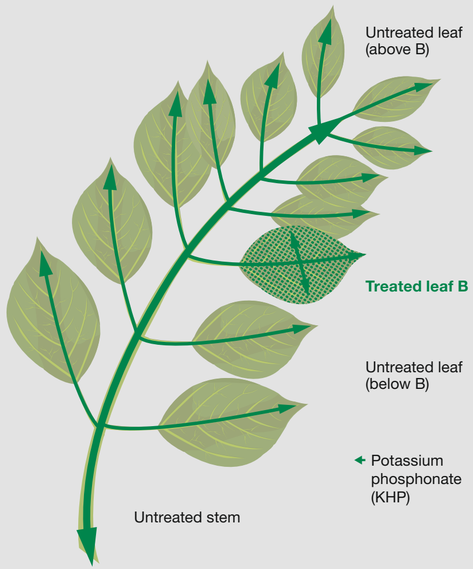
The Enervin® Pro formulation contains an aqueous solution of 453 g/l of potassium phosphonates (KHP). KHP is an inorganic salt and is fully soluble in water. As a result, KHP is highly systemic, being taken up into the leaf tissue and redistributed within the plant. Its accumulation in the plant grants new growth protection.

75 g/L Initium® (Ametoctradin)
For preventive contact activity

Initium® (Ametoctradin)

Enervin® Pro contains suspended particles of Initium® (Ametoctradin), which are highly lipophilic. Therefore they bind strongly to the leaf surface's wax layer, forming an active ingredient depot and providing strong preventive contact activity.

Potato Stem

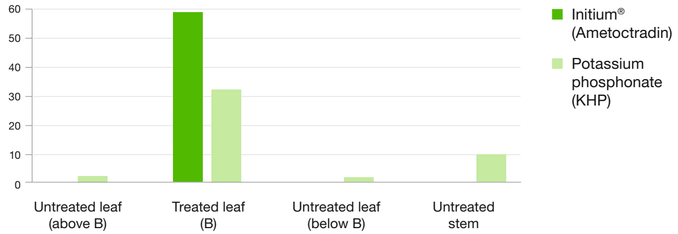


The Potassium phosphonate (KHP) moves up and down the stem protecting the whole plant.

Exceptional **uptake** and **translocation**

Enervin® Pro combines the strong contact activity provided by Initium® (Ametoctradin) with the systemic activity of Potassium phosphonate (KHP) protecting the whole plant.

% recovered active ingredient in wax layer and tissue relative to applied amount 10 days after treatment on leaf B



	Initium® (Ametoctradin)	Potassium phosphonate (KHP)
Contact activity	✪✪✪	✪
Cuticular absorption	✪✪✪	
Surface redistribution	✪✪✪	
Translaminar movement		✪✪✪
Apical mobility		✪✪✪
Basipetal mobility		✪✪✪





The Enervin® Pro **Mode of Action**

Enervin® Pro combines two unique and complementary modes of action in one optimized formulation for multi-site activity.

Protection of the whole plant

C: Respiration

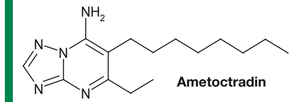
C4: Complex III

C7: ATP transport (proposed)

C3: Complex III cytochrome bc1 (ubiquinol oxidase) at Qo site (*cyt b gene*)

C8: Inhibition of complex III — **45**

Cytochrome bc1 (ubiquinone reductase) at Qo site stigmatellin binding sub site
45 QoSt-fungicide (stigmatellin binding)



Ametoctradin

Triazolo-pyrimidylamine

Initium® (Ametoctradin) is a single-site inhibitor of the Complex III of the mitochondrial respiratory chain. Its FRAC classification is QoSI (Quinone outside Stigmatelline binding site inhibitor). Initium®'s (Ametoctradin) mode of action is unique.

P: Host Plant Defence Inducers

P1: salicylate related

P2: salicylate related

P3: salicylate related

P4: polysaccharide elicitors

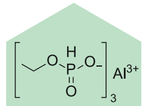
P5: anthraquinone elicitors

P6: microbial elicitors

NC: Not classified

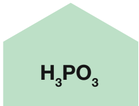
P7: Phosphonates — **P07**

#P07 phosphonates



fosetyl-al

Ethyl-phosphonates



phosphorous acid

Phosphorous acid

Phosphonates (KHP) have a complex mode of action. Both direct and indirect activity (Systemic Acquired Resistance) have been reported. They belong to the host plant defence inducers in the FRAC classification. Among the diverse families of plant defence inducers, phosphonates show the most reproducible and reliable activity in the field.

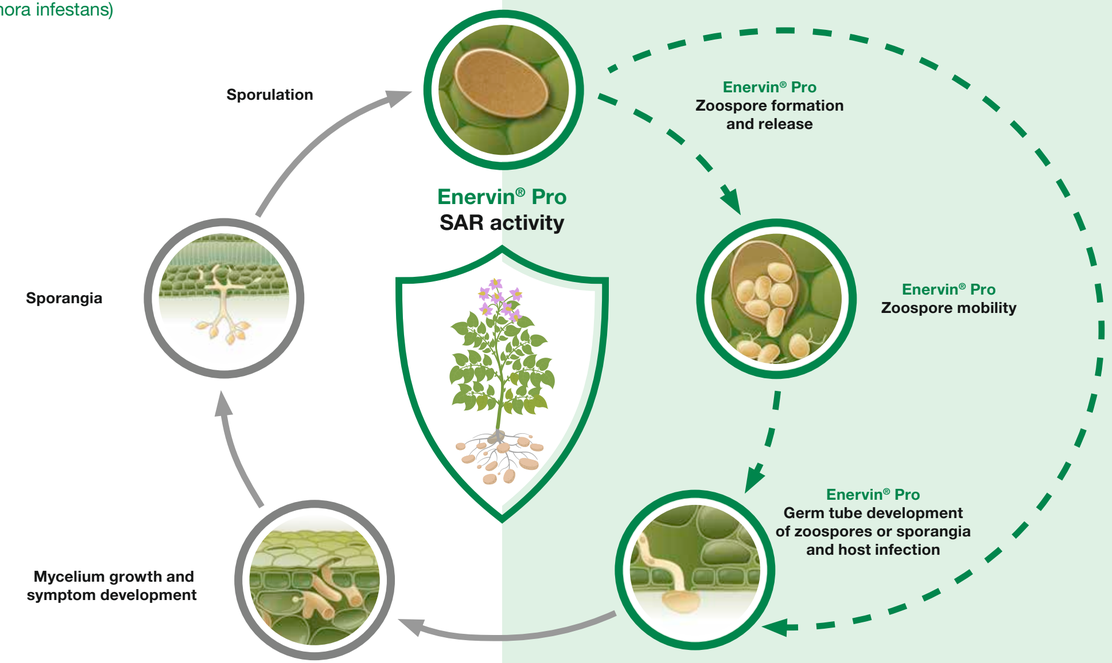


Effect of Enervin® Pro on **Potato late blight**

Enervin® Pro is an excellent product for preventing blight infections thanks to the strong preventive activity of Initium® (Ametoctradin) and the direct and indirect activity of Potassium phosphonate (KHP). Potassium phosphonate's (KHP) indirect activity (systemic acquired resistance) works similar to a vaccination. It primes defense mechanisms ahead of infection, giving the plant the valuable time it needs to get a lead on the pathogen.

Effect of Enervin® Pro on Potato late blight

(Phytophthora infestans)



Enervin® Pro active phase



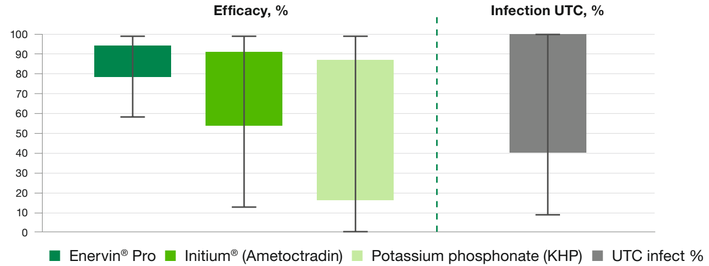
Two unique and complementary **modes of action**

Both Initium® (Ametoctradin) and Potassium phosphonate (KHP) contribute to the efficacy. Initium® (Ametoctradin) is the base, and Potassium phosphonate (KHP) is the “BOOSTER” for Enervin® Pro performance.

This synergistic effect within Enervin® Pro gives reliable, effective control (>80%) in many challenging conditions.

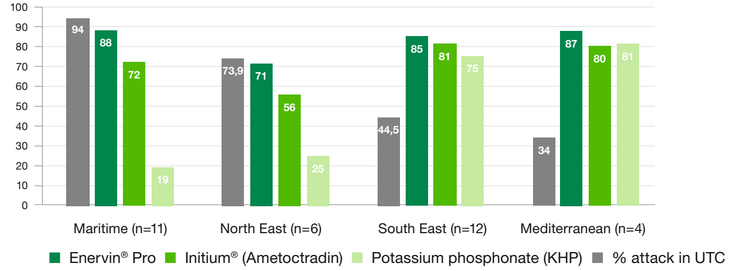
Protection of the whole plant

Powerful combination of two unique components against late blight in potato



n=33 orthogonal trials across EPPO zones: MA zone (11), ME zone (6) , SE Zone (12), NE zone(4)

Efficacy of Enervin® Pro and the solo Ais against late blight in potatoes by EPPO climatic zones



Initium® is the base and **KHP** is the “booster” of **Enervin® Pro** for reliable performance

Increased **quality** and marketable **yield**



“Late blight in potatoes is still the most devastating disease to both yield and quality, therefore protection against the disease is vital.”

Ed Maule, independant agronomist



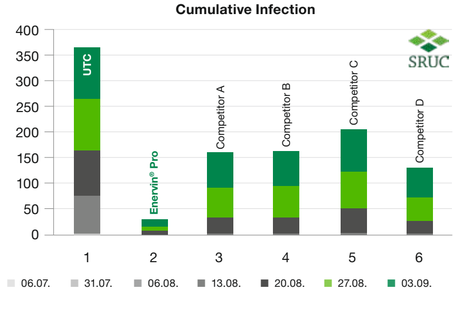
Protection against **late blight**

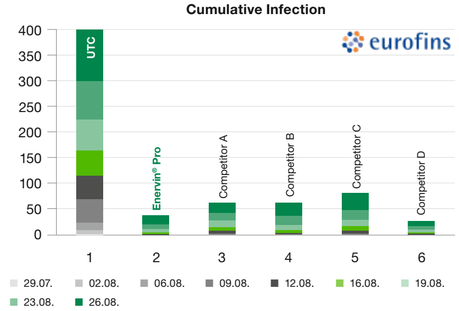
With the correct positioning in the spray programme, Enervin® Pro can protect against late blight at efficacy levels similar to key reference products.

Increases quality and marketable yield

Intensity of attack of late blight – SRUC/Eurofins UK – 2019

Enervin® Pro & Enervin® mixtures vs competitors





Performance of Enervin® Pro vs. competitors – SRUC UK – 2019



Competitor C



Competitor D



Enervin® Pro

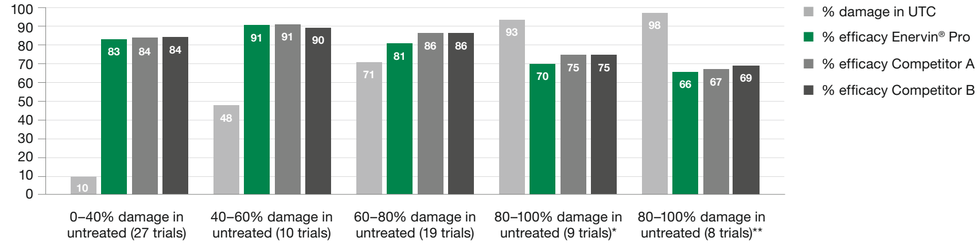


Enervin® Pro **increases marketable yield**

Well-protected plants produce a higher yield. Enervin® Pro also offers a similar yield increase in comparison to the market standard.

Increases quality and marketable yield

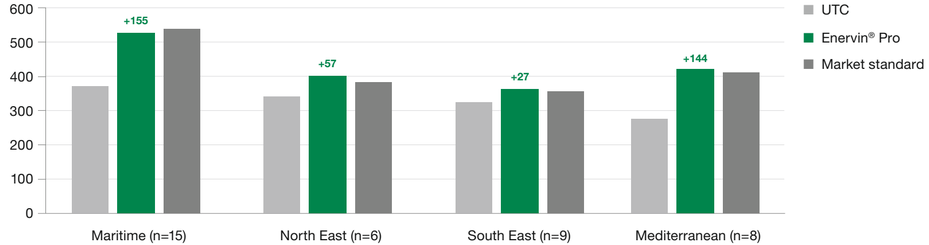
Efficacy of Enervin® Pro vs. Competitor A and Competitor B



*MAR EPPO zone trials with less than 7 days after the last application, **MAR EPPO zone trials with more than 7 days after the last application

Effect of Enervin® Pro vs. market standard on potato yield dt/ha

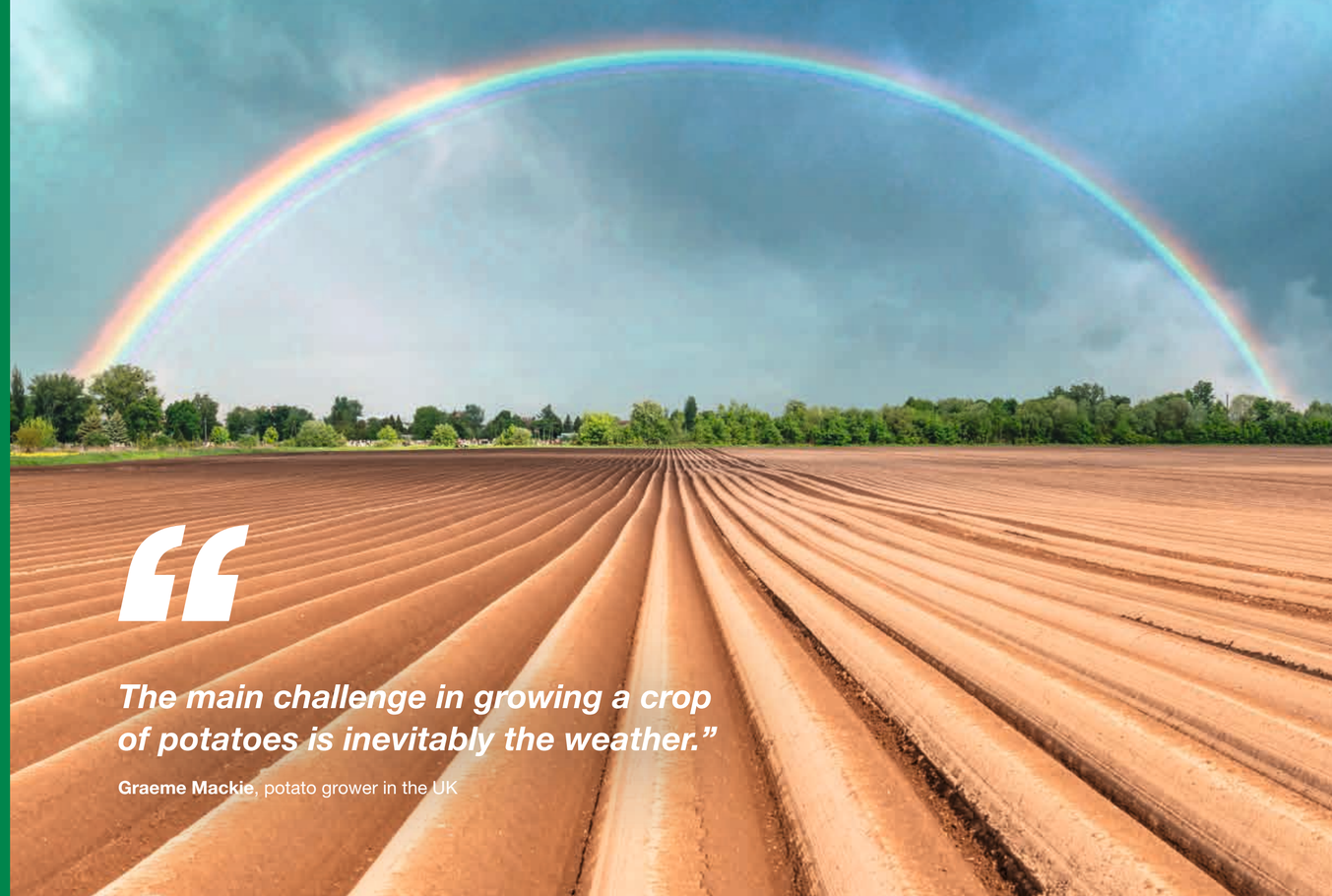
(in 38 European trials across EPPO climatic zones)



Internal Testing

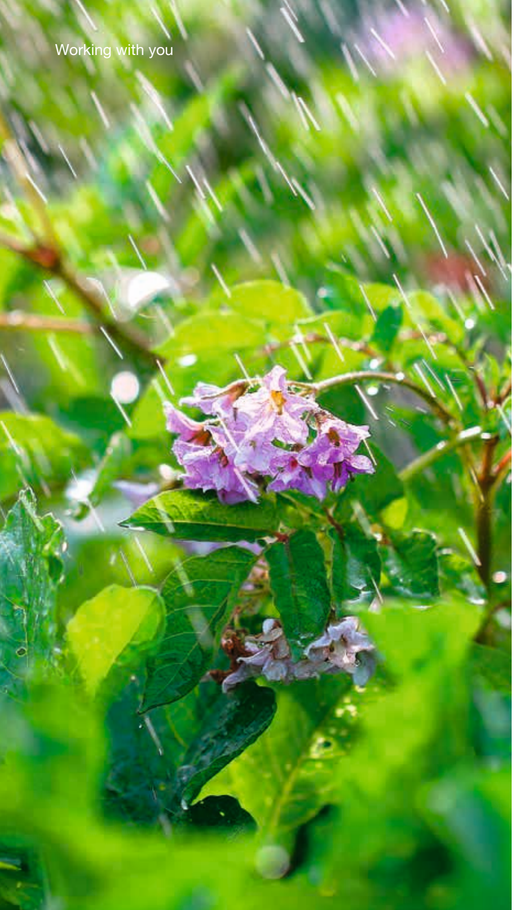
Healthier potato plants after Enervin® Pro applications are able to produce higher potato yield

Working with you



“The main challenge in growing a crop of potatoes is inevitably the weather.”

Graeme Mackie, potato grower in the UK

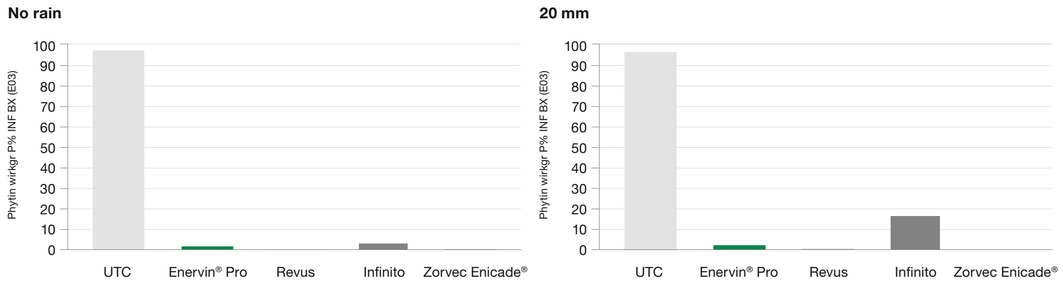


Enervin® Pro is a product that **works with you**

Enervin® Pro demonstrated excellent rain fastness, and both active ingredients in Enervin® Pro exhibit outstanding UV stability.

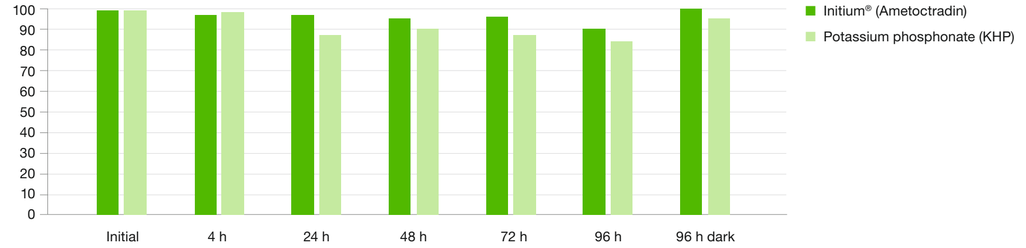
Working with you

Excellent rainfastness



2020 potato var. Bintje Limburgerhof; 5 appl , 7-10 d; A: 27.05.2020 - E: 26.06.2020, 20 mm 2 hr after each appl. (+6 mm each night)

Excellent UV stability



Test: November 2021 APR/DO II Simon Nord: 21_0041 - UV - Stability Fungicides formulations Specialty crops



Your ideal **spraying partner**

Enervin® Pro is highly miscible and selective for potatoes.

Proven selectivity

Enervin® Pro was tested in more than 40 different potato cultivars. Enervin® Pro was selective in all varieties under season-long applications and a wide range of climatic conditions.

Working with you

Proven miscibility

As tested in several combinations in tank mixes, Enervin® Pro easily mixes with the most common fungicides, insecticides, herbicides and adjuvants/fertilizers.

Fungicides	Insecticides	Herbicides	Adjuvants / Fertilisers
REVYONA*	GOCHA*	BASAGRAN SG*	CRUSADE
CYMBAL 45 WG*	HALLMARK ZEON*	TITUS + ACTIVATOR 90*	STERLING
OPTION*	INSYST*	TITUS + PHASE II	ACTIVATOR 90
SIPCAM C50 WG*	LASER*		PHASE II
INFINITO*	MAINMAN*		BITTERSALTS
PROXANIL*	TEPPEKI*		EPSO TOP
RANMAN TOP*	ENVIDOR		FOLEX K39
REVUS*	INSEGAR		FOLEX P
SIGNUM*	MAGEOS		CARNIVAL
SCORE	CORAGEN		
DAGONIS	VERTIMEC		
VIVANDO	ATOMINAL		
REVISOL	AXALION		
TALENDO EXTRA	EXALT		
BELLIS	ALVERDE		
KUMULUS	MOVENTO SC		
ORTIVA	MOVENTO 150 O-TEQ		
ALIETTE	PLENUM		
DELAN PRO	KARATE ZEON		
DELAN WG	NEALTA		
CANVAS	MASAI		
PROPLANT	ALTACOR		
ZORVEC ENICADE	AXALION		
SCALA	VELIFER		
CANTUS	AGRIMEC		
SWITCH	NISSORUN		
KAURITIL	FLORAMITE		
SERIFEL	PROCLAIM		
TOPAS	ADMIRAL		
LUNA TRANQUILITY	SIVANTO		
LUNA SENSATION	MOSPILAN		
SANGA	OBERON		

* Tested solo as well as in mixture with Crusade and in mixture with Sterling (anti-drift adjuvants) at low water volumes (100 L/ha). 200 L water volume needed for the mixture with Basagran + Crusade/ Sterling as well as for the mixture with Proxanil + Crusade/Sterling. Nitrasol results pending. We recommend keeping the tank in constant agitation and spraying immediately after mixing.



Low resistance risk

So far, no P. infestans sensitivity decrease has been observed for any of the active ingredients. With the unique Modes of Action of both Initium® (Ametoctradin) and KHP and the latter's property of activating unspecific plant defense mechanisms, the risk of selecting resistant P. infestans strains is low.

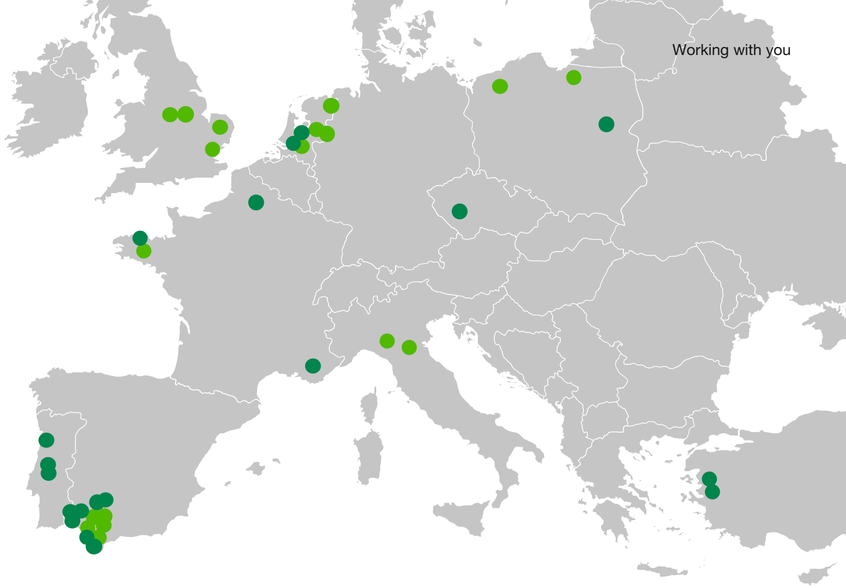
In addition, Enervin® Pro controls all important P. infestans lineages when used at the target rate and in a preventive manner. Enervin® Pro is an essential tool for blight resistance management.

Working with you

Resistance situation

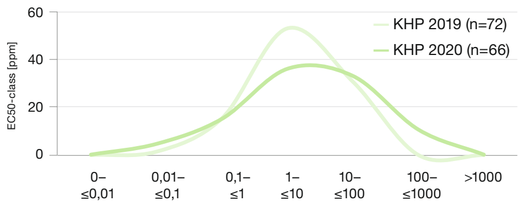
66 isolates from 19 sites in 2020:
3x CZ, 3x PL, 9x NL, 9x FR, 13x PT, 23x ES, 6x TR

72 isolates from 17 sites in 2019:
8x PL, 13x NL, 4x FR, 18x UK, 20x ES, 9x IT

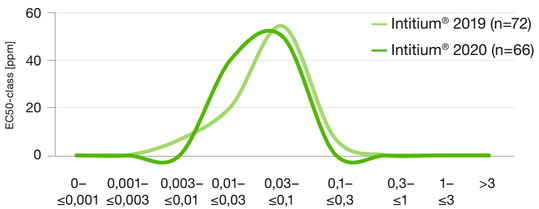


- Sensitive isolate 2020
- Sensitive isolate 2019

Frequency in %



Frequency in %



Planet-friendly profile



We need to do everything we can to protect the environment because there's a lot of beneficials out there that will help us growing our crops."

Justin Wilderspin, potato grower in the UK



Enervin® Pro meets the most **stringent regulatory requirements**

Crop protection products in Europe are facing a strict and complex regulatory environment. The legislation reduces the availability of active ingredients and products and slows innovation. All registered plant protection products in Europe are safe for the environment, humans and animals if used according to the label recommendations. In addition, Enervin® Pro shows a favourable regulatory profile.

Planet-friendly profile

Enervin® Pro impact on three key areas of the environment

Enervin® Pro combines multiple supportive features contributing to its favourable profile regarding the natural, living and human environments.







The natural environment

- Potassium phosphonates (KHP) are toxicologically not relevant for the environment
- In natural water/sediment systems, Initium® degrades very rapidly into harmless metabolites
- Enervin Pro® is not volatile. No risk of air pollution.

The living environment

- Safe* for bees and pollinators
- Safe* for beneficial insects
- Safe* for earthworms
- Safe* for aquatic life (buffer zone of 5m expected for potatoes in some countries)
- Safe* for birds and mammals
- No CfS

The human environment

- No CMR classification
- Not an endocrine disruptor
- H317: may cause an allergic skin reaction
- Safe* for operators and workers
- Safe* for residents and bystanders
- Safe* for consumers

* when used according to the label

Enervin® Pro

Hit the ground running!

The healthy start for your potato crop.



BASF
We create chemistry