

Potato

PORTFOLIO



Herbicides
Fungicides
Plant Growth Regulators
Soil Conditioners
Biot stimulants



2019/20



WELCOME TO UPL

UPL is a global food systems leader, now one of the top five agricultural solutions companies worldwide. We offer an integrated portfolio of both patented and post-patent products for various row and specialty crops, including; seeds, crop protection, biologicals, soil nutrients and post-harvest solutions covering the entire crop value chain, making UPL a complete agro solutions provider.

OpenAg™

Our purpose: An open agricultural network that feeds sustainable growth for all. No limits, no borders.

It is our OpenAg™ approach that makes UPL dedicated to continued investments in research, technology, productivity and environmental sustainability. Our initiatives follow a path of responsible excellence whereby we are committed to innovative solutions that help us to keep our grower's growing. **What makes UPL able to do this?**

- **48** MANUFACTURING FACILITIES ACROSS 14 COUNTRIES
- **130+** COUNTRIES SALES PRESENCE
- **10,300** EMPLOYEES GLOBALLY
- **1,500+** PRODUCT FORMULATIONS
- **1,023** PATENTS AWARDED SO FAR
- **12,400** PRODUCT REGISTRATIONS ACROSS COUNTRIES

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HERBICIDES TABLE

PRODUCT PROFILE	HERBICIDES			
	CLOZONE	PANAREX	QUIDAM	RANGO
PAGE NO.	06	07	08	09
MAPP NO. ¹	18979	17960	17595	17959
ACTIVE INGREDIENT(S) (g/L)	360g clomazone	40g quizalofop-P-tefuryl	800g prosulfocarb	40g quizalofop-P-tefuryl
FORMULATION	CS	EC	EC	EC
ACTIVITY	Contact Residual	Systemic Contact	Contact Residual	Systemic Contact
MOA CLASSIFICATION ²	F3	A	N	A
MAX. INDIVIDUAL DOSE (kg/L/ha/yr)	0.25	2.25	5	2.25
MAX. NO. OF APPLICATIONS	1	1	1	1
MAX. TOTAL DOSE (kg/L/ha/yr)	0.25	2.25	5	2.25
APPLICATION INTERVAL	NS	NS	NS	NS
HARVEST INTERVAL FOR POTATOES	NS	60 days	NS	60 days
LATEST TIME OF APPLICATION	Pre-emergence	NS	At emergence (soil rising over emerging potato shoots)	NS
AQUATIC BUFFER ZONE	—	—	5m	—
OTHER INFORMATION	To protect non-target plants RESPECT an untreated buffer zone of 10 meters to non-crop land.	To avoid the build up of resistance do not apply products containing an ACCase inhibitor herbicide more than twice to any crop. In addition, do not use this product in mixture or sequence with any other product containing Quizalofop-P-tefuryl or quizalofop-p-ethyl.	Not to be applied by hand-held equipment	To avoid the build up of resistance do not apply products containing an ACCase inhibitor herbicide more than twice to any crop. In addition, do not use this product in mixture or sequence with any other product containing Quizalofop-P-tefuryl or quizalofop-p-ethyl.
FINAL USE DATE	30.04.23	31.05.24	30.04.23	31.05.24

¹ Information for currently marketed MAPP No.s is provided.

² HRAC (Herbicide Resistance Action Committee) codes.

CLOZONE

CLOZONE is a residual and systemic herbicide for use on a range of annual broadleaved weeds.

PRODUCT PROFILE	
Brand	CLOZONE
MAPP No.	18979
Active ingredient(s)	360g/L clomazone
Formulation	Capsule Suspension (CS)
Activity	Residual and systemic.
Maximum individual dose	0.25L/ha
Maximum number of treatments	1
Water volume	200–400L/ha
Latest time of application	Pre-emergence.
Other restrictions	Extreme care must be taken to avoid spray drift onto non-crop plants outside of the target area. To protect non-target plants RESPECT an untreated buffer zone of 5m to non-crop land.
Target	Annual broad leaved weeds.
Pack size	5L
Aquatic buffer zone	None
Other crops	Oilseed rape (winter).

MODE OF ACTION

CLOZONE acts by inhibition of the biosynthesis of photosynthetic pigments leading to bleaching symptoms on susceptible weed species. Susceptible weeds emerge but are lacking pigmentation and plant death occurs shortly afterwards.

CLOZONE contains clomazone, classified as a group F3 herbicide by HRAC (Herbicide Resistance Action Committee).

PANAREX

PANAREX is a selective, systemic foliar applied graminicide for post-emergence control of a range of annual and perennial grass weeds, including volunteer cereals in broad-leaved crops

PRODUCT PROFILE	
Brand	PANAREX
MAPP No.	17960
Active ingredient(s)	40g/L quizalofop-P-tefuryl
Formulation	Emulsifiable Concentrate (EC)
Activity	Systemic contact
Maximum individual dose	2.25L/ha
Maximum number of treatments	1
Harvest interval	60 days
Water volume	200–400L/ha
Other restrictions	To avoid the build up of resistance do not apply products containing an ACCase inhibitor herbicide more than twice to any crop. In addition, do not use this product in mixture or sequence with any other product containing quizalofop-P-tefuryl or quizalofop-p-ethyl.
Target	Annual and perennial grass weeds, including volunteer cereals.
Pack size	4 x 5L
Aquatic buffer zone	None
Other crops	Combining pea, field bean, fodder beet, linseed, oilseed rape and sugar beet.

MODE OF ACTION

The active ingredient of PANAREX, quizalofop-P-tefuryl belongs to the aryloxyphenoxypropionates 'FOPs' family and works by inhibition of acetyl CoA and is classified by the Herbicide Resistance Action Committee (HRAC) as mode of action code A.

KEY INFORMATION

PANAREX is absorbed quickly, works fast and is rainfast within one hour. Application should only be made to actively growing weeds which will allow maximum movement of the product to the growing points. The first outward signs of the activity of PANAREX appear 5–10 days after application, and can usually be observed as the yellowing of the youngest leaf. Treated target grasses will die within 14–30 days.

QUIDAM

QUIDAM is a herbicide for use in potatoes (early and main crop) for the control of annual grass weeds and annual broad-leaved weeds.

PRODUCT PROFILE	
Brand	QUIDAM
MAPP No.	17595
Active ingredient(s)	800g/L prosulfocarb
Formulation	Emulsifiable Concentrate (EC)
Activity	Contact and residual.
Maximum individual dose	5L/ha
Maximum number of treatments	1
Latest time of application	At emergence (soil rising over emerging potato shoots).
Water Volume	200–400L/ha
Other restrictions	This product must not be applied via hand-held equipment.
Pack size	10L
Aquatic buffer zone	5m
Other crops	Barley (winter), wheat (winter). Product also has Extensions of Authorisations.

MODE OF ACTION

QUIDAM belongs to the thiocarbamates family and works by inhibition of lipid synthesis – not ACCase inhibition, and is classified by the Herbicide Resistance Action Committee (HRAC) as mode of action code N.

KEY INFORMATION

- Before applying **QUIDAM**, complete ridge formation and do not disturb soil after treating.
- For pre-emergence applications only, **QUIDAM** can be tank mixed with active substances containing metribuzin.
- **QUIDAM** will control a range of grass weeds and annual broad-leaved weeds, for further information see Tables 1 and 2 on pages 10–11.

RANGO

RANGO is a selective, systemic foliar applied graminicide for post-emergence control of a range of annual and perennial grass weeds, including volunteer cereals in broad-leaved crops.

PRODUCT PROFILE	
Brand	RANGO
MAPP No.	17959
Active ingredient(s)	40g/L quizalofop-P-tefuryl
Formulation	Emulsifiable Concentrate (EC)
Activity	Systemic contact
Maximum individual dose	2.25L/ha
Maximum number of treatments	1
Harvest interval	60 days
Water volume	200–400L/ha
Other restrictions	To avoid the build-up of resistance, do not apply products containing an ACCase inhibitor herbicide more than twice to any crop. In addition, do not use this product in mixture or sequence with any other product containing quizalofop-P-tefuryl or quizalofop-p-ethyl.
Target	Annual and perennial grass weeds, including volunteer cereals.
Pack size	5L
Aquatic buffer zone	None
Other crops	Combining pea, field bean, fodder beet, linseed, oilseed rape and sugar beet.

MODE OF ACTION

The active ingredient of **RANGO**, quizalofop-P-tefuryl belongs to the aryloxyphenoxypropionates 'FOPs' family and works by inhibition of acetyl CoA. And is classified by the Herbicide Resistance Action Committee (HRAC) as mode of action code A.

KEY INFORMATION

RANGO is absorbed quickly, works fast and is rainfast within one hour. Application should only be made to actively growing weeds which will allow maximum movement of the product to the growing points. The first outward signs of the activity of Rango appear 5–10 days after application, and can usually be observed as the yellowing of the youngest leaf. Treated target grasses will die within 14–30 days.

WEED CONTROL TABLES

TABLE 1: SUSCEPTIBILITY OF ANNUAL BROAD-LEAVED WEEDS TO UPL HERBICIDES APPROVED FOR USE IN POTATOES

PRODUCT PROFILE	HERBICIDES		
	CLOZONE	QUIDAM	
ACTIVE INGREDIENT(S)	clomazone	prosulfocarb	
GROWTH STAGE OF WEEDS	Pre-em	Pre-em of weeds	Weeds cotyledon
ACTIVITY	Contact + Residual	Contact + Residual	
Annual meadow grass		MS	MS
Black bindweed		MR	
Black nightshade		S	
Charlock			
Chickweed	S	S	S
Cleavers	MS	S	S
Cane's-bill		S	
Corn marigold			
Corn spurrey			
Dead-nettle	MR	S	
Fat-hen	MR	MS	R
Field penny-cress		S	
Forget-me-not		S	
Fumitory		S	
Groundsel		MR	R
Hemp-nettle			
Knotgrass		MR	
Mayweed		MR	R
Orache			
Pale persicaria		MR	
Pansy		MS	
Poppy		MR	
Redshank		MR	R
Scarlet pimpernel			
Shepherd's purse	S	S	S
Small nettle		MR	R
Speedwell spp.		S	S
Volunteer OSR		MS	
Wild radish			

KEY: S = Susceptible MS = Moderately susceptible MR = Moderately resistant R = Resistant

TABLE 2: SUSCEPTIBILITY OF GRASS WEEDS TO UPL HERBICIDES APPROVED FOR USE IN POTATOES

PRODUCT PROFILE	HERBICIDES			
	RANGO / PANAREX		QUIDAM	
ACTIVE INGREDIENT(S)	quizalofop-P-tefuryl		prosulfocarb	
GROWTH STAGE OF WEEDS	Growth stage (BBCH)	Rate (L/ha)	Pre-em of weeds	Weeds cotyledon
ACTIVITY	Contact		Contact + Residual	
Annual meadow grass			MS	MS
Blackgrass			MS*	
Common couch grass	14-31	1.75-2.25		
Italian rye-grass	12-29	1.0-1.5	MS*	
Loose silky-bent			MS	
Perennial rye grass (from seed)	14-31	1-1.5		
Rough stalked meadow-grass			S	
Volunteer wheat and barley	11-31	0.5-1.0		
Wild and volunteer oats	12-31	0.75-1.25	MR	

KEY: S = Susceptible MS = Moderately susceptible MR = Moderately resistant R = Resistant

* A pre-emergence application of QUIDAM will reduce levels of black-grass and Italian rye-grass, however it should only be used as part of a resistance management strategy including use of sequences with products with different modes of action and cultural control techniques.



FUNGICIDES TABLE

PRODUCT PROFILE	FUNGICIDES								
	AXIDOR	CHAMANE	DIMIX 500 SC	DIPROSPERO	MANZATE 75 WG	NAUTILE DG	PENNCOZEB 80 WP	PROXANIL	ZOXIS
PAGE NO.	14	15	16	17	18	19	20	21	22
MAPP NO. ¹	16830	15922	18459	19188	15052	16653	16953	16664	18438
ACTIVE INGREDIENT(S) (g/L)	50g cymoxanil 400g propamocarb hydroxide	250g azoxystrobin	500g dimethomorph	90g dimethomorph 500g propamocarb hydroxide	750g mancozeb	680g mancozeb 50g cymoxanil	800g mancozeb	50g cymoxanil 400g propamocarb hydroxide	250g azoxystrobin
FORMULATION	SC	SC	SC	SC	WG	WG	WP	SC	SC
ACTIVITY	Curative Protectant	Systemic Protectant	Protectant Curative	Protectant Curative	Protectant	Protectant Curative	Protectant	Protectant Curative	Systemic Protectant
MOA CLASSIFICATION ²	27 28	11	40	40 28	M3	M3 27	M3	27 28	11
MAX. INDIVIDUAL DOSE (kg/L/ha/yr)	2.5	3	0.3	2	1.7	2	1.7	2.5	3
MAX. NO. OF APPLICATIONS	4	1	NS	5	8	8	8	4	1
MAX. TOTAL DOSE (kg/L/ha/yr)	10	3	1.5	10	13.6	16	13.6	10	3
APPLICATION INTERVAL	NS	NS	7 days	NS	7 days	7 days	7 days	NS	NS
HARVEST INTERVAL FOR POTATOES	14 days	NS	7 days	14 days	7 days	NS	7 days	14 days	NS
LATEST TIME OF APPLICATION	NS	At planting	NS	NS	NS	NS	NS	NS	At planting
LERAP	—	—	—	—	B	—	B	—	—
AQUATIC BUFFER ZONE	—	5m	—	—	—	6m	—	—	5m
OTHER INFORMATION	Maximum concentration must not exceed 3.33g propamocarb/L and 0.417g cymoxanil/L.		A plant-back restriction of 120 days is required for all rotational crops with an MRL for dimethomorph below 0.05mg/kg. Cereals are exempt from this restriction.	A plant-back restriction of 120 days is required for all rotational crops with an MRL for dimethomorph below 0.05mg/kg. Cereals are exempt from this restriction.		Maximum concentration must not exceed 2.0kg product per 300L water		Maximum concentration must not exceed 3.33g propamocarb/L and 0.417g cymoxanil/L.	
FINAL USE DATE	31.01.23	30.06.27	31.01.22	31.01.23	31.07.22	31.07.22	31.07.22	31.01.23	30.06.27

¹ Information for currently marketed MAPP No.s is provided.

² FRAC (Fungicide Resistance Action Committee) codes.

AXIDOR

AXIDOR is a fungicide for the preventative control of foliar late blight (*Phytophthora infestans*).

PRODUCT PROFILE	
Brand	AXIDOR
MAPP No.	16830
Active ingredient(s)	50g/L cymoxanil + 400g/L propamocarb hydrochloride
Formulation	Suspension Concentrate (SC)
Activity	Curative and protectant.
Maximum individual dose	2.5L/ha
Maximum number of treatments	4
Harvest interval	14 days
Other restrictions	The maximum in use concentration must not exceed 3.33g propamocarb/L and 0.417g cymoxanil/L.
Target	Potato blight (<i>Phytophthora infestans</i>).
Pack size	10L
Aquatic buffer zone	None
Other crops	None

MODE OF ACTION

Cymoxanil is a fungicide with quick penetrating properties, translaminar action, shock effect (best curative efficacy) and short persistence. It acts by altering fungi metabolism. Even at very low doses it is effective in preventing germination of spores on the surface of leaves. Due to its penetration characteristics, it can selectively destroy the mycelium during the incubation period.

Cymoxanil belongs to the cyanoacetamide-oxime group and is classified by the Fungicide Resistance Action Committee (FRAC) as belonging to the mode of action group 27.

Propamocarb hydrochloride is a systemic fungicide that belongs to the carbamates chemical group and is classified by the Fungicide Resistance Action Committee (FRAC) as belonging to the mode of action group 28.

Propamocarb acts by interfering with the synthesis of phospholipids and its fatty acids, interrupting the formation of the fungi membrane cell. It affects the mycelium growth, the production and germination of spores. Its acropetally systemic properties provide strong rainfastness.

CHAMANE

CHAMANE is a broad-spectrum fungicide for use as an in-furrow application for the reduction of *Rhizoctonia solani* that causes Stem canker, Black scurf and Black dot which is caused by *Colletotrichum coccodes*.

PRODUCT PROFILE	
Brand	CHAMANE
MAPP No.	15922
Active ingredient(s)	250g/L azoxystrobin
Formulation	Suspension Concentrate (SC)
Activity	Systemic and protectant.
Maximum individual dose	3L/ha
Maximum number of treatments	1 per crop
Latest time of application	At planting.
Other restrictions	Do not use on high organic matter soils. Only approved for use as an in-furrow application. See label for restrictions on other crops.
Target	Stem canker, Black scurf and Black dot.
Pack size	5L
Aquatic buffer zone	5m
Other crops	Asparagus (outdoor), barley, broccoli/calabrese (outdoor), brussels sprout (outdoor), bulb onion, cabbage (outdoor), carrot, cauliflower (outdoor), collard (outdoor), combining pea, field bean, kale (outdoor), leek, oats, oilseed rape, rye, triticale, vining pea and wheat.

MODE OF ACTION

Azoxystrobin belongs to the QoI (Quinone outside Inhibitors) fungicide group and is classified by the Fungicide Resistance Action Committee (FRAC) as belonging to the mode of action group 11.

Used alone as a pre-planting treatment CHAMANE (azoxystrobin) does not contribute to the total number of applications of QoI fungicides advised on potatoes by FRAG-UK, so the number of foliar treatments of QoI fungicides need not be reduced.



DIMIX 500 SC

DIMIX 500 SC is a fungicide for the control of foliar late blight (*Phytophthora infestans*) in potato.

PRODUCT PROFILE	
Brand	DIMIX 500 SC
MAPP No.	18459
Active ingredient(s)	500g/L dimethomorph
Formulation	Suspension Concentrate (SC)
Activity	Translaminar, locally systemic.
Maximum individual dose	0.3L/ha
Maximum total dose	1.5L/ha
Water volume	200–400L/ha
Latest time of application	7 days before harvest.
Other restrictions	Not authorised for use as a solo product and must be applied in tank mixture with an authorised formulation of mancozeb.
Target	Foliar late blight (<i>Phytophthora infestans</i>)
Pack size	5L
Aquatic buffer zone	None
Other crops	None

MODE OF ACTION

Dimethomorph belongs to the CAA (Carboxylic Acid Amides) fungicide group and is classified by the Fungicide Resistance Action Committee (FRAC) as belonging to the mode of action group 40. It is translaminar and locally systemic.

No more than 3 consecutive applications of a CAA fungicide should be made.

DIMIX 500 SC should always be used in a tank mixture with an approved contact fungicide e.g. mancozeb as in MANZATE 75 WG or PENNCOZEB 80 WP.



DIPROSPERO

DIPROSPERO is a systemic fungicide for the control of foliar late blight (*Phytophthora infestans*).

PRODUCT PROFILE	
Brand	DIPROSPERO
MAPP No.	19188
Active ingredient(s)	500g/L propamocarb hydroxide + 90g/L dimethomorph
Formulation	Suspension Concentrate (SC)
Activity	Systemic
Maximum individual dose	2L/ha
Maximum number of treatments	5 per crop
Latest time of application	14 days before harvest.
Water volume	200–600L/ha
Other restrictions	A plant-back restriction of 120 days is required for all rotational crops with an MRL for dimethomorph below 0.05mg/kg. Cereals are exempt from this restriction.
Target	Foliar late blight (<i>Phytophthora infestans</i>)
Pack size	10L
Aquatic buffer zone	None
Other crops	None

MODE OF ACTION

Propamocarb hydrochloride is a systemic fungicide that belongs to the carbamates chemical group and is classified by the Fungicide Resistance Action Committee (FRAC) as belonging to the mode of action group 28.

Propamocarb acts by interfering with the synthesis of phospholipids and its fatty acids, interrupting the formation of the fungi membrane cell. It affects the mycelium growth, the production and germination of spores. Its acropetally systemic properties provide strong rainfastness.

Dimethomorph belongs to the CAA (Carboxylic Acid Amides) fungicide group and is classified by the Fungicide Resistance Action Committee (FRAC) as belonging to the mode of action group 40. It is translaminar and locally systemic.

No more than 3 consecutive applications of a CAA fungicide should be made. Up to 5 applications of Diprospero may be made, making up no more than half of the total number of intended late blight sprays per season.

MANZATE 75 WG

MANZATE 75WG is a fungicide for the control of late potato blight (*Phytophthora infestans*), and early blight (*Alternaria solani* and *Alternaria alternata*).

PRODUCT PROFILE	
Brand	MANZATE 75WG
MAPP No.	15052
Active ingredient(s)	75% mancozeb
Formulation	Water Dispersible Granule (WDG)
Activity	Protectant
Maximum individual dose	1.7kg/ha
Maximum total dose	13.6kg/ha
Maximum number of treatments	8 per crop
Harvest interval	7 days
Other restrictions	A minimum of 7 days must be observed between applications.
Target	Potato blight (<i>Phytophthora infestans</i>)
Pack size	10kg
LERAP	B
Other crops	Apple, wheat (winter and spring) and bulb onions.

MODE OF ACTION

Mancozeb is a protectant fungicide that is typically included in a tank mix with other fungicides as a tool to help with resistance management against the control of potato blight. Mancozeb belongs to the dithiocarbamate group of fungicides and is classified by the Fungicide Resistance Action Committee (FRAC) as belonging to the mode of action group M03 (Multi Site Action).



NAUTILE DG

NAUTILE DG is a fungicide for the control of potato blight (*Phytophthora infestans*). It combines local systemic action of cymoxanil and protectant activity of mancozeb in a unique dual action co-formulation.

PRODUCT PROFILE	
Brand	NAUTILE DG
MAPP No.	16653
Active ingredient(s)	5% cymoxanil + 68% mancozeb
Formulation	Water Dispersible Granule (WDG)
Activity	Protectant and Curative.
Maximum individual dose	2.0kg/ha
Maximum total dose	16.0kg/ha
Maximum number of treatments	8
Harvest interval	None stipulated.
Other restrictions	A minimum of 7 days must be observed between applications. Maximum concentration must not exceed 2.0kg of product per 300L of water. Must not be applied using handheld equipment.
Target	Potato blight (<i>Phytophthora infestans</i>)
Pack size	10kg
Aquatic Buffer Zone	6m ¹
Other crops	None

¹ 6m if horizontal boom sprayers are fitted with three star DRT, otherwise a 30m buffer zone applies.

MODE OF ACTION

Cymoxanil is a local systemic fungicide with protective and curative activity, it penetrates rapidly and when inside the plant it cannot be washed off by rain. It controls disease during the incubation period and prevents damage to the crop.

Cymoxanil belongs to the cyanoacetamide-oxime group and is classified by the Fungicide Resistance Action Committee (FRAC) as belonging to the mode of action group 27.

Mancozeb is a protectant fungicide that is typically included in a tank mix with other fungicides as a tool to help with resistance management against the control of potato blight.

Mancozeb belongs to the dithiocarbamate group of fungicides and is classified by the Fungicide Resistance Action Committee (FRAC) as belonging to the mode of action group M3 (Multi Site Action).

PENNCOZEB 80WP

PENNCOZEB 80WP is a fungicide for the control of late potato blight (*Phytophthora infestans*), and early blight (*Alternaria solani* and *Alternaria alternata*).

PRODUCT PROFILE	
Brand	PENNCOZEB 80WP
MAPP No.	16953
Active ingredient(s)	80% mancozeb
Formulation	Wettable Powder (WP)
Activity	Protectant
Maximum individual dose	1.7kg/ha
Maximum total dose	13.6kg/ha
Maximum number of treatments	8 per crop
Harvest interval	7 days
Other restrictions	A minimum of 7 days must be observed between applications.
Target	Potato blight (<i>Phytophthora infestans</i>)
Pack size	25kg
LERAP	B
Other crops	Apple, bulb onion and wheat.

MODE OF ACTION

Mancozeb is a protectant fungicide that is typically included in tank mix with other fungicides as a tool to help with resistance management against the control of potato blight. Mancozeb belongs to the dithiocarbamate group of fungicides and is classified by the Fungicide Resistance Action Committee (FRAC) as belonging to the mode of action group M03 (Multi Site Action).



PROXANIL

PROXANIL is a fungicide for the preventative control of foliar late blight (*Phytophthora infestans*).

PRODUCT PROFILE	
Brand	PROXANIL
MAPP No.	16664
Active ingredient(s)	50g/L cymoxanil + 400g/L propamocarb hydrochloride
Formulation	Suspension Concentrate (SC)
Activity	Systemic and translaminar.
Maximum individual dose	2.5L/ha
Maximum number of treatments	4
Harvest interval	14 days
Other restrictions	The maximum in use concentration must not exceed 3.33g propamocarb/L and 0.417g cymoxanil/L.
Target	Potato blight (<i>Phytophthora infestans</i>)
Pack size	10L
Other crops	None
LERAP	B

MODE OF ACTION

Cymoxanil is a fungicide with quick penetrating properties, translaminar action, shock effect (best curative efficacy) and short persistence. It acts by altering fungi metabolism. Even at very low doses it is effective in preventing germination of spores on the surface of leaves. Due to its penetration characteristics, it can selectively destroy the mycelium during the incubation period.

Cymoxanil belongs to the cyanoacetamide-oxime group and is classified by the Fungicide Resistance Action Committee (FRAC) as belonging to the mode of action group 27.

Propamocarb hydrochloride is a systemic fungicide that belongs to the carbamates chemical group and is classified by the Fungicide Resistance Action Committee (FRAC) as belonging to the mode of action group 28.

Propamocarb acts by interfering with the synthesis of phospholipids and its fatty acids, interrupting the formation of the fungi membrane cell. It affects the mycelium growth, the production and germination of spores. Its acropetally systemic properties provide strong rainfastness.

ZOXIS

ZOXIS is a broad-spectrum fungicide for use in potatoes as an in-furrow application for the reduction of *Rhizoctonia solani* that causes Stem Canker, Black Scurf and Black Dot which is caused by *Colletotrichum coccodes*.

PRODUCT PROFILE	
Brand	ZOXIS
MAPP No.	18438
Active ingredient(s)	250g/L azoxystrobin
Formulation	Suspension Concentrate (SC)
Activity	Systemic and protectant.
Maximum individual dose	3L/ha
Maximum number of treatments	1 per crop
Latest time of application	At planting.
Other restrictions	Do not use on high organic matter soils. Only approved for use as an in-furrow application. See label for restrictions on other crops.
Target	Stem canker, Black scurf and Black dot.
Pack size	5L
Aquatic buffer zone	5m
Other crops	Asparagus (outdoor), barley, broccoli/calabrese (outdoor), brussels sprout (outdoor), bulb onion, cabbage (outdoor), carrot, cauliflower (outdoor), collard (outdoor), combining pea, field bean, kale (outdoor), leek, oats, oilseed rape, potato, rye, triticale, vining pea and wheat.

MODE OF ACTION

Azoxystrobin belongs to the QoI (Quinone outside Inhibitors) fungicide group and is classified by the Fungicide Resistance Action Committee (FRAC) as belonging to the mode of action group 11.

Used alone as a pre-planting treatment (azoxystrobin); ZOXIS does **not** contribute to the total number of applications of QoI fungicides advised on potatoes by FRAG-UK, so the number of foliar treatments of QoI fungicides need not be reduced.



FAZOR

FAZOR For use as a foliar treatment in potatoes for the control of volunteers, and can help to suppress sprouting in store.

PRODUCT PROFILE	
Brand	FAZOR
MAPP No.	19074
Active ingredient(s)	Contains 600g/kg (60% w/w) maleic hydrazide
Formulation	Water Soluble Granule (WG)
Activity	Blocks cell division.
Maximum individual dose	5kg/ha
Maximum number of treatments	1 per crop
Latest time of application	21 days before harvest.
Water volume	350–500L/ha
Other restrictions	Do not use under drought conditions, when the temperature exceeds 26°C, or when the crop is under stress from other factors e.g. diseases or insect damage, to ensure maximum uptake and translocation. Do not mix with strongly alkaline sprays or those containing copper compounds. Although FAZOR is non-volatile no drift should be permitted onto nearby crops.
Target	Sprout suppression
Pack size	4 x 5kg
Aquatic buffer zone	None
Other crops	Bulb onions

MODE OF ACTION

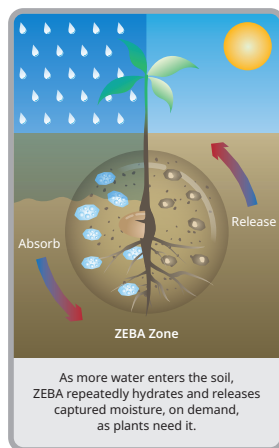
Maleic Hydrazide is translocated from the leaf into the tuber of the Potato. The Maleic Hydrazide then blocks cell division whilst still allowing the cell to swell and elongate.

Application should be made to the actively growing foliage when the smallest tubers required to reach marketable size will be not less than 25mm long and starting to expand. Typically this will be 3–5 weeks before haulm destruction but may occur earlier. The most important factors are the number of tubers required to reach marketable size and the health of the haulm. Do not desiccate or haulm destruct within 3 weeks of applying FAZOR.

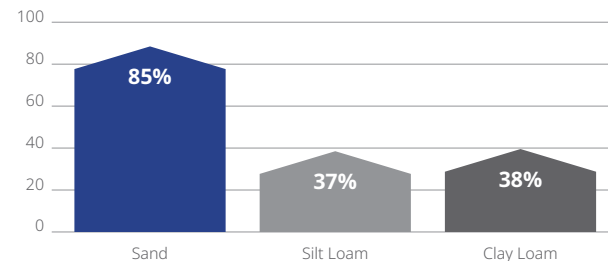
ZEBA

WHAT IS ZEBA?

- Revolutionary patented starch-based granule intended for soil incorporation in the root zone
- It has the function to absorb water up to 495 times its own weight, forming hydrogels suspended in and around the roots
- Performing in all soil types, it hydrates and releases water on demand multiple times in cycle before fully degrading
- Increases the soils water holding capacity (WHC), positively impacting on water use efficiency (WUE)
- Very high Cation Exchange Capacity (CEC) positively impacts on nutrient use efficiency (NUE)
- Non-toxic, safe and degradable



% Increase in Water Holding Capacity



Source: Logan Labs, LLC. Dose rate: 12kg/ha

ZEBA IN POTATOES

- ZEBA is a starch based Super Hydrating Granule which helps plants use water efficiently, producing healthier, higher quality, higher yielding crops
- Helps to maintain stomata function and tuber bulking rates for higher yields
- Reduces stress from lack of water
- Maintains moisture around the tuber at critical times e.g. tuber initiation, leading to increases in saleable grades and overall yield
- ZEBA is commonly applied using all standard granular application methods
- ZEBA is superior to wetting agents, other additive and soil conditioners in its ability to provide maximum water, precisely when plant roots need it most.
- Unlike products applied monthly, ZEBA is applied only once per year.
- Through efficient water management, ZEBA can allow longer intervals between watering.

RATES OF APPLICATION IN POTATOES

10–12kg/ha in row; 20–25kg/ha overall.

SUMMARY

- ZEBA increases the water holding capacity of soils
- ZEBA has direct and indirect influences on beneficial soil properties
- ZEBA maintains a level of moisture in the applied root zone (rhizosphere)
- ZEBA reduces leaching of key nutrients
- ZEBA is a fully degradable starch Super Hydrating Granule
- ZEBA supports soil microbial communities and adds to a sustainable soil policy

WATER HOLDING CAPACITY TESTS

Due to either the lack of overall irrigation, precipitation or the infrequency of water delivery to potatoes, it is very important to hold moisture around the tuber development zone, especially during the 4–5 week period of tuber initiation.

Allowing the soil to dry out at this critical stage can effect nutrient supply, tuber numbers and affecting skin quality.

ZEBA is ideally able to increase a soil's water holding capacity above that of a control.

ZEBA is repeatedly able to release the water it absorbs back to the plant more easily than that of clay, therefore providing a valuable source of water supply and nutrients, whilst providing a stable environment for soil microbes.

Soil Types of Test Samples

SAMPLE	TYPE	% SAND	% SILT	% CLAY
1	Sand	100	0	0
2	Silt Loam	37	40	23
3	Clay Loam	30	48	22

Soil Types of Test Samples

TYPE	TEST	WATER PASSING (ml)	WATER RETAINED (ml)	% RETAINED	% INCREASE
Sand	Control	425	325	43.3	—
	w/ZEBA	150	600	80	85
Silt Loam	Control	275	475	63.3	—
	w/ZEBA	100	650	86.1	37
Clay Loam	Control	352	398	53.1	—
	w/ZEBA	200	550	73.3	38

Source: PICSG/Jul 2013/v3.1

ARYAMIN F&V

ARYAMIN F&V is a physiological activator for plant development.

PRODUCT PROFILE	
Brand	ARYAMIN F&V
Ingredient(s)	6% nitrogen, 23% organic carbon and vegetable amino acids
Formulation	Suspension Concentrate (SC)
Activity	Amino acids are the building blocks of protein. By providing the plant with ready-built amino acids, it can better use its resources and improve energy usage, build protein more quickly and overcome stress.
Maximum individual dose	3L/ha
Maximum number of treatments	No restriction but 1 – 2 applications per crop recommended.
Latest time of application	Tuber initiation
Water volume	200 – 400L/ha
Other restrictions	None
Target	Protein production and abiotic stress.
Pack size	5L
Aquatic buffer zone	None
Other crops	Fruit and vegetables.



CALIBRA CARBO

CALIBRA CARBO is a growth stimulant with seaweed filtrate and vegetable amino acids. Boosts protein synthesis and relieves abiotic stress.

PRODUCT PROFILE	
Brand	CALIBRA CARBO
Ingredient(s)	2% nitrogen, 1.8% phosphorus pentoxide, 1.2% potassium oxide GA142 (oligosaccharide) seaweed filtrate and amino acids
Formulation	Suspension Concentrate (SC)
Activity	Activation of root pathways for nutrient uptake, boost protein synthesis and relieve abiotic stress.
Maximum individual dose	1L/ha
Maximum number of treatments	None specified but 2 applications recommended.
Latest time of application	Tuber initiation
Water volume	200 – 400L/ha
Other restrictions	None
Target	Stimulation of plant roots, boost protein synthesis.
Pack size	2 x 10L
Aquatic buffer zone	None
Other crops	Oilseed rape, cereals and maize.



ROOTER

ROOTER is a physiological activator of root growth and root activity.

PRODUCT PROFILE	
Brand	ROOTER
Ingredient(s)	13% phosphoric acid, 5% potassium oxyde, 0.003% copper and GA142 (oligosaccharide) seaweed filtrate
Formulation	Suspension Concentrate (SC)
Activity	Activation of root pathways for nutrient uptake.
Maximum individual dose	1L/ha
Maximum number of treatments	No restriction but 1-2 applications per crop recommended.
Latest time of application	Tuber initiation
Water volume	200-400L/ha
Other restrictions	None
Target	Stimulation of plant roots.
Pack size	10L
Aquatic buffer zone	None
Other crops	Oilseed rape, cereals and maize.



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