



POTATO CROP PROTECTION

THE COMPLETE SOLUTION FOR YOU

ADAMA



Contents

POTATO – GENERAL INTRODUCTION	4
Pests threatening the crop yield	5
WEEDS – CONSIDERATIONS	6
Weed control recommendations	7
DISEASE – CONSIDERATIONS	8
Disease control recommendations	9
Pathogens – Biological Info	10
INSECTS – CONSIDERATIONS	14
Insect control recommendation	15
Insects – Biological Info	16
NEMATODE - CONSIDERATIONS	17
Nematode control recommendations	18
Nematode - Biological Info	19
 Agil 100 EC	21
 Alanex 480 SC	22
 Linagan 500 SC	23
 Mahkro Paraquat 200 SL	24
 Mistral 700 WG	25
 Sultan 500 SC	26
 Chronos 450 SC	29
 Divino 250 EC	30
 Folpan 500 SC	31
 Mirador 250 SC	32
 Odeon 720 SC	33
 Orius 250 EW	34
 Sphinx Star 480 WDG	35
 Aceta Star 46 EC	37
 Azinphos 200 SC	38
 Cormoran 180 EC	39
 Kohinor 350 SC	40
 Lamdex 50 EC	41
 Makromectin 18 EC	42
 Methomex 900 SP	43
 Warlock 19.2 EC	44
TEAM MAP	46
POTATO GROWTH STAGES	48
RAINFALL CALENDAR	49
PARTNERS	50

General Introduction

Potatoes South Africa

Potatoes are produced throughout the year in South Africa. Cultivation of potatoes is done under varied climatic conditions within all of the 9 provinces, with a cultivated area of about 53 000 ha. Limpopo (21%), Free State (36%) and the Western Cape (14%) are the main production regions. These three regions accounts for 71% of production of potatoes in South Africa. The market for potatoes are divided into the formal fresh market, informal market, seed, processing and export market of which the formal market is the largest at 36 %.

Potato plants are highly susceptible to a wide variety of diseases and insect pests.

A thorough plant protection spray program, with weekly applications throughout the growth cycle of the potato plant is recommended in a preventative disease and insect management strategy.

- The challenges of plant protection in potatoes are extensive and varied.

- Adama South Africa provides effective means for complete crop protection in potatoes.

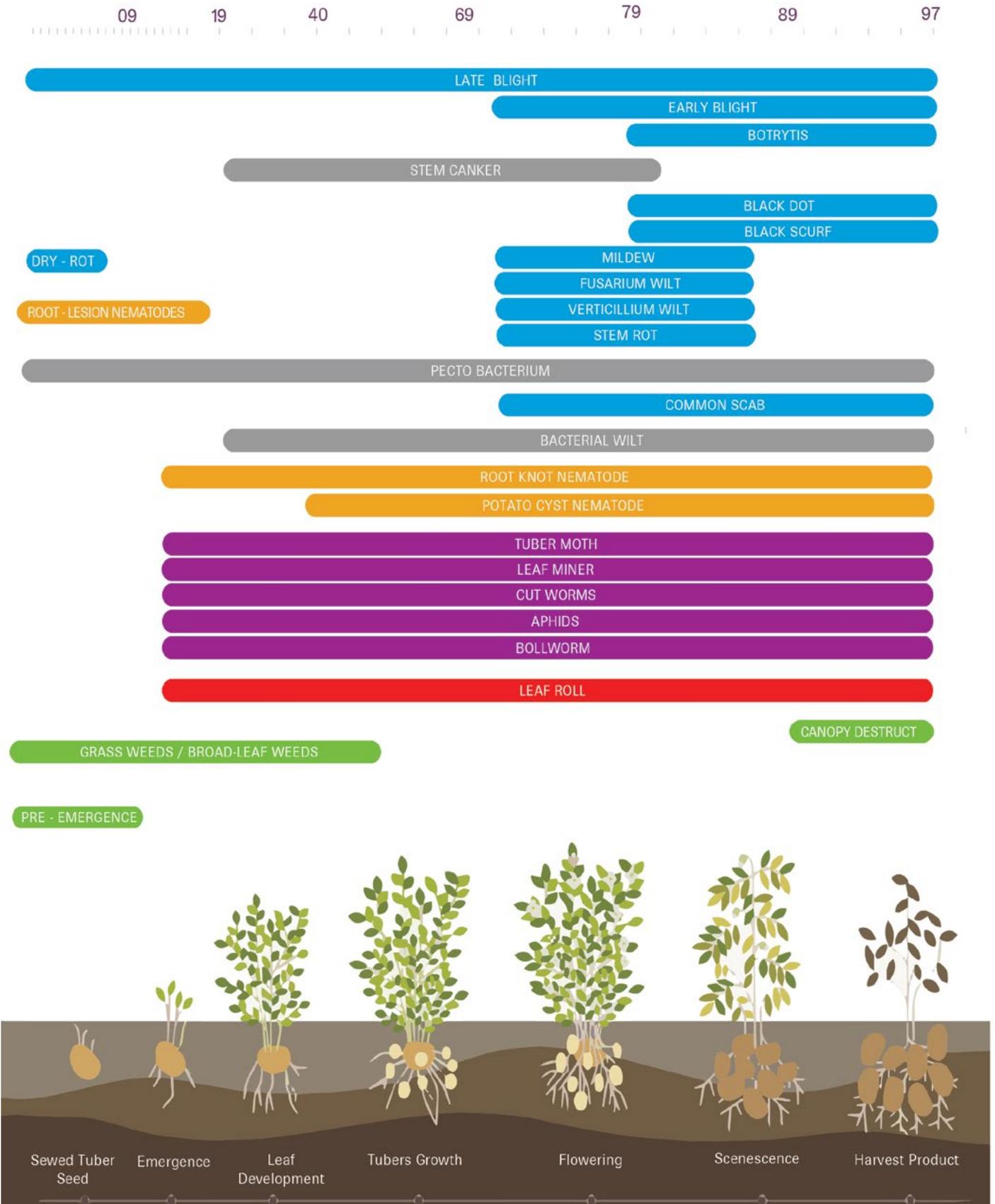
- With this brochure we strive to assist you in optimal crop management and income protection to obtain the full potential of your crop at harvest.

Our specialists are happy to support you personally. At the back of this brochure you will the find the contact information of your regional Adama support.



Pests threatening the crop yield

BBCH - Identification Keys



See solutions on pages 7, 9 & 15.

Weeds – Considerations

The selection of the optimal herbicide will depend on certain factors. To determine the most suitable herbicide the following considerations need to be made:

1. Which crop was planted the previous season and what herbicides was used?
2. Which weeds were present the previous season and how high was the pressure?
3. Does the workload and weather conditions allow you to use a pre-emergence spray, or should you rely on a post emergence application?
4. What are the sensitivities of the potatoes you are growing?
5. What is the growth stage of your potato crop?
6. If a post emergence application is used, which weeds do it need to control?
7. What is the growth stage of the weeds?
8. Is there any crop stress in the field? Cold/heat/flooding/drought etc.?
9. Are there crops in adjacent fields?
10. Planned crop for following year?

General information about the conditions during the day of application and forecasts afterwards:

- Wind speed
- Temperature
- Expected rain

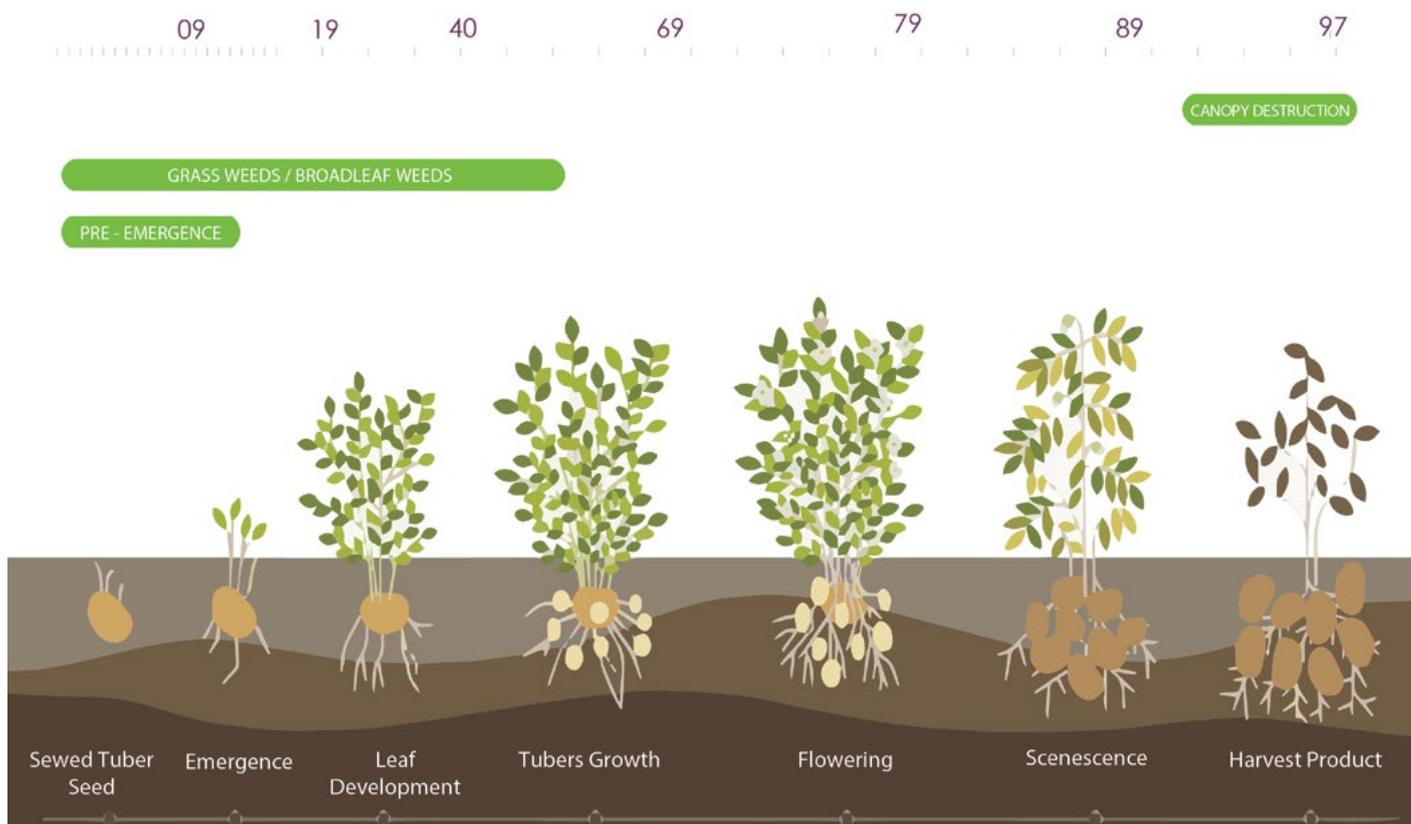
If the product you are using is volatile, it could be amplified at high temperatures which could end up drifting to the next field causing damage.



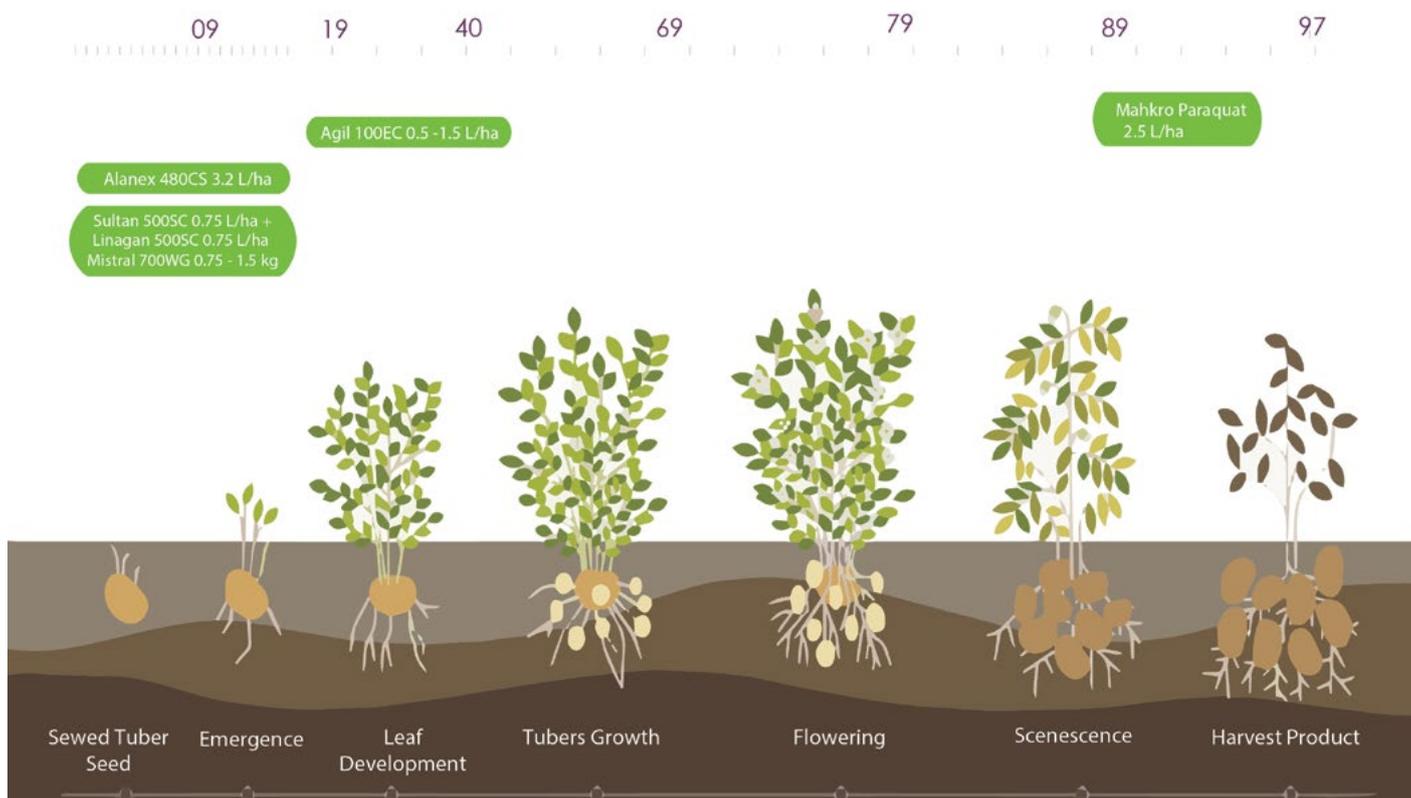
You can take pictures of the weeds found in your field and send it to our field specialists for identification.

(See team map on Page 46)

Weeds threatening the crop yield



Adama Solutions - Simply grow together





Disease – Considerations

The selection of the optimal fungicide will depend on certain factors. To determine the most suitable fungicide the following considerations need to be made:

1. Was a fungicide tuber treatment used?
2. What diseases were prominent the previous year?
3. Is a rotation system used?
4. What are the sensitivities of the potato variety you are growing?
5. What is the growth stage of your potato crop?
6. What disease will be promoted by forecasted climatic conditions?
7. Is there any crop stress in the field? Cold/ heat/ flooding/ drought etc.?
8. Length of time to next fungicide application?
9. Do you need curative or protective treatment?
10. Would you like the “greening” effect of certain fungicides?
11. Ground or aerial application?
12. Days to harvest?

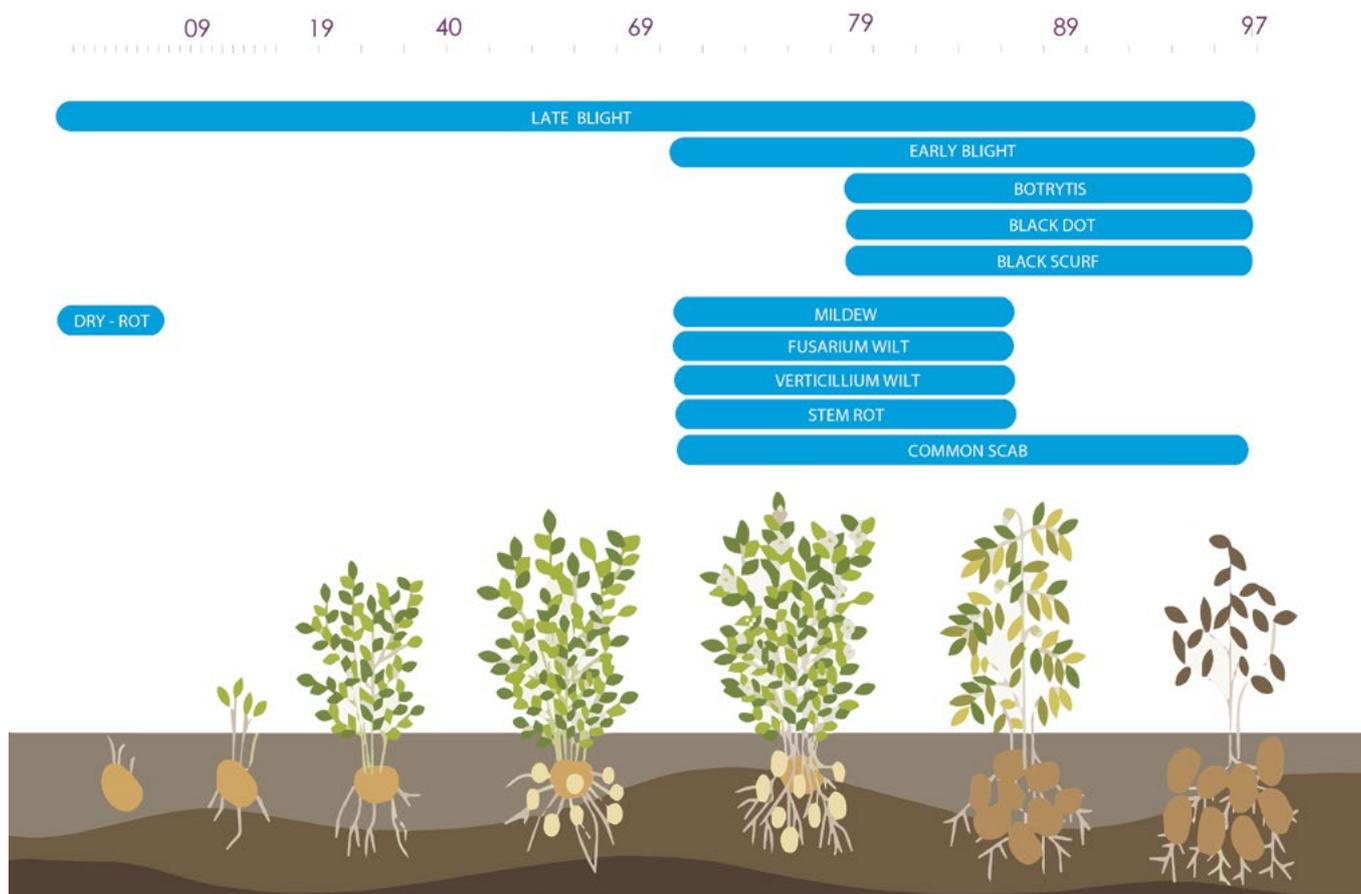
General information about the conditions during the day of application:

- Wind speed
- Temperature
- Expected rain

You can take pictures of the diseases found in your field and send it to our field specialists for identification.

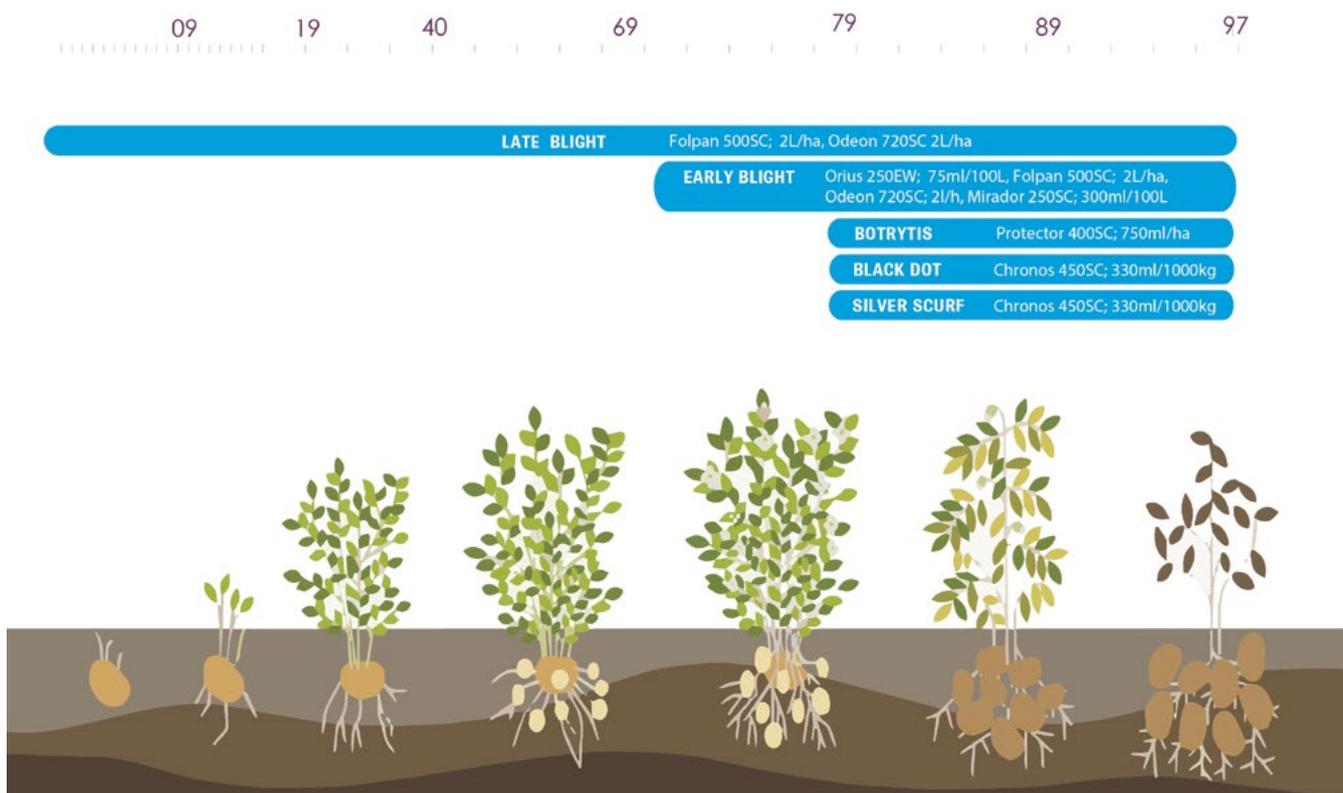
(See team map on Page 46)

Disease threatening the crop yield



Adama Solutions - Simply grow together

DISEASE & PRODUCTS WITH DOSAGE



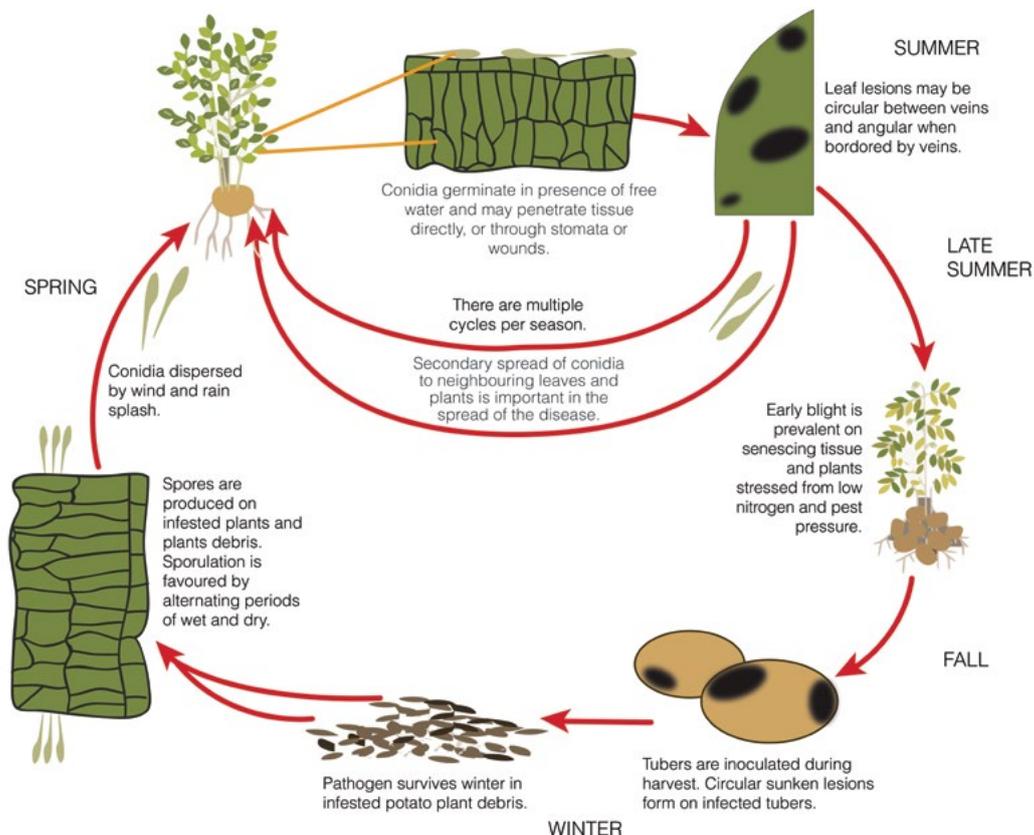
Pathogens - Biological Info

EARLY BLIGHT

Alternaria Solani

GENERAL INFORMATION

Symptoms are usually observed in older senescing leaves. Leaf symptoms are dark brown or black lesions, with concentric rings. Lesions are often surrounded by a chlorotic halo due to phytotoxic mycotoxins produced by the pathogen.

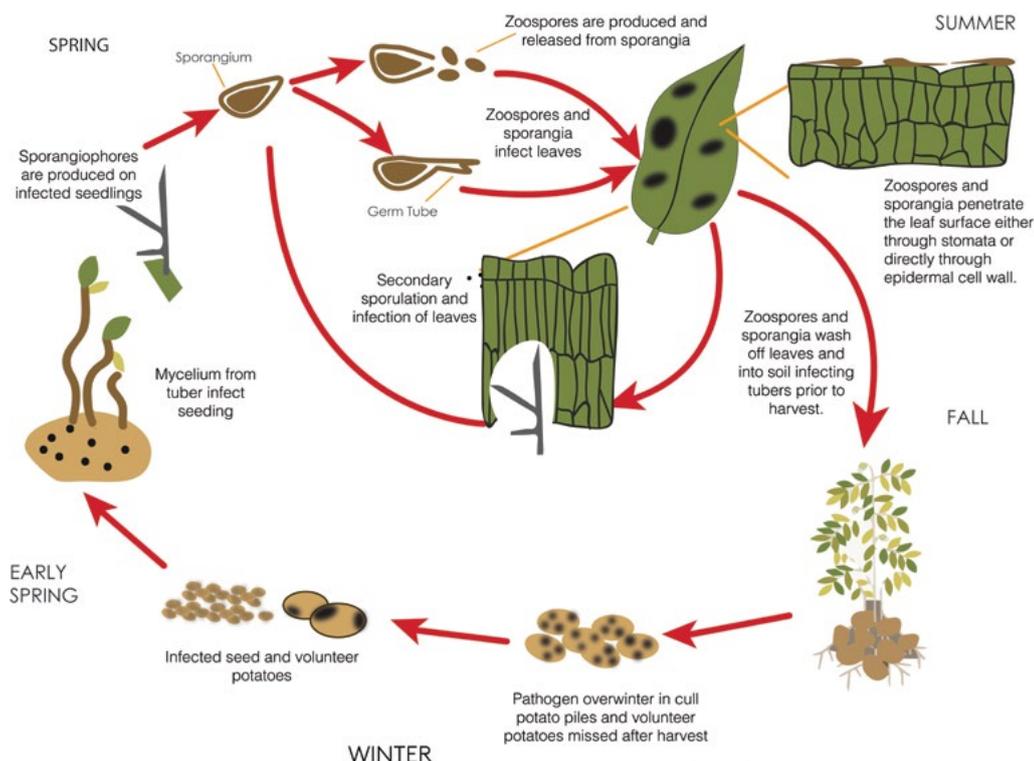


LATE BLIGHT

Phytophthora infestans

GENERAL INFORMATION

First symptoms of late blight are small, green to brown, irregular to circular shaped water soaked spots. Lower leaves usually express these spots first on the tips or edges of the infected leaves. A yellow to green border is often present around the lesions. These lesions under cool, humid conditions, expand into large, dark lesions. Infected leaves often with inspection on the upper side show prominent white fungal growth. Entire leaves can become blighted and killed within a few days.

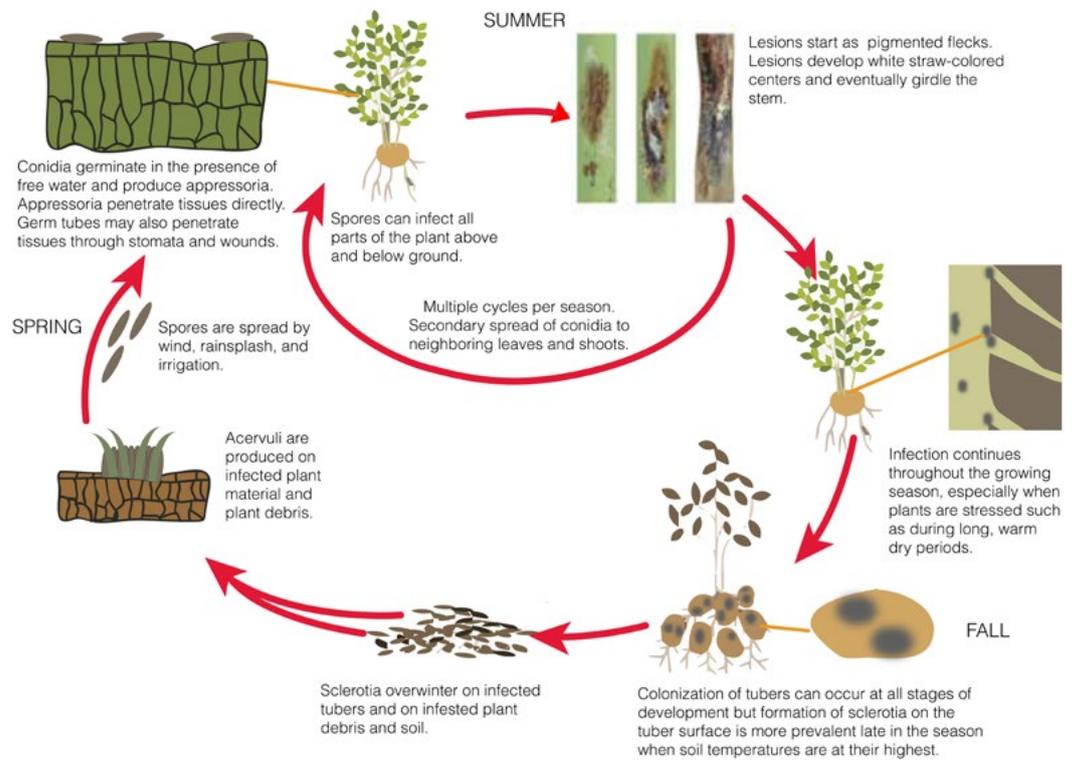


BLACK DOT

Colletotrichum coccodes

GENERAL INFORMATION

Abundant dot like, black sclerotia on tuber, stolons, roots and stems.

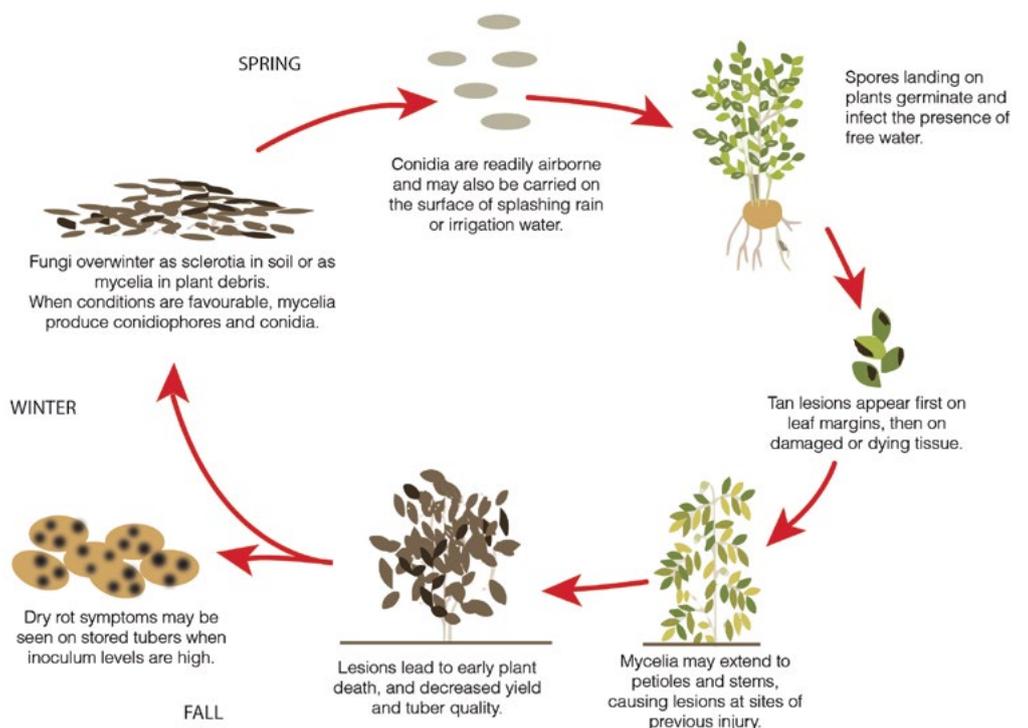


GREY MOULD

Botrytis cinerea

GENERAL INFORMATION

Leaves, stems, flowers and tubers of the potato plant can be infected by the fungus. Older, damaged leaves are first infected, with water soaked, grey-green lesions. Disease spread from the leaves to the stem. Tubers that are infected shows dry rot lesions, which is usually covered in a dark-grey mass of conidia.





Insects – Considerations

The insecticide to be used will depend on the insect pest that is present. To determine the most suitable insecticide the following considerations need to be made:

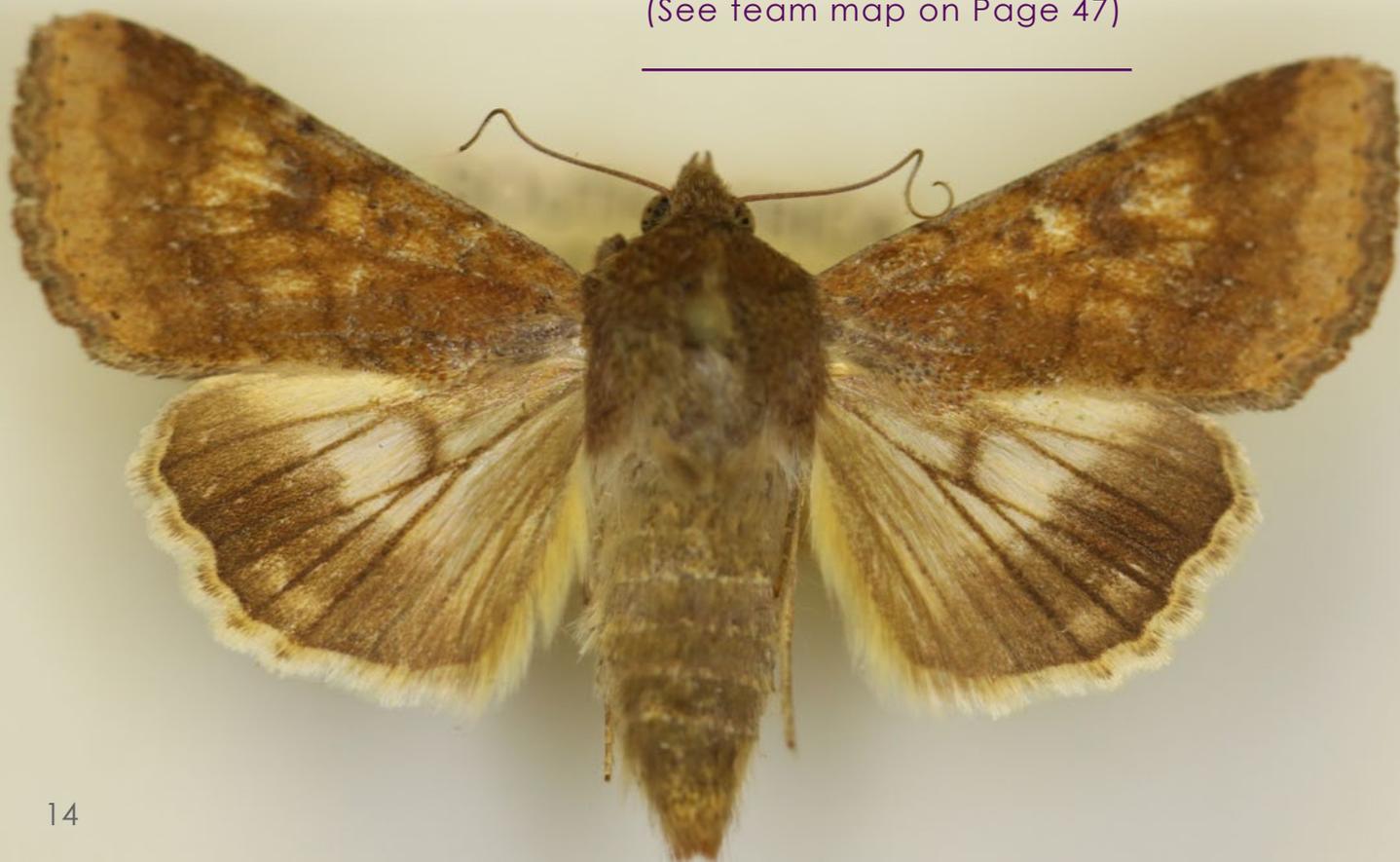
1. Was a tuber/in-furrow treatment used?
2. Which insect is it that needs to be controlled and what is the growth stage?
3. Are weather conditions favourable for this pest to develop?
4. What part of the plant is being attacked?
5. Is it possible to react when the insect is noticed or does the treatment need to be protective?
6. What is the growth stage of your potato crop?
7. Is there any crop stress in the field? Cold/heat/flooding/drought etc.?
8. Days to harvest?

General information about the conditions during the day of application:

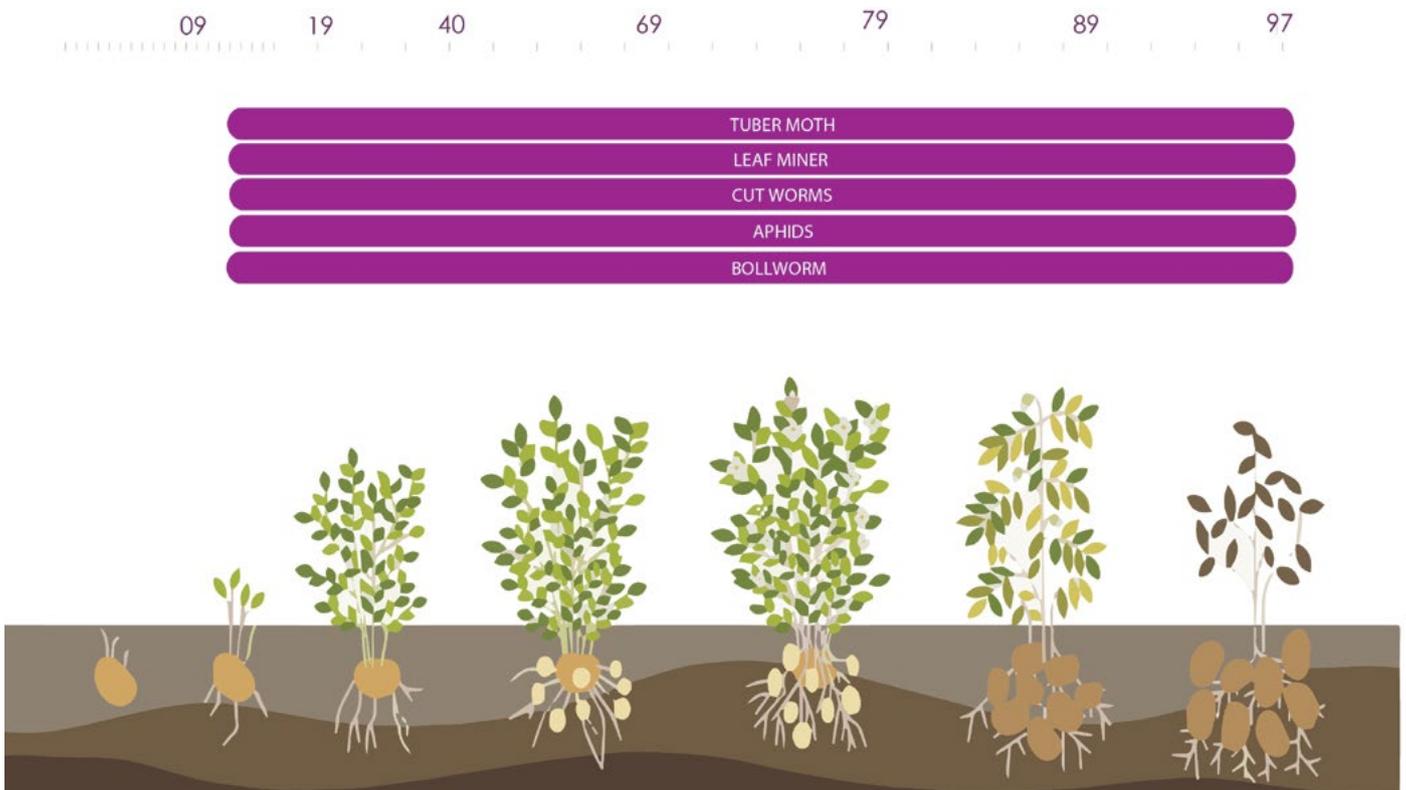
- Wind speed
- Temperature
- Expected rain

You can take pictures of the insects found in your field and send it to our field specialists for identification.

(See team map on Page 47)

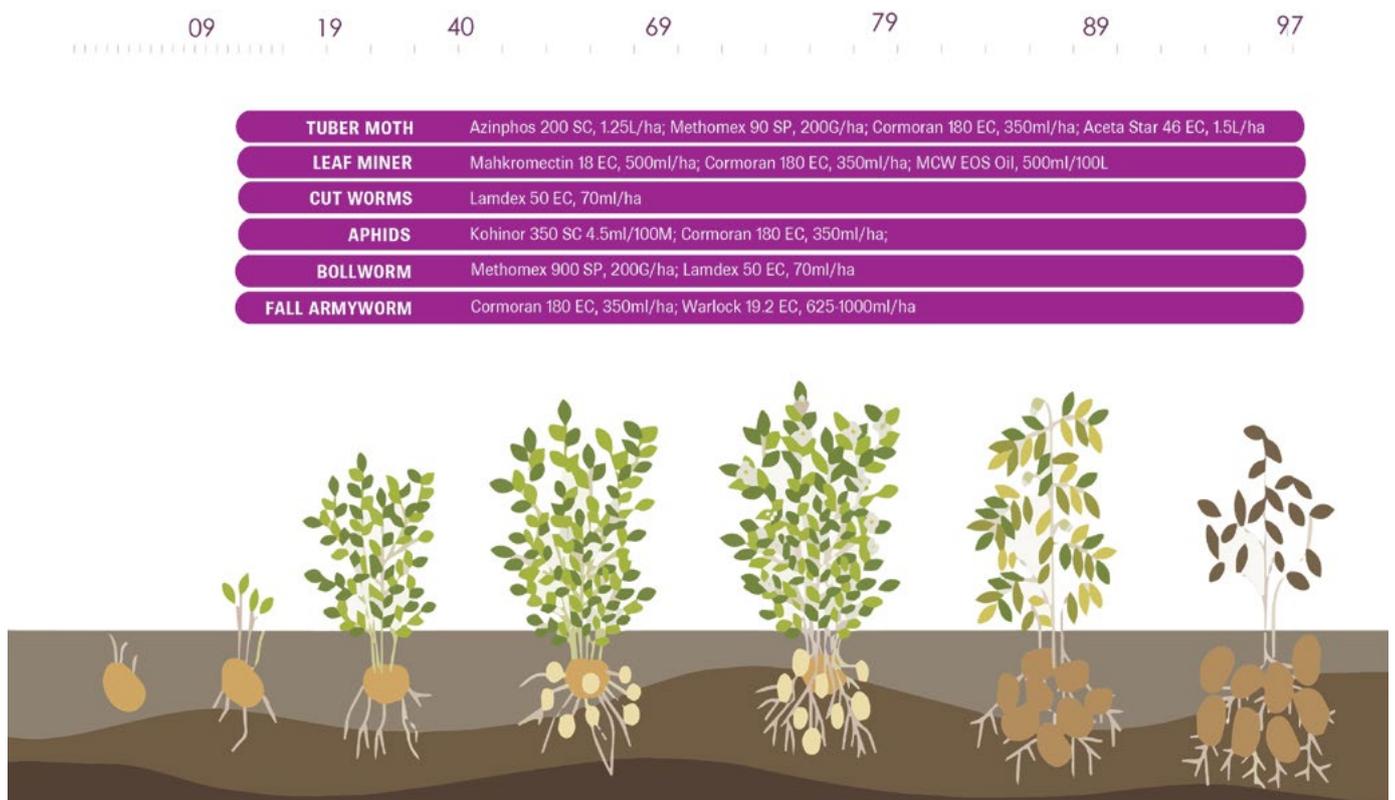


Insects threatening the crop yield



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DISEASE & PRODUCTS WITH DOSAGE



Insects - Biological Info

POTATO TUBER MOTH

Phthorimaea operculella

GENERAL INFORMATION



The adult moth is 8-10 mm in length and lay eggs on plants or soil under plants. Moths are nocturnal and is usually active after sunset. Eggs hatch within days. The first instar penetrates the leaves and matures within two weeks. They gradually move to the soil to the soil surface, spin cocoons where they pupate. The larva metamorphes into pupa inside cocoon and within seven days the moth emerge. Males are attracted to females by pheromones secreted by the females. Mating occurs readily and egg-laying is completed within three days. Females can lay approximately 200 eggs. The moth lives for one to two weeks and do not necessarily have to feed.

POTATO LEAFMINER

Liriomyza huidobrensis & American leafminer *Liriomyza trifolii*

GENERAL INFORMATION



Males of both species are smaller than females. American leafminer is yellow and smaller than that of the potato leafminer. Flies have a distinct yellow spot on the top of the thorax between the wings. Larvae are cream coloured and legless. They are found in leaves until they pupate. Pupae are orange coloured and turn black before emergence as adult flies.

AFRICAN BOLLWORM & FALL ARMYWORM

Helicoverpa armigera & *Spodoptera frugiperda*

GENERAL INFORMATION



Both species are generalist feeders which survives on numerous host plants. Moths fly from nearby areas and lay their eggs on potato leaves. Larvae only feed on leaves. Defoliation of potato plants can occur if not control.

APHIDS

Myzus persicae

GENERAL INFORMATION



Aphids can be described as small, 2 - 4 mm long insects that feed by penetrating the plant tissue with their sucking mouth parts. Winged and wingless forms occur. Winged females are usually responsible for the first infection by flying in from other areas. Females do not require males for reproduction (parthenogenic) and produce live offspring (ovoviviparous). Aphids are important vectors of plant viruses, such as PVY, because their mouth parts are adapted to feed directly on the plant sap.

CUTWORMS

Agrotis spp.

GENERAL INFORMATION



Cutworms are smooth and hairless larvae of nocturnal moths. Moths are brown and approximate 20 mm long. Females can lay up to 2000 eggs. Larvae are light sensitive and predominantly feed on the base of the plant.

Nematodes

Considerations

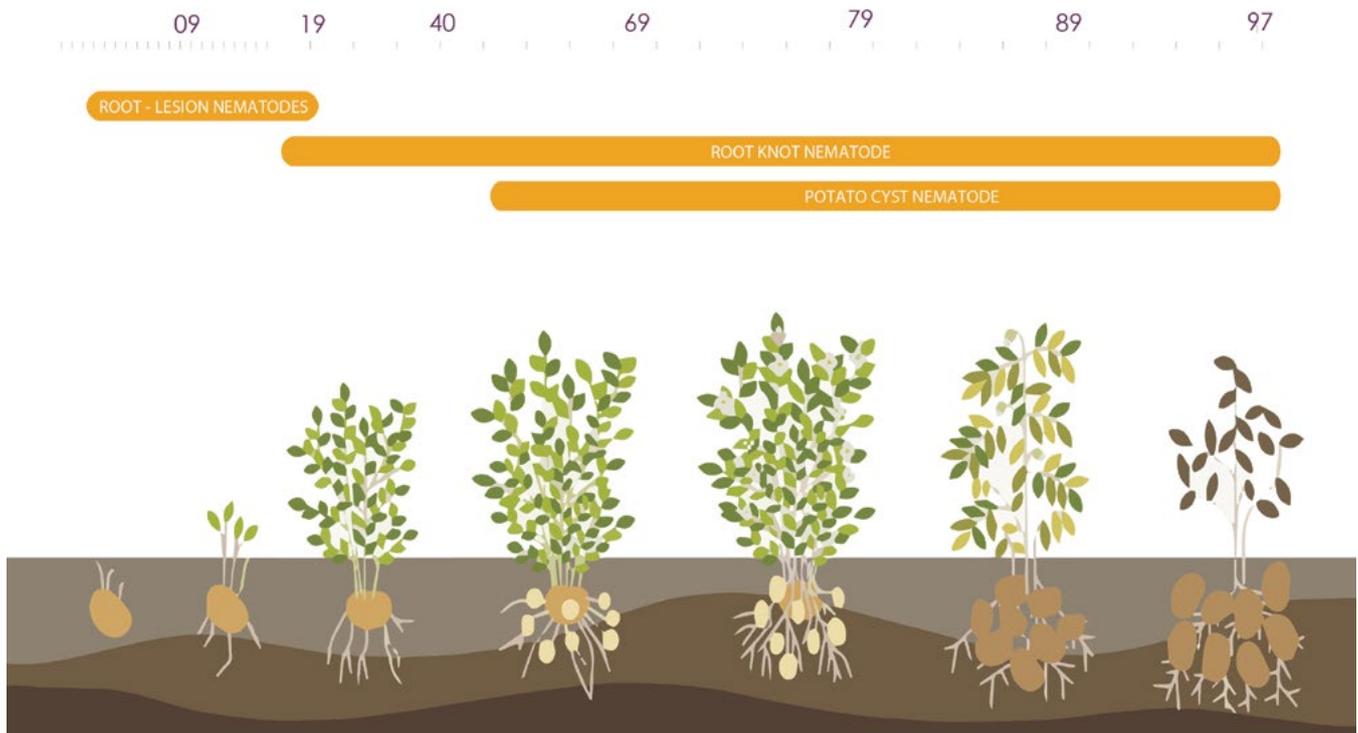
The nematicide to be used will depend on the nematode that is present. To determine the most suitable nematicide the following considerations need to be made:

1. History of soil in regards to past nematode infestations
2. Type of nematicide (contact, systemic or fumigant) to be used?
3. Which nematode is it that needs to be controlled
4. Days to harvest?
5. How many years has the field been laid fallow?
6. Does a fumigant need to be used?
7. Will the potato be grown for seed potatoes?
8. When will nematicide be used (plant-furrow or in season)?

You can take pictures of the insect egg/larva/adult and plant / tuber injury signs found in your field and send it to our field specialists for identification.

(See team map on Page 47)

Nematodes threatening the crop yield



Nematodes - Biological Info

ROOT-KNOT NEMATODE

Meloidogyne sp.

GENERAL INFORMATION



The life cycle of the root-knot nematode includes an egg, four larval stages and adult stage. Nematode develops inside the egg until the second larval stage. Larva responds to stimuli from secretions from the plant root as well as favourable climatic and soil conditions. Larvae leaves the egg, penetrates roots and starts to feed.

LESION NEMATODE

Pratylenchus penetrans

GENERAL INFORMATION



Lesion nematodes are endoparasites that are found in the tubers and roots. Between 20 - 50% of the nematode population can also be found in the soil where they feed ectoparasitically on the root hairs of the host plant.

POTATO CYST NEMATODE

Globodera rostochiensis

GENERAL INFORMATION



The nematode is a very important pest on potatoes as it may cause severe yield losses. The estimation is that two tonnes per hectare of potatoes are lost for every 20 eggs per gram soil. The nematode has the ability to survive in the soil for up 30 years.



Herbicides

INDEX

Agil 100 EC	21
Alanex 480 CS	22
Linagan 500 SC	23
Mahkro Paraquat 200 SL	24
Mistral 700 WG	25
Sultan 500 SC	26

Agil 100 EC

An emulsifiable concentrate herbicide for the selective postemergence control of annual grasses in potato.

Product description:

Propaquizafop 100 g/L EC

Product features & benefits:

Do not apply AGIL 100 EC to weeds under stress conditions.
AGIL® 100 EC should be applied after the crop has reached the 4- to 6-leaf stage.
Allow at least 3 days between an Agil application and another herbicide.



Reg. no. L8557,
Act 36 of 1947
(Caution)

Alanex 480 CS

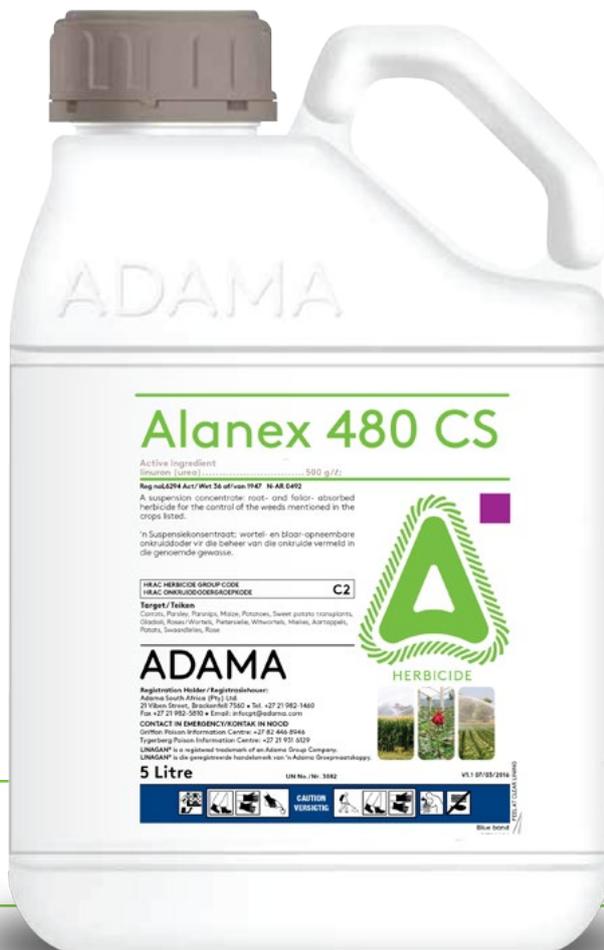
A selective capsule suspension pre-emergence herbicide for the control of annual grasses and certain broadleaf weeds in potatoes.

Product description:

Alachlor 500 SC

Product features & benefits:

Apply pre-emergence of weeds and crop. Dosage 3.2 L/ha on soils with a clay content of 0–16 % and 4.0 L/ha on soils with a clay content > 16 %.



Reg. no. L6294,
Act 36 of 1947
(Caution)





Linagan 500 SC

A suspension concentrate root and foliar absorbed herbicide for the control of weeds in potatoes.

Product description:

Linuron 500 SC

Product features & benefits:

Linagan 500SC and Sultan 500SC is an excellent combination for pre-emergent weed control.



Reg. no. L6294,
Act 36 of 1947
(Caution)

Mahkro Paraquat 200 SL

A soluble concentrate herbicide for the control of annual grasses and broadleaves.

Product description:

Paraquat 200 g/L SL

Product features & benefits:

Use 200 litres water/ha. Do not apply if haulms show signs of wilting as tuber damage may occur. Spray ONLY when at least 5 hours of intensive sunshine are expected to follow.



Reg. no. L7276,
Act 36 of 1947
(Harmful)





Mistral 700 WG

A water dispersable granule herbicide for the control of annual broad leaf weeds and grasses in potatoes.

Product description:

Metribuzin 700 g/kg

Product features & benefits:

Apply immediately after planting and before emergence of potatoes. Do not use MISTRAL 700 WG in potatoes in the "Sandveld" of the Western Cape (Aurora, Clanwilliam, Darling, Eendekuil, Elandsbaai, Het Kruis, Hopefield, Lambertsbaai, Leipoldtville, Paleisheuvel, Piketberg, Redelinghuys, Velddrif, Vredenburg, Vredendal, etc.).



Reg. no. L8457,
Act 36 of 1947
(Caution)

Sultan 500 SC

A suspension concentrate herbicide for the pre-emergence control of annual grasses, certain broad-leaf weeds under favourable conditions yellow nutsedge in potatoes.

Product description:

Metazachlor 500 g/L SC

Product features & benefits:

Apply immediately after plant or after ridging before any weeds have germinated. Quickest knock-down and widest weed spectrum compared to other actives in this HRAC group.



Reg. no. L6892,
Act 36 of 1947
(Caution)







Fungicides

INDEX

Chronos 450 SC	29
Divino 250 EC	30
Folpan 500 SC	31
Mirador 250 SC	32
Odeon 720 SC	33
Orius 250 EW	34
Sphinx Star 480 WDG	35



Chronos 450 SC

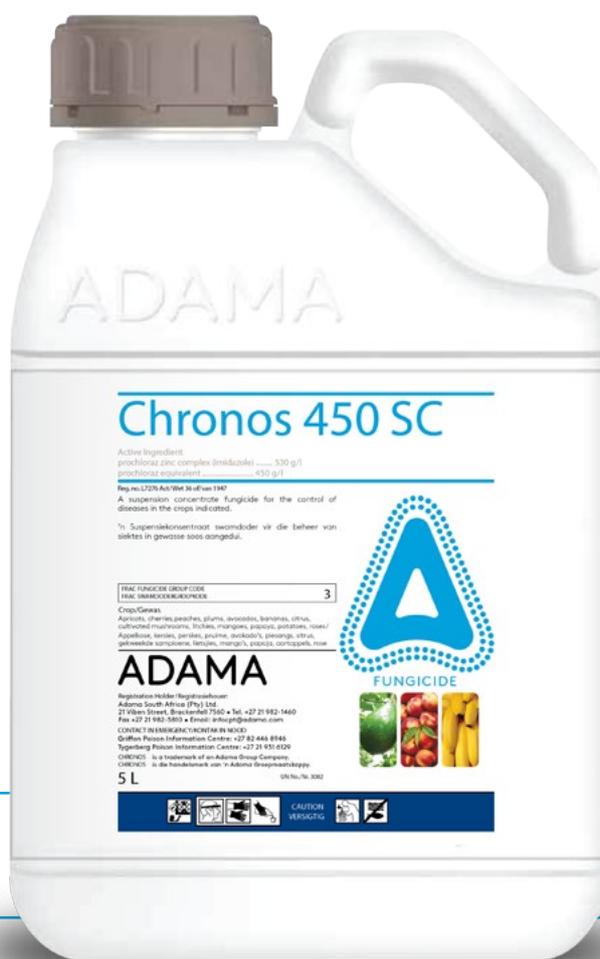
A suspension concentrate fungicide for the control of black dot & silver scurf as a tuber treatment of potatoes.

Product description:

Prochloraz zinc complex 450 g/L SC

Product features & benefits:

Apply as a low volume spray at 2 - 3 L water per 1000 kg seed. Ensure that the total surface of the tubers is fully covered by the spray mixture.



Reg. no. L7276,
Act 36 of 1947
(Caution)

Divino 250 EC

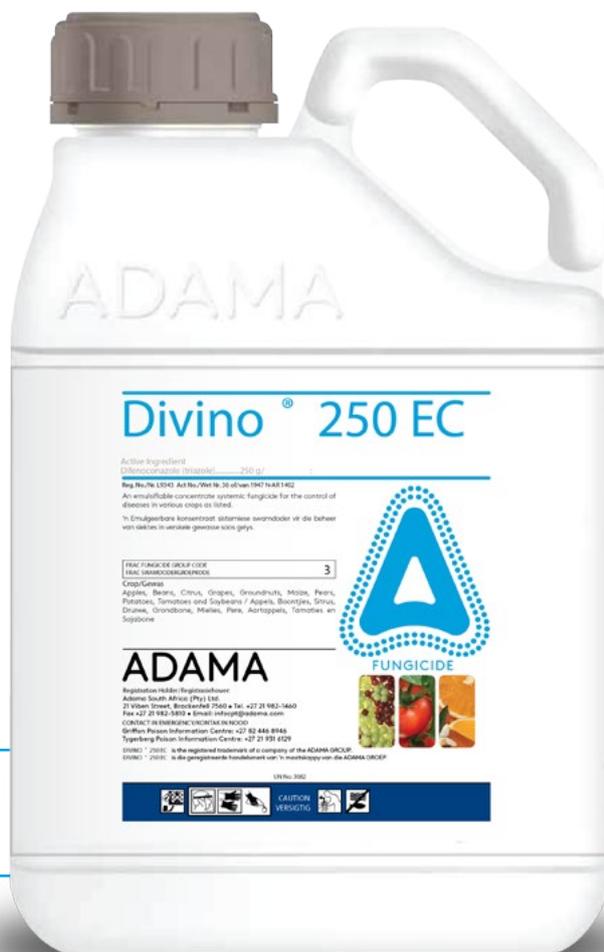
An emulsifiable concentrate systemic fungicide for the control of early blight on potatoes.

Product description:

Difenoconazole 250 g/L EC

Product features & benefits:

Start applications at the beginning of flowering. Sprays can be applied earlier, should early blight start to develop. Add a wetting agent such as MCW EOS oil.



Reg. no. L9343,
Act 36 of 1947
(Caution)





Folpan 500 SC

A suspension concentrate based fungicide for the preventative control of late- and early blight on potatoes.

Product description:

Folpet 500 g/L SC

Product features & benefits:

Apply from emergence at 7 – 10 days intervals, it is important to obtain thorough coverage.

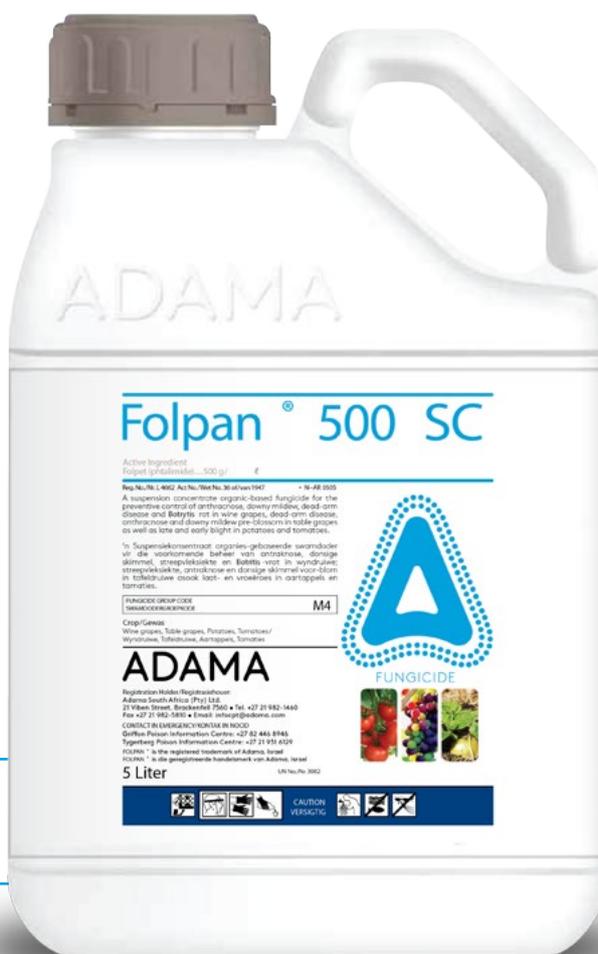
A suitable wetter can be used in the spray mixture.

Excellent contact action, and is compatible with systemic products.

Low impact on beneficials.



Reg. no. L4662,
Act 36 of 1947
(Caution)



Mirador 250 SC

A suspension concentrate, systemic, translaminar and contact fungicide for the control of early blight on potatoes.

Product description:

Azoxystrobin 250 g/L SC

Product features & benefits:

Apply MIRADOR 250SC as a preventive treatment when weather conditions are favourable for the development of the disease. The product give greening effect to the crop and is readily absorbed by roots of the crop.



Reg. no. L8894,
Act 36 of 1947
(Caution)



Odeon 720 SC

A suspension concentrate contact fungicide for the preventative control of early and late blight on potatoes.

Product description:

Chlorothalonil 720 g/L SC

Product features & benefits:

Commence application as a preventive treatment before the disease appear or if weather conditions favour the development of the disease. If necessary alternate ODEON 720 SC with registered systemic products.

Odeon 720SC gives superior knock-down control of early- and late blight.



Reg. no. L7596,
Act 36 of 1947
(Caution)

Orius 250 EW

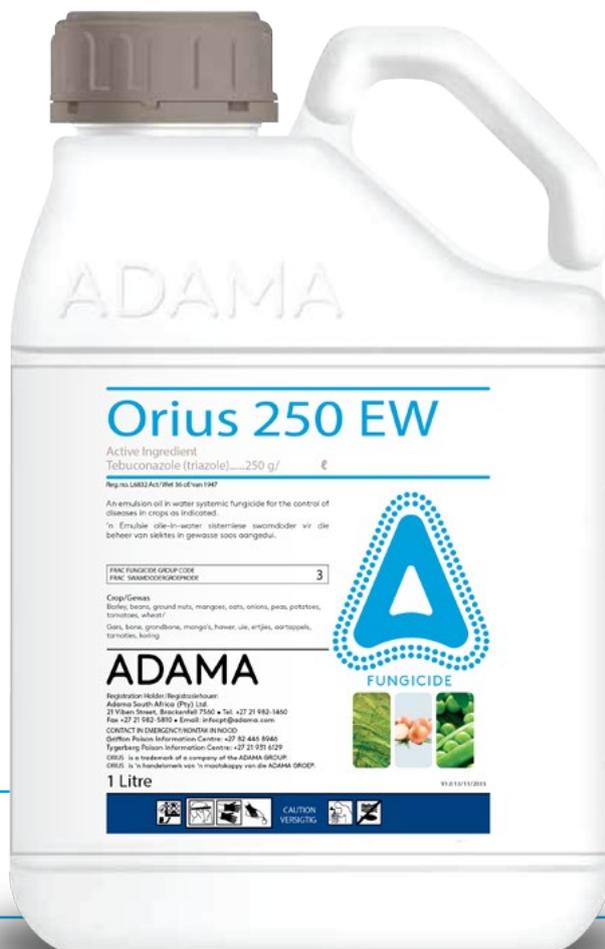
An emulsion oil in water systemic fungicide for the control of early blight on potatoes.

Product description:

Tebuconazole 250 g/L EW

Product features & benefits:

Apply ORIUS 250 EW as a preventive treatment when weather conditions are favourable for the development of the disease (warm, humid conditions). Repeat application every 7–10 days, but do not exceed 4 applications/season. Can be used in combination with strobilurins for early blight control.



Reg. no. L6832,
Act 36 of 1947
(Caution)



Sphinx Star 480 WDG

A preventive and local systemic water dispersible granule for the control of late and early blight in potatoes.

Product description:

Dimethomorph 80 g/L & Chlorothalonil 400 g/L

Product features & benefits:

Excellent combination of active ingredients for fungicide resistance management and the preventative control of late & early blight within a potato fungicide spray program.



Reg. no. L9084,
Act 36 of 1947
(Caution)



Insecticides

INDEX

Aceta Star 46 EC	37
Azinphos 200 SC	38
Cormoran 180 EC	39
Kohinor 350 SC	40
Lamdex 50 EC	41
Makromectin 18 EC	42
Methomex 900 SP	43
Warlock 19.2 EC	44



Aceta Star 46 EC

A suspension concentrate contact and stomach insecticide for the control of tuber moth and aphids on potatoes.

Product description:

Acetamiprid & bifenthrin 46 g/L EC

Product features & benefits:

The addition of suitable wetter such as MCW Eos oil at 500ml/100L is recommended. Gives superior aphid control.



Reg. no. L9255,
Act 36 of 1947
(Harmful)

Azinphos 200 SC

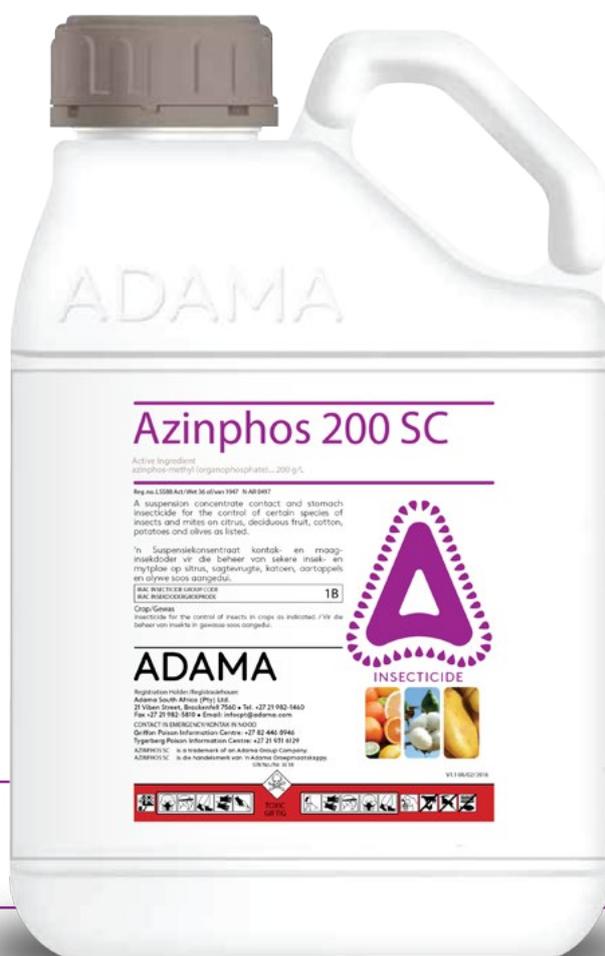
A suspension concentrated contact and stomach insecticide for the control of tuber moth on potatoes.

Product description:

Azinphos-methyl 200 g/L SC

Product features & benefits:

Best suited to use later in the season, when product can be washed into soil for the control of potato tuber moths present.



Reg. no. L5588,
Act 36 of 1947
(Toxic)



Cormoran 180 EC

An emulsifiable concentrate insecticide with systemic, contact and stomach action for the control of aphid and tuber moth on potatoes.

Product description:

Acetamiprid & novaluron 180 g/L EC

Product features & benefits:

Cormoran is a unique product that will give excellent residual control of potato tuber moth, bollworm and aphids.



Reg. no. L9480,
Act 36 of 1947
(Harmful)



INSECTICIDES

Kohinor 350 SC

A suspension concentrated contact and systemic insecticide for the control of aphid on potatoes.

Product description:

Imidachlopid 350 g/L SC

Product features & benefits:

Irrigate immediately afterwards with + 15 mm of water.



Reg. no. L8447,
Act 36 of 1947
(Harmful)





Lamdex 50 EC

An emulsifiable concentrate insecticide with contact and stomach action for the control of cut-, bollworm and tuber moth on potatoes.

Product description:

Lambda-cyhalothrin 50 g/L EC

Product features & benefits:

Lamdex 50EC gives cost effective control of cutworm and excellent control of bollworm in a tank-mix with Methomex 900SP.



Reg. no. L7578,
Act 36 of 1947
(Harmful)

Makromectin 18 EC

A translaminar emulsifiable concentrate insecticide acting as contact and stomach insecticide for the control of American leafminer on potatoes.

Product description:

Abamectin 18 g/L EC

Product features & benefits:

Translaminar movement of Makhromectin give control on both sides of the potato leaf against potato leafminer.



Reg. no. L7941,
Act 36 of 1947
(Toxic)





Methomex 900 SP

A water soluble powder insecticide for the control of tuber moth and bollworm on potatoes.

Product description:

Methomyl 900 g/L SP

Product features & benefits:

Ensure good coverage and wetting of the plant. Excellent knock-down of bollworm in a tankmix with Lamdex 50EC.



Reg. no. L7578,
Act 36 of 1947
(Toxic)

Warlock 19.2 EC

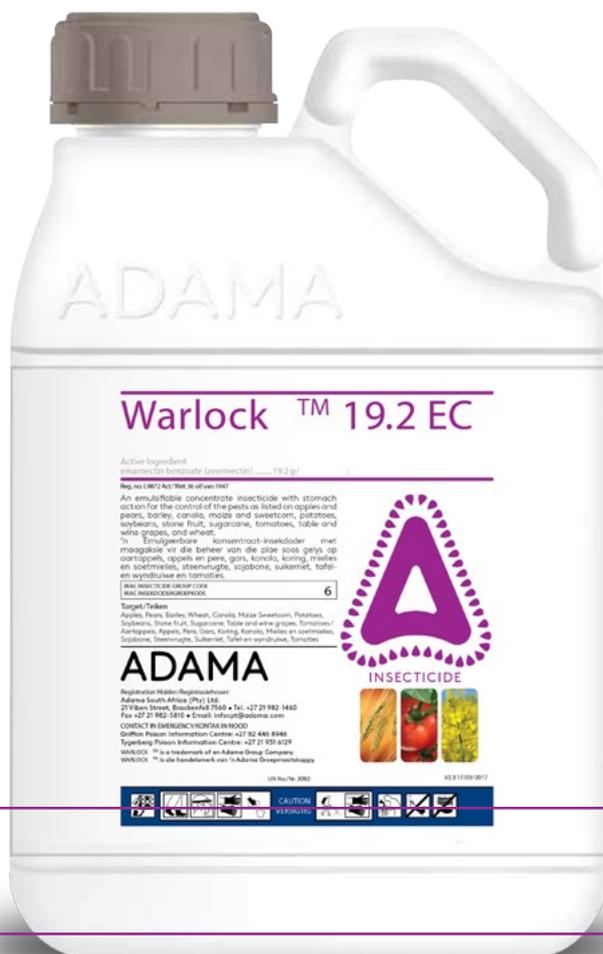
An emulsifiable concentrate insecticide with stomach action for the control of fall armyworm on potatoes.

Product description:

Emamectin benzoate 19.2 g/L EC

Product features & benefits:

Warlock 19.2 EC will not control larvae that have migrated into the potato tubers. Apply maximum of four applications per season.



Reg. no. L9872,
Act 36 of 1947
(Caution)







TEAM MEMBERS BY PROVINCE

Freestate, North West, & Northern Cape

Lourens Oellermann 082 491 2553
 Albrecht Gerrits 082 335 7750
 Schalk Burger 083 653 7940
 Sallie Herbst 083 457 7583
 Arne Smit 065 709 6841

Northern Cape (Table Grapes)

Handri Burger 084 676 4053
 Martin vd Merwe 060 965 9827

Western Cape

Handri Burger 084 676 4053
 Martin vd Merwe 060 965 9827
 Eduan Theron 082 342 4699

Eastern Cape

Handri Burger 084 676 4053
 Eduan Theron 082 342 4699

KwaZulu-Natal Mpumalanga & Limpopo

Gavin Smit 078 257 5126
 Rolf Swart 083 601 2217
 Hardus Hern 078 769 0795

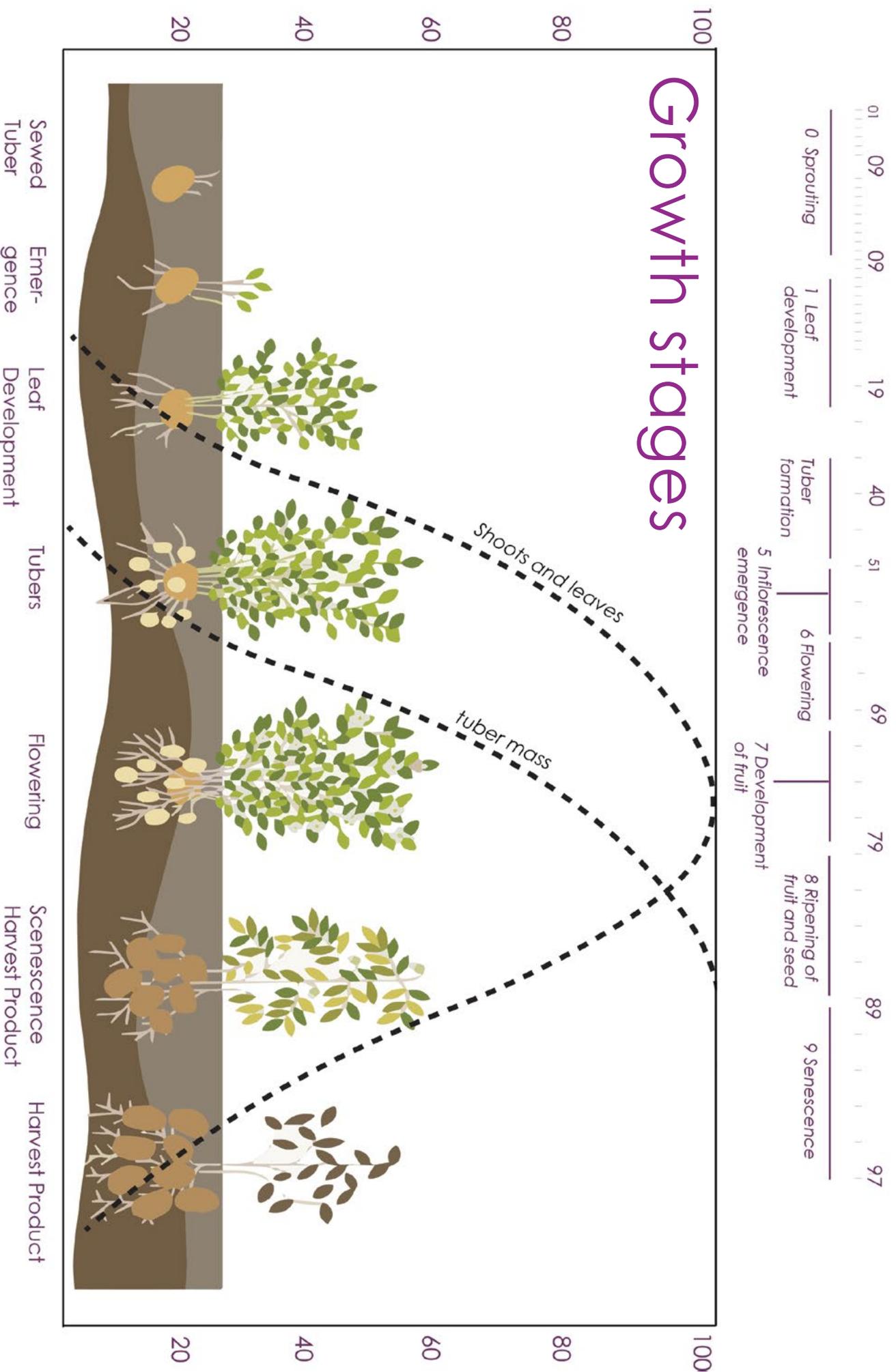
National Sales Manager Lourens Oellermann 082 491 2553
National Marketing & Technical Manager Schalk vd Merwe 082 331 6463



Our field specialists are on standby to assist you identify present or underlying crop problems and are trained to provide you with the best solution, that meets your needs.



Growth stages



Rainfall calendar

(mm/day/site)

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1												
2												
3												
4												
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Compiled by:
Martin van der Merwe

SOURCES



ARC / LNR - Agricultural Research Council Vegetable and Ornamental Plant Institute.

Email: enquiry@arc.agric.za

Professor Jacque van der Waals,
Department of Plant and Soil Science,
University of Pretoria.

Email: jacque.vanderwaals@up.ac.za

Sheila Storey, Nemlab
Email: info@nemlab.co.za

Design & Layout

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ADAMA

www.adama.com

Brackenfell, Cape Town
T: 021 982 1460
E: infocpt@adama.com

Olifantsfontein, Johannesburg
T: 011 635 4300
E: infojhb@adama.com