BULLETIN

Lepidoptera control on *POTATOES*

The Lepidoptera order is known to include some of the most important pests on potatoes i.e. cutworm, African bollworm and potato tuber moth. Other larvae like the tomato semi-looper, cabbage semi-looper and tomato leaf miner (Tuta absoluta) may also be present.

CUTWORM

The most common cutworm species on potatoes include the common cutworm (Agrotis segetum), brown cutworm (Agrotis longidentifera) and the black cutworm (agrotis ipsilon). Adult cutworms are normally inactive during the day and hide beneath plant debri or in the soil.

They normally feed during the night cutting off the plant at the soil surface (therefore the name). The damage is especially noticeable when young plants are attacked. The adult cutworm can also feed on tubers if they are present.

Multiple plants can be destroyed by a single cutworm during the night, and thus it is very important to control these pests. A pyrethroid is normally used for control during which a chemical barrier acts on the soil surface. Since the cutworm moves above the soil surface it will come into contact with the insecticide and be killed.

POTATO TUBER MOTH

The potato tuber moth is present in all the potato production areas in South Africa. The moth is only active at night and hides during the day. The moths live for approximately two weeks. From egg to adult takes about four weeks in the summer but can take up to five months in the winter. Characteristic windows can be seen in the foliage where the larvae feed between the upper and lower epidermis. As soon as the larva enters the tuber, it affects the marketability of the tubers and can cause significant economic loss to the producer or farmer.

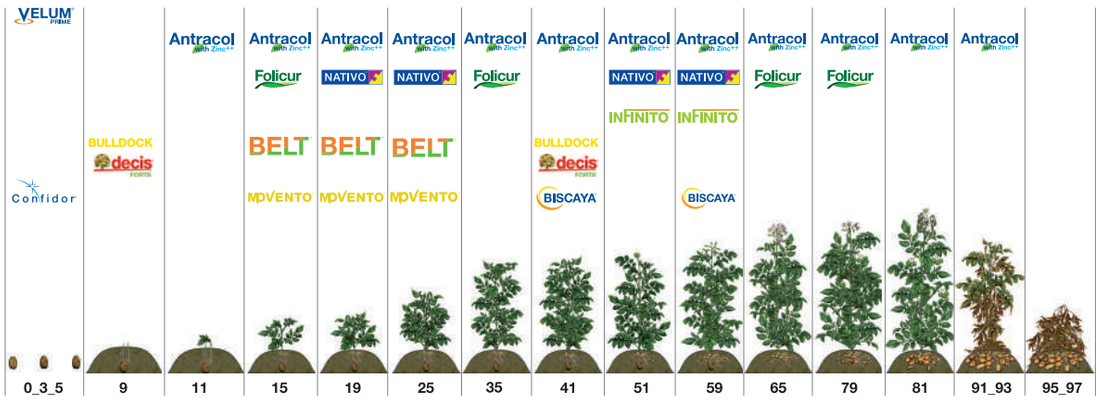
CONTROL

*Integrated control of potato tuber moth is critical to keep numbers under the economic threshold. A variety of natural predators are present in South Africa and thus the choice of insecticide is important not to harm them. Ridging is important to reduce the exposure of tubers to larvae. Chemical control must be used with caution to limit disruption of the natural balance in nature to have the maximum impact on the pest but the least impact on the environment. Bayer has the pyrethroids (**Decis® Forte** and **Bulldock® 125 SC**) and the diamide (**Belt®**) which could be used. If the pyrethroids are used in the beginning and at the end, it will have the least effect on the environment. Pyrethroids used during the first application window will also control cutworm.*

AFRICAN BOLLWORM

The Africa bollworm is only seen sporadically on potatoes. The larva is 30 to 40 mm and varies from green to brown and is identified by a white or yellow line along the side of the body.

BAYER MUCH MORE POTATOES SPRAY PROGRAMME



DECIS® FORTE

*Pyrethroids are still one of the best groups of products to use for cutworm control. As it is quite a harsh group, an early application on the soil will minimize its effect on beneficials. As Decis® Forte only has one active isomer, its efficacy will be the least influenced by unsuitable environmental conditions (warm dry soil). Its structure also ensures an even distribution that directly influences its uptake and efficacy. The specific formulation also ensures a fast knock down which minimalises the potential negative impact on beneficial organisms or non-target organisms. Both the pyrethroids (**Decis® Forte** and **Bulldock®**) have some of the best toxicological profiles in the industry (Figure 1).*

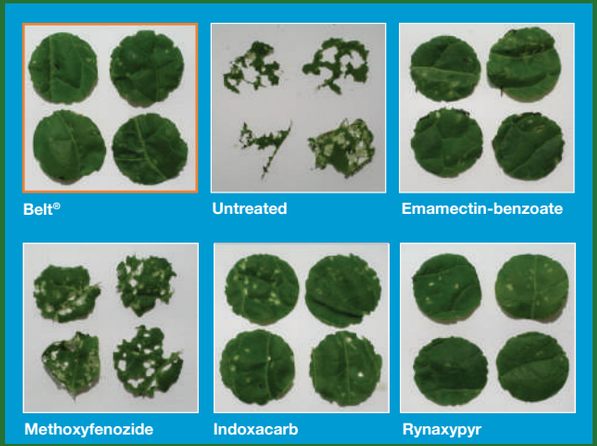
Active ingredient	Acute oral LD_{50} in mg/kg	Average application quantity (g.a.i/ha)	Relationship LD_{50} / application quantity
Deltamethrin (Decis®)	**135**	**10**	**13,5**
Gamma-cyhalothrin	< 50	8*	< 6.2
Lambda-cyhalothrin	56	12	4,6
Cypermethrin	250	50	5.0
Bulldock®	**500**	**7.5**	**66.7**
Esfenvalerate	87	20	4,3
Profenofos	358	500	0,7
Methomyl	17	500	0,03

***FIGURE 1:** **Comparison of the toxicity of different insecticides to man** (the higher the LD_{50} /dosis, the less toxic).*

BELT®

Belt® belongs to the diamide group of chemicals and is known for its excellent effect on lepidopteran pests. After ingestion of **Belt®** (flubendiamide) the larvae immediately stop feeding, start to contract, become paralysed and eventually die. **Belt®** has a translaminar translocation whereby the product is able to move through the leaf.

LEAF DAMAGE



FEATURES

- // Novel chemistry with unique mode of action.
- // Provides long lasting efficacy.
- // Excellent margins of safety.
- // Fit for Integrated Pest Management (IPM) and Insecticide Resistance Management (IRM).
- // Locally systemic and translaminar activity.
- // Immediate cessation of feeding.
- // High degree of rain-fastness.
- // Broad application window.
- // Outstanding control of all important lepidoptera pests.
- // Short PHI's.

BENEFITS

- // Controls resistant lepidoptera.
- // Fewer applications necessary.
- // Safe for the crop, environment and worker/operator.
- // Non-toxic to beneficial insects.
- // Acceptable for all food chain protocols and IRM.
- // Total leaf protection, resulting in more marketable produce.
- // Maximum crop protection.
- // No wasted applications.
- // Easier crop management. Works well under difficult weather conditions (temperature, humidity, rain).
- // Allows for greater flexibility in pest management.

BELT®

Belt® plays an integral role in Integrated Pest Management (IPM) and Insecticide Resistance Management (IRM) programs because of its many favourable characteristics.

Active Ingredient	Flubendiamide	Methoxyfenozide	Spinosad	Indoxacarb	Emamectin benzoate	Lamda-cyhalothrin	Methomyl
IRAC (MOA) CLASS	28	18A	5	22A	6	3	1A
Worker safety	Caution	Caution	Caution	Caution	Caution	Warning	Danger
Re-entry Interval (REI)*	12 hr	<12 hr	4 hr	12 hr	48 hr	24 hr	13-48 hr
Preharvest Interval (PHI)*	1 d	1-2 d	1 d	3 d	7-14 d	1 d	1-10 d
Beneficial Insect Toxicity	Low	Low	Moderate	Moderate	Moderate	High	High
Bee Toxicity	Low	Low	High	High	High	High	High
Secondary Pest Flaring	No	No	Moderate	Moderate	Moderate	High	High
Speed of Feeding Cessation	<12 hr	1 d	1 d	1 d	1 d	<12 hr	<12 hr
Speed of Lepidopteran Death	1-2 d	>2 d	1-2 d	1-2 d	>2 d	<1 d	<1 d
IPM Compatibility	High	High	Moderate	Moderate	Low	Low	Low
Known Resistance	Yes	No	Yes	No	No	Yes	No
Residual Activity	High	Moderate	Low	Moderate	Low	Low	Low
Primary Type of Activity	Ingestion	Ingestion	Ingestion	Ingestion	Ingestion	Contact	Contact
Translocation Activity	Low	None	None	None	None	None	None
Translaminar Activity	Moderate	None	None	None	None	None	None

Red - Inferior to commercial standard products Yellow - Equivalent to commercial standard products Green - Superior to commercial standard products

Basis for an effective pest program

// Good planning is key – consider when the pest will be present.
// Build a pest management plan for individual crops but consider pest movement from adjacent fields.
// Make use of locally registered products according to a window approach (explained to the right).
// Rotate chemicals with different modes of action to avoid resistance.
// Follow the manufacturer's recommendations.
// Avoid parallel or sequencing of host crops with the same pests.

Correct use of agrochemicals in program

// Using a window approach for insecticides:
- Treatment window should not be longer than 30 days with a group of chemicals.
- Period between treatment windows should not be shorter than 35 days preferably 60 days.
// Never expose two consecutive generations to the same group of chemistry.
// Preserve non-target and beneficial insects. Choose products with the least impact on beneficial insects.
// Implement IPM – plant early, rotate crops, etc.
// Use insecticide mixtures but each product in mixture must be effective on its own.
// Monitor during pre-plant period and if pest is present apply control strategy.

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06/2021