

Mondstuk van die Suid-Afrikaanse aartappelbedryf • Mouthpiece of the South African potato industry

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**SIRKEL-N-LANDGOED:
GESONDE MOERE VIR
VOLHOUBARE AARTAPPELPRODUKSIE**

**SATELLITE-DERIVED CROP
GROWTH INDICES FOR
MANAGEMENT OF POTATO CROPS**

Alternatiewe kragbronne
vir jou plaas

KZN small growers
hold farmers' day

Limpopo-kultivarproef
op Dendron, 2022

Nature is always one step ahead

By Dirk Uys, Potatoes SA

As nature changes, we see the emergence of new pests and diseases while older ones adapt to survive. This is evident in the current challenges we are facing in controlling pests such as potato tuber moth and tomato leaf miner (*Tuta absoluta*) due to a sensitivity shift as reported in *CHIPS* November/December 2022.

To make matters worse, there are challenges set by regulatory authorities, including the European Union (EU) Green Deal as well as local amendments to local crop protection products which are also facing non-renewal under the *Fertilizers, Farm Feeds, Seeds and Remedies Act, 1947* (Act 36 of 1947) which regulates the use of crop protection remedies.

During the past season, the potato industry was hard hit by the devastation caused by potato tuber moth as reported in *CHIPS* January/February 2023. This commissioned study by researchers from the North-West University indicates that trusted insecticides including the organophosphates, pyrethroids and inhibitors of chitin biosynthesis are showing a sensitivity shift resulting in weaker control. To make matters worse, higher temperatures combined with the impact of load shedding tends to favour the population increase of the potato tuber moth complex, causing havoc in many production regions.

A similar study reported in *CHIPS* March/April 2021 shows that *Alternaria* diseases are also presenting a sensitivity shift against trusted fungicides with different modes of action. To aggravate this state of affairs, widely used fungicides such as mancozeb are also facing the challenge of non-renewal in the EU. New crop protection solutions are expensive to develop and take many years to approve.

An article in *CHIPS* September/October 2022 also highlighted

how the EU Green Deal will impact agriculture with the bold ambitions to:

- Reduce the overall use and risk of chemical pesticides by 50% by 2030.
- Reduce nutrient losses by 50%.
- Reduce fertiliser use by at least 20%.

Crop protection efforts

In South Africa, potatoes are one of the most expensive crops when it comes to protection against pests and diseases. Potato crop protection is costing the industry approximately R1.4 billion every year, which amounts to potato producers paying an average of R27 000/ha to keep their crops pest- and disease-free. This means that at least 10% of a grower's input costs is linked to crop protection. Keeping this in mind, we need to continue to grow potatoes efficiently and affordably to provide our consumers with a good quality large-sized potato without blemishes and that has a long shelf life.

Fortunately, South African producers are solution driven. As the saying goes, " 'n Boer maak 'n plan!" To adapt to these market challenges the research team at Potatoes SA is promoting collaboration between research centres including the Agricultural Research Council (ARC), the Western Cape Department of Agriculture, and our leading agricultural research universities.

Fortunately, many diseases and pests can be efficiently predicted and managed based on their environmental condition requirements. This is highlighted

in the disease triangle (Figure 1) which shows that a disease can only develop in the presence of a causing organism, the right environment and a susceptible host.

As a result, more focus should be placed on the modelling and prediction of pest and disease risks. The following must be a priority:

- Climatic modelling to predict incidences.
- Monitoring of pests and diseases through trapping.
- Avoiding diseases through prevention which is the priority of the Potato Certification Scheme.
- The incorporation of biologics.
- Optimising crop health.

Prediction and modelling

Great effort has gone into problem prediction. In the case of insects such as potato tuber moth and tomato leaf miner, pheromone traps are available to estimate the presence of male moths. The same goes for late blight

Figure 1: The disease triangle.
(Source: www.growingproduce.com)

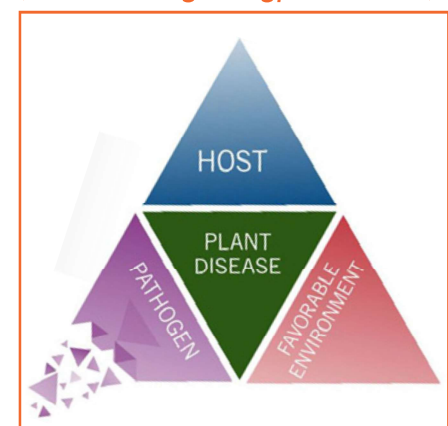
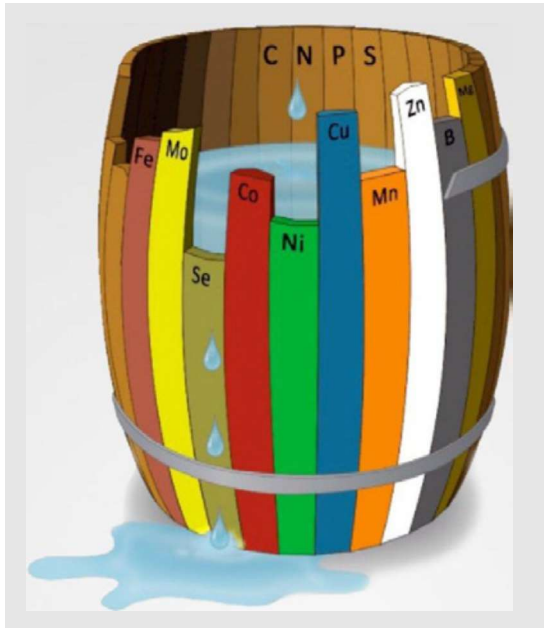


Figure 2: Von Liebig's law of the minimum states that the potential of a plant is restricted by the nutrient that is most deficient. (Source: Fernando G Feroso)



which can be predicted based on humidity and temperature.

The use of spore traps is also successful in creating early disease awareness. This is a tool used in the

citrus industry to monitor citrus black spot.

Biologicals

Until very recently, biologicals were classified as 'snake oils'. Fortunately, this perception is changing. The EU Green Deal is also committing to funding the development of new biologicals. These products are also easier to approve.

These biological compounds can complement traditional crop protection products. In cases where sensitivity shifts occur such as what we are seeing in potato tuber moth, *Alternaria* and late blight, we find that populations do carry a fitness penalty. This means that they are easier to control with biological compounds if correctly positioned in a programme at the right time of the potato's growth and the pest or disease's life cycle. For this to be effective, each pest or disease needs to be very well understood.

Crop health

A healthy crop is less prone to develop diseases or be attacked by

insects. Therefore we must understand the interaction between nutrients. Two important laws come into play:

- The law of the minimum, coined by the German scientist Justus von Liebig, which concludes that if only one nutrient is deficient, it will restrict the growth potential of a plant (Figure 2). This becomes even more relevant when fertiliser processes are increased. Von Liebig's law recommends looking at the complete picture. It may be that N-P-K is in abundance, but the potato's potential is restricted by a deficiency of a micro-element such as Se, for example.
- This should be looked at in combination with the work defined by Mulder (Figure 3) which shows how these nutrients interact with each other, resulting in antagonism and synergism.

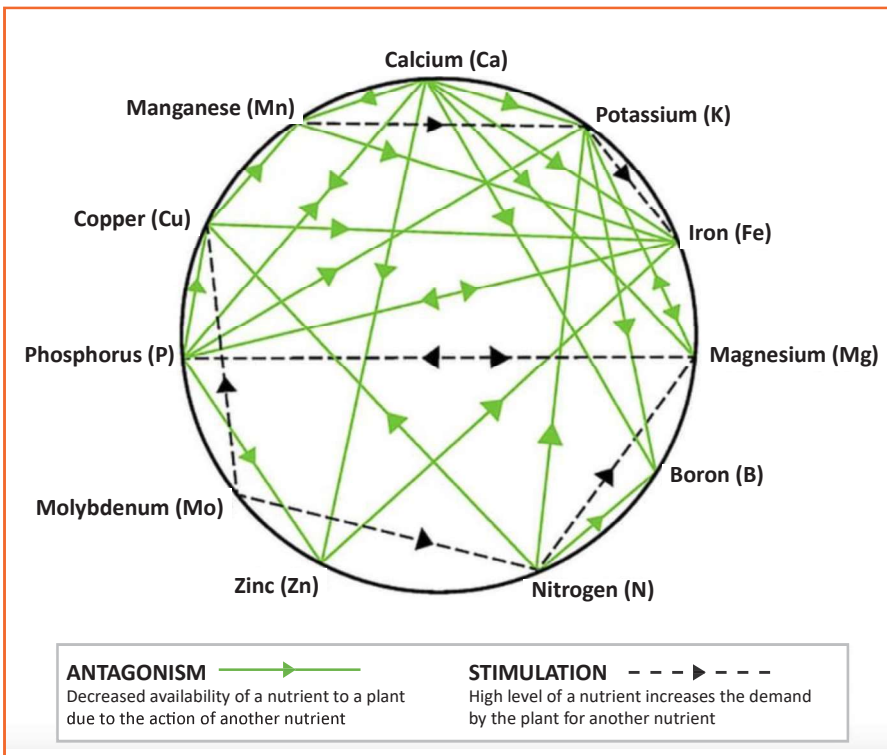
The way forward

The EU Green Deal and amendments to the *Fertilizers, Farm Feeds, Seeds and Remedies Act* has triggered us to think in new ways. Biologicals should be better understood and incorporated in crop protection strategies. Plant growth enhancers will also contribute to enabling potatoes to manage the onslaught of environmental challenges more efficiently.

It is valuable to go back to the basics by understanding the disease triangle, Von Liebig's law, and Mulder's chart.

As an industry, we should review blanket programmes which are often associated with marketing tools such as combination deals. In the coming season, much emphasis will be placed on working with the potato industry to support growers to optimise efficiency by promoting the more efficient application of products, and reducing pesticide and fertiliser waste associated with a product not reaching its target. 🍷

Figure 3: Mulders chart highlights the interaction between minerals in soils. (Source: www.nutriag.com/mulderschart/)



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