

Kynoplus® is 'n waardige N-bron-keuse vir boorde



Daar is 'n konstante strewe na verhoogde produksie en verbeterde vrugkwaliteit in die Suid-Afrikaanse vrugtebedryf, veral ten opsigte van uitvoerprodukte. Gegewe die uitdagings van insetkoste asook tydvertraging aan die uitvoerkant, is dit belangrik dat kunsmisverskaffers produkte ontwikkel wat veral beter vrugkwaliteit kan verseker (insluitende raklewe).

Aanvanklik is gereken dat ureum as stikstofbron (N-bron) by vrugtebome (hoë-waarde-gewasse) nie aan verwagtinge voldoen nie, veral om die volgende redes:

- risiko van wortelbrand as 'n direkte gevolg van omskakelingsprosesse en ammoniakvorming
- die geen- of minimumbewerkingsone onder vrugtebome wat met moontlike hoër organiese materiaal-inhoud en reste geassosieer kan word; dit op sigself impliseer dat hoë vlakke van urease-ensieme hier kan voorkom, wat beteken dat omskakeling van ureum na ammonium lei tot grootskaalse vervlugtiging
- die geldelike verlies van stikstof (N) wat verlore gaan.

Die gebruik van urease-inhibeerders om N-verlies gedurende die ureum-omskakelingsproses na ammonium te verminder, is baie goed gedokumenteer. Gestabiliseerde ureum, soos Kynoplus® het egter sekere voordele, soos:

- minder saailing- en wortelskade as gevolg van ammoniakbrand tydens omskakeling
- verhoogde NUE (Nitrogen use efficiency) as

gevolg van verminderde vervlugtiging, wat lei na verbeterde winsmarges vir die produsent.

Die verskynsel van alternerende (wisselende) drag is baie bekend met boordgewasse. Dit is meestal 'n funksie van die energie-status en reserwe-energie van die bome. Deur 'n Kynoch-voedingsprogram te volg, met die 4-R-beginsel in gedagte, bewys Figuur 1 dat die gewenste prestasie behaal is. Die 4-R-beginsel gaan oor die regte produk wat op die regte tydstop toegedien is, teen die regte hoeveelheid, op die regte plek. Figuur 1 wys dat 'n relatief uniforme opbrengs verkry is. Kwaliteit was na verwagting.

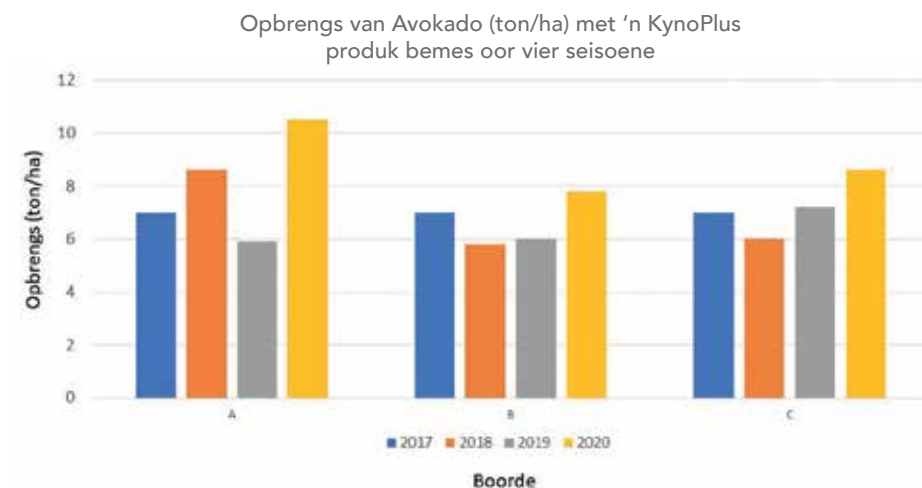
Die laer koste van Kynoplus-N per kilogram is 'n belangrike hydraende faktor in die stryd om insetkoste te verlaag. Deur N-verliese te beperk is dit hydraend tot die wêreldwye strewe om verliese

na die atmosfeer en omgewing te beperk.

Gevolgtrekkend kan die produsent gunstige oorweging skenk aan 'n effektiewe, hoë-konsentrasie N-bron, met huidige verhoogde brandstof- en vervoerkostes wat produsente in die oog staar. Die koste per kilogram vir elke kilogram N – veral indien die N-bron effektief is – sal laer wees teenoor 'n ander bron met 'n laer konsentrasie. Net so sal die aankoopkoste per kilogram N ook laer wees. En die somtotaal is dus belowend.

Daar bestaan dus geldige redes vir produsente om hul voorkeur N-bron te rig na Kynoplus, Kynoch se gestabiliseerde ureum met die kenmerkende blou kleur.

Saamgestel deur Chris Burbidge en Chris Schmidt (dr), Landboukundiges vir Kynoch Kunsmis.



Figuur 1: Opbrengs (ton/ha) van 'n avokado-boord oor 'n tydperk, bemes met 'n Kynoplus-produk

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Australian Bug and the Vedalia Beetle

in mandarin orchards in SA

By Leani Serfontein (Citrus Research International)

Beetle and bug: friend and foe

Icerya purchasi Maskell, commonly known as Australian Bug or Cottony cushion scale is native to Australia. Today, it can be found in numerous countries around the world and was probably spread through the movement of fruit or plant materials. It was first discovered in SA late in 1892, where it has since infiltrated all citrus growing regions of Southern Africa (Hamon and Easulo, 2005; Caltagirone and Doult, 1989; Bedford et al., 1998). Being polyphagous in nature, Australian Bug is able to complete its life cycle on up to 200 different plant

Figure 1: Australian Bug infestation on the trunk of a citrus tree

species. These plant species can range from garden plants such as roses, to commercial citrus orchards (Hamon and Easulo, 2005). In citrus orchards Australian Bug typically infests the branches, twigs and leaves where they cause damage by sucking the sap of the plant. Australian Bugs also secrete large quantities of honeydew on which sooty mould develops. The sooty mould blocks the stomata, impeding respiration and photosynthesis. When severe infestations occur (Fig. 1), plants may undergo stress, causing a decrease in vitality, stunting, deformation of the leaves, fruit drop, defoliation, dieback and even plant death (Hamon and Easulo, 2005; Bedford et al., 1998).

Novius cardinalis (Mulsant) (previously *Rodolia cardinalis*) is commonly known as the Vedalia Beetle, and is native to Australia. After the beetle successfully controlled Australian Bug in the citrus orchards of California in the US in 1889, it was introduced in over 60 countries worldwide for the control of Australian Bug in agricultural fields (Hamon and Easulo, 2005; Grafton-Cardwell and Gu, 2003; Caltagirone and Douth, 1989; Bedford et al., 1998). The Vedalia Beetle's success has been attributed to (1) its rapid generation times, approximately four to six weeks,

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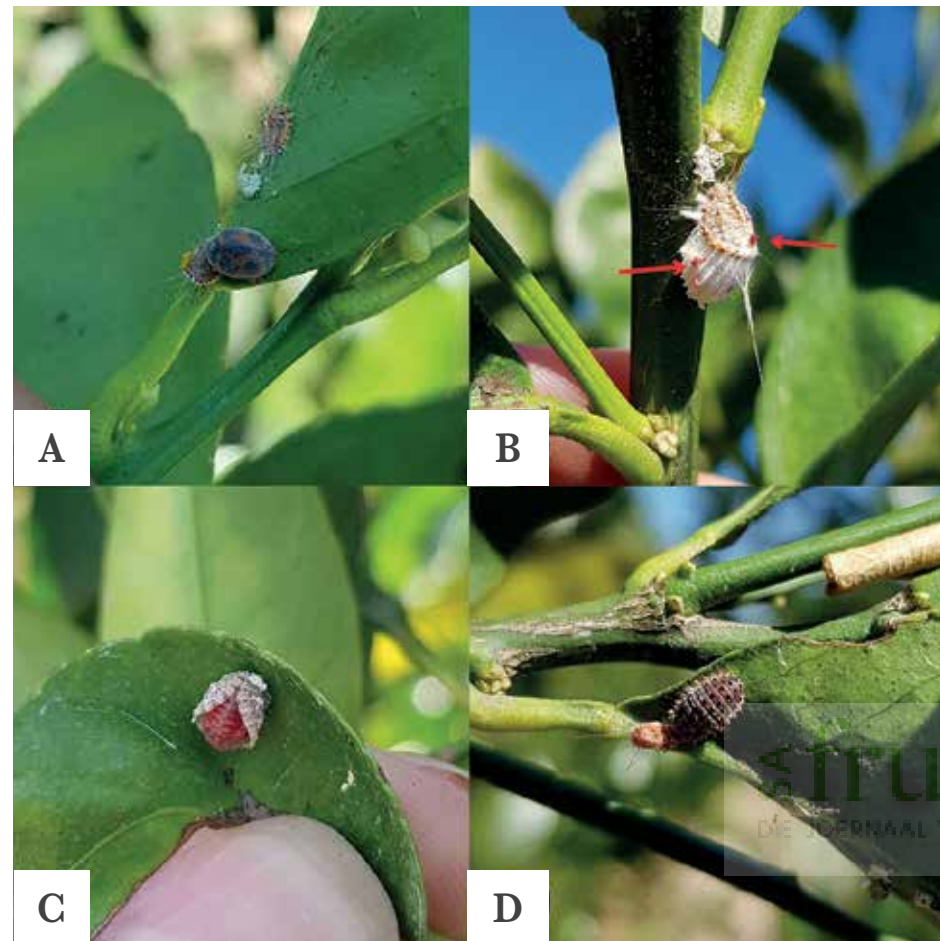


Figure 2: Vedalia Beetle life cycle A: Adult Vedalia Beetle feeding on Australian Bug nymph B: Vedalia Beetle eggs on Australian Bug adult C: Vedalia Beetle pupa D: Vedalia Beetle larva feeding on an Australian Bug nymph

relative to Australian Bug which can take up to three months to repeat one life cycle and (2) narrow feeding range (Causton et al., 2004). Adult Vedalia Beetles are oval in form and red in colour with black markings (Fig. 2A). In the orchards they can be distinguished from Harlequin ladybirds, *Harmonia axyridis* (Fig. 3), which are larger in size and have white markings on their pronotum. These white markings are absent in the Vedalia Beetles. All life stages of Vedalia Beetle, except pupae, are prolific feeders of Australian Bug (Cressman and Dumestre).

Outbreaks and control

In South African citrus orchards, Australian Bug infestation typically occurs as a

repercussion pest, following overuse or misuse of insecticides – particularly insect growth regulators (IGRs) – such as pyriproxyfen. The best way to control Australian Bug is through predation by Vedalia Beetle, which should become conspicuous in the orchards around December or January. However, occurrence of Vedalia Beetle later in the season would still be effective in controlling Australian Bug infestations. Insecticide intervention should only be considered as a last resort. Insecticides have significant adverse effects on Vedalia Beetles. Refer to the Citrus Research International production guidelines for more information on the management of Australian Bug.



A survey of Australian Bug and Vedalia Beetle in mandarin orchards

Until recently, the Vedalia Beetle has successfully managed to control outbreaks of Australian Bug within citrus orchards. But in the last several years there have been reports of high numbers of Australian Bug in mid to late maturing mandarin orchards in SA. A project funded by Citrus Research International was initiated in April 2021 to explore whether the Vedalia Beetle can effectively control Australian Bug without the need for chemical intervention. The abundance of Australian Bug and Vedalia Beetle is being monitored on a monthly basis in selected late mandarin orchards in Mpumalanga Province. In addition, the occurrence of the different life stages of Australian Bug is being recorded. Seeing as outbreaks of Australian Bug are generally associated with the use of IGRs that disrupt the life cycle of the Vedalia Beetle and that mandarins may have higher outbreaks than other citrus, possibly due to their canopy structure, pest control and pruning practices of these orchards are also being recorded to correlate Australian Bug infestation with these two possible factors. In the project, we also seek to mass rear the Vedalia Beetle and implement releases in affected orchards in periods when fewer insecticides are applied as well as shortly before harvest when insecticides with short residuals are applied.

Some preliminary findings of the survey

In the on-going study, infestation of Australian Bug was found to peak in

Figure 3: Harlequin ladybirds mating on a citrus tree

mandarin orchards in Mpumalanga in July. There was a general decline in infestation thereafter and infestation was low in November. As many as seven to 80 individuals of Australian Bug could be found per branch during their peak of abundance, with the nymphs being the most prevalent life stage in all the orchards. The Vedalia Beetle was found to be present in all infested orchards. The presence of the Vedalia Beetle in the orchards mirrored that of Australian Bug, with the peak in August. The most prominent Vedalia life stage varied from farm to farm. The Australian Bug population greatly outnumbered the Vedalia population and it is suspected that the naturally occurring Vedalia population is not able to keep up with the Australian Bug population within mandarin orchards. At the end of the season when the fruit have been harvested, aggressive spray programmes were implemented to control the increasing Australian Bug populations. This resulted in a steady decline in both Australian Bug and Vedalia populations from August to November.

We welcome any citrus farms that have experienced or are experiencing high numbers of Australian Bug within their mandarin orchards to participate in our study. We welcome scouting records of Australian Bug for the years 2020 and 2021. Information on pest control practices, pruning practices and fertilization regime would be useful in understanding the dynamics of Australian Bug. We will treat all data received anonymously.

Acknowledgements

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Leani Serfontein

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Further reading

Bedford, E.C.G., M.A. Van den Berg, and E.A. De Villiers. 1998. Citrus pests in the Republic of South Africa. 2:108-112.

Caltagirone, L.E., and R.L. Doutt. 1989. "The history of the vedalia beetle importation to California and its impact on the development of biological control." Annual Review of Entomology, 34, 1-16.

Causton, C.E., M.P. Lincango, and T.G. Poulson. 2004. "Feeding range studies of *Rodolia cardinalis* (Mulsant), a candidate biological control agent of *Icerya purchasi* Maskell in the Galapagos islands." Biological control, 29(3) 315 - 325.

Grafton-Cardwell, E. E., and P. Gu.

2003. "Conserving vedalia beetle, *Rodolia cardinalis* (Mulsant) (Coleoptera: Coccinellidae), in citrus: a continuing challenge as new insecticides gain registration." Journal of economic entomology, 96(5), 1388-1398.

Hale, L.D. 1970. "Biology of *Icerya purchasi* and its natural enemies in Hawaii." Proceedings, Hawaiian Entomological Society, 20(3) 533 - 550.

Hamon, A. B. and T. R. Fasulo. 2005. "Cottony cushion scale, *Icerya purchasi* Maskell." DPI Entomology Circular, 352.

Hattingh, V. and B. Tate. 1995. "Effects of field-weathered residues of insect growth regulators on some Coccinellidae (Coleoptera) of economic importance as biocontrol agents." Bulletin of Entomological Research, 85(4) 489 - 493.

Kim, D. H., J. Y. Yang, Y. S. Jang, K. San Choi, H. N. Hyun, and D. S. Kim. 2011.

"Stage-specific population dynamics of cottony cushion scale, *Icerya purchasi* (Hemiptera: Monophlebidae), in citrus orchards in Jeju, Korea." Journal of Asia-Pacific Entomology, 14(3) 305 - 309.

Mendel, Z. and D. Blumberg. 1991. "Colonization trials with *Cryptochetum iceryae* and *Rodolia iceryae* for improved biological control of *Icerya purchasi* in Israel." Biological Control, 1(1) 68 - 74.

Mendel, Z., D. Blumberg, and I. Ishaaya. 1991. "Effect of buprofezin on *Icerya purchasi* and *Planococcus citri*." Phytoparasitica, 19(2) 103 - 112.

Quezada, J., and P. DeBach. 1973. "Bioecological and population studies of the cottony-cushion scale, *Icerya purchasi* Maskell, and its natural enemies, *Rodolia cardinalis* Mulsant and *Cryptochaetum iceryae* Will., in southern California." Hilgardia, 41(20) 631 - 688.

Wickson, E. J. 1887. "Notes on the Australian bug (*Icerya purchasi*) in South Africa." West, Newman and Co, London.

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