Cutting Edge

RESEARCH NEWS FROM CITRUS RESEARCH INTERNATIONAL

May 2006 No. 39

Non-registered usage of abamectin and thrips resistance

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Increasingly, reports are being received of abamectin being recommended and used at higher than the registered rate (up to 60 ml per 100 litres water) for bud mite control. Abamectin is registered at 10-20 ml per 100 litres water for control of citrus thrips and should not be used at higher than this rate. In addition to this, its use is limited to no more than three applications or two consecutive applications per season. Despite being recognized as a miticide and being registered as such on other crops, on citrus it is not registered against bud mite or any other mite. On citrus, its registration is restricted to citrus thrips.

Registration profiles on other crops and in other countries should not be used as a justification for deviating from the directions for application that exist for citrus in South Africa. The relatively low cost of abamectin is also a weak justification for abusing the product. Abamectin should not be used or recommended at anything other than the registered rates, against the target pests listed on the label (for citrus this is only citrus thrips). An application against thrips will naturally have an incidental additional impact in controlling or suppressing other pests, such as certain mites (e.g. bud mite, rust mite, lowveld mite, red mite) citrus psylla and leafminer. However, sufficient registered and effective alternatives exist for these other pests, if specific applications against any of them are required.

When abamectin is used at 10 ml/hl with oil it is extremely IPM-compatible and has a negligible effect on most natural enemies found in citrus. However, at 20 ml/hl the mortality it causes to some natural enemies increases noticeably, e.g., with *Chilocorus nigritus* mortality increases from 1% to 24% and with *Aphytis* from 8% to 26%. Further increases in concentration of abamectin will be even less IPM-compatible and may result in pest repercussions.

The use of abamectin at higher than the registered rate is not only illegal, but it expedites the development of resistance to it by citrus thrips. All chemical insecticides, to a greater or lesser extent, exert a selective evolutionary pressure upon the insect pests they are intended to control. The insecticide acts as an environmental factor and selects for populations of insects that are most able to survive its application. Therefore, over a period of time, resistant strains of insects are certain to emerge. By applying abamectin at a high concentration, one is increasing the selective pressure for resistant individuals. Thrips individuals that escape death may carry some genetic disposition for resistance. The probability of this being so, should be significantly higher when thrips have been subjected to an excessive concentration of abamectin. The genes for resistance may then predominate in the local population and subsequently spread.

Abamectin is an invaluable thripicide, not only for its effectiveness but also for its low cost and favourable IPM profile (at registered rates). The loss of abamectin, due to the development of resistance, would be disastrous. It is well known that thrips have an uncanny capacity to develop resistance to a range of insecticide chemistries. To date, citrus thrips populations in certain regions of South Africa have developed resistance (or a tolerance) to a number of registered thripicides, including some organophosphates, pyrethroids and tartar emetic. The southern African citrus industry needs to do all that is possible to avoid adding abamectin to this list. **Do not deviate from the registered directions on the label!**

Rind pitting of sweet oranges and grapefruit

Paul Cronje (CRI) and Graham Piner (Crocodile Valley Citrus Co.)

- **Description**

Postharvest rind pitting of sweet oranges and grapefruit is characterised by the collapsing of sub-epidermal cells. The first indication of this disorder of unknown etiology is the development of small round depressions on the rind that later affects cells surrounding oil glands and adjacent areas of the flavedo.

- **Cause**

The mode of action is poorly defined but increasing evidence indicates that variations in relative humidity (RH) during the postharvest period (picking, packing and storage) could

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contribute to the development of this disorder. Waxing of fruit has also been found to increase the amount of rind pitting, especially of susceptible fruit that underwent sub-optimal postharvest conditions, e.g. high temperatures and sudden changes in RH.

- **Occurrence**

The development of rind pitting can start as early as 2 days after packing and it can continue to develop during storage at temperatures of above 4.5°C. When fruit was stored at temperatures of below 4.5°C soon after harvest (e.g. within one day) very little pitting was observed. However, pitting developed rapidly once the fruit was moved to ambient temperature. The highest incidence of this disorder is typically seen after 2 weeks in storage.

- **Development**

Although little is known of the etiology, there are indications that it may start with the collapse of an oil gland leaking its content into adjacent tissue and result in a cluster of a few collapsed, adjacent oil glands. Rind pitting can occur randomly over the surface of the fruit. However, it is more commonly found near the stem- or stylar-ends of the fruit.

- **Remedial action**

The mechanism responsible for rind pitting remains to be elucidated, but there are certain practices that could help to reduce the risk of pitting.

Temperature management: As mentioned, the loss of water from the flavedo during low RH conditions, directly after harvest, may lead to the development of pitting. Therefore it is strongly advised that the first step to be taken directly after harvest, is to reduce the temperature of the fruit (field heat) as quickly as possible. This is because the rate of water loss after harvest is directly related to fruit temperatures.

Postharvest thiabendazole (TBZ) application: TBZ is known to reduce the effect of chilling injury of citrus fruit. Researchers from New South Wales, Australia, reported that the application of TBZ at 1000 mg/ℓ as a cold dip (14°C) reduced the susceptibility of fruit to chilling injury by 28% over an 8-week storage period. The susceptibility of Washington Navel oranges to chilling injury was also reduced by 65% after dipping the fruit in hot TBZ (50°C) for 2 minutes. Although the mechanism of action is not known it could be the result of hormonal action. These reports led to the application of TBZ on Valencia oranges at Crocodile Valley in an attempt to reduce pitting. The chemical was applied within the wax at 4000 ppm and the fruit were cold-stored at 4.5°C within 2 days of harvest. This application resulted in a highly significant reduction in pitting in all cultivars tested. For this treatment to be effective it is critical that the fruit are treated and put into cold storage as quickly as possible, e.g. TBZ treatment on the same day as harvest and cold-stored by the second day.

Postharvest rind pitting starts to develop soon after harvest and it appears to worsen as the season progresses. Although the packhouse procedures do not cause the disorder they could aggravate pitting. It is therefore of utmost importance that the following aspects must always be taken into consideration: over brushing, too high temperatures in hot water baths and the type of wax. Currently, we are only able to manage this disorder to some extent with cold storage and a postharvest treatment with TBZ. Therefore, it is advisable to test these techniques for efficacy on the farm and implement them thereafter as part of the postharvest protocol.

SAMPLING FOR GREENING

M.C. Pretorius
CRI, Nelspruit

A total of about 30 leaves per sample is sufficient. Leaves should be picked individually and dispatched in labelled plastic bags. Please keep the samples cool by using a cooler bag or polystyrene box while collecting in the field.

Two important issues are:

1. Select leaves with greening symptoms.
2. Where possible, collect the youngest leaf material from infected twigs and ensure that the petioles are intact as only the petioles of leaves will be used in the tests.

Please supply the following information: name, address, contact number and email address (if available). Label each bag clearly and supply as much information as possible regarding the sample for tracing purposes (locality, block number, cultivar, etc.). Cost of sample analysis is R160-00 per sample.

Send samples by courier/speed mail to Diagnostic Centre, 2 Baker Street, Nelspruit 1200 or P O Box

28, Nelspruit 1200. **Please make arrangements with Diagnostic Centre prior to sending samples.** Contact Laura Huisman or Jacolene Meyer at 013-7598000.

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Nie-geregistreerde gebruik van abamectin en weerstandbiedendheid teen blaaspootjie

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Daar word toenemend gerapporteer dat abamectin teen hoër konsentrasies (tot 60 ml per 100 liter water) as waarteen dit geregistreer is, aanbeveel vir die beheer van knopmyt. Abamectin is teen 10-20 ml per 100 liter water geregistreer vir die beheer van sitrusblaaspootjie en behoort nie teen hoër konsentrasies as dit gebruik te word nie. Hiermee saam is die gebruik beperk tot hoogstens drie toedienings, of twee opeenvolgende toedienings, per seisoen. Ten spyte daarvan dat dit 'n erkende mytdoder op ander gewasse is en sodanig geregistreer is, is dit nie teen knopmyt of enige ander myte op sitrus geregistreer nie. Op sitrus is dit slegs teen sitrusblaaspootjie geregistreer.

Die raamwerk vir registrasie op ander gewasse en in ander lande moet nie regverdig dat daar afgewyk word van die aanwysings vir gebruik op sitrus in Suid-Afrika nie. Die relatiewe lae koste van abamectin is ook 'n swak verskoning om die produk te misbruik. Abamectin behoort nie gebruik of aanbeveel te word teen enige ander dosis of teikenplaag as wat op die etiket verskyn nie (op sitrus is dit slegs sitrusblaaspootjie). Toediening daarvan vir die beheer van sitrusblaaspootjie sal toevallig 'n natuurlike impak in die beheer of onderdrukking van ander plae hê, soos sekere myte (bv. knopmyt, roesmyt, laeveldse myt, rooimyt), sitrus psylla en bladmyner. Hoe dit ook al sy, daar bestaan alternatiewe produkte wat hierdie ander plae effektief beheer en daarvoor geregistreer is, sou spesifieke toedienings daarvoor vereis word.

Wanneer abamectin teen 10 ml per 100 liter water saam met olie gebruik word, is dit hoogs verenigbaar met geïntegreerde plaagbestuur en het dit 'n weglaatbaar klein effek op die natuurlike vyande wat in sitrus aangetref word. Teen 20 ml per 100 liter word die mortaliteit wat dit op sekere natuurlike vyande veroorsaak, merkbaar verhoog, bv word die mortaliteit by *Chilocorus nigritus* van 1% tot 24% verhoog en by *Aphytis* van 8% tot 26%. Verdere verhogings in die konsentrasie van abamectin sal selfs minder verenigbaar met geïntegreerde plaagbestuur wees en kan dalk plaagreperkussies veroorsaak.

Die gebruik van abamectin teen hoër konsentrasies as waarteen dit geregistreer is, is nie net onwettig nie, maar verhaas ook die ontwikkeling van weerstandbiedendheid van sitrusblaaspootjie teen dit. Tot 'n mindere of meerdere mate oefen alle chemiese insekdoders 'n selektiewe ontwikkelende druk uit op die insekplae wat hulle veronderstel is om te beheer. Die plaagdoder tree as 'n omgewingsfaktor op en selekteer vir insekpopulasies wat die beste in staat is om die toediening daarvan te oorleef. Gevolglik sal daar beslis oor 'n periode van tyd weerstandbiedende lyne van die insekte te voorskyn kom. Deur abamectin teen 'n hoë konsentrasie toe te dien, word die selektiewe druk vir weerstandbiedende individue verhoog. Individuele blaaspootjies wat nie vrek nie, kan 'n sekere genetiese samestelling vir weerstand dra. Die waarskynlikheid dat dit kan gebeur is betekenisvol hoër wanneer blaaspootjies blootgestel is aan oormatige konsentrasies van abamectin. Die gene vir weerstandbiedendheid mag dan in die populasie oorheers en gevolglik vermeerder.

Abamectin is 'n onskatbare blaaspootjie-doder, nie net agv effektiwiteit nie, maar ook sy lae koste en gunstige profiel vir geïntegreerde plaagbestuur (teen geregistreerde konsentrasies). Dit sal katastrofies wees om abamectin te verloor agv die ontwikkeling van weerstandbiedendheid. Dit is alombekend dat blaaspootjie 'n angswekkende vermoë het om weerstandbiedendheid teen 'n reeks insekdoder-chemies te ontwikkel. Tot op datum het sitrusblaaspootjie populasies in sekere streke van Suid-Afrika weerstand (of verdraagsaamheid) teen 'n aantal geregistreerde blaaspootjie-doders ontwikkel, onder andere sekere organofosfate, piretroiede en braakwynsteen (Tartox). Die Suider-Afrikaanse sitrusbedryf moet alles doen wat moontlik is om te verhoed dat abamectin tot hierdie lys bygevoeg word. **Moenie afwyk van die geregistreerde aanwysings op die etiket nie!**

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Gepokteskil (pitting) van lemoene en pomelo's

Paul Cronje (CRI) and Graham Piner (Crocodile Valley Citrus Co.)

- **Beskrywing**

Die na-oes ontwikkeling van gepokteskil van lemoene en pomelo's word gekenmerk deur die verval van subepidermale selle van die flavedo. Die fisiologiese afwyking begin as 'n induiking van die skil wat dan uitbrei na die aangrensende olieselle in omliggende weefsel. Die eerste teken is gewoonlik 'n verdonkering van 'n individuele olieklier.

- **Oorsaak**

Die oorsaak en meganisme van hierdie fisiologiese afwyking is nie bekend nie, maar dit blyk of 'n drastiese variasie in die RH (relatiewe humiditeit) gedurende die na-oes periode 'n belangrike rol speel. Die aanwending van wakse (gewoonlik swaar wakse) kan die voorkoms van gepokteskil in sensitiewe vrugte verhoog.

- **Voorkoms**

Gepokteskil kan so vroeg as 2 dae na die oes voorkom en sal gedurende opberging by temperature bo 4.5°C verhoog. As vrugte so gou as moontlik (1-2 dae na pluk) onder 4.5°C gestoor word is daar gevind dat die voorkoms van gepokteskil aansienlik verminder. Gepokteskil kan egter gesien word as vrugte by omringende temperature gehou word na opberging by lae temperature. Die meeste gepokteskil kom gewoonlik voor 2 weke na oes.

- **Ontwikkeling**

Hierdie na-oes afwyking begin as 'n olieklier lek en die olie die omliggende selle beskadig. Gewoonlik sal 'n paar aaneenliggende oliekliere saam lek en sodoende die versonke weefsel vorm. Die versonke weefsel kom ewekansig voor reg oor die vrugopervlakte alhoewel daar somtyds meer naby die stingel- en blomkant voorkom.

- **Beheermaatreëls**

Die meganisme verantwoordelik vir die ontwikkeling van gepokteskil is nog onbekend, maar daar is seker stappe wat geneem kan word om die impak van die fisiologiese defek te verminder.

Temperatuur beheer is die eerste stap en daar moet so gou as moontlik na-oes mee begin word. Vermoedelik bestaan daar 'n sterk verband tussen die verlies van water uit die flavedoselle gedurende lae RH toestande en ontwikkeling van gepokteskil. Dit word dus sterk aanbeveel dat maatreëls getref moet word om die vrugte se temperatuur so gou as moontlik na pluk te verlaag a.g.v. die direkte verband tussen tempo van vogverlies uit die skil en vrugtemperatuur.

Na-oes thiabendazole (TBZ) behandeling is daarvoor bekend dat die impak van koueskade verminder. Navorsers in New South Wales, Australië, het gevind dat TBZ toegedien teen 1000 mg/ℓ in 'n koue dip (14°C) verlaag die koueskade gedurende opberging van 8 weke met 28%. Die voorkoms van koue skade by Washington Nawel lemoene is ook verlaag met 65% na 'n TBZ dip (50°C) vir 2 minute teen 50°C. Die meganisme waarop die swamdoder die koueskade beperk is onbekend maar hou vermoedelik met 'n hormonale aksie verband. Hierdie resultate het gelei na 'n ondersoek deur Crocodile Valley in Nelspruit na die gebruik van TBZ om gepokteskil van Valencia lemoene te beheer. TBZ was toegedien in die waks teen 4000 ppm waarna die vrugte in binne 2 dae na oes in koueopberging geplaas is teen 4.5°C. Die gebruik van die TBZ het die voorkoms van gepokteskil op die Valencias drasties verminder. Daar is gevind dat dit krities is dat behandelde vrugte so gou as moontlik verkoel moet word, bv. TBZ behandeling op dag van oes en koue opberging op dag twee.

Na-oes gepokteskil ontwikkel vinnig na pluk en dit wil blyk of dit voorkoms daarvan verhoog soos die seisoen aangaan. Geen van die prosesse in die paklyn veroorsaak gepokteskil nie maar kan die voorkoms daarvan verhoog. Dit is dus belangrik dat al die aspekte bv. borselspoed, temperatuur in die warmbad en waks tipe goed gemonitor word. Op die oomblik is daar nog nie stappe wat geneem kan word om die voorkoms van gepokteskil heeltemal te keer nie maar deur temperatuurbeheer en moontlike gebruik van TBZ kan die voorkoms verminder word. Dit word dus ten sterkste aanbeveel dat die maatreëls getoets word op plaas en pakhuisvlak en indien effektief is geïmplementeer word in die na-oes protokol.

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VERGROENINGSMONSTERNEMING

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Ongeveer 30 blare per monster is voldoende. Enkel blare moet gepluk word en in gemerkte plastiese sakkies gestuur word. Hou asb. die monsters koel in 'n koelhouer of polysterene houer terwyl monsters in die boord geneem word.

Twee belangrike punte:

1. Probeer om blare wat vergroeningssimptome toon, te kies.
2. Versamel die jongste blaarmateriaal van geinfekteeerde takkies waar moontlik. Maak seker dat die petiole van die blare nie verlore gaan nie aangesien slegs die petiole gebruik word vir die ontleding.

Voorsien asb. die volgende inligting: naam, adres, kontak nommer en epos adres waar moontlik. Merk elke sakkie duidelik en gee soveel inligting i.v.m. die monsters as moontlik (lokaliteit, bloknommer, kultivar, ens.). Die koste van 'n ontleding is R160-00

Stuur monsters per koerier/spoedpos aan Diagnostiese Sentrum, Bakerstraat 2, Nelspruit 1200 of Posbus 28, Nelspruit 1200. **Kontak asb. vir Laura Huisman of Jacolene Meyer (013-7598000) vroegtydig voordat u monsters gepos word.**