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Mealybug control recommendations

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In the 2020/21 season, many growers in different production regions experienced high levels of mealybug infestation in their citrus orchards. Furthermore, the normal trend of mealybug peaking in mid-summer and declining after that towards harvest, due to the usual build up in natural enemy activity, was often absent. In some cases corrective sprays and parasitoid augmentation appeared to be insufficient.

There may be a few reasons for these elevated levels of mealybug infestation in citrus orchards.

1. Mandatory calendar spraying for citrus black spot (CBS) erodes populations of predatory mites, which are extremely effective in suppressing citrus thrips. This is particularly so if mancozeb is included. Consequently, increased spraying for citrus thrips control becomes necessary, often with harsh products and later in the season than previously. This results in a suppression of the extremely effective biocontrol complex of mealybugs, leading to mealybug repercussions.
2. Due to some recent changes to MRL restrictions, there has been a reduction in the use of organophosphates and buprofezin, both very effective as early season preventative sprays for mealybug. Due to the imminent disappearance of imidacloprid as an option for use in producing fruit for the EU market, so too has there been a decline in the use of this chemistry and the suppression of mealybug populations that would result. Furthermore, due to inexperience with the newer products registered for mealybug control, and their higher cost, their use has not yet become sufficiently widespread.
3. Parasitoid augmentation can be extremely effective, especially with *Anagyrus* wasps. However, there is sometimes an overreliance on augmentation, in situations where a spray is more appropriate due to high mealybug pressure, or where conditions are not conducive to parasitoid augmentation, particularly as a result of a hard spray programme, or parasitoids have been released too late in the season i.e. as a corrective treatment, which is the incorrect use of parasitoids.
4. Finally, it was determined during this past season that hyperparasitoids can significantly undermine biological control. These are naturally occurring secondary parasitoids, which attack the primary parasitoids like *Anagyrus* and *Coccidoxenoides*, reducing their effect, causing mealybug levels to increase. This is a natural phenomenon and no fault of any spray programme or decision-making process.

Here we provide some guidelines for controlling mealybug in those orchards where levels were problematic during the last season or more.

1. It is essential to start the season with well pruned trees in order to be able to achieve adequate spray coverage and penetration. This is imperative particularly for good mealybug control. If this has not yet been done, it is now too late to do so this season in most production regions, without having a detrimental effect on the crop load. However, it is essential to remember this for future seasons.
2. A double mealybug spray should be planned, with the first treatment in spring and the second 5-6 weeks later. Profenofos, prothiofos and buprofezin are recommended as suitable and effective options for the first spray, followed up by buprofezin (MRL permitting), sulfoxaflor (Closer) or spirotetramat (Tivoli). Extensive trial work has demonstrated that Closer and Tivoli have similar efficacy to buprofezin and the organophosphates. Another option that can be considered is a single Tivoli spray in spring (at 30-40 ml per 100 L) that in addition to mealybug would also control red scale and mites and would suppress thrips.
3. If parasitoid augmentation is planned, it should be done in addition to the scheduled double spray, selecting a spray programme that would be sufficiently harmless to the parasitoids to allow this. Bear in mind that for optimal efficacy of parasitoids, augmentation must be initiated early in the season, preferably not later than November.
4. Ants must be controlled at all times during the season. Experience has shown that if there is any ant activity in the trees, when mealybug is present, mealybug infestation is unlikely to fall below about 20% fruit infestation.
5. Scouting for mealybug on fruit must be conducted regularly throughout the

season. Scouting records must be kept in order that infestation patterns can be followed over time. This is the only reliable way in which it can be determined if a corrective spray is ever necessary.

6. Under normal IPM circumstances, mealybug infestation will peak sometime around December (in the northern regions) or January (in the southern regions) and will begin to decline after that, due to the build-up of naturally occurring parasitoids and predators. This peak may be even later in orchards under nets. If there is no decline in infestation over this time, a corrective spray should be considered. The best options being Closer or Tivoli, which have similar efficacy. However, Tivoli is softer on beneficial insects and may therefore be the better mid-season corrective option. Good scouting will help isolate problem orchards as one should avoid blanket treatments that could have a negative impact in orchards where such sprays are not justified.
7. If there is a problematic level of sooty mould on fruit leading up to harvest, a spray with a low percentage of mineral oil (0.2-0.25%) can be considered, once fruit has begun to colour up.

A new long-term research project will be initiated next year in order to better understand the role and cycles of mealybug hyperparasitoids, and consequently, how best to deal with situations where these hyperparasitoids undermine mealybug biocontrol.

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CRI Snykant
Verseker die toekoms van sitrus deur wetenskap
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Witluis beheer aanbevelings

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In die 2020/21 seisoen het baie produsente in verskillende produksie streke hoë vlakke van witluis besmettings in hul sitrusboorde ondervind. Verder was die normale tendens dat witluis 'n piek in middel somer bereik en dan nader aan oestyd afneem, weens die gewone opbou van natuurlike vyande se aktiwiteite, dikwels afwesig. In sekere gevalle het korrektiewe bespuitings en parasitoïed loslatings onvoldoende geblyk.

Daar kan verskeie redes vir die verhoogde vlakke van witluis besmettings in sitrusboorde wees.

1. Verpligte kalender bespuitings vir sitrus swartvlek (SSV) vernietig populasies van roofmyte, wat uiters effektief in die onderdrukking van sitrus blaaspootjie is. Dit is veral so wanneer mankozeb ingesluit word. Gevolglik is meer bespuitings vir sitrus blaaspootjie nodig, dikwels met harde produkte en later in die seisoen as voorheen. Dit lei tot onderdrukking van die uiters effektiewe biologiese beheer kompleks van witluis, wat dus witluis probleme veroorsaak.
2. As gevolg van sekere onlangse veranderings aan MRL beperkings, is daar 'n afname in die gebruik van organofosfate en buprofezin, beide baie effektief as vroeë seisoen voorkomende bespuitings vir witluis. Weens die dreigende verdwyning van imidakloprid as 'n opsie vir vrug produksie vir die EU markte, is daar ook 'n afname in die gebruik van hierdie chemie en dus onderdrukking van witluis populasies wat sou oorleef. Verder, weens 'n te kort aan ondervinding met die nuwer produkte wat vir witluisbeheer geregistreer is, en die hoër kostes, is daar nog nie genoegsame wydverspreide gebruik van hierdie produkte nie.
3. Parasitoïed loslatings kan uiters effektief wees, veral met *Anagyrus* wespes. Daar word egter dikwels te veel op loslatings vertrou in situasies waar 'n bespuiting meer geskik sou wees weens die hoë witluis druk, of waar toestande nie bevorderlik is vir parasitoïed loslatings nie, veral as gevolg van 'n harde spuitprogram, of as parasitoïede te laat in die seisoen losgelaat is, dws as 'n korrektiewe behandeling, wat die verkeerde gebruik van parasitoïede is.
4. Laastens, daar is tydens die afgelope seisoen vasgestel dat hiper- parasitoïede biologiese beheer betekenisvol kan ondermyn. Hierdie is sekondere parasitoïede wat natuurlik voorkom en primêre parasitoïede soos *Anagyrus* en *Coccidoxenoides* aanval en hulle effek verminder, wat veroorsaak dat witluis vlakke toeneem. Dit is 'n natuurlike verskynsel en geen fout van enige bespuitingsprogram of besluitnemingsproses nie.

Hier gee ons 'n paar riglyne vir die beheer van witluis in daardie boorde waar vlakke problematies gedurende die laaste seisoen of seisoene was.

1. Dit is noodsaaklik om die seisoen met goed gesnoeide bome te begin om voldoende spuitbedekking en penetrasie te verkry. Dit is noodsaaklik veral vir goeie witluis beheer. Indien dit nog nie gedoen is nie, is dit nou te laat om dit in meeste produksie- streke in hierdie seisoen te doen, sonder om 'n nadelige effek op die oeslading te hê. Dit is egter noodsaaklik om dit vir die toekoms te onthou.
2. 'n Dubbele witluis bespuiting moet beplan word, met die eerste behandeling in die lente en die tweede, 5-6 weke later. Profenofos, prothiofos en buprofezin word aanbeveel as geskikte en effektiewe opsies vir die eerste bespuiting, gevolg deur buprofezin (as MRL beperkings dit toegelaat), sulfoxaflor (Closer) of spinotetramat (Tivoli). Omvattende proewe het getoon dat Closer en Tivoli soortgelyke effektiwiteit as buprofezin en die organofosfate het. Nog 'n opsie wat oorweeg kan word is 'n enkele Tivoli bespuiting in die lente (teen 30-40 ml per 100 L) wat behalwe witluis ook rooidopluis en myte sal beheer en blaaspootjie onderdruk.

3. Indien parasitoïed loslatings beplan word, moet dit tesame met die geskeduleerde dubbel bespuiting gedoen word, deur ‘n bespuitingsprogram te kies wat onskadelik genoeg sal wees om parasitoïed loslatings toe te laat. Hou in gedagte dat vir optimale doeltreffendheid van parasitoïed loslatings, dit vroeg in die seisoen geïnisieer moet word, verkieslik nie later as November nie.
4. Miere moet te alle tye gedurende die seisoen beheer word. Ondervinding het gewys dat indien daar enige mier aktiwiteite in bome, waar witluis teenwoordig is, dit onwaarskynlik is dat die witluis besmetting totonder 20% vrug-besmetting salval.
5. Verkenning vir witluise op vrugte moet gereeld regdeur die seisoen uitgevoer word. Verkennings rekords moet gehou word sodat besmettings-patrone oor tyd gevolg kan word. Dit is die enigste betroubare manier wat kan bepaal of ‘n korrektiewe bespuiting ooit nodig sal wees.
6. Onder normale IPB omstandighede, gaan witluis besmetting iewers naby Desember (in die noordelike streke) of Januarie (in die suidelike streke) ‘n piek bereik en daarna begin afneem, as gevolg van die opbou van natuurlik voorkomende parasitoïede en predatore. Die piek kan selfs later in boorde onder nette wees. Indien daar geen afname in besmetting oor hierdie tyd is nie, moet ‘n korrektiewe bespuiting oorweeg word. Die beste opsie is Closer en Tivoli, wat soortgelyke effektiwiteit het. Tivoli is egter sagter op voordelige insekte en mag daarom die beter middel seisoen korrektiewe opsie wees. Goeie verkenning gaan help om die probleem boorde te isoleer aangesien “blanket” behandelings vermy moet word wat ‘n negatiewe impak op boorde kan hê waar sulke bespuitings nie geregverdig is nie.
7. As daar ‘n problematiese vlak van roetskimmel op vrugte voor oes voorkom, kan ‘n bespuiting met ‘n lae persentasie mineraal olie (0.2-0.25%) oorweeg word, sodra vrugte begin opkleur.

‘n Nuwe langtermyn navorsingsprojek gaan volgende jaar begin om die rol en siklusse van witluis hiper- parasitoïede beter te verstaan, en gevolglik hoe om die beste met situasies te deel waar hierdie hiper- parasitoïede witluis se biologiese beheer ondermyn.

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