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Recommendations for the pre-packline drench

by
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All packhouses, that degreen citrus fruit, have a pre-packline drenching system where the fruit is treated with a mixture of compounds to protect the fruit against postharvest diseases during degreening. Currently, there is a trend for non-degreening packhouses to also use pre-packline drenching as part of their strategy to combat postharvest diseases more effectively, especially where there is a delay between harvesting and treatment of the fruit in the packhouse. However, the drench application is suboptimal, compared to the dip application in the packhouse, and therefore requires diligent management. Limited research has been done on drench application in terms of disease control. Experience and knowledge of the different fungicides and diseases has prompted the recommendation of the most effective mixture of compounds for the pre-packline drenches.

Which fruit should be drenched?

- Fruit that is going to be degreened
- If there is a delay of more than 24 hours from harvest before the first packhouse fungicide application
- Citrus cultivars that are more susceptible to decay (Soft citrus and navel oranges)

Table 1. Specifications for the pre-packline drench.

Reservoir size	1000 L	Discard drench mix after 60 tons of fruit or 150 bins
	2000 L	Discard drench mix after 80 tons of fruit or 200 bins
	3000 L	Discard drench mix after 120 tons of fruit or 300 bins
Flow rate	1 bin	250 L per minute
	2 bin stack	500 L per minute
	3 bin stack	750 L per minute
Exposure time	per stack	1 to 3 minutes

Table 2. Registered active ingredients that can be applied through the pre-packline drench, as well as aspects that should be considered for their responsible use.

	Thiabendazole (TBZ)	Guazatine (GZT)	Imazalil/ Pyrimethanil (IMZ/PYR)*	Pyrimethanil (PYR)*	2.4-D
Registered concentration	•1000 ppm	•1000 ppm	•500 ppm	•1000 ppm	•250 ppm
Pro's	•Green and blue mould •Latent pathogens	•**Sour rot** •Green and blue mould	•Green and blue mould •Latent pathogens •Sporulation inhibition	•Green and blue mould •Latent pathogens (not registered)	•Calyx retention •Indirectly inhibit latent pathogens
Con's	•Precipitate •**High risk for TBZ resistance development**	•Residue loading unknown •Phyto risk •Only certain markets •Risk for resistance development	•**High risk for IMZ resistance development** •Residue loading suboptimal	•Residue loading suboptimal •Risk for resistance development	
Suitability / Caution rating	Red	Orange	Red	Orange	Green

*** These active ingredients or combinations are registered under specific trade names; please enquire from your supplier.**

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CRI recommended drench mixture per 1000 litres:
(The various trade names and volume per 1000 ℓ are given below each active ingredient)

- **Thiabendazole (TBZ) (1000 ppm)**
  2.0 L Tecto
  2.0 L Thiazole
  2.0 L Universal Thiabendazole
  2.0 L ICA Thiabendazole

- **Guazatine (1000 ppm)**
  5 L Deccotine
  5 L Kenopel
  4.8 L Citricure

- **Pyrimethanil (1000 ppm)**
  2.5 L Protector

- **2.4-D Sodium Salt (250 ppm)**
  10 L Deccomone
  10 L Calyfix

Important points to remember:

- In terms of disease control, the drench application is inferior compared to the dip application. It is therefore very important that drench application be conducted within 24 hours after harvest.
- Sanitation of the drench system and the surrounding drench area is essential.
- It is important to allow drenched fruit to dry thoroughly after drenching before degreening to avoid any possible phytotoxic damage.
- The reservoir needs to be thoroughly sanitised between each new mixture with either chlorine or a quaternary ammonium compound (QAC). Ensure that the reservoir is rinsed out thoroughly thereafter, because chlorine is not compatible with any of the fungicides in the mixture, and to avoid any QAC residues.
- CRI does not recommend the use of imazalil in the drench due to the high risk of imazalil resistance development and the essential and more effective use of imazalil in the dip tank and wax.
- There are currently no adjuvants or sanitising agents registered for use in the drench mixture.

Guazatine application in the pre-degreening drench mixture

- Some packhouses have queried the difference in strength between the three **guazatine** formulations Deccotine (200 g/L), Kenopel (200 g/L) and CitriCure (210 g/L) used in the pre-dregreening drench mixture

- There is no difference in the strength of the **guazatine** active ingredient in the pre-degreening drench mixture because the recommended concentrations compensate for differences in formulation strength (see above) ,

- Each of the three formulations results in a concentration of **1000 ppm** in the drench mixture

- **Recommended increase of guazatine concentration from 500 to 1000 ppm**

  Guazatine was originally recommended at 1000 ppm (the registered dosage) in the drench mixture during the years 2000-2005. After the registration of guazatine in the citrus wax formulations and the application in the packhouses at 3000 ppm and in the drench mixture at 1000 ppm, there was a perceived risk of possible guazatine MRL exceedence on export fruit. The guazatine concentration was therefore reduced from 1000 to 500 ppm in the drench mixture during the years 2006-2011. Since then, these concerns appear to have been unjustified and due to the continuous risk of sour rot infections on soft citrus and navels etc., guazatine is again being recommended at the registered dosage of 1000 ppm, from the start of the 2012 packing season.

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Aanbevelings vir die voor-paklyn stort-behandeling

deur
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Alle pakhuise wat ontgroening op sitrusvrugte toepas, sal 'n voor-paklyn stort sisteem hê. Hier word vrugte met 'n mengsel van middels vir die beskerming teen die ontwikkeling van naoes siektes gedurende die ontgroeningsproses behandel. Daar is tans ook 'n neiging dat pakhuise wat nie ontgroening toepas ook voor-paklyn stort sisteme gebruik as deel van hul strategie om naoes siektes meer effektief te bestry. Hierdie metode word veral toegepas waar daar 'n vertraging tussen oes en die eerste swamdoder aanwending in die pakhuis is. Die voor-paklyn stort sisteem vereis toegewyde bestuur omdat dit sub-optimaal in vergelyking met die doop aanwending in die pakhuis is. Beperkte navorsing is op die siektebeheer vermoë van die voor-paklyn stort aanwending gedoen. Ondervinding en kennis van die verskillende swamdoders en siektes het gedien as vertrekpunte om die mees ideale mengsels van middels vir die voor-paklyn stort sisteem aan te beveel.

Wanneer moet voor-paklyn stort toegepas word?

- Op vrugte wat ontgroening moet deurgaan
- Indien die vertraging tussen oes en die eerste swamdoder aanwending in die pakhuis meer as 24 uur is
- Op sitrus kultivars wat meer vatbaar is vir bederf (Sagte sitrus en nawel lemoene)

Tabel 1. Spesifikasies vir die voor-paklyn stort sisteem

Reservoir kapasiteit	1000 L	Vervang stort mengsel na 60 ton vrugte of 150 kratte
	2000 L	Vervang stort mengsel na 80 ton vrugte of 200 kratte
	3000 L	Vervang stort mengsel na 120 ton vrugte of 300 kratte
Vloei tempo	1 krat	250 L per minuut
	2 krat stapel	500 L per minuut
	3 krat stapel	750 L per minuut
Blootstellingstyd	per stapel	1 tot 3 minute

Tabel 2. Geregistreerde aktiewe bestandele vir toediening deur die voor-paklyn stort sisteem, sowel as aspekte wat vir verantwoordelike gebruik in ag geneem moet word.

	Thiabendazole (TBZ)	Guazatine (GZT)	Imazalil/ Pyrimethanil (IMZ/PYR)*	Pyrimethanil (PYR)*	2.4-D
Geregistreerde konsentrasie	•1000 dpm	•1000 dpm	•500 dpm	•1000 dpm	•250 dpm
Voordele	•Groen- en blouskimmel •Latente patogene	•**Suurvrot** •Groen- en blouskimmel	•Groen- en blouskimmel •Latente patogene •Sporulasie inhibisie	•Groen-en blouskimmel •Latente patogene (nie geregistreer)	•Behou stingel-end knoppie •Indirekte inhibisie van latente patogene
Nadele	•Sak uit •**Hoë risiko vir TBZ weerstands-ontwikkeling**	•Residu lading onbekend •Fitotoksiese risiko •Slegs sekere markte •Risiko vir weerstands-ontwikkeling	•**Hoë risiko vir IMZ weerstands-ontwikkeling** •Residu lading suboptimaal	•Residu lading suboptimaal •Risiko vir weerstands-ontwikkeling	
Toepaslikheids/ Versigtings teken	Rooi	Oranje	Rooi	Oranje	Groen

*** Hierdie aktiewe bestandele of kombinasies is geregistreer as spesifieke handelsname; verwys asseblief na leweransier**

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CRI aanbevole voor-paklyn stort mengsel per 1000 liter:

(Die verskeie handelsname en volume per 1000 L is aangewys onder elke aktiewe bestandeel)

- **Thiabendazole (TBZ) (1000 ppm)**
  2.0 L Tecto
  2.0 L Thiazole
  2.0 L Universal Thiabendazole
  2.0 L ICA Thiabendazole

- **Guazatine (1000 ppm)**
  5 L Deccotine
  5 L Kenopel
  4.8 L Citricure

- **Pyrimethanil (1000 ppm)**
  2.5 L Protector

- **2.4-D Sodium Salt (250 ppm)**
  10 L Deccomone
  10 L Calyfix

Belangrike punte om te onthou:

- Die voor-paklyn stort toediening is swakker as ‘n doop behandeling in terme van siektebeheer.
- Die sanitasie van die voor-paklyn stort sisteem en omliggende area is essensiëel
- Dit is belangrik om gestorte vrugte toe te laat om deeglik droog te word om fitotoksiese skade gedurende ontgroening te vermy.
- Die reservoir moet deeglik met chloor of ‘n kwatinêre ammonium produk (KAP) gesaniteer word voor ‘n nuwe mengsel aangemaak word. Daar moet seker gemaak word die reservoir word deeglik met skoon water uitgespoel, omdat chloor nie met enige van die swammiddels gemeng kan word nie en om KAP residue te voorkom.
- CRI beveel nie die gebruik van imazalil (IMZ) in die voor-paklyn stort mengsels aan nie as gevolg van die risiko om IMZ weerstandsontwikkeling aan te help en die essensiële gebruik van IMZ in die swambad en waks.
- Daar is tans geen benatter of saniteringsagent vir gebruik in die voor-paklyn stort mengsel geregistreer nie.

Gauzatine aanwending in die voor-paklyn stort mengsels

- Sommige pakhuise het die verskil in sterkte tussen die drie geregistreerde guazatine formulasies tans op die mark bevraagteken. Die produkte is Deccotine (200 g/L), Kenopel (200 g/L) en CitriCure (210 g/L). Daar is geen verskil in sterkte van die guazatine aktiewe bestandeel, want die aanbevole konsentrasie kompenseer vir die verskil (sien bo). Elkeen van die 3 formulasies lei tot ‘n konsentrasie van 1000 dpm in die stort mengsel

- **Aanbevole verhoging van die guazatine konsentrasie van 500 na 1000 dpm**

  Guazatine was oorspronklik teen 1000 dpm (die geregistreerde dosis) in die stort mengsel gedurende die jare 2000-2005 aanbeveel. ‘n Risko vir die moonlike MRL oorskreiding van guazatine op uitvoer-vrugte het ontstaan na die registrasie van guazatine in die sitrus waks formulasies vir gebruik teen 3000 dpm. Dit het gelei to die verlaging van die aanbevole guazatine konsentrasie van 1000 na 500 dpm in die stort behandeling gedurende die jare 2006 – 2011 om MRL oorskreidings te verhoed. Sederdien het dit voorgekom dat die gevreesde risiko ongegrond was. Die voordurende risiko van suurvrot infeksies op veral sagte sitrus en navels het daartoe gelei dat guazatine weer aanbeveel word teen die gergistreerde dosis van 1000 dpm vir die 2012 pakseisoen.