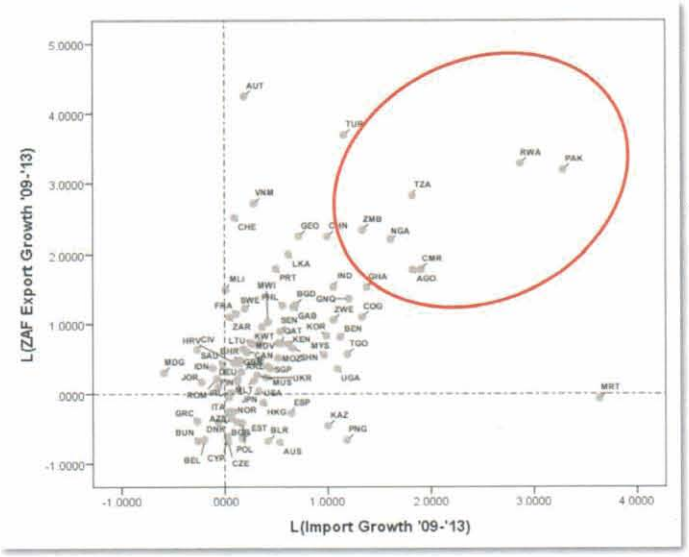

Figure 4. Growth orientation of South Africa's citrus fruit exports 2009 to 2013. SOURCE: Author's own calculations based on data from UN Comtrade (2015)

growth in South Africa's exports of citrus to those markets for that same period. Ideally, for an adequate growth orientation of citrus exports, you want to see high export growth in the fastest growing markets.

It is evident from the figure (see red circle) that South Africa showed some good export performance in the global growth markets for citrus such as Rwanda (RWA), Pakistan (PAK), Turkey (TUR), Tanzania (TZA), Zambia (ZMB), Nigeria (NGA), Cameroon (CMR), Angola (AGO), China (CHN), India (IND) and Ghana (GHA). Note that most growth markets for citrus are located in Africa.

These growth markets, however, do not necessarily pose significant potential in terms of market size. Further analysis show that South African citrus is found on the retail shelves in 35 of the 40 largest import markets for citrus fruit. Of these 50 sizable citrus markets, it currently does not export to Iraq, Thailand, Afghanistan, the Slovak Republic and Hungary. Hence, export potential to these markets should be further explored.

It is evident from the analyses (**Figure 4**) that the South African citrus sector is a best case study for fruit exports which can provide valuable lessons for export development in other agricultural sub-sectors. ‹‹

'n Biologiese benadering tot swartvlekbeheer

Swartvlek op sitrus is 'n ernstige probleem, veral in kusgebiede.

Dr Strauss Ferreira
DIREKTEUR, AGRO-ORGANICS

DIE EPIDEMIOLOGIE VAN SWARTVLEK wys dat die swam op dooie material oorleef, veral op sitrusblare op die boordvloer. Hier kan die swam piknidiospore of askusspore vorm. Dit is egter veral die geslagtelike askusspore wat deur 'n kragtige aksie in die lugstrome vrygestel word en die hoofbron van besmetting op sitrus in Suid-Afrika vanaf einde September tot einde Januarie is.

Een van die interessante eienskappe van swartvlek is dat die veroorsakende organisme, *Guignardia citricarpa*, baie jare lank in 'n spesifieke sitrusgebied teenwoordig kan wees voordat simptome op sitrus voorkom. Voor dit epidemiese afmetings bereik kan dit 5 tot 30 jaar neem, vanaf die verskyning van die eerste simptome op sitrus in 'n bepaalde gebied. Wanneer die siekte epidemiese afmetings aangeneem het, is dit 'n ernstige bedreiging vir enige sitrusprodusent, tensy doeltreffende beheermaatreëls toegepas word.

Om die siekte biologies te beheer sal die beste benadering wees om die swartvlekswam op die vloer van die boord te beheer voordat askusspore in die lug vrygestel kan word.

Baie navorsing is die afgelope twee dekades op die *Trichoderma*-swam gedoen, wat 'n bekende parasiet op ander swamme is, veral wortelpatogene. *Trichoderma* word vandag ook redelik algemeen in sommige boerderye as swamdoder vir bogrondse patogene soos botrytis en selfs houtverrotting-

Die twee foto's hieronder (1 en 2) toon hoe die *Trichoderma*-swam die swartvlekswam (*Quignardia citricarpa*) parasiteer. Die groen/gryserige/wit swam is *Trichoderma*, terwyl swartvlekswam swart vertoon.

***Trichoderma* (vanaf die regterkant van foto) het halfpad oor die swartvlekswam gegroei.**

***Trichoderma* het amper heeltemal oor die swartvlekswam gegroei. Net 'n V-vormige stukkie van die swartvlekswam is nog sigbaar.**

swamme gebruik. Hierdie swam het verskeie meganismes ontwikkel om ander swamme aan te val. Verskeie rasse van *Trichoderma* kan vandag bykans enige patogeniese swam beheer en help die plant ook om voedingstowwe op te neem.

Metode van toediening

Om 'n patogeen biologies te beheer is dit belangrik dat *Trichoderma* op die regte tyd en plek in oorvloed teenwoordig moet wees. *Trichoderma* is 'n baie aggressiewe koloniseerder van organiese materiaal en sal ook die swartvlekswam, wat op die blare oorleef, parasiteer. Vir die doeltreffende beheer van swartvlek op sitrus is dit gevolglik belangrik om *Trichoderma* gedurende Augustus en September op die vloer van die boord toe te dien en die boord se vloer vir 5 tot 7 dae klam te hou so-

NA BLADSY 17 ›››

Stump out calcium deficiencies

STUDIES ACROSS THE WORLD prove that Albion's patented Metalosate Calcium is the most effective way to increase calcium concentrations inside fruit and meristematic tissues, without any phytotoxic side effects.

An increased interest in the use of calcium foliar sprays has been noted and the reason for it is the effect calcium has on fruit quality and shelf life.

Why calcium is essential

Calcium is a divalent cation that is extremely important in maintaining the strength of stems and stalks of plants. It functions in plant cell elongation and division, structure and permeability of cell membranes, nitrogen metabolism and carbohydrate translocation. The mineral also regulates the absorption of nutrients across plasma cell membranes, is non-toxic even in high concentrations and serves as a detoxifying agent by tying up toxic compounds and maintaining the cation-anion balance in the vacuole. It is also one of the most significant factors of firmness and storage life of fruit, as calcium is part of the cell wall and acts as the cement that binds the cell walls together.

Calcium deficiency symptoms

Several factors can cause inadequate calcium in fruit and vegetables, even if the soil and weather conditions seem perfect. The application of nitrogen fertilisers can cause a deficiency. Nitrogen is translocated through the plant approximately 20 times faster than calcium, the slowest moving element in the plant. When unnatural amounts of nitrogen is frequently applied to maintain yields, it can cause plants to grow faster than the calcium can translocate, which then induce calcium deficiencies in growing points and fruit.

A second reason for a calcium deficiency is calcium passively moving through the xylem (water conducting tissue), a movement that is triggered by transpiration. Leaves have a much higher rate of transpiration than fruit, which means that the calcium concentration in fruit will be lower than in the leaves. Leaf calcium concentrations and -appearance is usually a poor indication of a calcium deficiency in fruit. There can be an adequate or even high concentration of calcium in leaf tissue analyses, while calcium deficiencies still result in fruit.

Metalosate Calcium prevents deficiencies that may limit crop growth and yields.

A solution that works

Metalosate Calcium is the only effective and economic product on the market that brings results without a risk of phytotoxicity. Albion has created a patented method for calcium to move in the phloem of plants and also continue with the same speed as nitrogen.

Each calcium ion in Metalosate Calcium is bonded to two amino acids, creating the Metalosate Calcium molecule. The plant recognises the molecule as a proteinaceous molecule and allows it to travel in the phloem, instead of forcing it to use the xylem route. When in Metalosate form, calcium is allowed to be a mobile element, while Metalosate Calcium will also move to the areas where the greatest need of photosynthates in the plant exists, such as the meristematic tissues and fruit. Tests have shown that 50% of the calcium in Metalosate Calcium will be translocated and moving in the plant within two hours after application.

With thanks to Albion Advanced Nutrition for the use of the editorial Metalosate Calcium (Reg. No. B4261/Act 36 of 1947) Active Ingredients: Ca 60 g/kg, 71 g/l. ‹‹

'n Biologiese benadering tot swartvlekbeheer

››› van bladsy 13

dat die *Trichoderma* goed kan vestig. Vanaf einde September moet weeklikse bespuitings van *Trichoderma* ook bogronds op die vrugte gedoen word.

Baie navorsing is die afgelope dekade ook op die metaboliete gedoen wat deur die *Trichodema*-swamme vrygestel word. Hierdie metaboliete is in staat om plante se weerstandsmeganismes te aktiveer en op hierdie wyse ook tot siektebeheer by te dra. Afwisselende bogrondse toediening van *Trichoderma* en die metaboliete is dus nodig vir effektiewe biologiese beheer van swartvlek.

- Die enigste kommersiële gewas waar *Trichoderma* groot verliese kan veroorsaak, is by sampioenboerderye.

Vir navrae, kontak Dr Strauss Ferreira by 021 851 2403 of 082 338 5561, of e-pos **strauss@agroorganics.co.za**. ‹‹