10 MAY 2019

Being Vigilant: HLB and South Africa

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Citrus greening disease takes two forms: Huanglongbing (HLB), the devastating Asiatic strain of citrus greening disease caused by the bacterium *Candidatus leberibacter asiaticus* and African greening disease, caused by the bacterium *Candidatus lebiribacter africanus.* Both forms can be spread by infected plant material or by citrus psyllid vectors, namely *Diaphorina citri (*Asiatic greening*)* and *Trioza erytreae* (African greening) (Gottwald et al., 2007). When a vector is carrying the bacteria, it is called a 'hot vector' (Jansen, 2019). The psyllid vectors transfer the disease-causing pathogens when they feed on plant sap from citrus leaves (Grafton-Cardwell et al., 2006). Asiatic citrus greening is of more importance, as it is far more destructive than African greening and its pathogen can withstand higher temperatures than the African greening disease pathogen.

Fig 1. Adults and nymphs of the Asian citrus psyllid (Grafton-Cardwell).

Symptoms of HLB include leaf yellowing or mottling, yellowing of shoots, twig dieback, poorly coloured deformed fruit, poor internal quality and fruit drop (Gottwald et al., 2007). The fact that leaf symptoms resemble nutrient deficiencies, can cause delayed diagnosis.

Fig. 2. Leaves of tree with Asiatic greening showing zinc deficiency-type symptoms. (Gottwald et al., 2007).

Fig. 3. Tree showing defoliation and dieback. (Gottwald et al., 2007).

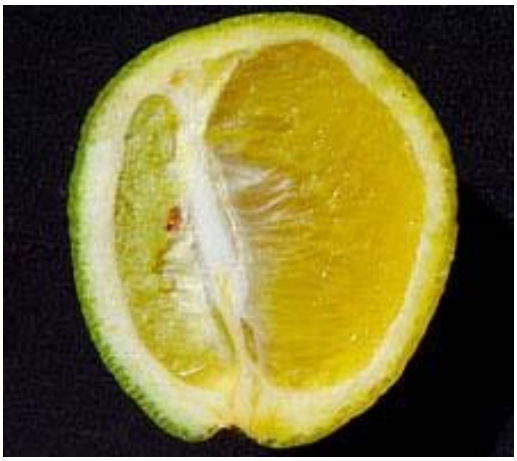

Fig. 4. Asymmetrical, poorly coloured fruit (Gottwald et al., 2007).

Economic impact of HLB

HLB has had a major impact on the citrus industry in Florida. The first case of citrus greening in Florida was detected on a backyard tree in 2005, and now it is present throughout citrus producing counties (USDA, 2016). According to an impact study by Hodges and Spreen in 2012, between the seasons of 2006/2007 and 2010/2011, there was a total output impact of -$4.541 billion. During the 4 years looked at in the study, the direct impact to the Agricultural employment sector was 3 940 jobs lost and the total jobs lost directly and indirectly as a result of HLB was 8 257. In Brazil, where the first reported case of HLB was in 2004, a total of 500 000 trees were officially eliminated by 2007 (three-year period), and 300 000 to 400 000 trees were eliminated unofficially (Gottwald et al., 2007). Currently, it is estimated that 52 million trees have been removed, equal to a quarter of the countries citrus hectares (Jansen, 2019).

HLB threat and Southern Africa

The spread and impact of HLB is quick and drastic. Yield decreases can range from a 30% decrease to total crop loss. An HLB infected orchard can be economically unviable in 5 to 8 years after planting (Gottwald et al., 2007).

Dr. Vaughan Hattingh, CEO of Citrus Research International (CRI), recently told delegates at the citrus summit in Port Elizabeth, South Africa, that the arrival of HLB is not a case of 'if', but rather 'when' (Jansen, 2019). At the Citrus Symposium held during August 2018, the CRI emphasized the importance of monitoring and early detection of the vector and bacteria. Upon positive identification of the disease, infected trees must immediately be removed and destroyed.

The CRI's monitoring efforts extend to neighbouring African countries where collaboration with local citrus industries on a producer and where possible, industry organization or governmental level is initiated. However, those involved in the South African citrus industry and especially those who travel to neighbouring African countries should equip themselves to be able to identify the vector and possible symptoms in order to assist the CRI with early detection attempts. A useful identification sheet can be found at https://ucanr.edu/sites/KACCitrusEntomology/files/158632.pdf.

The HLB vector (free of the HLB bacteria) was detected in Tanzania in 2015, followed by Kenya in 2016. It is known to occur in Réunion and Mauritius. The bacteria itself has been detected in Ethiopia in 2010 and again in 2014. The vector has recently (2019) been detected just north of Mozambique (Jansen, 2019).

Potential sightings of the vector or infected trees should be regarded as high priority with procedures and permits in place to be able to immediately import suspect tree leaf tissues to South Africa for testing at a lab. It is better to be overly cautious and test too many samples than overlook a potential threat by miss diagnosis of photographs of plant material.

Imidacloprid and the HLB vector

Given the magnitude of the threat to our Southern African citrus industry, the ongoing use of the systemic remedy Imidacloprid, registered but under pressure from supermarkets and consumers, should strongly be considered. Imidacloprid can help to suppress the spread of the vector and HLB. At the least, large buffer zones in production areas along national borders in Southern Africa should use Imidacloprid on an ongoing basis, despite no guarantee that a citrus orchard will be the first point of entry of the vector. This measure should be expanded to nurseries and home owners with citrus trees within such regions.

Once the vector or disease is detected, a coordinated eradication strategy involving

multiple agricultural remedies, both systemic- and contact- action, along with destruction of infected trees will be deployed. Buffer zones employing Imidacloprid should then be enlarged. It is important to stay ahead of the spread of the disease, not waiting for the vector to arrive before initiating the use of Imidacloprid.

In South Africa, Imidacloprid is registered as a soil drench. The remedy has attracted criticism due to its previous registered application in countries abroad as a foliar spray, which is indicated to have a potential negative effect on pollinators such as bees. However, soil drench application drastically reduces any potential threat towards pollinators and slight alteration of application timing (after, instead of before flowering) further reduces or likely removes, any potential threat. In the meantime, extensive research is being done to develop agricultural remedies as well as biochemical and genetic strategies to protect citrus industries against HLB and its vector.

Conclusion

When HLB spreads to South Africa, it will have a direct impact on our economy, as well as on the livelihood of farmers and citrus related industries and their employees. With the South African unemployment rate at 27.1% in the first quarter of 2019, we cannot afford this to happen. With South Africa's 2018 citrus exports at a record 2 million tons, the industry was one of the notable agricultural sector performers that helped South Africa out of a technical recession (Dean, 2018).

Given the magnitude of the threat, collective bargaining and reasoning should be engaged in between the industry and supermarkets, along with import country authorities, to emphasize the eminent threat of HLB and provide perspective with regards to the importance and safety of a carefully and responsibly used systemic remedy, with due sensitivity towards the importance of protecting our pollinators.

Sources

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