Phytphagous heteropterans (stink bugs) associated with litchi in the Lowveld

Stink bugs are polyphagous and are able to feed on a whole range of hosts throughout the year. In order to break this seemingly continuous cycle in litchis and other crops, it is important to understand this host switching behaviour.

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The main aim of this trial was therefore to quantify the host status and relative seasonal abundance of various subtropical fruit for important stink bug species but with particular emphasis on the coconut bug. With this knowledge in hand, Panizzi (1997) suggested that migration patterns could be disrupted chemically to the detriment of the pest complex.

Mango (cv. Sensation), avocado (cv. Pinkerton) and litchi trees (cv. Mauritius) at the Agricultural Research Council's Institute for Tropical and Subtropical Crops (ARC-ITSC) (25°27'18.68S 30°58'09.89E) were monitored with a thermal fogging machine (Super Hawk model 2605). Six randomly selected trees of each cultivar were monitored at the ARC-ITSC every fortnight by placing plastic sheeting (±5 m^2) underneath each tree. Trees were fogged between 07:00 – 08:00 to ensure limited disruption of the smoke cloud due to air movement. Dead insects were collected ±1 hour after treatment. No insect management occurred on any of the trees for the duration of the trial.

Remarks by Waite (1990) prompted a deeper investigation into the occurrence of heteropterous insects (stink bugs) on litchis in South Africa. In Australia a large percentage of premature fruit drop was ascribed to damage by coreid bugs of the genus *Amblypelta* spp. which are very similar to the coconut bug. Schoeman & Mohlala (2013) reported subsequently that the coconut bug did indeed occur on litchis in South Africa and mean damage levels of prematurely aborted fruit of 45% were recorded. Because of difficulties in monitoring for these pests, damage assessments were initially based on symptoms. Symptoms were characterised by confining stink bugs in sleeve cages on litchi fruit. However, visual inspection of the trees revealed the presence of large amounts of shield stink bugs (Pentatomidae) on the fruit (Fig.1) which indicated that the situation on litchis may be more complicated than anticipated. All stink bugs feed by inserting their needle like mouthparts into the fruit, therefore damage symptoms from various bugs are expected to be similar.

According to Table 1, 1 232 heteropterans were recovered from the three crops over a period of 17 months. Slightly more than 50% of these insects were recovered from litchi, which indicates that litchi may be a suitable host for this group of insects. Litchi trees are normally very dense and tall and both these factors were linked with high incidence of heteropterans in macadamia orchards (Schoeman, 2014).

The coconut bug only made up 3.33% of all individuals that were located and Table 2 indicates that the majority of these occurred during the winter when no crop damage was expected. Only adults were recorded which strengthened the belief that this insect primarily use this crop as an overwintering refuge. Approximately 20% of the individuals were recovered during September to January when there were crop on the trees, but these numbers were too low to be responsible for the extent of damage observed by Schoeman & Mohlala (2013).

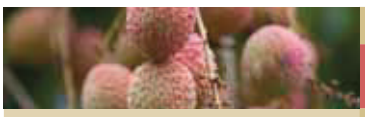
Coenomorpha nervosa comprised nearly two thirds of the bugs that were recovered (Table 2). Approximately 74% were recorded when fruit was available on the trees, which indicates that this insect may be an important contributor to early fruit drop previously ascribed to the coconut bug. Of the nearly 25% of insects that were recorded from February to April, 95% were immature and were therefore effectively trapped on the trees until maturity where after they could migrate to more suitable hosts.

Pseudatelus raptoria made up only 8.8% of all individuals that were located. Peak incidence also occurred during September to January when fruit was available on the trees. This insect could therefore also contribute

Table 1. The occurrence of stink bugs (Pentatomidae & Coreidae) on litchis, avocados and mangoes from February 2013 – June 2014 at the ARC-ITSC in Nelspruit.

Crop	Number of species	Number of bugs collected	Number of trees surveyed	Number of bugs/tree
Litchi	22	660	100	6.6
Mango	26	267	110	2.43
Avocado	22	305	168	1.22

Table 2. Relative seasonal occurrence of the four most abundant heteropterans that were recovered from litchis at the ARC-ITSC in Nelspruit from February 2013 – June 2014.



	Number of bugs/tree (%)		
	May – August (winter)	September – January (flowering & fruit)	February – April (post-harvest)
Pseudotheraptus wayi (coconut bug)	0.35 (55.56)	0.13 (20.63)	0.15 (23.81)
Coenomorpha nervosa (mottled bug)	0.15 (1.26)	8.78 (73.91)	2.95 (24.83)
Unidentified bug	0.35 (18.42)	0.35 (18.42)	1.2 (63.16)
Pseudatelus raptoria (powdery bug)	0.2 (11.76)	1.0 (58.83)	0.5 (29.41)

Figure 1. ***Pseudatelus raptoria*****: a shield bug commonly observed on litchis in the Nelspruit region of South Africa.**

to crop losses observed by Schoeman & Mohlala (2013). According to Haddad & Louw (2006) it was also regarded as the main pest on pistachio nuts in the Northern Cape Province. As with *C. nervosa*, 80% of the individuals of this insect recorded from February to April were immature.

The unidentified bug occurred in large numbers during February to April and due to its short mouthparts and abundance late in the season when no fruit is present, it is not expected to be of any economic significance.

Conclusions

a) Litchis appear to be a good over-wintering host for the coconut stink bug. In cases where macadamias or avocados are cultivated in close proximity to this crop, application of a discrete spray of an environmentally friendly product during winter could be considered to eliminate incursions of this insect into summer hosts such as avocado and macadamia.

b) The main heteropterous pests of litchis are probably *Coenomorpha nervosa* and *Pseudatelus raptoria* and not the coconut bug. Schoeman & Mohlala (2013) proved that profusely bearing litchi trees were able to compensate for damage. The effect of heteropterans on yield during an off-year when lower yields are expected should still be tested.

c) Mouthparts of stink bugs are not aseptic and bugs may transmit various opportunistic saprophytic fungi to the fruit. Most stink bugs feed on the seed and not the fruit pulp. Initially damaged fruit will be indistinguishable from undamaged fruit, but the shelf life of damaged fruit could be compromised.

d) Newton (1989) found that totricid moths (false codling moth and litchi moth) lay more eggs on damaged fruit. A possible link between early heteroptera damage and subsequent totricid infestation should be investigated as it could have a considerable effect on crop protection.

e) Stink bug infestation in litchis is not a new phenomenon, this crop has been produced in South Africa for decades without any form of stink bug control. No chemical is registered for this group of insects and any chemical usage should be done with extreme circumspection as not to damage the current delicate biological balance in South African litchi orchards.

References

Haddad, C.R. & Louw, S. vd M. 2006. Phenology and potential biological control of the stink-bug *Atelocera raptoria* Germar (Hemiptera: Pentatomidae) in pistachio orchards. *African Plant Protection* 12: 23-27.

Newton, P.J. 1989. The influence of citrus fruit condition on egg laying by the false codling moth, *Cryptophlebia leucotreta. Entomologia Experimentalis et Applicata* 52: 113-117.

Panizzi, A.R. 1997. Wild hosts of Pentatomids: Ecological significance and role in their pest status on crops. *Annual Review of Entomology* 42: 99-122.

Schoeman, P.S. 2014. Aspects affecting distribution and dispersal of the indigenous Heteroptera complex (Heteroptera: Pentatomidae & Coreidae) in South African macadamia orchards. *African Entomology* 22(1): 191-196.

Schoeman, P.S. & Mohlala, R. 2013. The impact of *Pseudotheraptus wayi* Brown (Hemiptera: Coreidae) on premature fruit drop and yield of *Litchi chinensis* in the Mpumalanga province of South Africa. *International Journal of Pest Management* 59(4): 303-305.

Waite G.K. 1990. *Amblypelta* spp. (Hemiptera: Coreidae) and green fruit drop in lychees. *Tropical Pest Management* 36(4): 353-355.