

Report

On Visit to the Coringa – Herald Nature Reserve 17-21 December 2001

with regard to the releasing of
parasitoids and ladybird predators of
the pest scale *Pulvinaria urbicola* on
Pisonia grandis.



Releasing parasitoids



Shoots with heavy infestation
of scale cleaned up by
Cryptolaemus montrouzieri



Tub for release of
Coccophagus ceroplasae

Photos by M Hallam

Dan Smith, Dan Papacek and Jonathan Smith.

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Itinerary

North East Herald was visited on the Australian Customs vessel DR Mitchell with Mark Hallam and team from 10 December. He was joined by Dan and Jon Smith from 17 December. South West Herald was visited on 20 December and all returned to Cairns on 21 December.

Objectives

1. Collect and rear the small wasp parasitoids (mainly *Coccophagus ceroplastae* and *Metaphycus sp.* and the ladybird *Cryptolaemus montrouzieri* on the mainland in preparation for re-release on NE Herald.
2. Re-release the parasitoids on NE Herald with the aim of confirming establishment.
3. Re-release *C. montrouzieri* in scale pockets on NE Herald. Treat for ants if necessary.
4. Reassess levels of pulvinaria scale on *Pisonia* and ant levels.
5. Determine if the parasitoids and ladybirds released in August established and their levels in the scale. Reassess scale levels on *Acharanthus* on SW Herald, assess presence of natural enemies, release *C. montrouzieri* and treat for ants if necessary.

Ladybird and parasitoid releases: *Coccophagus ceroplastae* was multiplied on *Pulvinaria urbicola* on young potted *Pisonia* plants during September – December 2001. These *Pisonia* plants were derived from thick (2-4 cm) wood cuttings brought back from NE Herald in August. They were dipped in Clonex ® (Gel-Green 1.5g/l indole 3 butyric acid) and rooted in river sand in a mist bed with bottom heating. Establishment of *C. ceroplastae* (coming out of late winter) was slow but there were moderate levels by mid December. The scale and parasitoid infested shoots were pruned off on 15 December, leaves removed and the shoots dipped in a mixture of benomyl fungicide and the miticide abamectin.

Metaphycus sp. was taken as adults in ten 500 ml tubs. *C. montrouzieri* was again supplied free of charge by Dan Papacek of the 'Bugs for Bugs' Insectary at Mundubbera with a total of 20 tubs totalling about 10 000 adult beetles. The *Metaphycus* and *Coccophagus* were released on 18 December in transect 8 (the northern end within the first 100m) where there was the greatest concentration of scale (surviving *C. montrouzieri* predation since release in August). The scale/parasitoid infested *Pisonia* twigs were hung in 8 small tubs (ant proofed) to allow progressive emergence of *Coccophagus* over the next 2 weeks. The release area

was treated for ants with a ground dog biscuit (Lucky Dog 15% protein, 10% fat, 5% fibre) fipronil bait (100 ppm) at a rate of 2.5 kg/ha.

Fresh beetle releases were made in transects 4 (60m), 5 (440m), 6 (280 and 480m), 8 (160, 340 and 370m) and 9 (30m) totalling about 7000 beetles on 18-20 December. The remaining 3000 beetles were released on SW Herald (interior SW corner) on 20 December.

The area of release was 200m by 50m or 1ha (and this was treated with the dog biscuit fipronil ant bait).

Scale, ant and natural enemy assessments: Scale/leaf samples were made (as described in Report No 1, 16-23 March 2001). Counts were made every 60m. Scale samples were collected, examined using a binoc stereoscope on the island and stored in mesh tubs and tubes for further examination/rearing out on the mainland.

Results

Counts of the transects of NE Herald made on 19-20 December are listed in Appendix 1. Results are summarised in Table 1.

Scale levels: The most heavily scale infested transect was No 8 with a total of 415 live scale (172 first, 171 second and 72 third instars). Transect 2 had 95 scale, transect 5 – 55, transect 11 – 52 and transect 6 – 41. Transects 1, 3, 4, 7 and 10 were almost scale free. The scale average per cm of leaf index was 0.18 compared with 0.43 in March 2001. The same index for just transects 2, 4, 6 and 8 in December was 0.30 as compares 1.48 in August and 0.33 in March. Whereas dead trees were evident in transects 1, 2, 6 and 8 especially on the northern edge in August, there was little evidence of dead trees in December.

The period from August – December must have been very dry as evidenced by water stressed *Argusia argentea* and by the dryness of the sand above the high water mark. This had also stressed the *Pisonia* forest but possibly the only evidence of this was a smaller average leaf length in the samples – 12.04cm in December in comparison with 20.4cm in August and 19.02cm in March. There was no evidence of leaf wilting in the *Pisonia*.

Ant levels: Total ant numbers were 238 *Tetramorium* sp. and 3 *Monomorium* sp. This compares with 339 and 36 for the same number of sites in March. Transects 2, 4, 6 and 8 in December had 165 *Tetramorium* sp and 0 *Monomorium* sp. as compared with the same transects in August of 731 and 16 respectively. Ant numbers had fallen then approximately 4 fold since August and by 30% in comparison with March.

Predatory beetle levels: *C. montrouzieri* levels had obviously greatly escalated since releases in August. In December, 87% of all scale infested leaves had evidence of beetle activity most of it in the previous 2 months. Out of a total of 1053 adult egg producing scale, only 9 were free of beetle activity, 993 had been eaten out and 51 were currently under attack. The beetle has almost destroyed the scale populations in every transect except 8 and is currently very active there.

On SW Herald, vegetation was severely affected by the dry conditions and species like the herbaceous *Acharanthes aspersa*, *Portulaca oleracea* and *Tribulis cistoides* (hosts of the scale) were much reduced with many dead plants. Live *A. aspersa* was heavily infested with scale and specimens were collected. Subsequent examination showed them also to be heavily infested with *C. montrouzieri* larvae. It must be

calculated that the beetle had spread some 12km from NE Herald in the previous 3 months. It is evident that a very large population of beetles has developed on NE Herald with many dispersing adult beetles looking for food.

Wasp parasitoids: Establishment of *Euryischomyia flavithorax* and *Metaphycus sp* was confirmed with *E. flavithorax* the most numerous particularly on the northern edge of transect 10 on NE Herald where about 50 out of 60 second instar scales on one leaf were parasitised by this species. There was no confirmed instance of *Coccophagus ceroplastae*.

Discussion

The scale population on NE Herald has declined 82% since August, 70% since March 2001. Transect 8 is the most infested but there are currently no trees highly enough infested to be seriously threatened. The result is very dramatic and timely in view of the considerable stress on the *Pisonia* forest by the dry conditions. The combination of heavy scale and drought would have killed many trees over the last few months.

The massive reduction in scale infestation has been produced by *C. montrouzieri* with almost every egg producing female being eaten out and many younger scale also. Much of the scale destruction appears to have occurred in the previous 2 months and by December the remnants appear to be being 'mopped up'. The potency of a *C. montrouzieri* release for outbreaks of *Pulvinaria urbicola* as occurred on NE Herald is obvious. It is uncertain at what level the beetle and scale population will stabilise. *C. montrouzieri* thrives where there are high host numbers (with much production of scale egg masses) reaching high numbers then dispersing when the host population collapses. It is possible 1) that the scale population on NE Herald will settle at a low level with *C. montrouzieri* also surviving but only increasing significantly when small outbreaks of the scale occur or 2) that the scale population will be reduced to a level that cannot sustain *C. montrouzieri* and the beetle will die out.

Parasitoids have not been responsible for the scale reduction in the past 4 months but have established and will play an increasing role as they become more widespread on the island and also as scale numbers drop. *C. montrouzieri* is more dependant on the egg producing adults whereas the parasitoids search out and attack mostly second instar scales and young adults and persist more readily when host numbers are small. They probably have better searching capacity for their host at lower scale densities and better capacity to reach a balance at lower scale densities. A considerable effort was again made on this visit to establish *Coccophagus ceroplastae* and it is considered important to establish this natural enemy. It is currently the key to control of *P. urbicola* in the Capricorn Bunker Group. It is possible that the peculiar facultative hyperparasitism of the male on the female is making establishment difficult. This dictates that a staggered release must be made, the first release resulting in female juveniles, the second (after about 2 weeks) then also producing males. The distance of NE Herald from the coast has prevented such a staggered release. In December more scale/parasitoid infested twigs were suspended in small tubs in the trees aiming at emergence of the parasitoid over a period of about 10 days. The very heavy predation by *C. montrouzieri* may also have influenced establishment of *C. ceroplastae* by eating out the areas of release particularly in transect 1.

The scales natural enemy level on NE Herald is not the final result but it is **very unlikely that *P. urbicola* will again poise a serious threat**. Parasitoid levels will increase and even if *C. montrouzieri* dies out rereleases (of 1000 – 2000 beetles) if warranted are a readily available tactic. Until the situation becomes clearer a small consignment of beetles should possibly be automatically taken out to the island once a year.

As expected **the ant population has declined** with the decline in scale numbers. The use of ant bait – Amdro ®, Presto ® (fipronil plus fishmeal) or the ground dog biscuit and fipronil bait used on this occasion remains a useful tactic to reduce ants where natural enemies are being released.

Recommendations

A visit in March 2002, Monday to Friday is recommended to

- Assess the final levels of scale and the beetle *C. montrouzieri* on NE Herald. This should clarify whether the beetle will persist at low scale host levels.
- Further assess the establishment of the parasitoids *E. flavithorax* and *Metaphycus* sp. It is important to confirm their establishment throughout the island and their persistence in low scale numbers particularly if beetle numbers so decline as to allow some scale resurgence.
- Determine if efforts to establish *C. ceroplastae* in December were successful. Make further releases of *C. ceroplastae*. This parasitoid must still be regarded as having priority in gaining establishment. It is a proven effective agent against the scale in stable medium to low infestations. Over the next 4-8 weeks there will be very good numbers (reared at Nambour) ready for a further release in Late February-early March.
- Reassess the situation on SW Herald particularly as regrowth occurs with more rain.
- Prepare press and TV release material (Mark Hallam assisted by D Smith) to strongly publicise the success in saving the *Pisonia* forest on NE Herald.
- Begin preparation of a scientific publication (Smith assisted by Hallam and Papacek); further assessments in March would be beneficial .

Serious consideration should be given (especially if effective control continues on NE Herald and also on SW Herald)

- To releasing *C. montrouzieri* on Coringa Islet (it will be interesting to see if the beetle can traverse the gap of 120 km between NE Herald and Coringa of its own accord). The sooner the beetle is released here the better; there was one live *Pisonia* in March although it is unlikely to have survived.
- Investigating biocontrol options for the hawkmoth problem (*Theretia* spp.). One or two species cause considerable defoliation each summer on the *Pisonia* on NE Herald and SE Magdelaine. Wasp egg parasitoids are common in mainland

hawkmoths and the inexpensive release of a mass reared species like *Trichogramma praetosum* may be possible.

- SE Magdelaine should be briefly visited (eg half day) to ensure that *Pulvinaria urbicola* has not arrived and is causing damage. Some *C. montrouzieri* should be re-marked for release against the possibility of infestation

Future visits to assess scale/beneficial levels in particular

- A yearly December visit (combined with turtle/bird studies) would be ideal timing to assess scale and beneficial level in the future.

References

Smith, D. and Papacek, D. F. (2001). Report on the levels of the scale insect *Pulvinaria urbicola* and its natural enemies on *Pisonia grandis* in the Coringa – Herald National Nature Reserve 16-23 March 2001.
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