



Project Report-2007

Project Title: Bio-Control of Dearsness Scale,  
*Rhizaspidotus dearnessi*  
(Cockerell) (Homoptera: Coccoidea:  
Diaspididae)

Part 2

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**Egg Stage:**

In the early samples, the abdomen of the female contained granular textured viscous yellowish fluid that oozed out when poked with a needle. This viscous fluid contained eggs in the early developmental stage. In later April and into May, the fluid became thicker and granules appeared larger. By mid May, the eggs were hatching into crawlers which remained inside the shell of the female till they were found on branches in the first week of June. While eggs were still present at this time, their numbers were declining as crawlers hatched. No more females with eggs were found after the second week of June.

**The Crawlers:**

The crawler stage was recorded on the vines from first week of June. They were found both on new growth on the older vines. The cranberry crop, at this stage, had several new uprights and the hook stage was in progress.



Dearness Scale crawlers were tiny (less than 1mm.) highly mobile, yellow ovals with three pairs of legs. The crawlers have needle-like mouthparts which they inject into the live vine and feed continuously. The crawlers hatched from the mature eggs and remained within the shell for at least 2 weeks before being found on the vines. Females appeared to hatch eggs, and release crawlers over approximately 4 weeks as the eggs matured sequentially. Prior to crawler presence on vines, dissection of the adult female shell revealed the presence of crawlers inside. Crawlers escaped from the shell through a small split between the shell's upper and lower portions at the tapered flattened end. The crawlers appeared to move easily to new growth and settled. Once settled, they stopped moving and very quickly developed a miniature thin shell. Young scales were found both singly and in clusters.

**Crawler Sexual Dimorphism:**

The crawlers settled on the adequate locations on the newly formed uprights and in-between the leaf and twig area under a protective cover. The crawlers developed into elongate small male scale and round and clam-shaped female scale. The female remains sedentary while the male scale developed into a free winged insect with 3 pairs of legs and well developed eyes. The male had its abdomen terminating into a needle-like structure to help facilitate in mating.



Male & female scale



Male scale



Male & female scale

### **Possible Predator feeding and Parasitoids of dearness scale:**

Mahr (2005) reported tiny, naturally occurring parasitic wasps, *Coccodencyrtus dearnessi* that attacked dearness scale in Wisconsin cranberry bogs. He reported that when the parasitic wasps emerged from the scale host, they left a small but noticeable hole in the back of the scale covering. Such symptoms were recorded on the scale samples collected from the defined experimental field sites. Scale specimens with such symptoms were collected and kept in the laboratory for further rearing, but nothing noticeable emerged.



Scale samples collected from dry harvest bog site



Possible predator feeding scale samples from dry harvest field

Sheila (2004) reported that there was evidence of parasitism and predation on dearness scale in British Columbia. Similarly, as documented through pictures below, symptoms were observed on scale samples collected from wet harvest fields where there was lot more predator/ parasite activity compared with the dry harvest bogs.



Parasite activity in the samples collected from wet harvest field



Predator feeding symptoms on female scale shells from wet harvest fields

As Mahr (2005) mentioned, insecticide applications during parasite flight periods probably contribute towards their kill and enhance scale outbreaks. This seemed true with BC scale situation, as well. It was found that highest numbers of damaged scale specimens were recorded in late May when the scale females were getting ready for the crawler delivery. Much predation activity also was observed during the same period. It was likely that the application of pesticides during that period resulted into parasite/ predator mortality.

### **Future strategy for Dearness Scale:**

- **Mating disruption approach:** The scale males fly in August and if they fail to fertilize females at that time, one can assume that the females will either die during winter or survive but not be able to produce crawlers in spring. This presents an opportunity for control as it is a potentially vulnerable point in the lifecycle. An insecticide at this time or a flood for green harvested berries, or girdler, may remove a significant number of the males.
- **Systemic Insecticide Application:** A systemic insecticide at a time when the roots or leaves will actively take one up could well control scale settled and feeding on the vines. Early spring or immediately post bloom are two possible times. The first would target mature females before they produce crawlers, and the second, young settled crawlers. It's possible that one of these stages would be more vulnerable than the other to a systemic insecticide.

- **Protecting Natural parasites and Predators:** There is evidence in the literature, that insecticide treatment may not be as effective in managing scale, as simply protecting the natural predators and parasitoids which attack it and provide “free” control.
- It is worth while to mention here that with the information achieved during the first year and recorded in this report, it formed a sound base for further innovative thoughts and experimentation with the proposed above strategies to develop, identify and establish better control measures for dearness scale control and prevention of its further outbreaks.

### **Acknowledgements**

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### **References**

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