FIGURE 1 | Soft scale infestation (Mauritius).

THE SOFT SCALE - *PULVINARIA ICERYI* (SIGNORET) (HEMIPTERA - COCCIDAE)

biosecurity feature

There are numerous pests and diseases at our doorstep threatening the Australian sugarcane industry. Awareness is the best weapon to combat any threats. In this biosecurity feature BSES Entomologist Nader Sallam based at Gordonvale focuses on soft scale.

COMMON NAME

The pest is commonly known in French as 'pou à poche blanche' because of its characteristic white ovisac which is attached to the body of the mature adult.

DISTRIBUTION

The soft scale, *Pulvinaria iceryi* (Signoret), is recorded from Mauritius, Reunion, South Africa, Zimbabwe, Madagascar, Zambia and Uganda (Ganeshan 2001).

HOST PLANTS

Sugarcane, couch grass (*Cynodon dactylon*), Guinea grass (*Panicum maximum*), *Digitaria* spp., Vetiver grass (*Vetiveria zizanioides*), Setaria grass (*Setaria barbata*) and *Paspalum* spp. are host plants.

DAMAGE SYMPTOMS

The soft scale infests cane plants in all stages of growth and gradually becomes more extensive as cane matures. Infestation is characterised by the occurrence of numerous individuals on the underside of leaves (Figure 1). Nymphs and adults (Figures 2 and 3) are covered with a white, cottony formation and are immobile. Insects suck the nuclear sap through their piercing and sucking mouth parts and also inject toxic saliva into the plant causing purple or yellow discolouration and premature death of leaves. The insects also excrete honeydew which results in the growth of 'sooty mold', reducing the plant's ability to perform photosynthesis. Infestation ultimately causes reduction or stoppage of growth, and the entire cane plant may die in cases of severe infestation. Plants which survive the attack remain weak and may die later or fail to ratoon after harvest.

LIFE CYCLE

Insects belonging to this species are only females, hence they reproduce 'asexually', which means that the ovum develops into a new individual (another female) without fertilisation. Mature females have an 'ovisac' attached to their body. Eggs hatch inside the ovisac and the new hatchlings (first instar nymphs) disperse and settle in a new location on the plant. The new hatchlings are the only mobile stage, and once they settle in a new location they tend to remain where they are. There are three nymphal instars and the last instar turns into the adult stage. The adult female loses its ability to move as the formation of the ovisac begins. The duration from the egg stage to a mature adult varies from 35-60 days, and one female can lay up to 1,000 eggs. A fully mature adult measures about 4.5 mm in length excluding the ovisac (Ganeshan 2001).

ECONOMIC IMPACT

Pulvinaria iceryi is generally a minor pest of sugarcane. However, outbreaks are known to occur and significant economic losses can be incurred. For example, one severe outbreak occurred in Mauritius in 1976-77 over an area of more than 4,200 hectares, and this led to an estimated loss of about 20,000 tonnes of sugar. Many fields were destroyed and had to be replanted during that outbreak. Since 1997, localised severe infestations have been recurring in many fields in Mauritius every year. In 2005, more than 600 hectares were infested, leading to an estimated loss of about 2,000 tonnes of sugar. High infestation may cause up to 70% reduction in CCS and 35% reduction in juice purity (Soma and Ganeshan 2003).

MANAGEMENT

In Mauritius, good natural control is normally exerted by several species of parasitoids and predators, and in the majority of cases insecticide spraying is not required.

BIOLOGICAL CONTROL

Pulvinaria iceryi populations are generally kept under control by the action of several natural enemies. The most common parasitoids are *Coccophagus cowperi* Girault and *Aneristus ceroplastae* Howard (Hymenoptera: Aphelinidae), while the most common predators are *Cryptolaemus montrouzieri* Mulsant, *Exochomus laeviusculus* Weise and *Hyperaspis hottentota* Mulsant (Coleoptera: Coccinellidae) (MSIRI, 2002), with *Cryptolaemus montrouzieri* (Figures 4 and 5) being the most efficient predator worldwide. This natural enemy is native to Australia and has been imported into several countries for the control of species of mealybugs and soft scale pests.

CULTURAL CONTROL

In cases of low infestation, thorough trashing and removal of all yellowing leaves can be effective. Early harvest is sometimes practiced in cases of high infestation.

CHEMICAL CONTROL

No chemical control is practiced against this species to encourage the impact of natural enemies (Ganeshan 2001).

MEANS OF MOVEMENT

Soft scales can be easily transmitted on plant material. Both mature and immature stages can be carried by wind. In case of introduction into Australia, this species might be confused with the Pink Sugarcane Mealybug (*Saccharicoccus sacchari*) which is established in Australia.

REFERENCES

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Soma AG and Ganeshan S. 2003. Some effects of the soft scale *Pulvinaria Iceryi* (Sign.) (Homoptera: Coccidae) on sugar cane. *Mauritius Sugar Industry Research Institute* AMAS. 163-168. Food and Agricultural Research Council, Réduit, Mauritius.

FIGURE 2 | Close up of soft scale adults.

FIGURE 4 | *Cryptolaemus montrouzieri* larval stage. The larval stage of the predator is covered with white scales, mimicking that of the pest's.

PULVINARIA ICERYI POPULATIONS ARE GENERALLY KEPT UNDER CONTROL BY THE ACTION OF SEVERAL NATURAL ENEMIES.

FIGURE 5 (RIGHT) | The adult ladybird beetle. *Cryptolaemus montrouzieri* is an effective predator of a wide range of mealybug pest species worldwide.

FIGURE 3 (BELOW) | Close up of soft scale nymphs and adults.