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The spotted stalk borer, *Chilo sacchariphagus* Bojer, is a major pest of sugarcane in southern Asia and on islands in the south-west of the Indian Ocean. In Reunion, Mauritius and Madagascar, the borer has been a serious pest since it was introduced with sugarcane during the 19th century.

The Entomology Laboratory of CIRAD, which has been working for nearly 30 years on insect pests, including stem borers, has focused its research programme on the control of the spotted stalk borer since 1994. About 17 species of natural enemies of *C. sacchariphagus* were introduced into Reunion from various countries in the 1970s, but only one third of them established themselves and none have successfully controlled populations of the borer. Therefore, the bio-ecology of the borer is being re-examined, from population dynamics in the field to laboratory studies, with biological control of the borer as the main goal.

Life tables studies indicate that the borer is more likely to develop large populations in the lowlands of the island, where the temperature exceeds 20°C nearly all year round (optimum temperature for development of *C. sacchariphagus* is 26°C).

The population dynamics of the borer were precisely determined, on the two main varieties of sugarcane (R570 and R579) grown in Reunion, at two sites on the island representing distinct climatic zones (Goebel, 1999). On a regional scale, the population dynamics of *C. sacchariphagus* have been studied in relation to damage caused to sugarcane. Such damage is expressed as the number of infested sugarcane internodes in sampled stalks (Goebel, 1999). These factors have been examined in relation to variety, cultural practices, and climate for four consecutive years at 50 sites distributed over the island. Similarities in infestation level observed between neighbouring sites were frequent, and revealed a regional pattern, probably related to the local climate.

Crop loss studies showed that only R579 was affected in terms of cane yield, expressing a reduction in growth rate, height and diameter of the stalks at harvest. In heavy infestations, yield loss can reach 30% of the mass of commercial cane, compared with losses in resistant variety R570.

Repeated studies over several crop cycles and field trials also confirmed that the variety R579 was more susceptible to *C. sacchariphagus* than the more common variety R570. The latter is resistant to the borer and various aspects of this resistance (antibiosis, antixenosis, and penetrometry of stalks) have been investigated (see for example Vercambre *et al*., 1997; Morin, 2000). Resistance appears to be due, at least in part, to the mechanical characteristics of cane stalks arising from the structure of plant tissues and components of cell walls (tannin, lignin or silicate). This is being studied using artificial diets with sugarcane powder to rear *C. sacchariphagus* larvae.

The impact of predators, predominantly ants of the genus *Pheidole*, on borer egg masses was quantified: 80-90% of the eggs are eaten by predators (Goebel, 1999; Goebel *et al.*, 1999; 2000). It is believed that the practice of burning the crop, before or after harvesting, has negative effects on natural enemies; moreover borer larvae and pupae, living inside the stalks, are less affected by the burning practice. Observations have shown that when burning was banned, natural enemy populations increased and damage due to borers was reduced (Goebel, 1999).

C. sacchariphagus and *Galleria mellonella* eggs are used to trap egg-parasitoids in the field in order to identify parasitoids and to examine their population dynamics. Natural parasitism of borer eggs is about 30-40% (Goebel, 1999), with maximum parasitism observed from November to February. To date, a single species, *Trichogramma chilonis* Ishii, has been recovered in sugarcane fields in Reunion. Bionomics of the species and/or strains of *Trichogramma* collected in the fields are being examined in the laboratory to select appropriate strains for mass production and augmentative release programmes.

Field experiments with inundative releases of *Trichogramma* are planned to test for their efficiency. Predation of borer eggs by ants is lower during early growth stages of sugarcane (December – February) (Goebel, 1999), which corresponds to the highest attack rate of the borer on the plant. Hence, releases of *Trichogramma* should take place during this period of reduced vulnerability to predators.

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