

THE *MYTHIMNA* SPP. (LEPIDOPTERA: NOCTUIDAE) COMPLEX ON SUGARCANE IN MAURITIUS

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Abstract

An upsurge of damage caused by *Mythimna* spp. has been observed in recent years in Mauritius. Larvae of *Mythimna* spp. were collected in 1995 from sugarcane fields in Mauritius and reared in the laboratory in order to clarify confusion in the species taxonomy. The abundance of species from various localities was recorded. Out of 380 moths reared from field collected larvae, 283 *M. curvula* Walker, 81 *M. loreyi* Duponchel, 12 *M. leucosticha* Hampson and 4 *M. insulicola* Guenée moths were obtained. Overall parasitism of all species was 16,6% and the major parasitoid was *Alsomyia anomala* Villeneuve (Diptera: Tachinidae). Specimens collected in 1959 from two localities (originally classified as *M. loreyi*) were also examined and revealed the presence of both *M. loreyi* and *M. curvula*. Burning, mechanical harvesting and trash blanketing appear to favour damage and it is suggested that an increase in these practices has led to the recent upsurge of the pest in Mauritius.

Keywords: *Mythimna* spp., relative abundance, parasitism

Introduction

The genus *Mythimna* comprises species involved in what are referred to as 'armyworm' outbreaks (Anon, 1960; Carnegie, 1977; Holloway *et al.*, 1987; Chandler and Benson, 1991). They have been given this common name due to their sporadic occurrence in large numbers in a manner similar to the African armyworm, *Spodoptera exempta* (Walker), which is a serious pest of many graminaceous crops (Brown, 1972; Carnegie *et al.*, 1974). Larvae of *Mythimna* spp. feed on pasture grasses, sugarcane and maize (Ganeshan and Rajabalee, (1995) *in press*) but, unlike *S. exempta*, which is a true armyworm, they do not migrate from one feeding site to another in search of food. The term 'trash caterpillars' has also been used to refer to these larvae due to their presence under the trash during the day. However, since several species occurring in the trash blanket essentially feed on dry or decaying trash, eg *Simplicia extinctalis* Zell., *Athetis ignava* Guenée and Dick, 1972; Carnegie, 1977) and *Nodaria cornicalis* (Fabricius) (Chandler and Benson, 1991) and do not feed on living cane leaves, using the term 'trash caterpillar' to refer to *Mythimna* spp. can be misleading. For want of a better name, the term 'armyworm' will therefore be used throughout this paper.

The moths of *Mythimna* spp. are nocturnal and hide during the day. The larvae start feeding at the onset of darkness and are rarely seen during the day (Carnegie and Dick, 1972; Carnegie, 1977; Ganeshan and Rajabalee, (1995) *in press*). The mode of attack of these species varies in different parts of the world. Blanket trash lining has been found to favour *M. phaea* Hampson and *M. polyrabda* Hampson in South Africa (Carnegie *et al.*, 1974; Carnegie and Dick, 1972) and *M. separata* (Walker), *M. convecta* (Walker) and *M. loreyimima* (Rungs) in Australia (Chandler and Benson, 1991).

Many species of 'armyworms' have been recorded from cane in Mauritius. Those causing severe outbreaks in young

regrowth of manually harvested sugarcane fields, burnt prior to harvest in 1959 were identified as *Mythimna* (= *Leucania*) *loreyi* Duponchel (Anon, 1960). Subsequently, Williams (1978) recorded the species as being sporadic in Mauritian cane fields. *M. tincta* Walker, recorded in 1971, sometimes eats the leaves of young cane shoots (Anon, 1972). Species recorded in Mauritius from other host plants include *M. nebulosa* Hampson (Vinson, 1938; Rungs, 1955), *M. hypocapna* Joannis (Vinson, 1938), *M. leucosticha* Hampson, *M. insulicola* Guenée and *M. infrargyrea* Saalmüller (Rungs, 1955). *M. loreyi* has been reported to attack sugarcane and other graminaceous crops in Africa, Australia, Philippines and Southern Europe (Box, 1953; Chandler and Benson, 1991; Calora, 1966; Edwards, 1992). *M. curvula* Walker has been reported from Réunion on sugarcane and other grasses (Etienne, 1976) and from Madagascar on sugarcane (Appert, 1967; Rungs, 1955).

With the advent of mechanical harvesting of sugarcane, an upsurge of 'armyworm' damage has been observed (Anon, 1993). Specimens collected from the mechanically harvested fields and sent to the International Institute of Entomology in 1992 were identified as *M. curvula* (= *pseudoloreyi*).

The amount of loss incurred from damage by 'armyworm' has been studied through damage simulation studies in Mauritius and South Africa. However, these experiments did not give consistent results. Some workers have shown reductions in yield, while others show no significant losses (Chandler and Benson, 1991; Ganeshan and Rajabalee, (1995) *in press*). However, 'armyworm' damage may retard shoot development, and crops which are under stress, eg drought conditions or underground stalk breakage, would suffer from the damage.

There has been considerable taxonomic confusion regarding members of the genus *Mythimna*. Calora (1966), Rungs (1955) and Edwards (1992) have studied the species from the Phillipines, Madagascar and Australia respectively. Detailed taxonomic studies have not been carried out in South Africa (Carnegie *et al.*, 1974)

In this paper an attempt is made to clarify the identity of the species involved in the 'armyworm' outbreaks of recent years in Mauritius and their relative abundance is reported.

Materials and methods

Larvae of *Mythimna* spp. were collected in 1995 from sugarcane fields in various localities (see Table 1) and reared in the laboratory at a mean ambient temperature of 20,5°C (minimum 15°C, maximum 27°C) and relative humidity of 72% (minimum 60%, maximum 92%). Larvae were placed singly in pill boxes (50 mm diameter x 25 mm high; Watkins and Doncaster, UK). The lids of the boxes were provided with a 30 mm diameter opening sealed with bronze wire gauze (80 mesh) for aeration. The larvae were fed with pieces of mature cane leaves (8 cm²) which were replaced every second day. Moist tissue paper (ordinary white or coloured Kleenex, 100 mm x 100 mm, folded into four) was placed inside the boxes

to prevent desiccation of the leaf pieces. Parasitism was recorded and the pupae obtained were kept for adult emergence.

The external morphology of 380 moths was observed and the genitalia dissected and mounted following the procedure described by Holloway *et al.* (1987).

The 20 specimens reared from larvae collected in 1959 at Solitude and Union Ducray, labelled as *M. loreyi*, and found in the MSIRI collection, were also examined.

Results and discussion

Based on descriptions of genitalia given by Rungs (1955), Calora (1966) and Edwards (1992), *M. loreyi*, *M. curvula* and *M. insulicola* were identified from the 380 adults reared from the 1995 collection of larvae. A fourth species which closely resembles *M. leucosticha* (described by Rungs (1955)) was also obtained.

The moths were externally very similar. They were pale to dark ochreous, stout bodied with a well developed tongue. The thorax and legs were scaly or hairy to varying degrees. The males of *M. curvula* and *M. loreyi* possessed a ventrolateral tuft of scales on the first abdominal segment. The males and females of *M. curvula*, *M. insulicola* and *M. leucosticha* had a patch of fine hairs on the underside of the discal cell of the forewing. This character was present only in females of *M. loreyi*. The moths of *M. loreyi* were paler than those of *M. curvula*, *M. insulicola* and *M. leucosticha*. *M. curvula* had a distinctive band of dark scales extending from the thorax to about half-way on the forewing, approximately at the level of the median vein. The forewings of *M. leucosticha* and *M. insulicola* were more uniformly dark brown.

Overall parasitism was 16,6% from a total of 1 773 larvae collected. The major parasitoid species, *Alsomyia anomala* Villeneuve (Diptera: Tachinidae), was obtained from 78% of the parasitised larvae. Other parasitoids obtained were *Disophrys lutea* Brullé (Hymenoptera: Braconidae), *Enicospilus hova* Gauld & Mitchell (Hymenoptera: Ichneumonidae) and *Netelia* spp. (Hymenoptera: Ichneumonidae).

Table 1 gives the relative abundance of the various *Mythimna* spp. out of the 380 moths examined. *M. curvula* and *M. loreyi* represented 95,8% of the moths. In general, in those fields where both *M. curvula* and *M. loreyi* were obtained, the former was present in greater numbers. However, since the different species might not be parasitised to the same extent and the larvae were not separated to species level, the data presented in Table 1 might not reflect the actual larval population of the various species in sugarcane.

Specimens collected in 1959 comprised 16 *M. loreyi* and 4 *M. curvula*. The presence of *M. curvula* in Mauritius therefore dates at least as far back as 1959, possibly introduced from Madagascar where it was first described by Rungs (1955).

The fact that *M. curvula* was not identified in 1959 could suggest its occurrence in relatively low numbers and no reasonable explanation can be given for the apparent increase in the population of *M. curvula* in recent years. However, increasing areas under mechanical harvesting and trash blanketing could be the main factors which have favoured this upsurge. It is to be noted that, with the high rate of parasitism, the per cent area with appreciable damage has been decreasing (Table 2). It could thus be expected that in years to come the population will stabilise at a low level.

Table 1
Number of *Mythimna* spp. adults reared from larvae collected in various localities in 1995

Date of collection	Locality	<i>Mythimna loreyi</i>		<i>Mythimna curvula</i>		Other spp
		Female	Male	Female	Male	
20 July	FUEL	2	3	4	1	1 male <i>M. leucosticha</i>
8 August	Solitude	6	5	-	-	
18 August	Belle Vue	-	6	5	5	3 male <i>M. insulicola</i>
23 August	Beau Plan	4	6	17	12	
7 September	Bagatelle	5	2	5	7	1 male <i>M. leucosticha</i>
7 September	Ebene	4	9	3	3	
29 September	Labourdonnais	3	12	2	4	1 male <i>M. leucosticha</i>
27 September	Mon Loisir Rouillard	1	1	-	-	1 male <i>M. insulicola</i>
27 September	Beau Sejour	-	-	6	2	1 male <i>M. leucosticha</i>
10 October	Helvetia	1	2	29	20	6 male + 1 female <i>M. leucosticha</i>
19 October	New Grove	2	2	1	-	
31 October	Chebel	-	-	11	10	1 male <i>M. leucosticha</i>
2 November	Bel Air	1	1	24	14	
2 November	Britannia	3	-	74	5	
24 November	Bagatelle	-	-	54	32	
Total		32	49	168	115	

Table 2
Damage caused by sugarcane armyworms in Mauritius and percentage parasitism over the period 1992 to 1995

Year	Area harvested mechanically (ha)	Area surveyed (ha)	% surveyed area with appreciable damage	Number of larvae collected	% parasitism
1992	2 528	-	-	289	9,5
1993	3 622	1 025	11,0	521	20,6
1994	4 254	3 464	5,3	473	15,0
1995	5 036	3 213	4,0	1 773	16,6

Studies on the spatial and temporal distribution of the 'armyworm' are desirable to determine the presence of alternate/wild hosts especially outside the cane harvest period. This would enable a better understanding of the behaviour of the pest.

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