THE CATERPILLAR RETURNS:

A report of the epidemic of silver-Y moth caterpillars in sugar beet in 1996

Caterpillar-damaged beet in 1996.

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Two years ago, in the hot summer of 1994, caterpillars of several species of moth caused substantial damage to sugar beet particularly around the Wash, in Yorkshire, and Cambridgeshire (Ref. 1). Chief amongst them was the silver-Y moth, *Autographa gamma (Pics 1 and 2)*. Silver-Y moths returned with a vengeance in 1996, colonising peas, beans, potatoes and again, sugar beet, in June. This article highlights the factors which contributed to this latest epidemic and the consequences for beet growers.

Adult silver-Y moth.

Where did the moths come from?

As described in a previous article **(Ref. 1)** silver-Y moths are not an indigenous species, but migrate annually to Britain from their over wintering haunts in the Canary Isles, North Africa and other parts of the Mediterranean. Conditions there each year in late May and early June cause the adult moths to migrate in large numbers, and, in 1996, this event coincided with a weather pattern which was to transport millions of these migrants across Spain and France to this country. Anthony Biddle at the Processors and Growers Research Organisation near Peterborough in Cambridgeshire monitored the invasion in vining peas using pheromone traps which were specific for silver-Y moths. His traps caught unprecedented numbers, up to 470 per trap per day, for three weeks after 5th June. Thereafter, numbers declined to low levels.

4th instar caterpillar of silver-Y moth.

Life cycle

The adult moths laid their light green eggs singly ***(Pic 3)*** and they were fairly uniformly distributed across fields. Another species which was also prevalent this year, the cabbage moth, *Mamestra brassicae*, laid its eggs in batches ***(Pic 4)***. Eggs of both species hatched after six or seven days and the tiny newly hatched caterpillars devoured the remains of their egg cases before attacking the plant. Caterpillars are cosmopolitan in their feeding habits, adapting very quickly to whichever host plant their mother

Silver-Y moth egg.

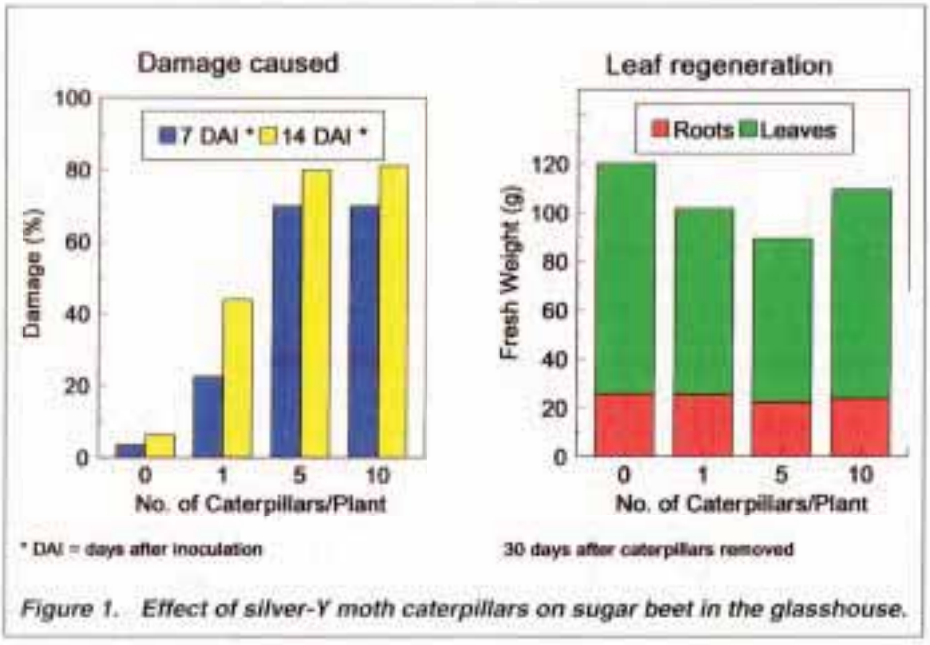

Figure 1. Effect of silver-Y moth caterpillars on sugar beet in the glasshouse.

has consigned them to. Within a couple of weeks the small white larvae, about 2mm long with large dark heads, had grown into large green caterpillars, up to 35mm in length, with faint light stripes down both sides. Silver Y moth caterpillars were distinguishable from other green caterpillars by having only two pairs of prolegs (instead of four) and a pair of hind claspers, causing them to move in a looping manner ***(Pic 2)***. Their feeding in sugar beet became noticeable in July and stimulated a flurry of spraying.

In fields which were not sprayed, the caterpillars began to pupate in mid-late July, forming cocoons on the plants ***(Pic 5)***. Adult moths hatched from these about 10 days later, but, surprisingly, the expected massive second generation of caterpillars did not become manifest, at least in the arable crops which had been colonised originally. Many adult moths were seen feeding on wild flowers in field margins during August, and a few crops had severe damage along the headlands ***(Pic 6)***, but they did not lay their eggs across the sugar beet fields as they had done in June.

The reasons for this are unclear. Perhaps the earlier damage caused by the first generation was sufficient to persuade the newly-emerging adults that the food supply for their offspring was not guaranteed. Perhaps the presence of unhatched cocoons, and late-developing larvae of the first generation deterred the adult females from laying eggs on previously colonised plants. Or perhaps this generation of adults had different host preferences at that time of year. Whatever the reasons, the second generation did not materialise and farmers heaved a sigh of relief.

What economic damage was caused?

Thresholds for controlling caterpillars in sugar beet have never been established because their occurrence

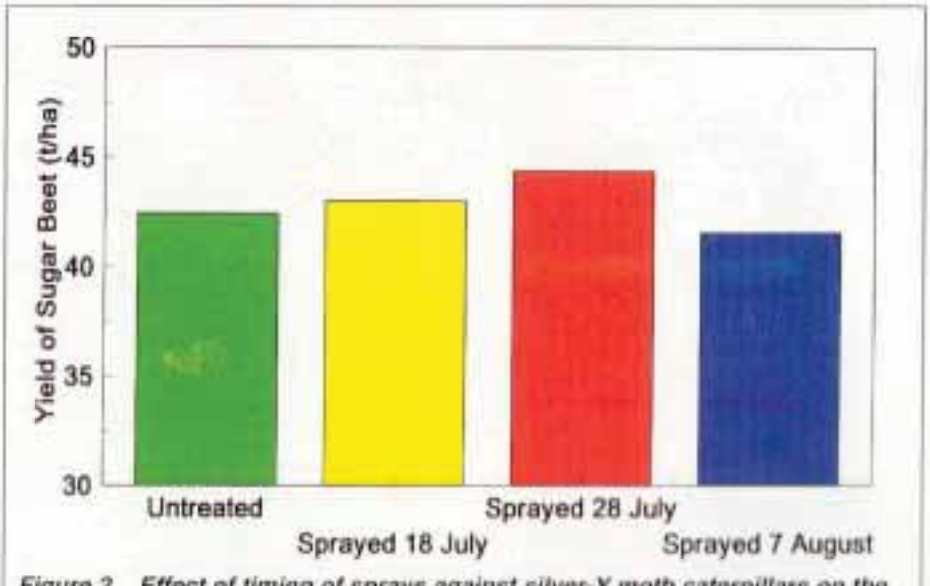

Figure 2. Effect of timing of sprays against silver-Y moth caterpillars on the yield of sugar beet in a field trial in 1996.

Chrysalis of silver-Y moth in cocoons.

has been sporadic in the past. Attempts to determine an appropriate threshold this year were frustrated by the non-appearance of the second generation. However, some support for a threshold of three caterpillars per plant was obtained from a glasshouse trial in which caterpillars were confined on young potted beet plants for a couple of weeks. Damage caused by five or ten caterpillars per plant was substantial, but that caused by one per plant was significantly less **(Fig. 1a)**. Field observations in different parts of the country gave circumstantial evidence for the figure of three per plant, and this number is also used as a threshold for spraying in southern Mediterranean countries such as Greece, where these moths are indigenous.

However, sugar beet has a great capacity for compensating for even quite extensive defoliation if the time between pest attack and harvest is long enough to allow regeneration. In the glasshouse trial, plants which had suffered 90 per cent damage to the leaves recovered sufficiently well such that there was no significant effect on root or leaf weight four weeks after removal of caterpillars **(Fig. 1b)**. In a field trial in which the pyrethroid sprays, cypermethrin (Ambush), deltamethrin (Decis) and lambda-cyhalothrin (Hallmark), were applied in mid-July, late-July and early-August, there were no significant differences in yield between treatments at harvest in November **(Fig. 2)**. Although these products are approved for use in sugar beet to control other pests, they have no specific recommendations for the control of caterpillars in sugar beet. Thus in the UK at

Severe defoliation of sugar beet on a headland.

least there may be no need to control this pest at all in sugar beet, although it would require a steady nerve to watch holes appearing in your beet crop and not reach for the sprayer.

Disadvantages of spraying

In retrospect it seems likely that much of the spraying that was carried out in July would have had no economic benefit. There were, however, two possible harmful side effects. In late August and September a number of fields suffered some damage, mostly around headlands, caused by two-spotted spider mites, *Tetranychus urticae*. This pest was fairly widespread, in East Anglia at least, and seemed to be more numerous in crops that had previously been sprayed with pyrethroids to control caterpillars. It is well known that pyrethroid sprays in orchards can cause resurgence of spider-mite populations due to removal of their predators by the insecticides, and a similar process might have been operating in sugar beet. However, the evidence is only circumstantial.

The second possible side effect was the selection of aphids resistant to insecticides. A serious epidemic of *Myzus persicae*, with dual resistance **(Ref. 2)** to all currently approved aphicides, occurred in potatoes in Lincolnshire and Cambridgeshire in September. Many of these crops had also been sprayed with pyrethroids in July to control silver-Y moth caterpillars. No similar observations were made in beet crops, but that may have been due to the relative unpalatability of beet to aphids at the time these aphids migrated (August). Again, the evidence is only circumstantial, but it is important that growers are aware that the consequences of spraying one pest can sometimes lead to outbreaks of another.

As always with novel epidemics it is easy to be wise after the event, and those of 1996 add to our experiences. Constant vigilance is the only answer to these sporadic but recurrent pest problems. The chances of another epidemic of silver-Y moth caterpillars happening again next year are difficult to calculate. It really depends on the confluence of adult moth migrations in May from their over wintering sites, and the occurrence of warm southerly winds. As anyone with experience of British weather knows, the latter is impossible to predict.■

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Cabbage moth eggs.