

NOTES ON THE DISTRIBUTION AND BIOLOGY OF THE LYGUS BUG—*LYGUS* *VIRIDANUS* MOTSCH—(HETEROPTERA- MIRIDAE), A PEST OF TEA IN CEYLON.

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Introduction

Species of the genus *Lygus* are widely distributed and are pests of economic importance in many parts of the world. In Ceylon, six species of the genus have been recorded. Of these six species, *L. decoloratus* Dist. and *L. viridanus* Motsch. have been recorded on tea (1).

L. decoloratus has been recorded as a pest of tea in Bogawantalawa (6,000 ft.) by E. E. Green as early as 1904 (1). Since then no record of *Lygus* as a pest of tea appears to have been made until B. N. Webster, in 1954, investigating a "corroded flush" symptom on tea in plucking, formerly attributed to the "Cercospora" disease, showed that a capsid bug, *Lygus viridanus* Motsch. was responsible for the damage (3). Once the symptoms of the attack were recognised and associated with the pest, reports of infestations of *Lygus viridanus* continued to reach the Tea Research Institute. It is quite probable, however, that some of these reported attacks of *L. viridanus* may have been caused by *L. decoloratus*. Nevertheless, recent observations indicate that of the two species *L. viridanus* is the more common pest on tea.

The *Lygus* bug is not one of the common pests of tea, however, and rarely does it cause extensive damage. Sporadic outbreaks of the pest appear to have occurred in the years 1956 and 1957.

Hitherto, there is no available record of published information on the bionomics of *Lygus viridanus* Motsch. This paper outlines its distribution and briefly describes the biology of the species.

Distribution

Lygus viridanus Motsch. appears to be endemic to Ceylon, but its distribution is confined to the cooler and more humid parts of the hill country. It is a common pest on ornamental plants in up-country bungalow gardens and is prevalent as a pest of tea, on some estates, above an elevation of about 4,000 ft. *Lygus viridanus* is usually found in the Maskeliya, Dimbula, Dickoya, Nuwara Eliya, Haputale, Badulla and Bandarawela districts. However it is more commonly found in the Maskeliya and Dimbula-Dickoya districts. The distribution on estates is indicated by the following list:—

LIST OF ESTATES SUBJECTED TO LYGUS ATTACKS

Dickoya and Maskeliya Districts

Estate	Elevation	Locality	Reported Outbreaks	
			Year	Month
1. Alton	4,700'	Upcot	1956	May
2. Gartmore	—	Maskeliya	1957	April
			1958	April-May
3. Heidri	—	Rozella	1955	April
4. Robgill	4,500'-6,600'	Bogawantalawa	1957	August
5. Laxapana	*5,951'	Maskeliya	1953	February
			1954	April
			1956	May
			1957	May
6. Lethenty	*4,000'	Hatton	1958	May
			1957	April
7. Loinorn	—	Hatton	1958	December
			1957	February
8. Moray	*4,053'	Maskeliya	1958	December
			1957	May
9. Theresia	*4,300'	Bogawantalawa	1957	April-May
10. Tillyrie	*4,539'	Dickoya	1956	December
			1955	April
			1957	September

Dimbula-Nuwara Eliya Districts

11. Ardlaw	4,500'-5,000'	Agrapatna	1956	June
12. Caledonia	*4,400'	Lindula	1956	June
13. Glenlyon	*4,500'	Agrapatna	1957	July
14. Gonapitiya	*6,000'	Kandapola	1956	April-May
				June-Sept.
15. Hoomwood	*5,200'	Agrapatna	1957	July
16. Oliphant	—	Nuwara Eliya	1957	August
17. Scrubs	6,100'-6,900'	Nuwara Eliya	1956	June
			1957	September
			1958	May
18. Somerset	4,500'-5,000'	Talawakelle	1956	April
19. Strathspey	4,400'-5,000'	Talawakelle	1955	April
20. Torrington	4,600'-6,500'	Agrapatna	1956	June

Badulla, Bandarawela & Haputale (Uva)

21. Balagalla	*4,900'	Glen Alpin	1956	June
22. Beauvais	*4,800'	Idalgashinna	1956	August
23. Nayabedde	*6,100'	Bandarawela	1957	March-April
24. Udaveria	4,000'-7,000'	Ohiya	1956	April

Lygus infestations on tea estates are usually confined to "top fields," with an elevation of about 5,000-6,500 ft. Invariably the infested fields border jungle or lie close to the jungle and since it has been found that most of these jungles too were infested with the bugs, it is quite probable that they are the sources of infestation.

*Elevation-factory site.

In the tea fields the bugs are usually confined to small "pockets" or "depressions" close to ravines or to the jungle.

Damage due to *Lygus* may occur throughout the year, but is more common in April, May and June.

Description and life history

The adults of the bug, as the name *viridanus* indicates, are green in colour, with a slight yellowish tinge and are rather delicate insects. The females and males are similar in general appearance, the males being on average slightly smaller than the females and of a paler green colour. The length of the females ranges from 0.15" to 0.2" approximately. The wings give the insect a slightly larger appearance, as they cover the whole of the abdomen and extend about 0.04" beyond the tip of the abdomen. The outer pair of wings forms a triangular iridescent apex, when the insect is at rest, which is covered with fine black hairs. The head is distinct and has large black eyes. The antennae are as long as the body. The proboscis lies flexed beneath the body when the insect is at rest.

The females can be easily distinguished from the males by the presence of the ovipositor which appears to the naked eye as a small brown streak on the mid ventral line of the abdomen. The ovipositor when at rest lies nearly concealed in a groove on the ventral side of the abdomen.

The females lay their eggs within the tender tissue of the host plants. They are embedded, singly, in the tender parts of the plants such as stem, petiole and leaf mid-ribs. A single female lays 1-12 eggs per day.

The eggs when freshly laid measure 0.9mm. in length and 0.25mm. in breadth. The egg is cylindrical, rounded at the posterior extremity, obliquely truncated towards the apex, which ends in a distinct egg cap—the only part of the egg visible above the surface of the stem. In a freshly laid egg the egg cap is visible to the naked eye as a pale yellow spot, flush with the surface of the stem. In development the egg swells in size and the egg cap is pushed out above the surface of the stem and appears as a brownish convex cap, which later turns white in colour.

The egg takes 13-20 days to hatch, the duration of the egg-stage varying with climatic conditions. When hatching takes place, the fine fibrillae that attach the egg cap to the egg case break, and the nymph slowly wriggles out. The nymph on immediate emergence is covered with a fine membrane, which it splits open and casts off.

There are five nymphal growth stages or 'instars' and the developing nymph moults after each instar, the adult insect appearing from the final moult. The average length of the different instars is 1st 0.95 mm, 2nd 1.2 mm, 3rd 1.6 mm, 4th 2.1 mm and 5th 3 mm. Rudiments of the wings ('wing-pads') appear in the 3rd instar, developing in size in the 4th and 5th instars to appear as functional wings in the adult. All instars of the nymph, and the adults, feed by sucking sap from the buds, tender shoots and leaves. The nymphal period takes about 3 weeks. Adults live for a period of 2-3 months.

Habits and damage to host plants

In their habits *Lygus* bugs show much resemblance to other sucking bugs such as *Helopeltis theivora*. They have been observed to feed during all times of the day. It has been recorded that they feed by night too (Webster, 1954). During the day the bugs avoid the direct rays of the sun. They remain within the ground cover or within the tea bushes during hours of sunshine and come out to feed in

dull and cloudy weather. They thrive well in warm and moist weather, and the "misty" condition in most "top fields" of the higher elevations (5,000-6,500 ft.) is most suitable for the bugs. The bugs are swift fliers and their flight is characterised by short flights to distances of 2-3 yards at a time; nevertheless they can also fly distances of 30-40 yards.

Lygus viridanus attacks only the young and succulent tissue of plants, notably young buds and tender leaves. Older tissues of plants, such as mature leaves and stems are not attacked. The bug feeds on the sap of the host plants with its long proboscis, which is inserted into the tender tissues of the buds and young leaves. The insect's saliva has in it a toxic property, which kills the cells of the tissue around those that have suffered mechanical damage as the result of the insertion of the proboscis; so that, on freshly attacked flush these areas of dead cells appear as small brown spots of about 1 mm in diameter. When the buds open and the leaves enlarge, as a result of cell expansion, no corresponding expansion takes place in the small areas of dead cells, resulting in the formation of small holes in the more mature leaves. When feeding punctures are made along the inrolled margins of the buds and when such buds open, the margins of the leaves are found to be wavy or "corroded." Very often the tender buds that are attacked die, with the result that many "flushing points" are lost and when this is repeated it brings about a stunted effect on the tea bush, resulting in severe loss of crop. Very often the damage caused by *Lygus* bugs is not noticed till weeks after the attack, as the "corroded leaf" appearance becomes evident only when the buds open and the young leaves mature, so that the "corroded leaf" is no indication of *Lygus* damage at that particular time of inspection. To determine whether a tea field is being attacked by *Lygus* bugs one should look for "fresh attack" in the form of fresh punctures on the young buds and tender leaves, which appear as very small brown spots.

Host plants

Lygus viridanus Motsch. has been observed to feed on a large number of wild plants in the jungle bordering the infested tea estates, the most common being *Eupatorium odoratum*, *Solanum auriculatum* Ait. and *Solanum feron* L.

They also feed on *Tibouchia semidecondra*, *Polygonum repalanse*, *Tithonia diversifolia*, *Lantana* sp., *Crotalaria walkeri* Arn. *Strobilanthes kestius* Nees. In bungalow gardens they are a pest on *Salvia*, *Geranium*, *Verbina*, *Coletus*, *Tropaecolum* and *Hibiscus*. On estates they also attack *Tecoma stans*, a shade tree, and cover crops such as *Drymaria cordata* and *Oxalis corymbosa*. Of the tea plant they show preference for low jat tea. Observations have shown that in the presence of more suitable host plants like *Salvia*, *Lygus viridanus* does not attack tea plants. Attempts to breed the bugs on tea in St. Coombs exclusive of all other host plants, have been unsuccessful. This would suggest that the tea plant is only a casual host of the pest; nevertheless a more detailed investigation would be necessary to determine this.

Methods of Control

To date the control methods adopted for *Lygus* infestations are:—

1. Hard plucking.
2. Spraying with D.D.T.

Recent observations have shown, however, that hard plucking alone may not be an effective means of *Lygus* control, since the eggs are not deposited on the tender shoots only but below the "fish leaf" as well.

The application of D.D.T. has proved to be effective, when applied in the concentration of 1 lb. 50% D.D.T. Wettable Powder in 25 gallons water and at the rate of 100 gallons of spray fluid per acre. One such application should be sufficient in good weather, but should the symptoms of fresh punctures be observed two weeks after the first application, a second application would be desirable. The D.D.T. spray can be confined to the attacked patches of tea alone, but care should be taken to spray the ground cover and weeds by the side of ravines and jungle borders to ensure maximum kill of the pest.

It should be noted that the use of D.D.T. on other crops has in some cases resulted in the increase of other pests due to the destruction of natural insect enemies. At present there is insufficient evidence on this aspect of the use of insecticides on tea, and it is receiving attention. Pending further work, the use of D.D.T. on strictly limited areas to control severe *Lygus* infestation is considered justified. The removal of the above mentioned wild plants, which are alternate hosts of the pest, from jungle borders and ravines would help a great deal in the prevention of an infestation.

Acknowledgment

My thanks are due to Dr. K. Mellanby, C.B.E., Sc.D., Head of the Entomology Department, Rothamsted Experimental Station, for having kindly read through the paper and offered me his valuable advice. To Mr. G. D. Austin, Entomologist, I am also indebted for guidance during the course of the investigation.

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