

## SOME NOTES ON THE PADDY FLY IN CEYLON

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**T**HOSE of you who are interested in paddy cultivation will have read the reports of the various Sub-Committees with much interest and you will doubtless have noticed that most of them allude to paddy fly as being the most important insect pest of paddy in Ceylon. You may perhaps have wondered why it is that, no matter at what time of the year paddy crops are maturing in any given district, paddy fly is usually present in sufficient numbers to cause appreciable damage to the maturing grain, except perhaps when there is a strong dry wind on the northern and eastern sides of the Island.

I propose therefore to indicate, as briefly as possible, some of the reasons for the general prevalence of paddy fly (*Leptocorisa varicornis*) throughout the year and for its importance as a pest and to touch on certain possible control measures, and in doing so I shall draw mainly on our previous knowledge of this pest obtained from investigations carried out by Mr. G. D. Austin of the Entomological Division some nine years ago at Anuradhapura and given in Bulletin No. 59 of this Department. Brief allusions will also be made to the opinions expressed by Agricultural Officers of this Department in reply to a questionnaire on paddy fly sent out last year, and to the information about the pest given in the recent reports of the Sub-Committees.

With regard to the investigations, it was unfortunate that these could only be carried out for a period of about six months from December 1920 to June 1921 and that they had to be abandoned just as they were reaching an interesting stage. There is still a lot more to be learnt about paddy fly and it is hoped that it will be possible to resume the work later, with special reference to the possibilities of controlling this pest by means of its natural enemies, as one or two of the Sub-Committees have recommended in their reports.

The following are among the more important reasons for the general prevalence of paddy fly throughout the year in paddy districts, so far as our investigations have indicated at present:

1. Both nymphs (young stages) and adults can feed on several species of common wild grasses and cultivated plants when paddy plants are not available. Among the wild grasses may be mentioned *Panicum colonum* and *Cyperus polystachyus*, two of the favourites, and about 8 other species, while among cultivated plants are kurakkan (*Eleusine Coracana*), Amu (*Paspalum scrobiculatum*), tanahal (*Setaria italica*), green gram (*Phaseolus Max*), cowpea (*Vigna catieng*), and species of *Crotalaria* and *Amarantus*. Probably this list could be increased considerably by further investigation. Paddy fly is said to breed freely in jungle areas, and this requires confirmation.

2. Both sexes can survive for several weeks on paddy and on at least one species of wild grass. During the investigations both sexes were kept alive for at least 14 weeks on paddy and *Panicum colonum*. Further experiments would probably indicate their ability to survive for long periods on other grasses and cultivated plants.

3. Paddy fly can aestivate, or remain dormant, during hot dry periods, possibly with a minimum of food. Observations made at Anuradhapura indicated that during the hot dry months of February and May 1921 the bugs retired to areas of weedy growth or low jungle, especially where the ground was damp or swampy. Further observations on aestivation are needed. Incidentally it may be mentioned that bagging operations with hand nets indicated that paddy fly shows a marked preference for damp or water-logged areas during hot dry weather, as a reference to Bulletin No. 59 page 7 will show.

4. Female paddy flies, after becoming full-grown, can, if supplied with food, remain for periods of from 2 to 10 weeks without laying their eggs, the normal pre-oviposition period being about 3 weeks. Field observations at Anuradhapura showed that, while the bugs were inactive during the hot dry months of February and May 1921, as soon as rains came they began to feed actively, mate and lay eggs. This seems to indicate that the females can withhold their eggs until conditions of food, and possibly of moisture and temperature, are favourable.

5. Under favourable conditions paddy fly can breed rapidly on paddy and on at least one species of wild grass, namely, *Panicum colonum*. Life-history experiments at Anuradhapura indicated that *Leptocorisa* can pass through a complete life-cycle from egg to adult in about 24 days in captivity and it is possible that under field conditions the life-cycle may be shorter, say 3 weeks. Allowing 3 weeks to elapse until the first eggs are laid for the next generation we get a period of about 6 to 7 weeks from egg to egg.

6. The probable scarcity of any efficient natural enemies of paddy fly.

During the course of the investigations at Anuradhapura an egg-parasite was found in small numbers while three species of predaceous bugs were frequently observed feeding on both nymphs and adults of *Leptocorisa*. The most important of these was *Asopus malabaricus*. No birds were ever observed to feed on paddy fly, which is probably distasteful to them. In this connection it may be mentioned that Mason and Lefroy in the course of a thorough investigation into the food of birds in India, during which the stomach contents of several hundred birds from over 100 different species were examined, found no instance in which *Leptocorisa varicornis*, our paddy fly, was taken by birds. It is doubtful whether any of the animals known to visit paddy fields would feed on paddy fly, owing to the pungent odour which it gives off when disturbed. As previously indicated considerable further investigation is needed on the natural enemies of paddy fly.

The above observations will serve to emphasise that the importance of paddy fly as a pest lies mainly in its ability—

- (1) to survive unfavourable conditions when the food supply is low and when there is little or no paddy available in any given area;
- (2) to keep back its eggs until conditions are favourable for breeding; and
- (3) to invade paddy areas in sufficient numbers and start breeding rapidly just at the time when its damage will be most serious, that is, during the maturing period of the crop, starting from the flowering stage. In this connection it may be of interest to note that, at the Experiment Station, Anuradhapura, during 1921, when paddies were maturing several times a year each maturing period (starting from the flowering stage) was accompanied by an invasion of paddy fly.

Before passing on to brief notes on possible control measures, some allusion may be made here to the influence of climatic conditions on paddy fly, and to the incidence of this pest in relation to the varying conditions of paddy cultivation.

#### INFLUENCE OF CLIMATIC CONDITIONS

In a few of the reports of the Sub-Committees attention is drawn to the absence of the fly from the paddy areas during strong winds, especially the hot dry wind which blows during the south-west monsoon on the northern and eastern sides of the Island. It is possible that at such times this

pest goes into aestivation, as was found to be the case at Anuradhapura during hot dry weather. Some of the Agricultural Officers have observed that paddy fly is disturbed by heavy rains and it is not unlikely that many of the nymphs are washed down and drowned in the fields.

#### INCIDENCE OF PADDY FLY

The replies to the questionnaire on paddy fly in relation to paddy cultivation indicate that cultivators are quite aware of the damage caused by paddy fly and that they seem to have realized from long experience that the severity of the attack can be lessened if they can manage to grow over a large area those varieties of paddy which will flower and mature about the same time. The result of this system of cultivation seems to be that the paddy fly becomes more or less evenly distributed over the whole tract of paddy and the damage to the crop is comparatively slight. If the north-east rains are early or irrigation facilities are assured for that particular crop then long-aged paddies of approximately the same maturing age are usually sown over fairly large areas, but if the monsoon is late or an adequate supply of irrigation water is not available in good time then shorter-aged paddies are grown. In either case, provided that the paddies, whether short or long-aged, flower and mature together, and provided that a fairly large area is grown, the damage done to any one variety is slight.

Several of the reports call attention to the fact that paddy fly damages a late crop or a crop sown at wrong seasons, and indicate that for various reasons, such as the irregularity of the monsoon, the lack of sufficient irrigation facilities, (*i.e.*, supply of water, attention to drainage or the removal of flood water), the shortage of buffaloes, the counter-attractions of chenas or of estate work, the cultivators may not get their paddy sown at the right time.

As a result of these uncertain conditions cultivators may grow at the last moment whatever paddies are available or they may leave large areas uncultivated. In any case the areas of paddy grown under such conditions are comparatively small and scattered and may be maturing at different times in the same locality, with the result that severe damage is usually done by paddy fly. One or two of the reports refer to the heavy attacks of this pest on small isolated areas of paddy surrounded by jungle, notably in the Trincomalee district and in the North-Central Province and suggest or imply that the heavy infestations may be due to the invasions of the pest from jungle areas where it is said to breed. The above points are of much interest and require further investigation both from the agricultural and the entomological sides.

### CONTROL MEASURES

The control measures recommended at various times for the control of *Leptocorisa* may be grouped conveniently under preventive and remedial measures.

Preventive measures are mainly the clearing of grasses and weeds from around paddy areas and in adjoining uncultivated areas before the maturing of the crop. The object of these measures is to deprive paddy fly of some of its main sources of food supply outside the paddy season and prevent it breeding in large numbers just before paddy reaches its attractive stage. Incidentally the control of grasses will also keep down other pests of paddy, such as the swarming caterpillar. If it is true that paddy fly and other insect pests of paddy breed in jungle areas then the above remedial measures are hardly likely to be effective for small areas of paddy grown near jungle, as for instance in the Trincomalee district and in the North-Central Province.

Nowhere can it be said that any serious attempt is made to keep down grasses and weeds. Cattle are sometimes grazed in the paddy fields after harvest.

Remedial measures recommended include the use of hand nets and of winnows smeared with some sticky substance to catch bugs already in the fields. Both of these appliances gave good results at Anuradhapura during the investigations. So far as is known hand nets have not been used since then except occasionally on paddy stations or in demonstrations to cultivators. Sometimes in the Negombo district winnows on long poles are smeared with jak juice and waved over the plants to catch the bugs.

The cultivators in some districts usually have their own methods by which they hope to control the pest or drive it away. Such measures include the use of sticky ropes to catch the "flies" or ropes smeared with fat or grease to keep them off. Bonfires are occasionally lit near paddy fields to attract and destroy the paddy fly, while smoky fires, sometimes with strong smelling substances, are said to act as repellents.

The use of charms of various kinds seems to be universal in paddy districts. These include the reciting of incantations and the sprinkling of powders over the fields. Special men are employed on these occasions and being good opportunists and psychologists they doubtless arrange to synchronise their operations as nearly as possible with the disappearance of the pest, whether it be paddy fly or swarming caterpillar. It cannot be said, however, that any of the above methods usually employed by cultivators have any real effect in reducing the numbers of paddy fly.

The reports of the various Sub-Committees have emphasised the unsatisfactory conditions under which paddy is grown in most districts and until the conditions of paddy cultivation and the financial position of the cultivators themselves are improved, it cannot be expected that they will respond to any suggestions for organised control measures.

Meanwhile, it seems to be essential that the paddy fly investigation should be taken up again as early as possible, with special reference to the control of this pest by biological methods.

If it is later shown to be possible to breed and distribute the natural enemies already known to be present in Ceylon or if others can be imported from abroad, then it may be possible, with the help of organised campaigns, to prevent the pest breeding in such large numbers as to be one of the limiting factors of paddy cultivation in many districts.