

The system of giving Income-Tax rebates and depreciation allowances to investments made in farms are intended to attract sufficient capital to the rural areas.

The action taken by the farmers themselves in organising gigantic Co-operatives for the processing of their products—Ardmony Coop. Canery, Leeton Co-op. Cannery, the Rice Growers' Co-op. Mills and various butter factories—and for supply of their requirements at reasonable cost, has the effect of ensuring to the farmer a fair deal in all his transactions. These co-operatives, it must be understood, have sprung from below and not super-imposed on the farmers by any Government agency.

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Rice Hispa (*Hispa Armigera* Ol.)

by

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Introduction: Rice Hispa (*Hispa armigera* Ol.) is one of the major pests of Rice crop in the Hyderabad State causing an average loss of 10% in yield. Occurring on both the seasonal crops, the winter sown crop, known as *Tabi*, planted in December–January is more attacked than the monsoon crop known as *Abi*, sown during the months of June–July. In years when the south-west monsoon rains are late, *Abi* crop also is damaged to a very considerable extent. In Hyderabad State the pest is found in all the rice growing districts. It is locally called “*Nalla Purugu*” (Black Insect). The annual average infestation of Rice Hispa is 15,000 acres on an area of 14.5 lakhs of acres grown in the State.

Padwick (1948) in his review on Plant Protection and Food crops in India mentions that in 1946, Rice Hispa caused a heavy loss on 20,000 acres of Rice crop in Madhya Pradesh. Trehan and

Pingle (1946) reports that it is a major pest in Karwar and Belgaum districts of Bombay State and that both the *Kharif* and *Rabi* crops of paddy are damaged. It is also a serious pest of rice crop in Assam, West Bengal, Bihar, Orissa and Madras States. Outside the Indian sub continent, it is a serious pest of rice crop in China (Chu, 1938) and Formosa (Shen and Kung, 1954).

Description: Rice Hispa belongs to the genus *Hispa*, sub-family *Hispinae*, Family *Chrysomelidae*, of the natural order *Coleoptera*. The body of the insect is oblong and shining, blue-black in colour. On each side of the thorax four long spines are found which originate from a common base and a fifth separate posterior one which is smaller. The elytra is also oblong and armed with a number of strong erect spines. The adult female beetles are on an average 4.7 mm long and 1.97 mm broad, whereas the corresponding figures for the male beetles are 3.7 mm and 1.7 mm. The adult beetles can fly long distances mostly in the direction of the wind. They usually fly in the evening hours and are observed in large numbers on the plants in the morning hours.

Nature of Damage and Loss Caused to the Crop: The damage to the rice crop is done by both the adult beetles and the grubs. The adult beetles scrape the leaves and devour the mesophyll while the upper and lower epidermis are not touched. In cases of severe infestation the leaves wither and dry up. In large fields of 50-60 acres extent, the infestation is found in patches in the centre of the field. These affected patches present a bowl-like depression due to the stunted growth of the crop. These 'bowls' act as foci for further infestation.

Infestation in the field not being uniform in all places, great difficulty is experienced in the estimation of loss in yield caused by the Rice Hispa. Sweeps with a hand net of 18" diameter have shown that the population in *Abi* season varies from 3-4 beetles per sweep whereas in *Tabi* it varies from 14-16 beetles per sweep. The population of adult beetles per plant in the transplanted crop varies from 25-30 beetles in cases of severe infestation. To determine the injury caused to the paddy plants, detailed observations have been made on the individual plants in both the affected and healthy patches of the same field, all the other set of crop conditions being uniform for both. Records have been taken of the number of culms per clump, average height of

the culms, length of panicles and numbers of sound and abortive panicles. The details are shown in the Table I.

TABLE I.

Table showing the Individual Plant Characteristics of Hispa affected and unaffected Paddy Plants.

Type of clump	No. of culms per clump	Average height of clump	Average No. of sound panicles	Average No. of abortive panicles
	VARIETY: Banswadolu		LOCALITY: Bodhan	
Healthy	3.7	2' - 6"	3.0	0.8
Very severely infested with hispa	1.4	1' - 10"	—	9.8
	VARIETY: HR. 35		LOCALITY: Bodhan	
Healthy	3.9	5' - 0"	2.8	0.2
Hispa affected	1.4	4' - 2"	1.2	0.6
	VARIETY: Rajagarkal		LOCALITY: Bodhan	
Healthy	3.0	4' - 1"	1.7	0.3
Hispa affected	2.2	4' - 1"	1.7	0.3

It will be seen from the table that the main effect of injury by Hispa is on tiller formation and also on the formation of the panicles. The maturity of most of the culms in affected plants is delayed.

To determine the loss in yield of paddy due to Hispa infestation, records of the average yields obtained from the individual cultivators during the years of heavy hispa infestation and during normal years when there has been no hispa attack are given below. The crop under study was the *Tabi* crop sown in December-January. The data recorded is given in Table II.

TABLE II.

Table showing the average yields obtained during the years of severe Hispa infestation and during normal years (Hispa free).

Name of cultivator	Normal average yield in the per acre	Average yield when heavily attacked by Hispa in lbs. per acre
1. Korna Bhoomanna	1,600	500
2. Begari Sayiga	1,840	1,120
3. Magdonm Saheb	1,840	800
4. Lacchi	1,200	640
5. Sadasivam	2,400	1,280

From the table it will be seen that there is a reduction in yield ranging from 39-65%.

Seasonal History: After the harvest of the *Tabi* crop in May, stray adult beetles are observed on the sprouted stubbles and the early nurseries raised for the transplantation of the *Abi* crop in June. The first brood adults emerge by 3rd week of July and spread over to the neighbouring fields. The 2nd brood adults emerge by 3rd week of August. This brood is the most widespread and destructive especially if the rainfall is not normal, the attack continues up to end of September. Stray adults of the 3rd brood migrate by 2nd week of December to sprouted stubble and *Tabi* nurseries. The 4th brood adults emerge by last week of January and spread over to neighbouring fields. The 5th brood emerge by the 3rd week of February, and is very widespread and destructive to the *Tabi* crop. By last week of March the 6th brood adults emerge but the damage is negligible as the crop is advanced in maturity.

Eggs are laid in the leaf tip which hatch out in about a week's time. The grub stage lasts for 15-20 days, the grub feeding throughout in the same leaf mines and has never been observed crawling to other leaves as reported by Logothetis (1951). When two or more grubs attack a single leaf the different mines often coalesce into one. Pupation takes place inside the leaf mine between the two epidermal layers of the leaf and lasts for 6-10 days. The adult beetles in confinement have a longevity of a week to ten days. The complete life cycle occupies 30-35 days and does not vary much from year to year.

Natural Enemies: Logothetis (*Loc. cit*) in reviewing the information available on Rice Hispa does not mention of any natural enemies noted on it. In Hyderabad State the following parasites have been recorded.

- (1) *Bracon* Sp. (*Braconidae*: *Hymenoptera*) - Larval parasite.
- (2) *Eupteromalus* Sp. nr *nidulans* Forst. (*Chalcidoidea*: *Pteromalus*) - mostly a secondary parasite on *Bracon* Sp. and sometimes a primary larval parasite on hispa grub.
- (3) An unidentified *Cecidomyiid* larval parasite.

A brief account of *Bracon* Sp. has already been given by Khan and Murthy (1954.) Detailed observations have shown that the incidence of parasitism ranges from 15% to 82%. The parasite appears very promising and its potentialities have been observed in Bodhan Taluka of the Nizamabad district which used to be an endemic area of hispa infestation formerly. It may be mentioned that since the past three years, Rice Hispa has never been observed in a pest form in Bodhan Taluka. *Bracon* Sp. however, has the following two hyperparasites, which exercise a considerable check on it.

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| (1) <i>Dimmockia</i> Sp. | } (<i>Chalcidoidea</i> :
<i>Eulophidae</i>) |
| (2) <i>Achrysocharis cardigaster</i> Masi | |

Control Measures: A number of remedies have so far been tried for the control of this insect pest. While it could be easily controlled in nurseries, it is more difficult when once the pest spread to the transplanted crop. Amongst the methods of control tried against the pest were bagging of adult beetles by hand nets and clipping of affected leaves. Clipping of affected leaves, although effective at the time of transplanting, is not favoured by the local cultivator who fears a set back in growth and yield of the crop which, however is not the case.

Amongst the earlier chemical methods experimented, spraying with Lead Arsenate deserves mention. Lead Arsenate spraying @ one oz. per gallon of water was found quite effective comparing well with DDT. But spraying with Lead Arsenate and DDT was found very tedious and also costly, the cost of the Chemical itself amounting to 7-8 Rupees per acre for each spraying. Further, the area that could be covered was also considerably less. In view of the above, the need of a satisfactory insecticidal dust was felt. Both BHC and 'Pyrodust' were experimented with and found equally effective. However, BHC is found more economical. Uptill now, an area of over 50,000 acres of paddy has been dusted with BHC 5% dust against hispa attack.

While passing it may be pointed out that while in earlier years 10-12 lbs of BHC 5% dust was effectively controlling this insect pest, of late, it has been found essential to increase the dosage to more than 15 lbs per acre in endemic areas where dusting is being carried out season after season by the Plant Protection Organisation. The biological assay results show that there has

been no loss in the potency of the insecticide. It appears that the pest is slowly gaining a perceptible resistance to the insecticide, which, however remains further to be investigated.

Summary: Hispa (*Hispa armigera*, Oliver) is one of the major pests of Rice crop in Hyderabad. It is observed on both the 1st and 2nd crops in the Telengana area but the damage is more on the 2nd crop. The main effect of injury is on the formation of culms and also the delay in normal emergence of panicles thus contributing to low yields. Three larval parasites have been observed of which *Bracon* Sp. (*Braconidae: Hymenoptera*) appears very effective. Amongst the control measures tested and adopted on a large scale is the dusting of BHC 5%. Brief notes on the biology and seasonal history are given.

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