

Some Experiences with Gammexane
(B. H. C.) and D. D. T.

III. *The Paddy Jassid* — (*Nephotettix bipunctatus*, F.)
A short account of the experiments and the campaign.

By

S. RAMACHANDRAN,
Government Entomologist
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This insect, which was hitherto classified as a minor pest on paddy plants suddenly assumed serious proportions during October, 1948. The phenomenal incidence of this hitherto little-known insect was an eye-opener regarding the potentialities of our insect foes and showed that the entomologist has not only to contend with numerous major forms of insects peculiar to cultivated crops, but has also to hold himself in readiness to fight any obscure insect which may suddenly turn a pest.

The first report about a widespread damage was received from Tanjore district by the last week of October 1948, and it was found on investigation that the "Kuruvai" crop which was almost ready for harvest by this time, had harboured considerable numbers of these bugs and that their number had subsequently dwindled to negligible limits with the harvest of the crop. The real trouble, however, started by about the end of this month. An alarming report was received from Chinglepet, and this was followed by similar accounts from Salem, South Arcot, North Arcot Chittoor, Coimbatore, Tiruchirappalli, Madura and Tirunelveli. In short practically the entire part of the country at present known as the "Tamil Nad" was seriously infested with the pest during October—November. On the whole, the alarm was so unprecedented that the resources of the Entomology Section were at no time more heavily taxed than during the present occasion. The pest has been recorded in a serious form in the Central Provinces, Bihar and Orissa. Coming nearer home it was prevalent in North Arcot during 1946. One of the probable factors for its sudden multiplication and virulence may be the complete failure of the North-East monsoon during 1948. Another possibility is that the present system of intensive and continuous cultivation of paddy in some of the garden-land areas practically throughout the year might have afforded a fertile breeding ground for the jassids to multiply.

The pest, its life-history and habits: The bugs are small, active, wedge-shaped creatures about 5 m. m. in length, green in colour, the males

having a prominent black spot on each of the fore-wings. The female inserts her eggs into the lower leaf sheaths of paddy plants and the egg-laying capacity of an individual varies from 24 to 34. The nymphs hatch out in 4 or 5 days. They feed on the plant sap as they grow and reach the adult stage in about 20 days, moulting five times during the period. The full grown nymph is pale-green in colour. The females are ready for egg-laying in about 10 days. It is, therefore, likely that there may be at least 4 to 5 broods during a paddy season. The bugs are reported to breed on a few species of wild grasses also during the off-season.

Nature and extent of damage: The pest, was observed to be more severe in tracts where paddy was cultivated under well-irrigation. The maximum area under a well rarely exceeds 3 or 4 acres and even this is planted in successive stages, the area being decided according to the availability of water. As a result of this practice one often finds the crop in all stages of growth at the same time in a garden. The pest has been found to be particularly partial to young crops under two months old. The first visible symptom of infestation is that the plants develop an unhealthy look without the usual bright green colour and the growth is somewhat stunted. On a closer examination, scores of the bugs can be seen resting on the plants sucking up the plant sap. More definite symptoms are perceptible a few days later. The plants make no progress in growth, the leaves turn yellowish and the crop eventually withers and dries up. The drying up of the crop is probably hastened by the utter neglect of such fields. The owners do not even care to irrigate them out of sheer helplessness, and invariably plough them up. Though the bugs restrict their activities to young crops, an appreciable population may also be found on the older plants, but such older plants appear to be capable of withstanding the drain and hence no serious damage is caused. Most of the reports of jassid damage were from the well irrigated areas, except for two instances from the deltaic tracts of Tanjore and Tiruchirapalli. The present year's experience shows that the pest is virulent during the months of October, November and December,

Preliminary work: The approved methods of control in vogue were systematic hand-netting of the bugs supplemented by light traps, to which these insects are attracted in large numbers. On receipt of the earlier reports, every available hand in the section and districts was deputed to demonstrate and popularise these methods. Hundreds of the handnets and leaflets in Tamil giving a description of pest and the control measures to be adopted were distributed in all districts. In addition, the District Agricultural Officer, Salem arranged a special issue of 800 gallons kerosine to kill the bugs caught by netting, the humorous aspect in the distribution being that the possession of a handnet entitled the owner for his quota of kerosene. At Coimbatore about 100

nets were kept ready and every ryot was given one or two. These mechanical methods of control, however, can at best be claimed merely as palliatives and the pest was kept in check only in places where the measures were adopted systematically and assiduously.

Work done: The Entomology Section at Coimbatore had, in the meanwhile, realised that mechanical methods should at once be replaced by efficient insecticides, especially the new compounds B. H. C. and D. D. T. The following experiments were designed and conducted. Severely infested areas round about Coimbatore were surveyed, suitable plots were selected and dusted separately with D. D. T. at 2, 3, 5 and 10% concentrations and B. H. C. (D. O. 25). The result after 24 hours was not very marked. The trials were repeated with the addition of sprays of the two chemicals at 0.1 and 0.25% strengths and here again the mortality was not convincing for 24 hours. A third repetition was made on the next day with aqueous forms of D.D.T. and B.H.C. at 0.1 and 0.25% and D.D.T. kerosene emulsion at 0.16, 0.32, 0.64, 0.96 and 1.28% (1, 2, 4, 6 and 8 oz. of the emulsion in a gallon of water). In the third set of trials, the areas treated 3 days previously revealed a complete mortality of the entire jassid population in the plots treated with D.D.T. both as dust and as spray. Encouraged by these results, the trials were repeated once again in another area and the previous observations were confirmed. The course of mortality is by itself quite interesting. The jassids do not at all seem to be affected for the first 24 hours, as they are quite active, when disturbed. On the second day stray specimens may be found dead here and there but the full effect is seen only after three days. The leaf hoppers, once they had come in contact with the chemical do not seem to be capable of hopping to long distances even in the course of the three days, as they are invariably found dead immediately below the plants on which they had been resting. The hoppers drop down and float in the water and get wafted along the direction of the wind and thousands of them can be found collected along the field bunds, generally on the third or fourth day after the spraying. A gist of the trials made, the result obtained as well as of the costs of the different treatments is furnished in a separate statement.

From the data, it is evident that D.D.T. both as dust and spray has a specific action against this jassid, though it takes three days to effect a complete kill. D.D.T. emulsion in kerosene is effective but the higher concentrations have a scorching effect. B.H.C. was not found to be quite so effective as D.D.T. Meanwhile trials were also taken up with another preparation 'Torch Brand D.D.T. 4% Emulsion' at Madras, Salem etc. This too was quite effective, but had to be given up because of its prohibitive cost.

In view of these results, steps were taken to popularise the method, but the problem was the availability of the chemical, the use of the chemical

not having been attempted so far on a field scale, at any rate in this presidency. Only 17 x28 lbs. tins were at all available at Madras with Messrs Addison and Co., the stockists. The entire quantity was requisitioned and apportioned to the different districts according to the virulence of the pest. The staff at Coimbatore was trained in the spraying technique and sent to the different districts a second time to demonstrate and popularise the new method, and the spraying campaign was in full swing, within a week of the preliminary findings. The results were everywhere remarkably successful and the specific action of DDT against the jassid was established beyond doubt.

Summary: The paddy jassid—*Nephotettix bipunctatus*, F. though considered only as a minor pest till recently suddenly became a serious pest in the Tamil districts, during 1948. It was more virulent on well irrigated tracts, having a partiality to young crops under one or two months. DDT either as spray or dust had a spectacular effect against the pest. Between the two forms the spray was found to be cheaper. Two lbs. of "Guesarol 550" in suspension in 100 gallons of water are required to treat an acre and the cost of the chemical works out to Rs. 6. DDT emulsion in kerosene, though effective is not recommended as its inadvertent use is fraught with phytocidal risks with the added disadvantages of a higher cost and the difficulty in procuring the necessary grades of DDT and kerosene. The preference of the pest to small patches of newly transplanted paddy under well irrigation is a vulnerable point in its habits as it is easy to tackle these limited areas promptly and effectively.

- References:*
1. Misra C. S. 1919. The Rice leaf hoppers — Memoirs of the Department of Agriculture in India Entomological series Vol. V.
 2. Rana Abalos 1939. The Rice leaf hoppers — The Philippine Journal of Agriculture Vol. 10.



Statement of the trials conducted against the paddy jassid

S. No.	Insecticide	Concentration	Quantity required to treat one acre	Approximate cost	Time taken for complete mortality	Remarks
1	DDT dust	2% DDT	20 lb.	8	12 0	2 to 3 days High mortality
2	do.	3% do.	20 do.	10	0 0	do. do.
3	do.	5% do.	20 do.	12	8 0	do. do.
4	do.	15% do.	20 do.	20	0 0	do. do.
5	BHC D. 025 dust	5% BHC	20 do.	10	0 3	... Mortality not very high
6	DDT 550 spray	0.1% DDT	2 lbs. in 100 gallons of water	6	0 0	do. High mortality
7	DDT do.	0.25% do.	5 do.	10	0 0	do. do.
8	BHC P 520	0.1% G. I.	15 do.	30	0 0	... Mortality low
9	do.	0.25% do.	37½ do.	75	0 0	... do.
10	DDT emulsion spray	0.15%	0½ do.	7	0 0	... do.
11	do.	0.32%	12½ do.	14	0 0	do. High mortality*
12	do.	0.64%	25 do.	28	0 0	12 hours do. *
13	do.	0.96%	37½ do.	42	0 0	do. † do. †
14	do.	1.28%	50 do.	56	0 0	do. † do. †

* Slight scorching; † Scorching more prominent.

Preparation of DDT emulsion and its probable cost (item 10 to 14):

Aromox	1 Gallon	1	8	0
DDT pure	3 lbs.	12	0	0
Soap	5 oss.	0	8	0
		14	0	0

Gives 1½ gallons or 200 oss. of 25% DDT stock solution.