

Further spreading the news announced by the radio. By suitable legislation, if necessary, wide publication must be achieved in actual practice. Every organisation, whether official or otherwise, should help the State to this end. Press also has got its important role to play in this national weather service.

(iv) The Government can financially help the voluntary organisations involved in weather study. These organisations have to be continuously vigilant in their observations, since then only they can be successful, as changes occur so rapidly in the weather. The really valuable information can be merited and awarded a merit bonus. These organisations are not to ignore the phenological side of weather.

(v) On co-operative basis and with the support of the Government industrial workshops are to be started in suitable localities to manufacture the required essential thermometers, windvanes, anemometers, rain-gauges and screens. As it is, the initial cost of setting up an observatory is very high. It can be reduced considerably if these workshops function efficiently with suitable efficient staff.

Conclusion: The State and the Public should take co-ordinated measures to run weather service on a par with 'Postal Service'. In addition, the farmers should be posted with all details as to what the adverse weather conditions are for their particular locality with special reference to everyone one of the cultivated crops. This valuable information can be furnished to them, crop-war, by enabling them to have for reference, Crop Weather Calendars in regional languages. Steps in this direction have already been taken by the Director, Agricultural Meteorology, Poona, with the kind co-operation of the various Provincial Agricultural Departments.

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Some Experiences with Gammexane

(B. H. C.) and D. D. T.

II. *The Garlic and onion thrips — Thrips tabaci*

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Garlic is one of the most important spice crops in this Province but its cultivation is restricted to certain parts of Coimbatore, Madura and Bellary districts, probably because of its being able to thrive only under the peculiar environments prevalent in these tracts. At Bellary only one crop is raised from October to January while at Coimbatore there are two seasons, the first one from June to September and the second

from November to January. The duration is reported to vary from 2½ to 3½ months according to the local conditions. The maturity of the crop is indicated by the flowering of the plants and the formation of the small size-bulbs, but a certain amount of experience is necessary to decide the actual stage at which the bulbs are to be lifted. The yield varies from 1,500 to 7,000 lbs., but the average may be taken as somewhere about 4,000 lbs. In spite of the attractive prices the produce fetches, the ryots are only luke-warm about its expansion, more in a spirit of sheer helplessness against the minute insect — the thrips — which regularly infest the crop year after year, often causing its wholesale ruin, not to speak of one or two fungoid diseases which also levy their toll. D.D.T. and B.H.C. were tested against this insect recently and the following is a short account of the details of the pest and the lines of control.

The pest: Investigations on the life-history, habits and control of the thrips have been in progress from 1929 onwards and the available information on these aspects is summarised below. Two species of thrips *Heliothrips indicus* B. and *Thrips tabaci* L. are concerned in the damage. The former is generally the first to appear but is very soon swamped out by the latter, because of its higher prolificity. Discussing the details about *Thrips tabaci* — the major pest — stray adults are first found by about November but they multiply to large numbers within such an incredibly short period that the plants literally teem with their population by December, the mild sunny weather probably being favourable for their multiplication.

Life-history and habits: The female lays its eggs singly inside the leaf tissue, generally more towards the basal parts of the leaf and the egg spots are easily visible when the leaf is held against light. Tiny nymphs hatch out in about eight to nine days and seek the innermost recesses in the heart of the plant where they hide and feed on the plant sap. They attain the pre-pupal stage in the course of 4 to 6 days. The actual pupation takes place a couple of days later in the soil at a depth of 1 to 2 inches. The adult emerges in 3 to 4 days. The egg-laying capacity of a female ranges from 50 to 60. The adults first confine their feeding activities to the inner regions of the leaf-bases but with the rapid increase in population, numbers of them can be found resting on the exposed surfaces of the leaves as well. They are very active and sneak away inside at the least disturbance. The fresh hatchlings are white but turn yellow in colour within a day or two. In contrast to this species, the other *Heliothrips indicus* is somewhat sluggish and the individuals are generally found feeding near the basal portion of the leaves.

Predators and parasites: A chrysopid larva, a species of mite and one or two egg-parasites feed on the different stage of the pest, but this natural control is hardly felt in reducing the incidence of the pest.

Host plants : *Heliothrips indicus* is reported to have a wide array of host plants such as coriander, Bishop's weed, fenugreek, brinjal, onions, ground-nut, agathi, cotton, beans, cabbage, cauli-flower etc. *Thrips tabaci*, on the other hand has a lesser range consisting of fenugreek, onions, and cotton. One of the factors which is perhaps most contributory to the pest having become chronic to certain areas, at any rate for the Siruguppa tract, is the fertile and almost perennial breeding ground, afforded by its alternate host—onions. This crop is grown practically throughout the year in successive batches with the result that the pest which is always prevalent there transfers its attention to garlic with all its virulence, whenever conditions are favourable. This trouble on this account was so bad during some years, that even a temporary cessation of the cultivation of onions was suggested as a preventive measure.

Control measures : Strenuous attempts were made as early as 1929 to control this insect. Tobacco extract in the strength of 1 lb. to 6 gallons of water with an extra dose of 1 lb. of soap, lime-sulphur at 1 in 15 and 1 in 20 with the addition of soapnut lather were tried. It, however, transpired from the trials that the treatments did more harm to the crop itself. The over-dose of soap was found to definitely retard plant growth and inhibit bulb formation while the lime-sulphur washes had even a scorching effect on the foliage. The results were so discouraging that the control plots were found to fare better than the treated ones. The possibilities of insecticides being limited, mechanical sweeping of the plants with a pasteboard smeared with castor oil was also tried. Even this attempt proved futile and the whole problem was, therefore, kept in cold storage for the time being, advocating mere tobacco spray or dust as a palliative in serious cases of attack. It was also found that in well cultivation plots with a liberal application of manure and frequent irrigations, the plants developed a better vigour and were, on that account, able to withstand the damage for a longer time.

Work done : The pest was serious at Puliampatti near Palladam, Coimbatore district, during December, 1948. The insecticides already mentioned not being of any practical use, B.H.C. 5% dust and D.D.T. 0.1% spray were tried, each over an area of 30 cents. Counts of the population taken before and 24 hours after the treatments showed a reduction of only about 35% in the case of the spray and much less in the dust. The trials however, gave an indication about the higher efficacy of the spray, as the fluid when discharged under high pressure is able to permeate into the inner recesses of the plant, where the insects usually lurk. A second set of experiments were conducted with sprays of B.H.C. (P. 520) 0.1%, D.D.T. 0.1 and 0.2%. D.D.T. emulsion 0.16% and D.D.T. dust 2% and the percentages of reduction were 97, 08, 43, 89 and 58 respectively. The tentative results indicated that both D.D.T. and B.H.C. had a lethal

action against this species of thrips and that the effects of B.H.C. spray 0.1% were more convincing. D.D.T. emulsion also was promising but further work with this preparation was dropped out owing to non-availability of the necessary chemicals and the probable risk of foliage injury attendant with its inadvertant use. A few more trials conducted on exploratory basis gave more definite indications of the specific action of B.H.C. spray against these thrips.

Properly laid out field-scale experiments were again taken up during December, 1949, with B.H.C. and D.D.T. sprays each at 0.05% and 0.1% in 4.5 cent plots, randomised and replicated four times. Population counts of 5 plants, selected at random, were recorded for each replication before as well as 24 and 48 hours after treatment. At harvest, the yield of 4 beds (about 1/3 of a cent in extent) per replication, situated exactly in the middle of the experimental plots, was recorded. The data are furnished in statements I and II.

Conclusions: The respective percentages of reduction after 48 hours are 108, 100, 48 and 62% in the order of the 0.05% and 0.1% concentrations of B.H.C. and D.D.T. confirming the high lethal action of B.H.C.

The yield has been proportionate to the reduction in insect population, the B.H.C. 0.05% and 0.1% plots yielding 258 and 269% over the control. The calculated additional yield over the control in the case of the two concentrations is 2457 and 2625 lbs. respectively, the money value of which at Rs. 10/- per maund of 25 lbs. works out to Rs. 885/- and Rs. 1,050/-.

The higher yield is brought about by the better development of the bulbs in the treated plots. A thousand of them selected at random from the produce of the sprayed plots weighed 12 lbs. while a similar lot from the controls weighed only 3 lbs.

About 8 lbs. of the chemical in 100 gallons (0.05%) may be required to spray an acre and the cost of the same works out to Rs. 16/-. A second treatment may be necessary after about a fortnight in case there is a recrudescence of the pest. Though the figures definitely prove the higher efficacy of B.H.C. spray at 0.1%, it is considered that a 0.05% strength is enough for the purpose, provided the spray is applied carefully and thoroughly.

Considering the practical ruin of the crop by the pest year after year, a net profit of nearly Rs. 1,000/- per acre in either case is in no way inconsiderable. These results were further tested on a field scale and confirmed beyond doubt and the use of the chemical is becoming exceedingly popular in the Palladam area.

Trials against thrips on onions : D.D.T. and B.H.C. dusts at 5%, D.D.T. spray 1% and B.H.C. 0.5% were also tried against the same species of thrips on onions and the mortality ranged from 85 to 100%. Contrary to the previous findings, both the chemicals appear to have a uniform effect on this species crop which may probably be due to the looser arrangement of the leaves facilitating better penetration of the chemicals.

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STATEMENT I.

Results of trails at Puliampatti—Palladam Taluk

Against the Garlic Thrips (Thrip Tabaci).

(Population only)

Date of sowing : 15th October 1949. Lay out : Randomised plots replicated
 Date of treatment : 15th December 1949. four times.
 Date of harvest : 28th January 1950. Area of each plot : 135' x 15'.
 Area harvested in each plot : 1/3 cent.

Population on 5 plants—average of four replications

Treatment	Population on 5 plants—average of four replications				
	Before treatment	24 hours after treatment	48 hours after treatment	Reduction in population after 48 hrs.	20 days after treatment
B.H.C. 0.05%	166	8	Nil	100%	28
B.H.C. 0.1%	188	Nil	Nil	100%	16
D.D.T. 0.05%	176	117	91	48%	64
D.D.T. 0.1%	176	103	65	62%	51
Control	194	161	149	23%	362

STATEMENT II. (Yield Data)

Treatment	Yield in Lb. & Oz.				Yield in lb. mean of 4 replications.	Acre yield in lb.	Percentage over control	Approximate money value @ Rs. 10/- per maund of 25 lb.
	I. Rep.	II. Rep.	III. Rep.	IV. Rep.				
B.H.C. 0.05%	18-2	14-0	10-10	10-12	13-6	4013	257.9	Rs. 1605
B.H.C. 0.1%	14-0	15-0	15-0	11-12	13-15	4181	268.7	1670
D.D.T. 0.05%	10-2	13-10	8-8	9-0	10-5	3094	198.9	1240
D.D.T. 0.1%	14-0	9-0	10-12	6-0	9-15	2981	191.6	1190
Control	4-13	5-0	6-0	4-14	5-3	1556	100.0	620