

Conclusions: (1) The paper deals with the economic and commercial importance of some of the important spices of India. (2) A brief survey of the causes of the success and failure of the respective spice crops has been made. (3) The possible methods of crop culture which would go to set off the factors handicapping the progress of the spice industry have been indicated. (4) An appeal to the planter to make a serious endeavour to make good the deficiency in the spice crop production is made.

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Transmission of research on pest control

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Every cultivated plant or tree has its own specific insect enemies, and agricultural products, which, are grown and stored at so much expense and trouble, are also not exempt from the depredations of insects. It has been computed that over 200 species of insects occur as major pests and that the damage caused by them both in the field as well as the godown, deprives the ryot by about 10 to 15% of his legitimate earnings. It has also been estimated by various authorities that the overall food deficit for the entire country is from 7 to 15%. It would thus seem as if the entomologist by himself might be able to wipe out food deficit in the country by controlling insect damage to crops.

The Entomological Section of the Madras Agricultural Department was organised during the year 1912. The work has not always been quite an enviable one since it consists in organising a regular, unrelenting warfare against Nature, who, while having blessed us with her unlimited and bountiful resources, has also created the myriads of insect foes for us to contend with. Perhaps the chief handicap which has all along been felt was the inadequacy of staff, to transmit what little had been achieved by way of research, promptly and in time to the door of the ryot in times

of emergency. The situation was at no time more seriously felt, than during the present food crisis, when the resources of all governmental agencies had to be mobilised to save every plant raised and every grain harvested. The first urgent demand on the entomologist was during 1943, when a consignment of over 6,000 tons of imported wheat was threatened with complete ruin by insects at Madras. Since then the conservation of the large stocks of foodgrains, held in storage by the Government, from insect damage has become a routine work of the special entomological staff. In the wake of the above problem, the vagaries of the monsoons and other environmental factors, have favoured the multiplication of some of the major pests of field crops. Some of the forms which were till now dormant suddenly assumed serious proportions, while some others, which were practically insignificant so far, flared up into prominence. The recent intensive practice of crop cultivation, which has for its incentive the attractive prices of food stuffs, has been an important factor aiding the rapid multiplication of insect pests. The seriousness of the situation was realised by the ryots also and frequent requisitions for help and advice were pouring in from all parts of the Presidency. The experience of previous years, coupled with the discovery and easy availability of the two new insecticides - DDT and B. H. C. have enabled the section to rise to the occasion and handle the situation satisfactorily. More than that, the timely organisation of a separate plant protection agency for the Presidency, has been of immense help in transmitting the results of research to the ryots and popularising the approved methods of pest control. The object of this paper is to present a short account of the work done in this line.

The activities of the Entomology section may be classified under two categories, viz. (i) Protection of food-grains and (ii) Protection of crops and plants.

(i) **Protection of food-grains.** This branch though, it was first organised to meet emergent cases of grain infestation, has subsequently become practically a food-grain protection service, in 1943, when the food crisis was just making itself felt, alarming reports were received about the badly-wcevilled condition of about 6,000 tons of wheat imported from Australia. Immediate steps were taken to investigate the complaint and fumigation with calcium cyanide was decided to be the only resort. Suitable accomodation and the necessary machinery were improvised and the entire consignment was fumigated with success. Meanwhile, the Government also programmed the policy of importing enormous stocks of food-grains and keeping them in storage for a regulated issue to the public. This procedure created in its wake the problem of insects also. Investigations were immediately taken up to find out the ways and means of conserving the stocks and the following standardised policy was evolved and adopted. Experiments had shown that Calcium cyanide was about the best fumigant and that DDT and B.H.C. dusts were good disinfectants as well as prophylactics. Empty godowns are first cleaned and dusted

with one of the latter chemicals to eliminate the insect population, lurking in the corners and crevices. The bags are subsequently stacked according to specifications and if they get infested, they are fumigated with Calcium cyanide. Initial or re-infestation of the stocks is prevented by a periodical dusting on the bags with BHC D. 034. Adequate precautions are taken to see that the grains do not get damaged by the treatment. A technical staff of four officers with a complement of subordinate staff is attending to the work in the whole Presidency and the entire organisation is under the administrative control of the Board of Revenue. It is unnecessary to dilate here about the volume of the work turned out by this service, but it would suffice to say that food-grains are handled by lakhs of tons and every attempt is made to minimise the loss by insects.

(ii) **Plant Protection Service.** A plant protection staff comprising two officers one stationed at Bapatla for the northern districts and another at Coimbatore for the south - with an upper subordinate for each district specially trained for the work was sanctioned during the current year. The scheme began to function by about the middle of January, 1949. Each district was also furnished with the minimum equipment of dusters, sprayers, and the standard insecticides to meet all emergencies. The period under review, though short, had been unique in the successfully tackling of a number of major pests, mostly of food crops. Paddy which happens to be one of the staple crops of our Province had to suffer severely, from its insect enemies. The army worm of paddy *Spodoptera mauritia* broke out in all its virulence over the Circars, West Coast and parts of the Tamil-Nad and about 640 acres of nurseries and 5,500 acres of planted fields were infested. Prompt control measures, such as flooding and sweeping the caterpillars were organised. Dusting with BHC D. 025, the latest insecticidal treatment was also advocated. An acre requires about 10 to 20 lb. of the chemical costing about Rs. 8/- and this expenditure was not grudged by the ryot, as over two and a half tons of this chemical were purchased and used by them in the Circars alone. The rice grasshopper - *Hieroglyphus banian* - appeared on a large-scale, over 6,000 acres in Malabar and the latest methods of control were adopted with success in this district also. The same chemical - BHC D. 025 - was equally effective against the grasshoppers also and its use is rapidly becoming very popular. Another serious pest of paddy, is the paddy jassid - *Nephotettix bipunctatus*. Among the various chemicals tried, for the control of this bug DDT spray at 0.1% concentration was found to give very good results at a low cost of Rs. 6/- per acre. The pest appeared again this year over 300 acres in the Tamil Nad and was dealt with promptly. An effective remedy by way of dusting BHC D. 025 was discovered against the rice bug - *Leptocorisa acuta* - and this campaign was pushed on about 100 acres. The cost is negligible compared with the probable damage, as it works out to less than Rs. 10/- per acre. The damage by the common field rats - *Gunomys Kok* - is being reported to be far more serious than that caused by most

of the other pests. Control measures advocated and practised, so far, were not convincing. The recent astounding results obtained with zinc phosphide used as a poison bait have practically solved the problem. The mortality of the rodents was so convincing that over 2,000 lb. of the chemical, enough to treat 20,000 acres were recently purchased and used by the ryots of the Northern Circars. Apart from the major pests, minor ones such as the smaller grasshoppers — leaf-eating caterpillars and beetles, plant bugs, etc., occurred sporadically in isolated areas and suitable measures were adopted. Crops coming under the category of millets also were subject to infestation by grass hoppers, the ear-head bug, etc., and all these were successfully dealt with. In the case of vegetables, hundreds of acres of brinjal were protected for its specific enemy — the *Epilachna* beetle, not to speak of other insects which infest this crop. The new insecticides have also been equally effective and were used on a large scale against thrips on chillies and garlic. Remarkable results were obtained against cutworms on potatoes and cruciferous crops on the Nilgiris with BHC D.025 which practically annihilated these worms and its use is becoming increasingly popular. Besides these, a number of pests on fruit trees, industrial crops like betelvine, oilseeds, etc., were promptly attended to. The research section at Coimbatore is, in the meanwhile, busy with finding out new methods of combating the insect foes. Interesting results have been obtained against a number of insects such as the pomegranate borer, the ber fruit fly, the agathi weevil, the mango hopper, etc., which were till now defying all our ingenuity and these will be popularised as soon as the tentative results are confirmed.

The resume of the work given above would serve to show clearly that the staff appointed have more than justified their existence. The benefits to the public by the grain storage service alone is enormous. Based on the encouraging results obtained so far, the Board of Revenue are seriously considering the expansion of the staff. The plant protection service under the Agricultural Department, though hardly six months old, has turned out creditable work and its future possibilities also are immense. Apart from carrying out the approved methods of control, the staff are also taking up field observations as and when there is need and it will not, be long before this Department has to approach the Government with proposals for expansion in this line as well.

Before concluding this note, it is also my duty to point out one major aspect, which seriously handicaps the efficiency of the service. Insect outbreaks generally occur all on a sudden over large areas and effect considerable damage before help reaches the place. In these days of acute transport difficulties; it has not always been possible to reach the workspot promptly, with the somewhat cumbersome and heavy appliances and large consignments of insecticides. Provision of a few mobile units for each division would go a long way to solve the problem and make for efficient service.