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Our Present Position with Regard to the Control of Fruit Pests.*

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Introduction. It is a welcome sign that increasing interest is being taken in fruit culture by the public. This has been particularly the case ever since the Government opened the Fruit Research Station, Kodur. Expansion of orchards is bound to result in the near future and with it the problem of tackling the pests is bound to come into more prominence. It is therefore thought that a brief account of the major pests of the more important fruit trees and their control will be of special interest to those in the line and also to those who propose taking up fruit culture.

Mango Pests. Of the various fruit trees grown in this Presidency mango is one of the most important. There are about two dozen pests affecting the mango of which the blossom hopper (*Idiocerus* spp), the stem borer (*Batocera rubus*) and the fruit flies (*Dacus ferrugineus* and *Dacus ferrugineus incisus*) are the most important. Among the other insects which do some damage occasionally may be mentioned the leaf caterpillar (*Farasa lepida*), the shoot webber (*Orthaga exvinacea*) and the nutweevil (*Cryptorhynchus mangiferae*). The hoppers both adults and nymphs—infest the blossoms and injure them by sucking the sap with the result that they are either shed or prevented from setting into fruits. Spraying with fish oil rosin soap at a strength of one pound in ten gallons of water is found effective against the pest. In Bombay, dusting with flowers of sulphur is recommended. This treatment is being tested here with a view to finding out its effect against the pest and the cost of the treatment. How far dusting will interfere with the setting of fruits is also receiving attention. The stem

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borer is another serious pest of the mango; the stout grubs bore into the stem and branches and cause them to dry up. Injection of a mixture of chloroform and creosote in equal proportions into the larval tunnels and closing the entrance hole with wet clay is generally recommended for the destruction of the grubs in deep tunnels. An equally effective method is the use of a mixture of kerosene and petrol in the proportion of 10:1. If the grubs are found just under the bark hooking them out with a flexible wire is often done.

Fruit flies are also serious pests of the fruits; their maggots feed inside the pulp and spoil the fruits. Three or four treatments are in vogue. Systematic destruction of fallen fruits so as not to allow the maggots therein to come out and pupate in the soil, raking up the soil round about the trees if the maggots have already pupated, spraying a dilute solution of crude oil emulsion as a repellent to prevent flies from laying eggs on the fruits and bagging in the case of costly fruits are some of the methods recommended against fruit flies.

Different species of caterpillars also attack the leaves. One of these is the nettle grub—*Parasa lepida*; it is covered with hairs which are irritating to the touch. Handpicking is therefore out of question and spraying with calcium or lead arsenate has been found to be effective. As the caterpillars pupate at the base of the stems inside hard cocoons these may be crushed so as to kill the pupae. Another caterpillar known as the shoot webber is sometimes troublesome; it webs together the leaves and feeds on them voraciously. In the case of small trees the caterpillars can be controlled by mechanical means while in the case of tall trees stomach poisons have to be applied. The nut weevil is another pest found especially in the fruits of *neelum*. Direct control of the weevil in the fruits is rather difficult as the infection starts early when the fruits are tender. Destruction of adults when they come out of the fruits and proper disposal of nuts are two of the measures which may be attempted.

Citrus Pests. Citrus is another important fruit tree and has, like the mango, a long list of pests. Of the more important pests, mention may be made of the fruit sucking moths (*Ophideres* spp.), the leaf eating caterpillar (*Papilio demoleus*), the bark borer (*Arbela tetraconis*) and the leaf miner (*Phyllocnistis citrella*). The other pests which are sometimes found doing damage are the stem borer (*Cheledonium* sp.), the fruit fly (*Dacus* sp.), plant lice (*Aphis tovaresi*), mealy bugs (*Pulvinaria* sp.) and scale insects.

The fruit sucking moths by means of their serrated probosces suck the juice from the fruits at night and cause them to drop. The loss due to this pest is sometimes considerable. Eggs are laid by the moth not on citrus but on a weed known as *Tinospora* and the caterpillars feed on the leaves of this plant. The measures generally suggested against the pest are (1) destruction of the weed to prevent breeding of the moth, (2) screening of the fruits with palmyra baskets, (3) spraying of the fruits with repellents,

and (4) handpicking of the moths especially on small trees. When a light is directed towards the moths these creatures become stupefied when hundreds of these can be easily caught and killed. Some of these methods have their own drawbacks. So, another method, i. e., growing tomato as a trap crop is being experimented upon. It is found that the moths have a special preference to fruits of tomatoes as against those of citrus. This partiality is being used to advantage by raising tomatoes in citrus gardens. It is so arranged that both these come to fruiting at the same time when moths transfer their attention to tomato fruits whereby the citrus fruits are left free.

The citrus caterpillar is yet another widely distributed pest. It defoliates the plant and in the case of young plants much damage is done. Prompt handpicking of the caterpillars has been found to be an economical and efficient method. Spraying of arsenical is suggested in the case of big trees. In this connection it may be stated that trials with cheaper insecticides are in progress. One such substance that is being tried—seed of *Thevetia* plants found growing in large numbers in many parts of the Presidency—is giving hopeful results.

Another pest of citrus is the bark borer found mostly in the Circars. The caterpillars which hatch out of the eggs laid on the bark bore into the stem. They come out at night and feed on the bark under cover of galleries while during day time they hide inside the holes. Injection of a mixture of kerosene and petrol suggested against the mango stem borer is effective against this pest also. The caterpillars may also be killed with pointed wires.

The citrus leaf miner is a tiny caterpillar which mines into the leaves making them curl and fade. In the case of young plants the damage done is serious. This is one of the pests against which some effective remedy is needed. Rubbing of the attacked leaves to crush the different stages of the pest found in the mines and spraying of deterrents alone may be suggested now. Besides, the pests mentioned above, Psyllids, mealy wings, mealy bugs and plant lice are occasionally come across. Tobacco decoction is very effective against these pests. Our studies have shown that tobacco stems which are generally discarded can also be used for preparing the decoction with equally good results. Spraying has, in all cases to be done in time.

Other Fruit Pests. Banana is yet another fruit crop grown all over the Presidency. Fortunately for us no serious pest has been noted so far on them. Grapevine is often attacked by a flea beetle—*Scelodonta strigicollis*, and the leaf mite—*Tetranychus telarius*. The beetle feeds on the leaves and the tender shoots; this can be controlled by spraying with arsenicals. Mites which suck the sap from the leaves can be checked by dusting with flowers of sulphur. The pomegranate fruit's worst enemy is the butterfly—*Virachola isocrates*. A remedy often suggested is the use of paper or muslin bags to prevent the butterfly from laying eggs on the fruits.

Destruction of the first attacked fruits will also reduce the infestation. The most important pest of guavas—the scale insect (*Pulvinaria psidii*) can be controlled by spraying contact insecticides. The Ber fruits at Panyam and other places are attacked by a fruit fly (*Carpomyia vesuviana*). Our recent studies have shown that the maggots pupate in the soil and remain as such for months before the emergence of adult flies. Raking up of the soil round about the trees, if carried out properly and at the correct time, will reduce the fly incidence considerably.

Pests of Hill Fruits. Cultivation on a small scale of fruits like apples, pears, peaches, plums, etc., is done on the Nilgiris, Shevaroy and Pulneys. One of the serious pests of apples—the woolly aphis—needs some mention in this connection. Our studies have shown that spraying with contact insecticides to be effective has to be repeated a number of times. Biological method of control is therefore being attempted. A parasite—*Aphelinus mali*—which is found effective in the temperate regions, has been introduced in the Pomological Station, Coonoor. Counts taken recently have shown 40 % parasitisation especially at the beginning of the season and there is reason to hope that the parasite will check the pest considerably.

Scope and Possibilities for Further Work. As stated elsewhere in this paper there is scope for work in the direction of finding cheaper indigenous insecticides to suit the pockets of the Indian ryot. Another line of investigation which is likely to show promise is the utilisation of resistance in the evolution of resistant types against specific pests. With the help of the Fruit Specialist it is possible to evolve suitable varieties to replace the more susceptible ones. Though this is an achievement that is likely to take a long time, in view of the fact that the fruits are mostly perennials, it is worth a trial.

Need for Plant Quarantine Service. Lastly, a word may be said about the urgent need for plant quarantine service. Some foreign pests have already found their way unnoticed into India. The woolly aphis and the fluted scale and other foreign pests are already present in this Presidency. San Jose Scale and the Codling Moth—also foreign pests—have recently been reported from North India. We have already in this province a formidable number of pests—over 500—attacking different crops and surely it should be our chief concern to see that this number is not allowed to increase by unrestricted invasion of foreign pests. Knowing as we do how the other countries have suffered and are spending large sums in fighting the insect menace, it is our imperative duty to see that serious pests are successfully intercepted from gaining a foothold in our country by the establishment of effective quarantine stations at the ports of entry manned by expert staff.