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INSECT *Pests* AND THEIR CONTROL

by C. F. H. JENKINS, M.A. (*Government Entomologist*).

FULLER'S ROSE WEEVIL (*Pantomorus godmani* Crotch)

FULLER'S rose weevil is a comparatively recent pest to reach Western Australia and so far its activities have only been reported from one or two restricted areas. It is such a serious pest, however, and has such a wide distribution over the globe that all orchardists should be on guard against the beetle and should be prepared to carry out control measures immediately the insect is detected.

The first Australian record of the weevil came from New South Wales (Gurney, 1934) and their appears to be no published record of the insect's occurrence in any of the other Eastern States.

The original home of the beetle is said to be South America (Buchanan, 1939) but it is now known from the U.S.A., California, Mexico, Italy, Africa, France, Spain, the Azores, Hawaii and New Zealand. There has been little opportunity to study the life history of the insect under local conditions, although some work along these lines is in progress. The following information, therefore, is to some extent adapted from the findings of New South Wales entomologists (Hely, 1948) who have had experience with the pest for a considerable period. Investigations in Western Australia have already revealed local differences in the habits of the beetle as compared with New South Wales and further study will probably reveal more. It is unlikely that these

findings will materially affect the control recommendations at present available and further delay in acquainting growers with the information that is available would appear to be undesirable.

LOCAL DISTRIBUTION

So far, the rose weevil has only been found in the Pickering Brook-Carmel district and at Denmark. Orchardists suspecting the presence of the pest are requested to send to the Agricultural Department specimens of any beetles which are regarded with suspicion.

DESCRIPTION

The adult weevil may easily be confused with the apple curculio or apple weevil, as superficially the two beetles somewhat resemble one another as does the damage which they cause to various foliage. The weevil is greyish brown in colour and a little over $\frac{1}{4}$ -inch in length with the typical rostrum or "snout" of

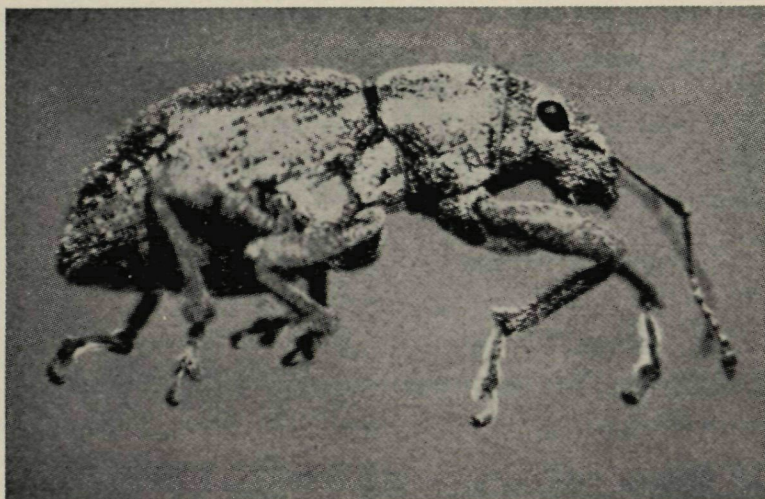


Fig. 1.—Fuller's rose weevil. The photo shows the beetle enlarged about 14 times—adults are between one-quarter and one-third of an inch in length.

—After R. A. Flock.

the weevils or elephant beetles. The mouth parts are placed at the end of the snout as are also the sharply bent or elbowed antennae. The beetle may have a slightly broader snout than that of the curculio and its colouring is duller. The most marked distinction between the beetles is in their habits, as the rose weevil may commonly be found clustering on food plants in the daytime, whereas the apple curculio is typically a night feeder and hides in the soil at the base of the tree during the day.

LIFE HISTORY AND HABITS

Weevil activity is most pronounced during the summer months but active feeding has been observed in Carmel orangeries right throughout the winter. Egg-laying in New South Wales takes place in the late summer and autumn and a single beetle is said to be capable of laying about 200 eggs. Some of the late eggs may carry over the winter without hatching but the summer eggs hatch in three or four weeks and the tiny orange-coloured grubs drop to the soil where they continue their development.

The eggs are creamy-yellow in colour, and may be deposited in clusters of up to a hundred eggs. Each egg mass is placed in a sheltered situation such as between curled leaves, under stones or loose bark, or between two fruits in contact, and the masses are cemented into place with a fluid which hardens on exposure to the air.

Hatching time varies from a month to several months, depending upon the temperature and other weather conditions. The larval period also

varies considerably in its duration but may occupy up to nine months or more.

The legless grubs are concentrated mainly in the surface six to eight inches of soil, where they feed upon the roots of the host plant. When fully fed the larvae remain inactive for a period in an oval earthen cell, then they pupate and after a period of two or three weeks the adult beetles emerge.

HOST PLANTS

Rose weevil injury in this State has so far been mainly in citrus groves, but the insect is known to have such a wide host range that no fruit grower can afford to be complacent. They are also known to attack a range of garden shrubs, many weeds and some vegetables. Amongst the preferred plants may be listed the following:—Citrus, passion-vine, blackberry, camelia, rose, peach, plum, dahlia and French beans. Occasional attacks have been observed on *Pinus radiata* and *Eucalyptus* but these are not believed to be favoured hosts.

INJURY

The most obvious injury caused by Fuller's rose weevil is to the foliage.

The adult beetles chew the leaves to shreds and a heavy infestation will rapidly defoliate a small tree. Bark injury is usually unimportant and fruit damage has not been observed in Australia, although it has been reported abroad.

The effect of the larval root feeding is difficult to assess. Most of the injury appears to be associated with the destruction of root fibres but severe effects from this cause alone on well-tended trees have been difficult to prove.

CONTROL

Prevention of Spread.

Although the beetles are unable to fly, the fact that they have a wide host range and cling readily to various objects gives them ample opportunity for artificial dispersal. They are also capable of surviving long periods of starvation and other unfavourable conditions. The fact that no male beetles are known and that every individual is capable of laying viable eggs (parthenogenetic reproduction) further facilitates the beetles' chances of becoming established in a new environment.

Egg masses may be transported attached to leaves and fruits and picking-boxes placed in the orchard may also be used by the beetles as egg-laying sites. All these factors should be considered by the orchardist not only with relation to spread within an individual property, but also from one part of the State to another.

Cultural Methods and Mechanical Barriers.

Although weevil injury may be quite severe in well cultivated orchards, local observations have shown that abundant weed growth (especially couch in the summertime) favours beetle activity. Wherever possible, therefore, weed growth should be kept under control and trees should be skirted so that the leaves do not touch the ground or adjacent weeds and so afford beetles a ready access from the ground to the branches.

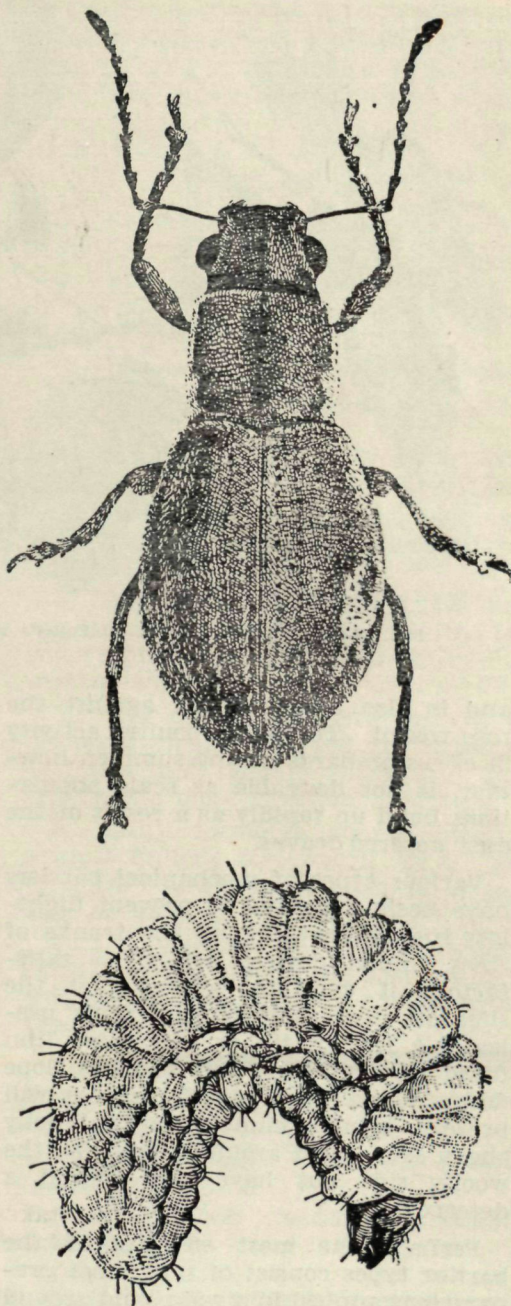


Fig. 2.—Larva and adult of Fuller's rose weevil (enlarged).
—From "The Agricultural Gazette" (N.S.W.)

The controlled use of poultry in orchards has been used effectively in this State against the apple curculio

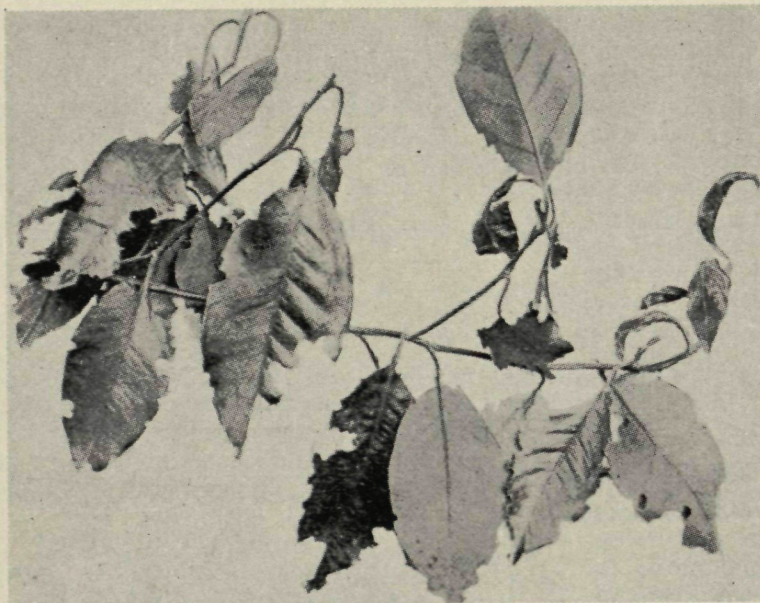


Fig. 3.—Citrus leaves injured by Fuller's rose weevil.

and is also recommended against the rose weevil. Too much poultry activity in citrus orchards during summer, however, is not desirable as scale populations build up rapidly as a result of the dust covered leaves.

Various types of mechanical barriers have been suggested to prevent flightless insects crawling up the trunks of trees. Such devices are often satisfactory if carefully applied but the slightest negligence renders them useless. A frill of tin or galvanised iron fitted closely to the butt so as to slope down at an angle of 45 degrees will prevent beetles climbing up. Woolly sheep skins fixed around trees with the woolly side out have also proved a deterrent.

Perhaps the most effective of the barrier types consist of tanglefoot preparations applied in a wide band around the butt. A strip of grafting wax or bituminous grafting paint should be applied around the tree trunk first and allowed to dry as this will serve as a suitable base for the sticky compound and prevent bark injury.

Chemical Sprays and Dusts.

Arsenate of lead has given poor results against the rose weevil, although from the leaf-feeding habits of the beetle satisfactory control from any foliage poison would be expected.

DDT and cryolite sprays have both given good control in New South Wales and could be used in cases of severe local infestations, although the latter insecticide has never been commonly used in this State against any pests. The cryolite formula recommended is 1½ lb. of cryolite to 40 gallons

of water. The concentration of DDT recommended in New South Wales is 0.5 per cent. so that 20 per cent. water emulsions would require to be mixed at the rate of 1 part to 40 parts of water. This spray has considerable residual effect against the beetles but may produce some unfavourable responses, such as an increase in scale insects.

Cryolite would not have this drawback but may be less efficient against the beetle than DDT. As already mentioned, weeds are important in supporting beetle populations and consequently weed growth should be destroyed in the orchard before spraying operations are carried out. This will increase the kill by concentrating the beetles on the trees before spraying and reduce the means of carry-over.

The mixing of DDT emulsions with white oil and Bordeaux sprays is widely recommended but foliage injury to apple trees from white oil-DDT mixtures has occurred, so other fruits may be similarly affected. No doubt susceptibility to damage will vary with the locality, the condition of the trees and

the variety concerned, but until more evidence is available wholesale spraying with the mixture may be undesirable.

Sprays should be applied when the maximum number of beetles are very active but before extensive egg-laying has taken place. December is probably the most satisfactory month, although if very serious damage is done by overwintering adults and the spring brood, earlier treatments may be necessary.

If DDT is used and scale insects increase abnormally, then a late summer white oil spray should restore the situation.

In addition to the spray treatments just outlined BHC ("Gammexane" or Benzene-hexachloride) and DDT dusts have been found very toxic to Fuller's rose weevil, the former being somewhat the quicker acting. The dusts can best be used as barriers placed at ground level close to the tree trunks.

To gain maximum results the ground close around the butts must be levelled and freed from weeds and other weed growth and trailing branches which may allow the weevils to by-pass the dust barriers must also be removed.

Dust barriers will, of course, not affect insects already established on the tree but will prevent reinfestation from the ground. Sudden jarring, especially of small trees, however, will cause many beetles to fall to the ground and these will be killed when attempting to re-climb the tree.

The dust must be used in sufficient quantity to ensure that a quantity clings to any insect attempting to climb the tree. The most effective concentration tested was a 10 per cent. dust but lower concentrations used more liberally should prove quite satisfactory. Although dust treatments may not be

applicable for the control of some extensive and severe infestations, they may be used to good effect in conjunction with spray applications and cultural treatments, or to protect already clean trees.

SUMMARY

1. Fuller's rose weevil was first recorded from Western Australia in 1948.
2. The present known distribution in Western Australia is Pickering Brook, Carmel and Denmark.
3. The beetle has a wide host range and the feeding adults may cause severe foliage damage.
4. Most damage in Western Australia is at present done to citrus trees.
5. The larval stage is subterranean and feeds mainly upon fibrous root growth.
6. Beetles are principally active during the spring and summer months but some adults may be found feeding during the winter.
7. The control of weed growth in orchards helps to reduce breeding facilities and renders spray and dust treatments more effective.
8. Spray formulae found effective against Fuller's rose weevil are 0.5 per cent. DDT and cryolite 1½ lb. to 40 gallons of water.
9. Dust barriers of 10 per cent. BHC or DDT placed around the butts of trees will kill beetles climbing to and from the tree trunk.

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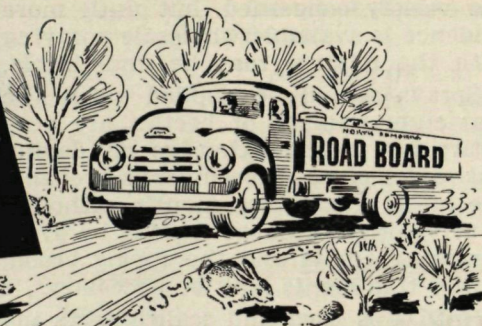
SPECIMENS HELP DIAGNOSIS

WRITTEN descriptions of plant diseases are often insufficient for accurate diagnosis. Send specimens, preferably several, showing the disease at various stages. They will usually carry well if wrapped in moist newspapers and enclosed in well-ventilated containers.

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