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INSECT *Pests* AND THEIR CONTROL

By C. F. H. JENKINS, M.A., Government Entomologist
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THE CITRUS WHITE FLY

(*Aleuroplatus citri* Tak.)

FOR the first time in Western Australia the citrus white fly was recorded on lemon trees at Maddington in 1950 and since then it has been found to be widely distributed in the Maddington-Gosnells area and in scattered situations in the Darling Range, Middle Swan and Perth suburbs. It is also of interest to note that the insect appeared in Mildura citrus orchards in Victoria (Anon 1952), about the same time as it was reported from Western Australia, although there appears to be no explanation for its sudden dispersal over the continent.

The Australian citrus white fly was originally described from New South Wales (Takahashi 1940) and must, therefore, be regarded as a native insect. In its home State, however, it is of little importance and any trouble it may cause is on a few backyard trees.

The "white flies" or "snow flies" (Aleurodiae) belong to a group closely related to lerp insects and scales. Like these insects they have sucking mouth parts and so when present in large numbers their feeding may detrimentally affect plant growth. There are quite a number of native species of white flies to be found in Australia but most of them confine their attention to bush plants and so the group has aroused little local interest. Two world renowned pests included in the Aleurodids are the American citrus white fly (*Dialeurodes citri* (Raley & Howard)) and the greenhouse white fly (*Trialeurodes vaporariorum* (Westwood)). The

former is not known to occur in Australia and is not to be confused with the subject of this article although the damage caused by both pests has points in common. The greenhouse white fly was a serious pest of glasshouse tomatoes in part of the Eastern States but has now been brought under control by a wasp parasite (*Encarsia formosa* Gahan).

DESCRIPTION

The adult white fly (Figs. 1 and 2) is a tiny creature about the size of an aphid. It is characterised by the fact that both pairs of wings and the body are covered with a white, flocculent waxy secretion which makes the popular names "white fly" and "snow fly" particularly appropriate. The insects may cluster in large numbers on young shoots and leaves or fly in misty clouds when disturbed. Apart from the snowy adults which can usually be detected,

another indication of white fly infestation is the presence of eggs and other immature stages glued to the under-surface of the foliage.

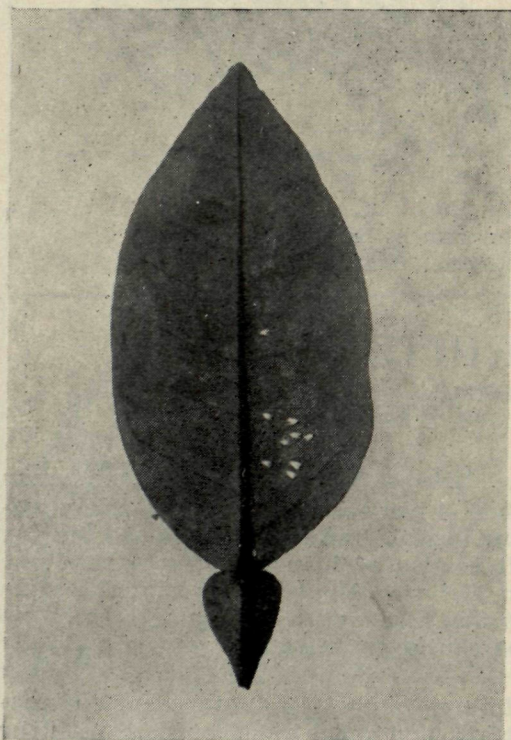


Fig. 1.—Adult white flies (natural size) laying eggs on the underside of a grape-fruit leaf.

LIFE HISTORY AND HABITS

The eggs are laid in horseshoe shaped or incomplete circle patterns on the under-sides of the leaves and from these the tiny wingless "crawlers" emerge (Fig. 3). After a very brief life of activity the larvae settle down on the leaves, lose all power of locomotion and look very like small scales. After a period, the length of which will vary according to the season of the year, the outer covering of the scale-like larva hardens and forms a "pupa case" (Fig. 4). From this puparium the adult "fly" later emerges to continue the cycle.

Breeding is most active during the warmer parts of the year and several

generations develop annually. Young succulent growth favours the pest and so the greatest populations usually occur in the spring and autumn. All stages can usually be found on the trees at one time, although eggs and adults are at a minimum during the winter.



Fig. 2.—Enlarged photograph of the adult flies and eggs.

INJURY

Lemon trees are the favourite host of the white fly but all types of citrus are more or less liable to attack. The sap-sucking habits of the insect both in the adult and immature stages are a drain on the tree's resources but it is the fouling of the fruit with sooty mould (Fig. 5) which causes growers most concern.

Many sap-sucking insects including scale and aphids excrete large quantities of a sweet sugary material known as "honey dew". When fresh this glistens on the leaves and fruits like syrup but it is an admirable medium for the growth of fungi and it is this "honey dew" which leads to fruit, leaves and branches being sometimes covered with a soot-like blanket.

CONTROL

Contact sprays, if correctly applied, should effectively control the white fly. In Victoria where routine white oil sprays are applied for scale control,

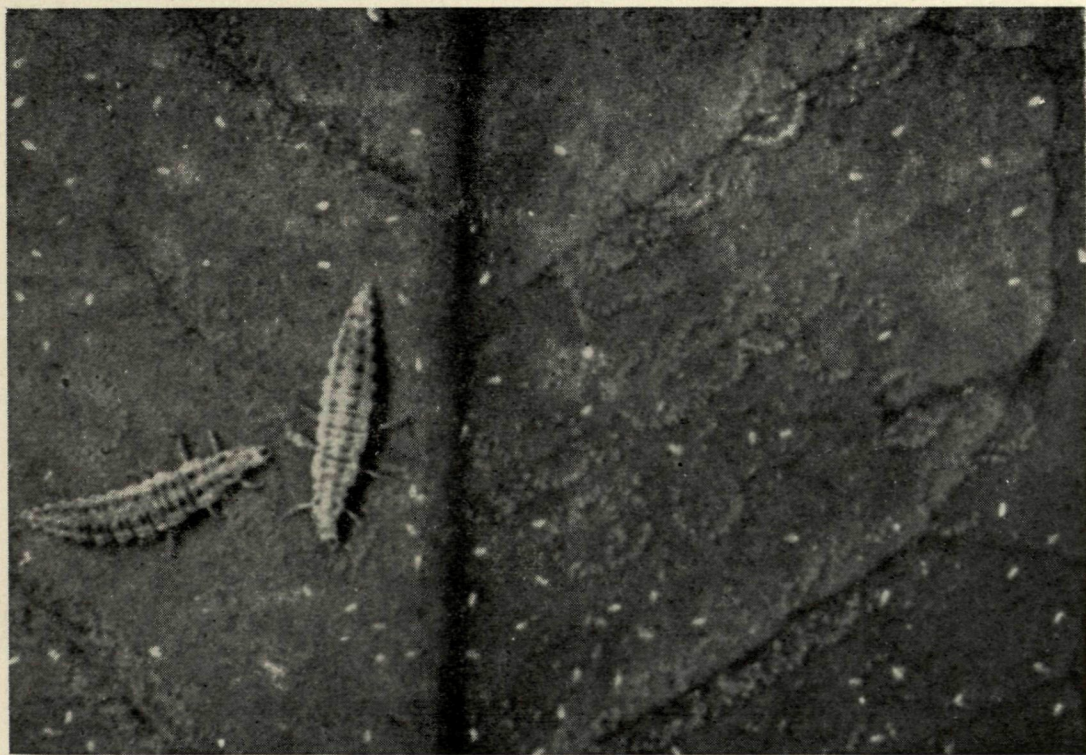


Fig. 3.—Lacewing larvae (at left) feeding on white fly eggs and larvae.

these treatments have kept the white fly well in check. Where special sprays are applied for the white fly, however, the following formula which will, of course, assist in combating scale insects and citrus aphis, is recommended:—

White Spraying Oil— $1\frac{1}{2}$ gallon.

Nicotine Sulphate—1 pint.

Water—60 gallons.

For the most effective control the spray should be applied in the spring soon after the first signs of white fly infestation are observed. A second treatment a fortnight or three weeks after the first may be advisable in the case of severe outbreaks to deal with any insects missed by the earlier spray.

DDT has been shown to be effective against the white fly but wholesale treatments of citrus with this insecticide are not recommended because of the possibility of stimulating the in-

crease of scale insects. The DDT has little effect on many scale insects but adversely affects their natural enemies and so permits the abnormal multiplication of the pests. Small or restricted outbreaks could, however, be satisfactorily dealt with by DDT and later action could be taken against scale insects, if necessary.

Organic phosphates such as H.E.T.P. ("Hexone") and E.605 or Parathion ("Folidol" and "Phosphone") have been used as substitutes for Nicotine Sulphate against a wide range of pests and have been recommended against the white fly in Victoria (Anon 1952). The dilution commonly used is one part of insecticide to 1,600 parts of water. The manufacturers' recommendations, however, should be closely followed in all cases and users should be careful not to inhale the spray mist or allow the concentrates to splash on the bare skin.

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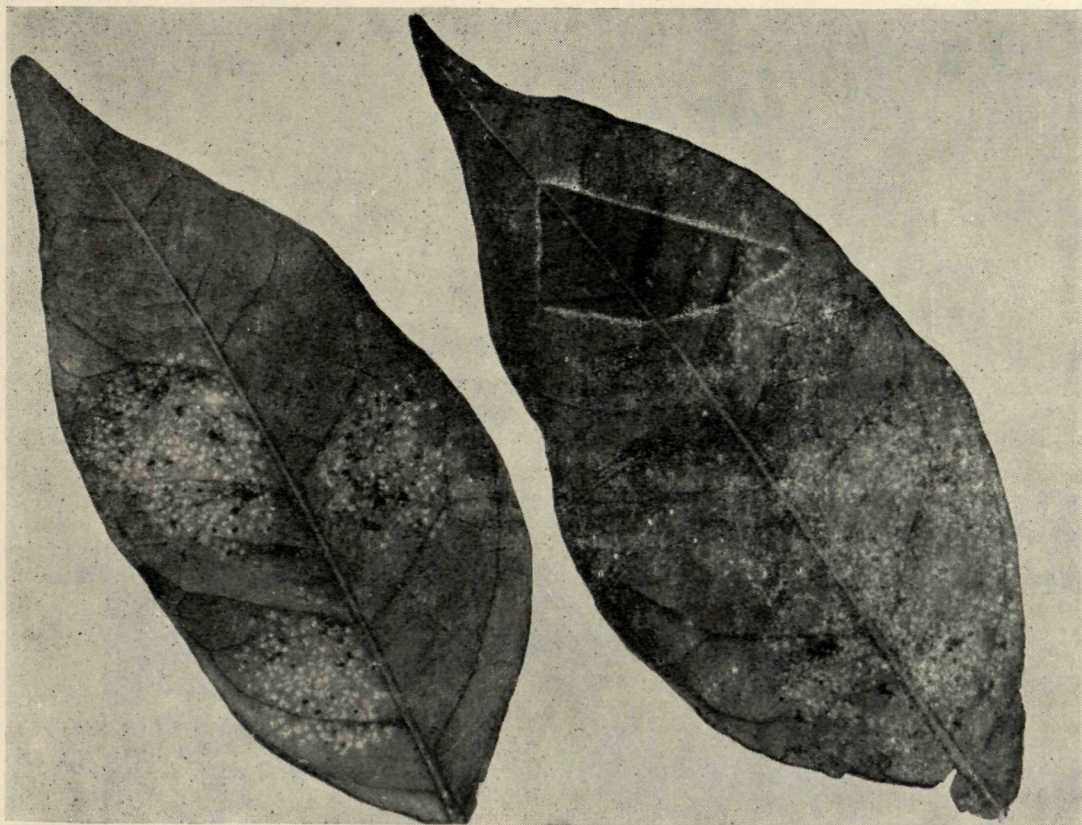


Fig. 4.—Infestation of white fly pupae on orange leaf.

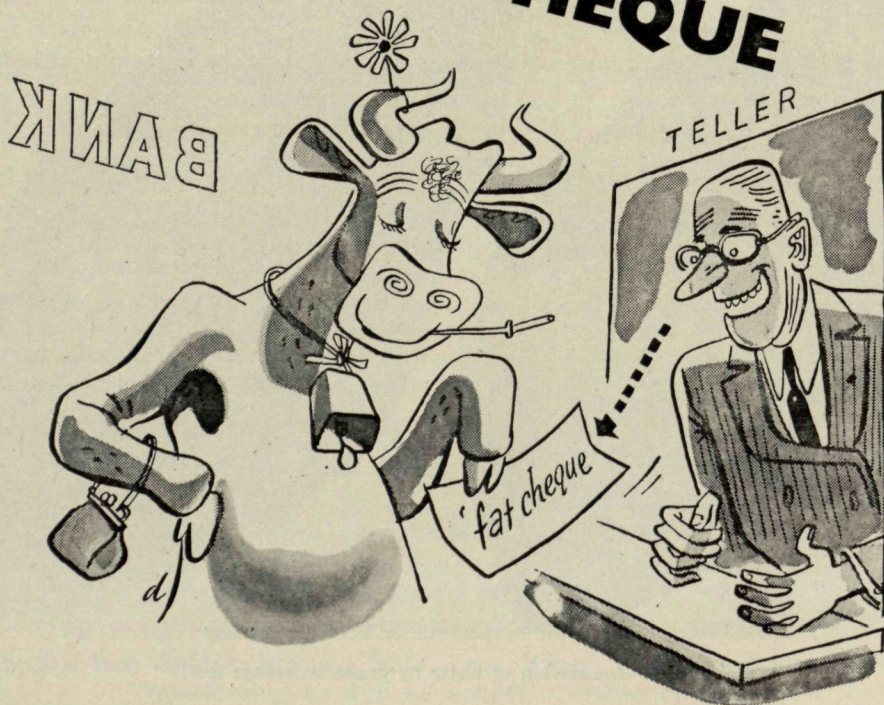
Clothing which may have become saturated with spray should not be worn again before being thoroughly washed. Organic phosphates should not be sprayed on fruits likely to be picked in less than a month.

BIOLOGICAL CONTROL

The very successful control of the greenhouse white fly by a wasp parasite naturally draws attention to the possibility of achieving similar results with the citrus white fly. Present indications are not very hopeful but efforts are being made to obtain colonies of any parasites which may seem worthy of test. In the United States of America certain types of fungi exert a check on the citrus white fly but very little information is available on the fungus parasites of the local variety.

That some insect killing fungi occur in local citrus groves is indicated by the increase in certain scale populations which may occur if complete cover sprays are given with fungicides such as Bordeaux Mixture. For this reason orchardists should leave about the top third of the trees unsprayed so that beneficial fungi can easily spread again to all parts of the tree. Several insects have been found associated with the white fly, but a tiny beetle belonging to the genus *Clambus* is the most prevalent. Many members of this group feed upon fungus growths and refuse associated with various insect infestations, but in the present instance beetle larvae have been observed destroying the white fly eggs and using the empty shells to decorate their light pupal covering. Ladybirds and lacewing larvae

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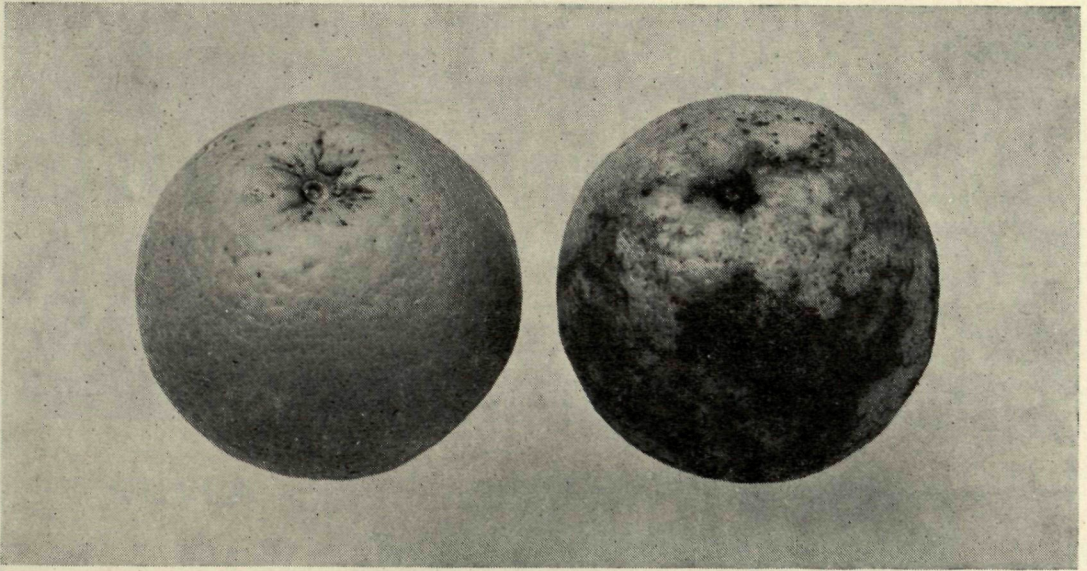


Fig. 5.—Clean orange (left) contrasted with sooty mould-covered fruit from tree infested with white fly.

(Fig. 3) also feed upon the white fly but no outstanding biological control has yet been effected locally by these predators.

SUMMARY

1. The white fly (*Aleuroplatus citri*), originally described from New South Wales in 1940, is a new pest to citrus in Western Australia.
2. Infestation is most serious in the Maddington-Gosnells area, but it occurs scattered over other districts.
3. The insect and its life history are briefly dealt with.

4. The most serious form of injury is caused by the associated growth of sooty mould fungus.

5. Satisfactory control can be achieved by the application of a White Oil-Nicotine Sulphate spray. DDT and Parathion are also toxic to the insect.

6. A slight measure of control is being achieved by several parasites and predators, including a beetle *Clambus* sp.

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- Anon, 1952, Journ. of Agric. Vict., Vol. 50, Pt. 1, p. 10.
 Takahashi, R., 1940, Trans. Nat. Hist. Soc. Formosa, Vol. XXX, p. 205.

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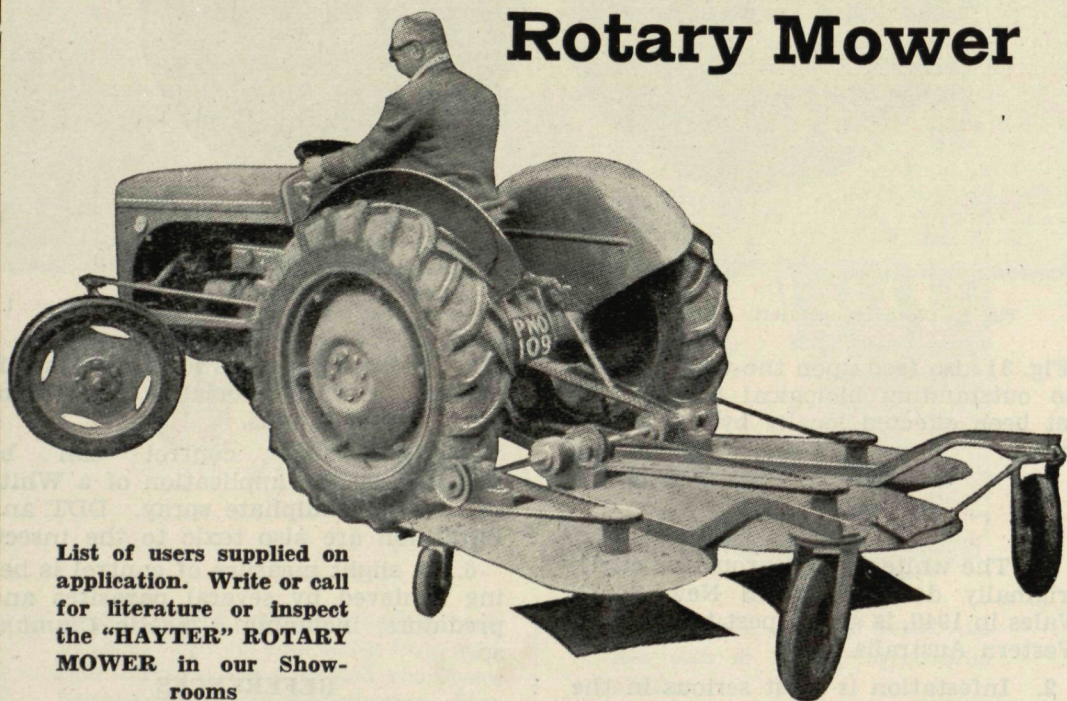
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