INSECT Pests AND THEIR CONTROL

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THE BARK BEETLE IN WEST AUSTRALIAN PINE FORESTS

THE bark beetle, Ips grandicolis Eichh. (Coleoptera, Scolytidae) has been known in metropolitan pine plantations for the last ten years. It was first recorded in Australia from the South Australian pine plantations (Brimblecombe 1953). Although the mechanical damage caused by these beetles is not very serious, they introduce a wood-staining fungus, and cause a degree of desiccation, which has an adverse effect upon the commercial value of the logs when marketed to the plywood industry.

DESCRIPTION

The adult beetle varies in colour from light brown in its freshly emerged state, to dark brown in its later life. It ranges in size from 3 to 4 m.m. and is readily recognised by the presence of five tooth-like spines on each side of its posterior end.

ADULT HABITAT

Under local conditions the bark beetle is only concerned with felled trees, slash material, dead limbs and tops, and dying trees.

Although in North America *Ips grandicolis* is known to attack living trees, chiefly the trunks of saplings and larger limbs of mature trees, observations carried out in West Australian forests have failed to reveal this type of damage.

Standing trees were attacked in the Scaddan plantation following the fires in 1957. These trees were fire-damaged and the incidence of *Ips* attack fell rapidly as the distance from the fire boundary increased. Attack was also observed in lightning-struck trees in the Mundaring plantation.

The normal beetle population exists in the slash material formed during thinning operations. Where thinning has been carried out during the summer period a large population rapidly develops. A minimum log size of approximately three inches in diameter, appears necessary to provide the correct physiological factors attractive to the adult. Thickly-barked logs are not attractive.

The first evidence of attack is the appearance of yellow or reddish boring dust in the bark crevices, or small piles of dust on the ground beneath the entrance holes. Pitch tubes are not formed and the boring dust is free from pitch. Once entry is gained to the inner bark, the characteristic tunnelling is commenced at the junction of the bark and sapwood. In a highly infested log the bark is readily detachable, the junction of inner bark to sapwood having been destroyed. This results in desiccation of the log. Upon removal of the bark the pattern of tunnels is clearly shown as an etching in the sapwood.

LIFE HISTORY

The adult male initiates the attack by boring a nuptial chamber several times his size in the inner bark. He is then joined by several females, the number varying slightly but usually being five. Following fertilisation the females construct egg gal-

A typical logging scene. Note slash material in foreground

leries, which are slightly meandering tunnels radiating from the central nuptial chamber. The basic pattern is a typical radiate gallery. The females deposit eggs in niches on the sides of these galleries. On hatching the larvae begin mining at right angles to the parent gallery. Upon maturation a pupal chamber is formed and metamorphosis occurs. The freshly hatched adults bore to the outside of the log making an exit hole. During peak summer activity the life-cycle occupies from four to five weeks.

During a typical season *Ips* activity extends from September until May, resulting in about six generations per season. During the mild winter conditions existing in this region larvae will overwinter, but the main overwintering stage is the adult which remains beneath the bark of suitable logs.

CONTROL METHODS

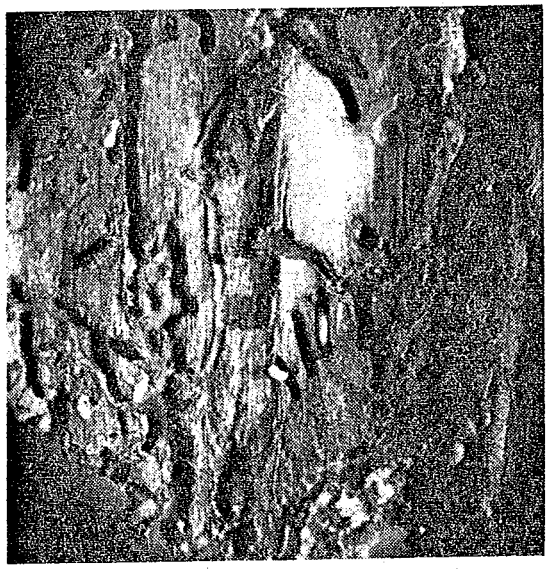
As the major breeding habitat of *Ips* is slash material, any attempt at slash destruction would result in a general fall in the *Ips* population.

As a time-lag of some 24-48 hours exists after felling before a log becomes attractive to the insect, prompt removal from the forests will provide an acceptable log at the plywood factories. However, a population reservoir exists at these sites which makes some type of insecticidal protection desirable.

Chemical Control.

Experiments were carried out during the period 1956 to 1959 in an endeavour to obtain a substance which would provide economic log protection. Any proposal for eradication was not possible due to the extensive distribution of the insect.

The chemicals to be tested were applied with a power spray to piles of millable logs, there being approximately 20 in each pile. The ends of the piles were well sprayed,



Ips activity in the inner bark of a pine log

material passing completely through the length of the pile. One load of peeler logs (50 cub. ft.) would receive two gallons of insecticide. At the end of the two-month test period the bark was carefully removed from the centre foot of each log and the numbers of *Ips* holes counted. The sample area of each log was chosen at random in early trials, but some factor, probably phloem moisture, made this sampling invalid. The piles were formed from freshly-cut logs in an area with a high *Ips* population, and the insecticide was applied on the day of cutting. One pile was used for each insecticidal concentration, untreated piles being left as controls.

The following materials were tested as one per cent water emulsions:—chlordane, dieldrin, lindane, endrin, aldrin, B.H.C., and diazinon. DDT was tested as a 2 per cent. water emulsion.

Pentachlorphenol was used as a 2 per cent. kerosene solution. A commercial creosote preparation was tested.

Orthodichlorobenzene in diesolene at the rate of one part to six, and ethylene dibromide at the rate of 1½ lb. to 5 gals. of dieseline were tried. A water emulsion of ethylene dibromide was also tested.

From the above compounds lindane and endrin were selected for further concentration tests. A water emulsion of 0.3 per cent. lindane was found to give log protection for a period of two months. A water emulsion of 0.5 per cent. endrin gave protection for a similar period. The lindane treatment was more economical, resulting in an insecticidal cost of 3s. per load of peeler logs, whereas the endrin treatment cost 6s.

During the 1958-59 season, thiodan and the Shell Chemical W.L. 1650 were tested as 0.5 per cent. water emulsions. Thiodan gave only slightly inferior protection to the 0.3 per cent. lindane treatments, but costs of this material are not available at this date.

SUMMARY

1. In West Australian pine forests *Ips grandicolis* has not been found attacking healthy pine trees.
2. The main breeding habitat is fresh slash material and recently felled logs.
3. There is continuous activity from September until May, the life-cycle occupying four to five weeks, there being approximately six generations per year.
4. Removal of the logs within 48 hours of felling will provide uninfested logs.
5. Chemical protection of logs for a period of two months can be obtained by spraying with a 0.3 per cent. water emulsion of lindane.

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