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Data Sheets on Quarantine Pests

Ips plastographus

IDENTITY

Name: *Ips plastographus* (LeConte)
Synonyms: *Tomicus plastographus* LeConte
Taxonomic position: Insecta: Coleoptera: Scolytidae
Common names: California pine engraver (English)
Notes on taxonomy and nomenclature: *I. plastographus* has two subspecies, *I. p. plastographus* (LeConte) and *I. p. maritimus* Lanier.
Bayer computer code: IPSXPL
EPPO A1 list: No. 275
EU Annex designation: II/A1

HOSTS

Subspecies *plastographus* usually occurs in *Pinus contorta* and rarely *P. ponderosa*, while subspecies *maritimus* prefers *P. contorta*, *P. muricata* and *P. radiata*, with one authentic record from *Picea sitchensis*.

GEOGRAPHICAL DISTRIBUTION

EPPO region: Absent.
North America: Subspecies *plastographus* is found in Canada (interior of British Columbia) and USA (interior of California, Idaho, Montana, interior of Oregon, Wyoming) while subspecies *maritimus* occurs only in the western coastal margin of USA (Oregon and California).
EU: Absent.

BIOLOGY

The adults and larvae of *Ips* spp. are phloeophagous or bark-feeding, mainly attacking declining or dead trees and freshly cut wood. They frequently carry the spores of bluestain fungi. They usually overwinter in the adult and larval stage with the proportion of adults to larvae varying from species to species (Wood, 1982) *I. plastographus* generally overwinters as immature adults (Bright & Stark, 1973).

Adults emerge from overwintering sites between February and June. Activity is resumed when subcortical temperatures become sufficiently high, about 7-10°C. The insects fly individually or in small groups, during the warmth of the day in spring or near nightfall in summer (at temperatures between 20 and 45°C), and infest further trees. Terpenes in the oleoresin are the primary source of attraction, guiding pioneer beetles in the selection of a new host. Pheromones are responsible for the secondary attraction of other members of the same species and are the means by which individuals communicate after colonization.

Ips spp. are polygamous: the male excavates the entrance tunnel and nuptial chamber, and then admits two to five females. The females push their frass into the nuptial chamber. The male has the responsibility for ejecting their frass and for protecting the entrance hole. The eggs are usually deposited in individual niches, closely placed but not contiguous in the case of *I. plastographus*. Up to 100 eggs may be laid per female of *I. plastographus* (Bright & Stark, 1973). The length of the larval period under optimum conditions is, as in other scolytids, 30-90 days. The end of the larval mine is usually slightly enlarged and cleared of frass to form a pupal chamber. The pupal stage, as in other scolytids, requires 3-30 days, but averages 6-9 days under ideal conditions. It may be extended if pupation begins in late autumn, but is rarely an overwintering stage except in areas where the winters are very mild.

The adult beetles may emerge from the host tree immediately, even before becoming fully coloured, or may require a period of maturation feeding before emerging. The newly emerged adults of *I. plastographus* have the unusual habit of boring into the wood at or near the pupal cells to a depth of 1 cm (Lanier, 1967). After completing one gallery system it is not uncommon for the parent beetles to re-emerge and construct a second, third or fourth system of tunnels to produce an equal number of broods. A few old adults may survive the winter and participate in the production of the spring brood. There are two to five annual generations in *I. plastographus*. For further information on the biology of this species, see Lanier (1967, 1970).

DETECTION AND IDENTIFICATION

Symptoms

In *Ips* spp., the gallery system is situated in the phloem-cambial region and consists of a central nuptial chamber from which elongate egg galleries fork or radiate, forming a species-diagnostic pattern. In *I. plastographus*, two to three longitudinal egg galleries extend from each nuptial chamber. When two egg tunnels extend in the same direction, they are parallel and less than 5 cm apart.

The larval galleries commence more or less parallel to or divergent from the egg gallery, penetrating the bark or wood to varying depths and progressively widening away from it. These galleries are usually full of debris. The gallery terminates in a small chamber, where pupation occurs and the adult emerges through a hole from this chamber. In *Ips* spp., larval mines are short to very long, straight to irregular, and always visible on peeled bark. They wander irregularly in *I. plastographus*.

Morphology

Eggs

Smooth, oval, white, translucent.

Larva

In general, *Ips* larvae are white, legless, with lightly sclerotized head; head usually as broad as long with evenly curved sides, protracted or slightly retracted; frons sometimes with pair of tubercles (some species). Body at most only slightly curved; abdominal segments each with two or three tergal folds; pleuron not longitudinally divided. Larvae do not change appreciably in form as they grow. Identification requires the assistance of a specialist. For generic keys to the larvae of *Ips* and other bark beetles, see Thomas (1957).

Pupa

The pupae of scolytids are less well known than the larva: exarate; usually whitish; sometimes with paired abdominal urogomphi; elytra rugose or smooth; head and thoracic tubercles sometimes prominent.

Adult

In general, *Ips* adults are small, 0.5-8 mm in length (4-6 mm in *I. plastographus*), cylindrical to hemispherical in form, usually yellow, brown or black, sometimes shining and glabrous, dull and coarsely granulate, densely pubescent or covered with scales. Antennae geniculate, funicle five-segmented, with abrupt three-segmented club; subcircular to oval, strongly flattened, with sutures strongly to moderately bisinuate. Head partly concealed in dorsal view, not prolonged into distinct rostrum, narrower than pronotum, with mouthparts directed downwards. Eyes flat, usually elongate, sometimes notched, very rarely rounded or divided. Pronotum weakly to strongly declivous anteriorly and usually with many asperate crenulations in anterior half. Scutellum large and flat. Elytra entire, concealing pygidium, with basal margin straight and without crenulations. Elytra terminate in a rounded or blunt slope (the declivity) which is concavely excavated with lateral margins dentate, all teeth on summit (*I. plastographus* belongs to the group with 4 spines on the elytral declivity; this group also has the sutures of the antennal club strongly and acutely angled at the middle). Tibiae unguiculate. Tarsal segment 1 not longer than 2 or 3, distinctly five-segmented. For generic and specific keys to *Ips* and other genera, see Wood (1982).

MEANS OF MOVEMENT AND DISPERSAL

Some bark beetles are strong fliers with the ability to migrate long distances. The most common mode of introduction into new areas is unseasoned sawn wood and wooden crates with bark on them. If wood is barked, there is no possibility of introducing bark beetles. Dunnage is also a high-hazard category of material, on which most of the scolytids intercepted in the USA are found. It is particularly difficult to monitor properly.

PEST SIGNIFICANCE

Economic impact

Like other scolytids, *Ips* spp. periodically cause loss of wood over extensive areas. Their galleries do not affect the structural properties of the wood significantly, but may render it useless for veneer or furniture making. However, they tend to be less aggressive and less host-specific than *Dendroctonus* spp. They mostly breed in slash, or in broken, fallen or dying trees, and *I. plastographus* usually selects the upper side of fallen or cut logs for attack. It occasionally causes tree mortality of economic importance in stands of *P. radiata*. Infrequently, it also kills saplings and pole-sized trees. Furniss & Carolin (1977) consider that subsp. *plastographus* is always a secondary pest, while subsp. *maritimus* is not often a primary pest.

I. plastographus is also one of the species reported as a possible vector of *Fusarium subglutinans* f.sp. *pini* (the pine pitch canker pathogen) in California (Storer *et al.*, 1994) but it is relatively rare on *P. radiata* compared with other possible insect vectors (Fox *et al*., 1990).

Control

Broadly, the same control methods are available for all bark beetles. A tree that has been attacked usually cannot be saved, so preventive rather than curative control is best. Since scolytid populations are probably always present in a forest, breeding on unthrifty, injured, broken, wind-thrown or felled material, damage can be reduced or avoided by maintaining the health and vigour of the stand; especially by thinning stagnated young stands or removal of overmature trees in older stands.

Losses caused by bark beetles usually involve individual trees or irregularly distributed groups of trees. Insect surveys are made to locate and appraise infestations in their early

stages. If endemic conditions prevail, natural control factors (climate, weather, predators, parasites, disease) will hold the population at a steady level at which damage is within normal limits (losses less than annual tree growth). If epidemic conditions exist, damage exceeds normal limits (losses exceed annual growth). Such surveys determine the need for direct control. The available methods have been reviewed in EPPO/CABI (1992). Treatment with insecticides is used, if at all, for logs rather than for trees.

Phytosanitary risk

I. plastographus is an A1 quarantine pest for EPPO, within the category "non-European Scolytidae" (EPPO/CABI, 1992). Though its main host in North America is *P. radiata*, a species which has been planted in the EPPO region, it is doubtful whether *I. plastographus* presents more than a minor risk. Its geographical distribution (in western North America) covers climatic conditions like those in southern Europe, but one subspecies is reported to be always a secondary pest, and the other only rarely a primary pest. There is no obvious need for *I. plastographus* to be specifically identified as a quarantine pest for the EPPO region; measures taken against other *Ips* spp. would in any case exclude it.

Indigenous *Ips* spp. already occur on conifers throughout most of the EPPO region, so the risk arising from introduced species is uncertain. However, those areas of the EPPO region which lack indigenous *Ips* spp. and protect themselves from species already present elsewhere in Europe (e.g. *I. typographus*) have evident reason to protect themselves also from North American pest species of *Ips.*

PHYTOSANITARY MEASURES

Specific measures against *I. plastographus* are not needed.

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