EPPO Datasheet: *Pissodes zitacuarense*

Last updated: 2022-03-09

IDENTITY

Preferred name: *Pissodes zitacuarense*
Authority: Sleeper
Taxonomic position: Animalia: Arthropoda: Hexapoda: Insecta: Coleoptera: Curculionidae: Molytinae
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EU Categorization: Quarantine pest ((EU) 2019/2072 Annex II A)
EPPO Code: PISOZI

Notes on taxonomy and nomenclature

This species was described in 1969 by Sleeper and there have been no taxonomic or nomenclatural changes since.

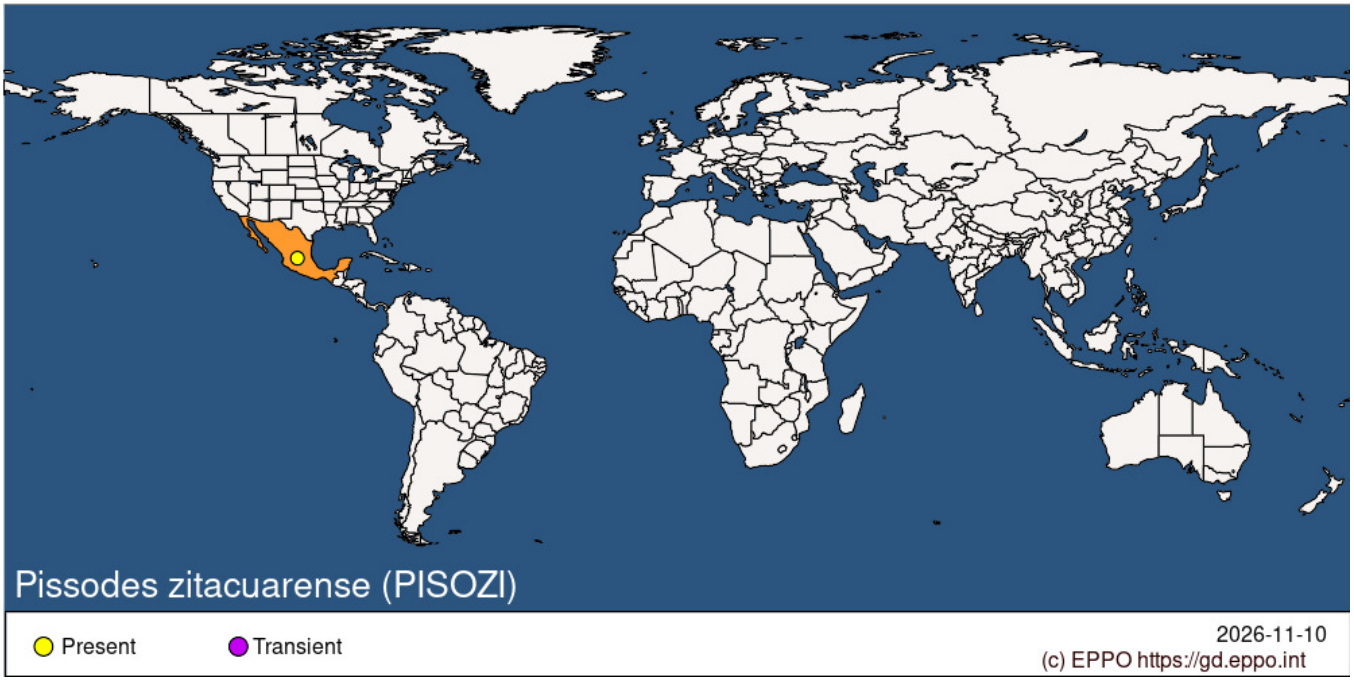
HOSTS

Known hosts of *Pissodes zitacuarense* include *Pinus arizonica*, *Pinus ayacahuite* var. *brachyptera* and var. *veitchii*, *Pinus cooperi*, *Pinus durangensis*, *Pinus hartwegii*, *Pinus lawsonii*, *Pinus leiophylla*, *Pinus montezumae*, and *Pinus patula* (Sleeper, 1969; Pineda Torres & Guerrero Alarcón, 1983; O'Brien, 1989; Cibrián Tovar *et al.*, 1995).

Host list: *Pinus arizonica*, *Pinus cooperi*, *Pinus durangensis*, *Pinus hartwegii*, *Pinus lawsonii*, *Pinus leiophylla*, *Pinus montezumae*, *Pinus patula*, *Pinus rudis*, *Pinus strobiformis*, *Pinus veitchii*

GEOGRAPHICAL DISTRIBUTION

Pissodes zitacuarense is currently only known from Mexico, where it occurs in several states in: Chihuahua, Coahuila, Cuidad de México, Durango, Hidalgo, Jalisco, Mexico, Michoacán, Morelos, and Puebla (Pineda Torres & Guerrero Alarcón, 1983; O'Brien, 1989; Cibrián Tovar *et al.*, 1995).



North America: Mexico

BIOLOGY

There has not been a comprehensive study of the phenology and biology of this species, and the extent of knowledge is based on anecdotal observations from several localities and host species (O'Brien, 1989; Cibrián Tovar *et al.*, 1995). Adults have been observed on trees between April and October. In some locations in Central Mexico, pupae have been found during April to June. In the northernmost state of Chihuahua adults, pupae, and mature larvae have been found in July and it was predicted new adults would be present from August to September. Adults feed on the phloem of new shoots and on the most recent 4-5 internodes of the main trunk. To feed, adults insert their snouts through the outer bark to feed on the inner phloem, creating small punctures (a little less than 1 mm in diameter) in the bark. As with other species of *Pissodes*, adults are expected to require several weeks of feeding to become sexually mature. After mating females start to lay eggs in the tree trunk by first chewing a small hole through the bark to the phloem, then depositing 2-3 eggs per puncture before plugging the puncture with some macerated phloem. Upon hatching, larvae begin creating individual feeding galleries in the phloem that are mostly straight, and as the larvae grow the galleries grow wider and deeper, eventually scoring the cambium and outer xylem. Larvae generally feed downwards towards the base of the trunk. When the larva reaches maturity, it creates an oval pupation chamber in the outer sapwood and fills the exterior portion with shredded pieces of xylem. These chambers are called 'chip cocoons' and are characteristic of most species of *Pissodes* worldwide. In young *Pinus ayacahuite* trees with thick phloem (> 1 cm), *P. zitacuarense* construct meandering feeding galleries limited to the phloem layer, and the pupal chamber is less oval and lacks a wood chip lining. The adult remains in the pupation chamber for several days while its cuticle hardens and darkens before emerging through a circular hole chewed through the pupal chambers and bark.

DETECTION AND IDENTIFICATION

Symptoms

Pissodes zitacuarense most commonly attacks young trees in plantations, including Christmas tree plantations, and in densely stocked naturally regenerating stands, and therefore trees in such stands most commonly present symptoms (Cibrián Tovar *et al.*, 1995). Feeding punctures on new shoots and on internodes up to five years old leak resin which is visible from a few metres away. Upon close inspection feeding punctures of almost 1 mm in diameter can be seen. Sometimes feeding punctures are so abundant that they can cause premature needle fall, shoot

deformation, and a decrease in new shoot growth, which is conspicuous. As larvae feed in the phloem and obstruct the conducting tissue by mechanical damage and growth of weevil-vectored fungi, the new foliage begins to droop and change colour, first becoming yellowish and then gradually changing to greyish brown. The presence of chip cocoons under the bark and embedded in the surface of the xylem is also evidence that *Pissodes* are present, although chip cocoons may persist for many years after they are vacated. When *P. zitacuarense* attacks trees with phloem thickness of about 1 cm or more, pupation occurs entirely in the phloem and therefore the pupation chambers are not lined with wood chips. If the infestation is severe in small trees, and larval feeding and fungal invasion completely disrupts the phloem, the tree may die before the larvae mature.

Morphology

Egg*:* Eggs are bright pearly-white, oval, smooth, on average 0.8 mm long and 0.5 mm wide (Cibrián Tovar *et al.*, 1995) and look like the eggs of many other species of *Pissodes*.

Larva*:* Mature larvae are at most 9 mm in length, legless, and the abdomen is cylindrical and slightly curved downwards (Cibrián Tovar *et al.*, 1995). The milky-white body contrasts with the light brown head. Superficially, larvae of *P. zitacuarense* closely resemble larvae of other species of *Pissodes*, and there is no detailed description of the larval stage to help distinguish this species from larvae of native species in the EPPO region.

Pupa*:* Pupae are about 7 mm in length, have a snout, and are milk-white for a few days before gradually obtaining brown tones as they mature (Cibrián Tovar *et al.*, 1995). Pupae of different *Pissodes* species cannot currently be distinguished.

Adult*:* Adults have been described in detail (Sleeper, 1969; O'Brien, 1989; Cibrián Tovar *et al.*, 1995). Herein, key morphological characteristics to distinguish this species from the nine native *Pissodes* species in the EPPO region are provided based on unpublished taxonomic studies of *Pissodes* by David Langor. Adult *P. zitacuarense* range from 4-8 mm long. The base colour of the dorsal integument is orange brown, except for the tarsi and flagellum of the antennae which are distinctly and contrastingly brownish black (piceous) to black. The prothorax is slightly darker than the elytra. As well, the black to piceous ventral integument, especially that of thorax and abdomen, contrasts with the orange brown dorsal integument of the elytra. The integument colour pattern of *P. zitacuarense* contrasts with all nine native species in the EPPO region. All native species in the EPPO region have a black to brownish black dorsal and ventral integument, and there is no distinct colour contrast along the length of legs and antennae. Although newly emerged adults of species native to the EPPO region are only partially hardened can resemble *P. zitacuarense* in integument colour, colour contrasts within the legs and antennae will not be obvious. The bands of scales on the elytra also have diagnostic value (e.g., number of bands, colour patterns, presence/absence of anterior band). Each elytron of *P. zitacuarense* has near its posterior end a somewhat rectangular and transverse band of white scales that spans interstriae 2-5. Many specimens also have a small patch of ochre scales adjacent and slightly anterior to the band of white scales on interstriae 5-6. Also, most specimens have an oblique band of ochre scales on the anterior part of the elytron spanning interstriae 4-6. No native *Pissodes* species in the EPPO region has this combination of integument colour and elytron scale pattern.

Detection and inspection methods

Pissodes zitacuarense most commonly attacks young pine saplings growing in densely stocked stands of regenerating pines, but can also attack saplings growing more openly, e.g., in plantations (Cibrián Tovar *et al.*, 1995). This weevil species target weakened, suppressed saplings in dense stands. Young pine saplings with resin droplets on the current year's growth and on 1–5-year-old internodes should be investigated for signs of weevil attack such as feeding punctures and presence of adults on the bark. Drooping of recent growth and eventual discoloration of needles first to yellowish and then greyish brown is also a sign of possible infestation, and these saplings should be examined for presence of oviposition punctures and adults on the bark surface. Removal of bark on the trunk of saplings suspected of being infested may reveal larval galleries in the phloem, chip cocoons, pupae, callow adults and/or round adult emergence holes in the bark. There are five native species of *Pissodes* that attack boles of pine trees in the EPPO region and adults of *P. zitacuarense* can be distinguished from those species using morphological characters as described above. DNA barcodes are not yet available for *P. zitacuarense*.

PATHWAYS FOR MOVEMENT

Adults disperse by flight and by walking, but it is not known how far they can naturally disperse in a season. It is possible that dispersal can be aided by human transport of infested saplings and foliage of host pine species in Mexico however, there are no records of such transport to the EPPO region. Long-distance transport via lumber, roundwood or dunnage is possible, although there is no evidence that Mexico ships such materials to the EPPO region. Christmas tree plantations of *Pinus ayacahuite* are attacked by this weevil species, but these trees are used only domestically.

PEST SIGNIFICANCE

Economic impact

Several native pine species attacked by *P. zitacuarense* are of economic importance in Mexico as they are utilized for pulp, lumber, roundwood, manufactured products, etc. (Chapela, 2012). These species are actively managed and there are plentiful plantations and naturally regenerating stands that may be attacked by *P. zitacuarense*. Tree damage and mortality in plantations causes an economic impact even though the scale of the impact has not been quantified. It was noted that *P. zitacuarense* caused severe damage to *Pinus lawsonii* in the 1960s (Sleeper, 1969). This species also attacks *Pinus ayacahuite* Christmas tree plantations and, although tree death does not typically occur, discolouration of the foliage and premature needle drop on infested trees lowers their sale value (Cibrián Tovar *et al.*, 1995). In densely stocked naturally regenerating pine stands, *P. zitacuarense* typically attacks saplings that are stressed, e.g. by shading and competition, and thus functions as a secondary insect rather than as a primary pest. It may be that under these specific circumstances *P. zitacuarense* could have a positive economic impact by naturally thinning dense stands, perhaps reducing the need for silvicultural intervention (e.g., pre-commercial thinning). The susceptibility of pines undergoing silvicultural treatments or growing in plantations is frequently due to the suboptimal growing conditions (e.g., nutritional, environmental). In these conditions the insect is often an important factor undermining health of affected trees (Cibrián Tovar *et al.*, 1995).

Control

Successful direct control measures against infestations of *P. zitacuarense* all occurred in plantations where persistent use of insecticides (e.g., lindane or sevin) against feeding adults was effective (Cibrián Tovar *et al*., 1995). As the foliage of infested trees droops and fades before new adults emerge, in situations where control is deemed necessary, removing and destroying infested trees could be effective as long as it is done before new adults emerge.

Phytosanitary risk

The risk of inadvertent introduction of *P. zitacuarense* from its native range in Mexico to the EPPO region via transportation on pine logs is likely to be very low as logs are not exported from Mexico to Europe. It would require the transportation of untreated dunnage and infested saplings or foliage samples to allow spread of this species, and movement of these materials is subject to high levels of regulation. If this weevil were to be transported to the EPPO region, it is likely that it could establish there. The species successfully colonizes at least ten pine species in Mexico and grows under a variety of environmental conditions there, so is likely to find an acceptable host and environmental conditions in the EPPO region.

PHYTOSANITARY MEASURES

Adherence to International Standards for Phytosanitary Measures No. 15 for solid wood packing material (IPPC, 2019) will greatly decrease the risk of introduction of bark- and wood-boring insects, including *P. zitacuarense*. Any seedlings, saplings, logs or foliage of *Pinus* introduced into the EPPO region should be quarantined until thoroughly checked for signs and symptoms of non-native species, including *P. zitacuarense*. Fumigation of tree material suspected of being infested with *P. zitacuarense* is expected to be highly effective as has been demonstrated for the related Asian species, *Pissodes nitidus.* Fumigation using methyl isothiocyanate (applied at 20 g/m^3 for 24 h at 15 °C), sulfuryl fluoride (30 g/m^3, 24h, 15°C), methyl bromide (10 g/m^3, 24h, 15°C), and methyl iodide (30 g/m^3, 24h, 15°C) cause complete mortality of *P. nitidus* eggs, larvae, and pupae under the bark (Naito *et al.*, 1999, 2003; Soma *et al.*, 1999). In the EU methyl bromide can only be used in emergency quarantine situations upon receiving special

permission from the European Commission.

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CABI and EFSA resources used when preparing this datasheet

EFSA Pest survey card *on Pissodes cibriani, P. fasciatus, P. nemorensis, P. nitidus, P. punctatus, P. strobi, P. terminalis, P. yunnanensis* and *P. zitacuarense*. Available at: https://efsa.onlinelibrary.wiley.com/doi/epdf/10.2903/sp.efsa.2020.EN-1910 [Accessed 15 November 2021]

ACKNOWLEDGEMENTS

This datasheet was prepared in 2022 by Stephen D. Langor (University of Alberta) and David W. Langor (Natural Resources Canada, Canadian Forest Service). Their valuable contribution is gratefully acknowledged.

How to cite this datasheet?

EPPO (2026) *Pissodes zitacuarense*. EPPO datasheets on pests recommended for regulation. Available online. https://gd.eppo.int

Datasheet history

This datasheet was first published online in 2022. It is maintained in an electronic format in the EPPO Global Database. The sections on 'Identity', 'Hosts', and 'Geographical distribution' are automatically updated from the database. For other sections, the date of last revision is indicated on the right.



Co-funded by the
European Union