Megastigmus spermotrophus Wachtl, 1893 - The Douglas-fir seed chalcid (Hymenoptera,Torymidae). Chapter 14: Factsheets for 80 representative alien species

Alain Roques

14.60 – *Megastigmus spermotrophus* Wachtl, 1893 - The Douglas-fir seed chalcid (Hymenoptera, Torymidae)

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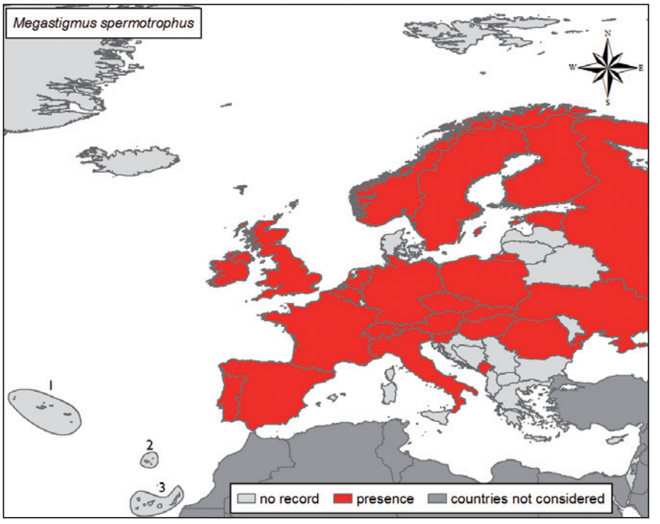
Description and biological cycle: Female 2.8–4.3 mm long, body entirely brownish-yellow to orange- yellow with a few darker spots and an ovipositor as long as body (*Photo*). Male 2.7–3.8 mm long, with body colour dark lemon yellow with distinct black patterns on head, thorax, propodeum and first two abdominal segments. Adults emerge from late April to mid-June, depending on location. Oviposition occurs after the host plant cone becomes pendant, when its water content is near its maximum. Egg laying begins when a red-brown or purple margin appears on cone scales and lasts until the cone scale turns entirely red-brown. In seed orchards, the oviposition period may last up to 7 weeks. Most oviposition punctures are made on scale margins, resulting in conspicuous resin droplets. Eggs are laid directly into the seed. The hatching larva feeds on *archegonia**, then on cotyledons. The following larval instars progressively consume the *megagametophyte** (endosperm), which is entirely destroyed by July. Larvae can successfully develop in unpollinated, unfertilized seeds where they prevent megagametophyte abortion. Larval diapause may extend up to four years, but most individuals emerge during the first two years. The proportion of individuals in prolonged diapause is highly correlated with cone abundance in the year following larval development. Sex ratio is highly variable with location and year, usually ranging from 1:0.5–1:1.5. In North America, Douglas-fir seed chalcid attacks both varieties of Douglas-fir, *Pseudotsuga menziesii* (var. *glauca* and var. *menziesii*). In Europe, it has been found in *P. menziesii* and on other introduced *Pseudotsuga* species such as *P. macrocarpa* and *P. japonica*.

Native habitat (EUNIS code): G3 - Coniferous woodland.

Habitat occupied in invaded range (EUNIS code): G3 - Coniferous woodland; G4 - Mixed deciduous and coniferous woodland ; G5 - Lines of trees, small anthropogenic woodlands, recently felled woodland, early-stage woodland and coppice ; I2 - Cultivated areas of gardens and parks; X11- Large parks; X15- Land sparsely wooded with coniferous trees ; X24- Domestic gardens of city and town centres.

Credit: David Lees



Native range: Western North America, from British Columbia to California and Mexico.

Introduced range: First recorded in Europe in Austria in 1893. Then, observed wherever Douglas-fir has been planted, even in Mediterranean countries (*Map*).

Pathways: Trade of tree seeds. The presence of larvae is is usually overlooked in traded seed lots, the infested seeds showing up only when X-rayed (*see Figure 12.10 in Chapter 12*).

Impact and management: In Europe, this species has few indigenous competitors and parasitoids. Thus, the proportion of seeds infested in European seed orchards can reach up to 95%, especially during years of light cone crops. During years of moderate to heavy cone crops, seed infestation varies between 10%-50%. However, the true impact of this insect on seed production is difficult to assess because larvae can complete development in unfertilized seeds. For example, in the absence of fertilization, no viable offspring would be produced from seed, but seed damage would be estimated at 100 %, because only chalcid-infested seeds can be found. Monitoring can be carried out using yellow traps baited with terpinolete. Chemical control is possible, but effective only against adults, whereas systemic insecticides give contrasting results for larvae concealed in the seeds. The introduction of parasitoids from the native range, e.g. the pteromalids *Mesopolobus* spp., may constitute an alternative, biological control.

Selected references

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