

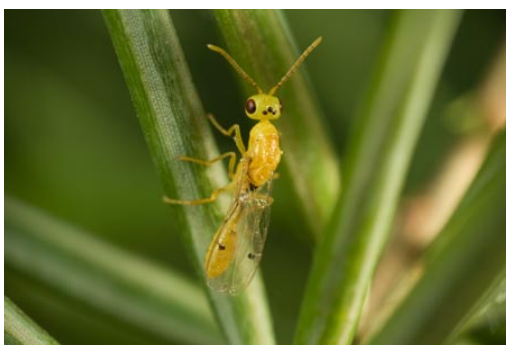
CONE AND SEED INSECT PEST LEAFLET No. 7

British Columbia Ministry of Forests and Range, Tree Improvement Branch, Saanichton, BC

DOUGLAS-FIR SEED CHALCID (*Megastigmus spermotrophus*) SPRUCE SEED CHALCID (*Megastigmus piceae*) and others

TAXONOMY:

Order (Family): Hymenoptera (Torymidae)



M. spermotrophus male on Douglas-fir foliage

INTRODUCTION:

There are at least eight species of seed chalcids affecting conifer seed crops in British Columbia. Several of these species are economically important, while others do not impact significantly on cone crops. They all have similar life cycles, developing within and destroying one seed during the larval stage. Each species is relatively host-specific.

Reductions in seed crops may reach as high as 25% (REF). (Need some other wise words here regarding importance of this insect)



M. piceae female on spruce cone

Four species of *Megastigmus* are important in British Columbia: *M. spermotrophus* (in Douglas-fir), *M. piceae* (in spruces), *M. albifrons* (in ponderosa pine), and *M. pinus* (in various true firs). Other species such as *M. tsugae* (mountain and western hemlock), *M. lasiocarpae* (Pacific silver and subalpine fir), *M. rafni* (true firs), and *M. milleri* (grand fir) are not considered to be major seed pests at this time.

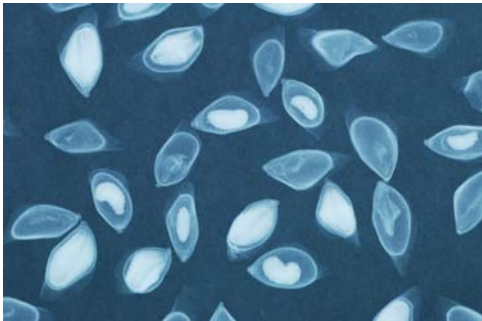
HOSTS AND DISTRIBUTION:

The seed chalcids native to North America are found throughout most of Canada, the United States and into Mexico, depending on the species. In British Columbia, most species of conifer are affected by one or more species of *Megastigmus*. *M. spermotrophus* is found throughout the range of Douglas-fir in western United States and Canada. *M. piceae* affects various spruces and eastern white pine. It is widespread through the range of spruces in North America. In British Columbia, it is found solely on interior spruce (**Is this true?**). The ponderosa pine seed chalcid, *M. albifrons* is found throughout the range of ponderosa pine from southern interior British Columbia to north central Mexico. And finally, *M. pinus* (true firs) has a scattered distribution in southern BC and western United States. Its range is less extensive than that of another seed chalcid common in the seeds of true firs, *M. rafni*.



M. spermotrophus female on Douglas-fir cone

DAMAGE: Each larva develops within and destroys one seed, leaving no external evidence of their presence. Level of damage is highly variable depending upon the species. In highly affected host species, damage may be expected to range from 2-15% of the seed crop in most years. Presence of seed chalcid larvae within mature seeds is normally only detectable through x-rays or seed dissections.



X rayed seed showing empty seeds, full seeds, and seeds filled with *M. spermotrophus* larvae.

IMPORTANCE: Although certain species are responsible for significant reductions of seed yields, proactive management of this insect is not practised in BC. **Talk more about the importance. Important mostly in the interior?**

DESCRIPTION

Life History: One generation per year. Adults emerge over about a month period in spring after pollination period is finished. Females bore holes through cone scales with their ovipositor and lay up to 150 eggs into young seeds. Usually one egg is laid per seed. Unfertilized eggs develop into males.



Megastigmus. piceae female preparing to oviposit in a spruce cone

Egg: Eggs hatch within a week. No description is available. Laid (usually singly) into ovules in young cones shortly after pollination is complete.

Larva: White, C-shaped, legless grub with no distinctive features except tiny dark mandibles at one end. Each larva stays within one seed and consumes the entire contents over the summer.

At maturity, each larva is enclosed within the intact seed coat of a seemingly normal, viable seed. Larvae overwinter in seeds fallen to the ground or remain in cones on trees. A percentage of larvae may enter an extended diapause.



M. spermotrophus larva in exposed seed capsule

Pupa: Larvae pupate in early spring. No description is available, but they are probably brown and found within overwintered seeds in spring.

Adult: Small wasp. The adult *Megastigmus* female ranges from approximately 3 mm to 7 mm long, with a long ovipositor. The males of each species are smaller and have no ovipositor. Common characteristics include membranous wings and distinctive dark “stigma” on the leading edge of the forewings. Thorax and

abdomen colour varies by species, as well as eye colour.



M. spermotrophus female on Douglas-fir cone
Note the stigma on the wings

Adults drill circular holes in seed coats to exit seeds.

It would be nice to have a picture of drilled seeds

Insect stage calendar to be added

DETECTION AND MONITORING

Although, certain species, such as *M. spermotrophus* are responsible for significant reductions of seed yields in Douglas-fir, protocols have not been well developed for management of these insects.

Is there an early season monitoring program using yellow sticky traps to capture adults used here?

Does one sample the conelets young larvae after pollination? Does one dissect cones to estimate population levels and percent seed loss?

As with all seed chalcids, after extraction and cleaning, random samples of seed from all seedlots should be routinely x-rayed to determine levels of infestation by this insect in stored seed.

CONTROL

Does one ever use systemic insecticides if population levels are considered unacceptably high? If so, how are they applied?

In the famous words of Manuel in Fawlty Towers, “I know nooooooohhhing”.

KEY REFERENCES

Hedlin, A.F. 1974. Cone and seed insects of British Columbia. Canadian Forestry Service, Pac. For. Res. Cen., Victoria, BC. BC-X-90. 63 pp.

PHOTOGRAPHS: Dion Manastyrski and Ward Strong.

If there are photos of the other species kicking around, that would be great.

Consider this blurb unformatted at the moment. And consider if you like the pictures that I have chosen, or whether you would prefer to see others.