RESEARCH UPDATE ON THE BROWN SPRUCE LONGHORN BEETLE, *TETROPIUM FUSCUM* (FABR.)

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ABSTRACT

A 3-year research project, funded by the Canadian Forest Service and the Canadian Food Inspection Agency, was initiated in the spring of 2007 to address key issues of provincial and forest industry stakeholders concerning the brown spruce longhorn beetle, *Tetropium fuscum* (Fabr.) (Coleoptera: Cerambycidae). *Tetropium fuscum* is an invasive wood boring beetle from Europe that has been established in Halifax, Nova Scotia since at least 1990. The project is focused on the development of practical tools and knowledge for risk mitigation, risk analysis, estimating rate of spread and pheromone-based methods of population suppression. In 2008-09 we began ecological studies on the effect of host condition, natural enemies, and competition on *T. fuscum* fitness. Here, we briefly highlight our progress to date.

Spruce logs infested with prepupae, pupae, and emerging adult *T. fuscum* and *Tetropium cinnamopterum* (Kirby) were processed by sawmill debarkers and hog machines to determine the relative risk of moving live *T. fuscum* in round wood, debarked logs, bark, and hog fuel. Significantly more *Tetropium* adults emerged per square-meter surface area from untreated logs and debarked logs than from bark. Bark from debarkers produced less than 0.15 percent of the *Tetropium* spp. of untreated logs. Processing the bark through a hog machine, a common practice at most Maritime sawmills, reduced the risk further still. No *Tetropium* adults emerged from an infested bark sample fed through a sawmill hog machine compared to 84 percent survival and emergence of *Tetropium* adults from an untreated control sample. Results indicate that bark and hog fuel have much lower risks of carrying *T. fuscum* than round wood.

In collaboration with Therese Poland (USDA Forest Service) and Robin Taylor (Ohio State University), we've been studying the flight behavior of *T. fuscum* on laboratory flight mills. Preliminary data indicate that most beetles make short flights but on average both sexes flew a total of >1 km in 24 h with some individuals flying >9 km and others not flying at all. Most flight occurred during the day (16 hr photophase) but the most flights per hour occurred at dusk and dawn. More flight mill data are being gathered to compare the effect of sex, size, mating status, and rest (24 hr on, 24 off) on mean distance flown per 24 h and per adult lifespan. Flight behavior and dispersal behavior of individual *T. fuscum* in the field will be measured in 2009 using a back pack harmonic radar unit and tagged *T. fuscum*, in collaboration with Gilles Boiteau (AAFC, Fredericton) and Bruce Colpitts (UNB, Fredericton). Laboratory trials with tagged beetles (with a copper-coated steel wire attached to the pronotum with crazy glue) indicate that tags did not significantly affect *T. fuscum* flight and mean flight angle after take off did not differ between tagged and untagged beetles.

Deepa Pureswaran is developing a population growth model for *T. fuscum* based on empirical studies of the community of organisms associated with *T. fuscum*, such as its fungal associates *Ophiostoma tetropii* and *O. piceae*, mites (phoretic or parasitic), parasitoids, predators, and native bark and wood borers that may act as competitors or synergists, such as the native spruce beetle, *Dendroctonus rufipennis* (Kirby). Leah Flaherty (Ph.D. candidate) is studying the effects of host tree condition, larval density, co-infesting phloem feeders, and two native endoparasitoids of *T. fuscum* (*Rhimphoctona*

macrocephala [Ichnemonidae] and *Wroughtonia occidentalis* [Braconidae]) on colonization success, stage specific mortality and overall fitness of *T. fuscum* (see Flaherty et. al., poster abstract in these Proceedings)

Male *T. fuscum* emit a pheromone (fuscumol) that in combination with host volatile lures synergizes attraction of male and female *T. fuscum* (Silk et al., 2007). We tested two methods for suppressing *T. fuscum* populations in 2008: 1) ground application of 10 percent fuscumol in Hercon flakes to disrupt mating; and 2) mass trapping of male and female *T. fuscum* in traps baited with fuscumol + host volatiles (100 traps per ha). For both methods we predicted a significant reduction in both mean catch of *T. fuscum* in traps baited with fuscumol + host volatiles and infestation in bait logs. Ground applications of Hercon flakes did not reduce attraction of *T. fuscum* to traps baited with fuscumol + host volatiles and had mixed results in terms of *T. fuscum* infestation in spruce bait logs. Mass trapping of *T. fuscum* reduced overall mean infestation of *T. fuscum* in bait logs and appeared to work better at low population densities. These data are preliminary and trials must be repeated in 2009.

Literature Cited

Silk, P.J.; Sweeney, J.;Wu, J.; Price, J.; Gutowski, J.M.; Kettela, E.G. 2007. **Evidence for a male produced pheromone in *Tetropium fuscum* (F.) and *Tetropium cinnamopterum* (Kirby) (Coleoptera: Cerambycidae)**. Naturwissenschaften. 94: 697-701.