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REDUCED FECUNDITY IN *NEODIPRION MERKELI* (HYMENOPTERA: DIPRIONIDAE) ASSOCIATED WITH FEEDING ON JUVENILE SLASH PINE FOLIAGE

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The slash pine sawfly, *Neodiprion merkeli* Ross, periodically causes heavy defoliation of 5- to 10-yr-old typical slash pine, *Pinus elliottii* Engelm. var. *elliottii,* plantations in the Southeastern Coastal Plain (Wilkinson 1971). Eggs are laid in the current year's (juvenile) needles located in the apical 1/2 of growth flushes (Wilkinson & Popp 1989) and larval instars 1 & 2 feed on the outer (mesophyll) tissue of this immature foliage. In contrast, instars 3-6 feed on all tissues of the previous year's (mature) foliage, dispersing to other trees if the supply of mature foliage is exhausted. Late-instar larvae often are forced to feed on juvenile foliage during outbreaks when mature foliage is gone (unpublished studies). Preference for feeding on mature foliage of pine and hemlock (*Tsuga*) has been reported in a number of northern *Neodiprion* spp. (e.g., Wilkinson et al. 1966; Hard 1971; All & Benjamin 1975; Niemela et al. 1982). A compound [13-keto-8(14)-podocarpen-18-oic acid] present in the juvenile foliage of 2 species of pine has been shown to deter feeding of 3 *Neodiprion* spp. (Ikeda et al. 1975, Niemela et al. 1982). Reduced fecundity and other deleterious effects have resulted from rearing larvae solely on juvenile foliage of pine (Erlandson 1967) and hemlock (Hard 1971).

During Sept. 1965, several thousand instar 4-6 *N. merkeli* were collected from a large, outbreak population infesting 7- to 8-yr-old plantations in Taylor Co. (NW peninsular FL). Larvae were laboratory-reared to the cocoon stage on cut-branches bearing both juvenile and mature foliage and misted daily with water (all feeding instars imbibe free water). Forewing length (to nearest 0.05 mm) and fecundity (no. full-sized, green eggs present) were determined for each of 50 ♀♀ emerged during Oct. 1965 and data were analyzed by correlation-regression procedures (SAS 1985; Fig. 1, A).

Following a June 1966 outbreak in a 6-year-old plantation in Glades Co. (S FL), 5 cocoons were dug from the soil under each of 20 trees. Half of the sample trees were

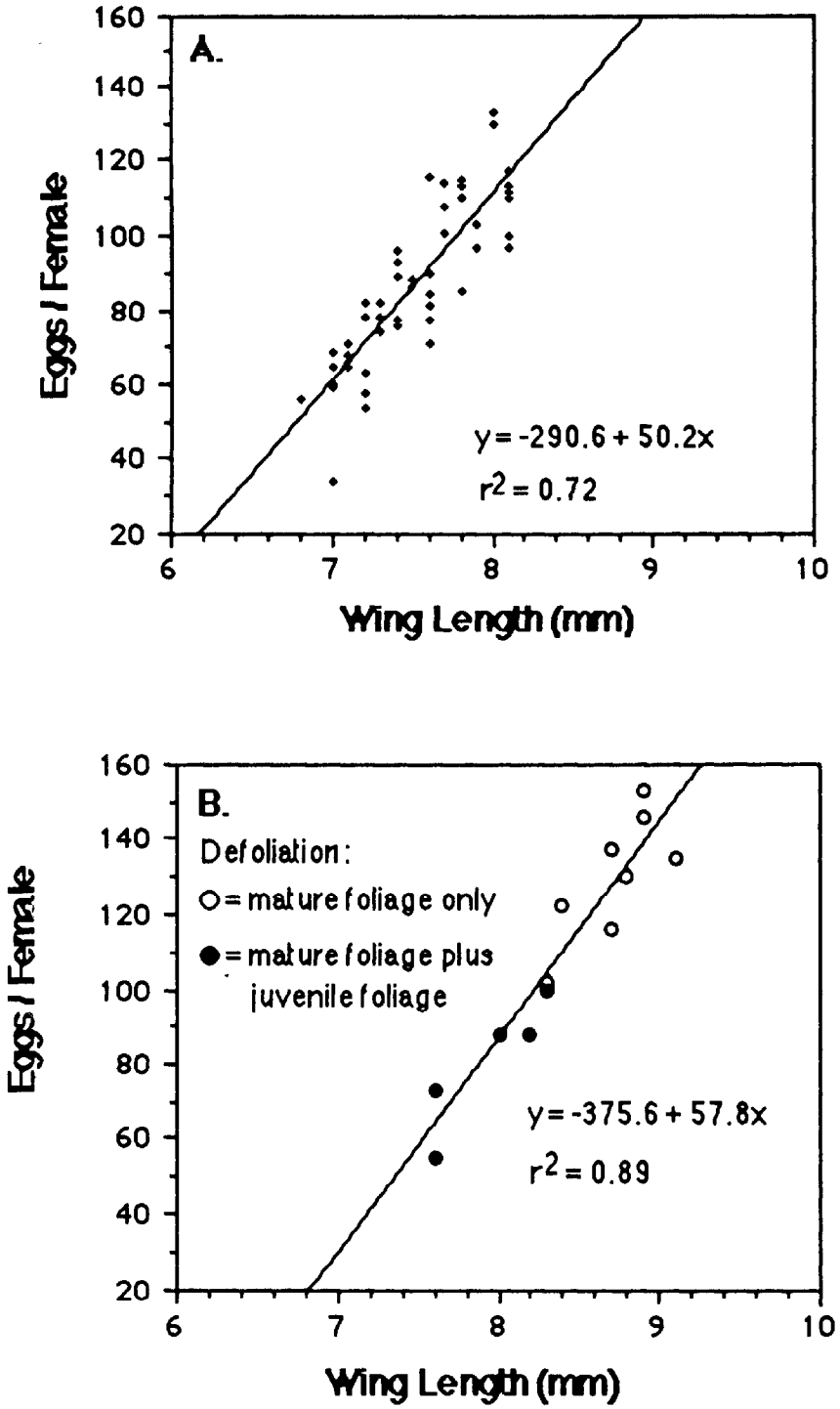

Fig. 1. Regression of fecundity with forewing length in ♀ *N. merkeli*. A. 50 ♀♀ from laboratory-rearing of large, feeding larvae collected in Taylor Co., 1965. B. 13 ♀♀ from cocoons collected in the field in Glades Co., 1966. Hollow circles indicate "light" defoliation; solid circles indicate "heavy" defoliation (see text).

in a group which had sustained relatively "light" defoliation (only 50-75% of mature needles eaten per tree); the other half in a group which had sustained relatively "heavy" defoliation (100% of mature foliage plus 12.5-25% of juvenile foliage eaten per tree). A total of 13 ♀ *N. merkeli* emerged from the cocoons during July-Sept. 1966; data on wing length and fecundity were analyzed as in 1965 and related to the age of foliage fed upon (Fig. 1, B).

A positive correlation was found between ♀ size (forewing length) and fecundity in *N. merkeli* (Fig. 1, A); a similar relationship was reported for *Neodiprion excitans* Rohwer from Florida and Belize, C. A. (Wilkinson & Drooz 1979). Feeding on mature foliage only (light defoliation) was associated with greater size and fecundity of ♀ *N. merkeli* than when larvae had fed both on mature and juvenile foliage (heavy defoliation) (Fig. 1, B). The implied negative relation between the amount of feeding damage caused to the host pine and ensuing fecundity may be explained by assuming that a feeding deterrent is produced in juvenile slash pine foliage. This deterrent may protect slash pine from complete defoliation and might also reduce the probability of an outbreak occurring or continuing by reducing ♀ fecundity. Hard & Torgerson (1975), who worked extensively with *Neodiprion tsugae* Middleton in Alaska, found that ♀ fecundity was one of several parameters that could be used collectively to determine trends in sawfly population density. Further research is needed to determine whether fecundity can be related to changes in *N. merkeli* populations.

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