

A MULTIPLE REGRESSION MODEL FOR PARASITIZATION OF
GYPSY MOTHS BY THE INTRODUCED LARVAL PARASITE
COTESIA MELANOSCELUS (HYMENOPTERA: BRACONIDAE)

Roger W. Fuester
USDA Agric. Res. Service, Beneficial Insects Research Laboratory
501 South Chapel Street, Newark, Delaware 19713

ABSTRACT

Cotesia melanoscelus (Ratzeburg) is a bivoltine, solitary, endoparasite of larvae of the gypsy moth, *Lymantria dispar* (L.). Imported from Europe after the turn of the century, it readily became established and now occurs throughout the generally infested area. Rates of parasitization are highly variable, particularly during the second (overwintering) parasite generation when females attack third and fourth instars of the gypsy moth. Detailed observations on parasitization of gypsy moths by this species were made in yellow pine-hardwood stands at Belleplain State Forest on the coastal plain of southern New Jersey during 1982-1989. Each year of the study, *C. melanoscelus* was the dominant larval parasite of *L. dispar*.

Multiple regression analysis of 10 variables monitored over the 8-year period indicated that temperature, host density, abundance of overwintering cocoons (formed the previous year), and basal area of oaks within the stand were the most important factors affecting rates of parasitization by this braconid during its second generation. When rates of parasitization were plotted against mean temperatures during the period from May 1 to June 15 (includes the attack period of adults emerging from overwintered cocoons, development of the first parasite generation, and the attack period of adults emerging from first generation cocoons), a second-order regression gave a rather good fit ($r = 0.568$), suggesting that the gypsy moth is favored at moderate temperatures, but that the parasite is favored at low or high temperatures. Second generation parasitism was positively correlated ($r = 0.408$) with the parasite to host ratio, that is, the previous year's parasite cocoon counts divided by the present year's gypsy moth larval counts. Parasitization was negatively correlated ($r = -0.267$) with the basal area of oaks in the stand, a variable considered to serve as an index of the area to be searched by the parasites. The multiple regression model obtained by using these three variables as predictors accounted for 51% of the variation in rates of parasitization by second brood *C. melanoscelus*.