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SPRUCE BUDWORM WEIGHT AND FECUNDITY: MEANS, FREQUENCY DISTRIBUTIONS, AND CORRELATIONS FOR TWO POPULATIONS (LEPIDOPTERA: TORTRICIDAE)

Nancy Lorimer and Leah S. Bauer¹

ABSTRACT

Pupal weights and fecundities of spruce budworm from Minnesota had different means, coefficients of variation, and frequency distributions than spruce budworm from New Hampshire. The two variables were correlated in one of the populations but not the other.

We collected pupal weight and fecundity information on spruce budworm (*Choristoneura fumiferana* (Clemens)) as part of a larger project to measure and document population differences in this economically important insect (Lorimer 1982, in press; Lorimer and Bauer 1983). We were interested in trait variabilities: how the weight and fecundity values were distributed about their means, and whether the distributions were different by population. Because size and egg number are commonly correlated in Lepidoptera and other insects, we also examined this relation.

MATERIALS AND METHODS

Spruce budworm late instar larvae were collected from Minnesota (MN) and New Hampshire (NH) in 1981, weighed within 24 h of pupation, and mated as newly emerged adults in single pairs. We counted all eggs at the end of the oviposition (Lorimer and Bauer 1983). Statistical analyses were performed with the MULTREG program at the University of Minnesota Computing Center.

RESULTS AND DISCUSSION

The mean values for weight and fecundity in the two populations corresponded rather well. Mean pupal weight of MN females was 24% greater than for NH females; MN mean egg number was greater by 21% (Table 1).

Frequency distributions for the two variables in the two populations were also dissimilar (Fig. 1). The frequency distributions for the MN data were both leptokurtic, i.e., more of the values were in the center and the tails than the intervening areas of the normal curve. All four bar graphs showed some skewness. Overall variation was greater in the NH data than in the MN data. The coefficients of variation for weight and eggs in MN were 16.9 and 33.1, respectively, as compared with 25.3 and 42.8 in NH.

The relation between the variables was also different by population (Table 1, Fig. 2). Only the females from NH displayed a strong correlation. Correlation coefficients for pupal weight and egg number in MN and NH were 0.40 and 0.78, respectively. Regression statistics were different (Table 1), but this is a nearly meaningless comparison because of the insignificant correlation between weight and egg number in MN.

The data do not suggest a reason for the lack of size-fecundity correlation for females from one of the populations. Correlations have been reported in the literature for this

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Table 1. Statistics for pupal weight and fecundity of females from Minnesota and New Hampshire.

	Minnesota	New Hampshire
Mean weight (mg)	105.7	85.5
standard deviation	17.9	21.6
Mean egg number	148.2	122.3
standard deviation	49.0	52.4
Correlation	0.40	0.78
Slope	1.1	1.9
Intercept	32.4	-39.2

species. Campbell (1962) also explored the possibility that fecundity-pupal weight relations differed by population in the spruce budworm. He found no significant differences among populations from Kenora, Cochrane, and Port Arthur, Ontario in 1950 (Campbell 1962). The overall correlation coefficient was 0.72. Separate population coefficients were not reported. Thomas et al. (1980) listed fecundity-forewing length correlations of 0.65-0.82 from two populations of spruce budworm in New Brunswick in 1977 and 1979. Regression statistics for females collected from the same host species did not appear to differ significantly by population (Thomas et al. 1980). Mattson et al. (1982) found differences in spruce budworm pupal weight-adult dry weight relations that apparently depended on the source of the insects.

As in all insects, traits such as size and fecundity are variable in the spruce budworm, and their means, distributions, and relations commonly vary unpredictably from population to population.

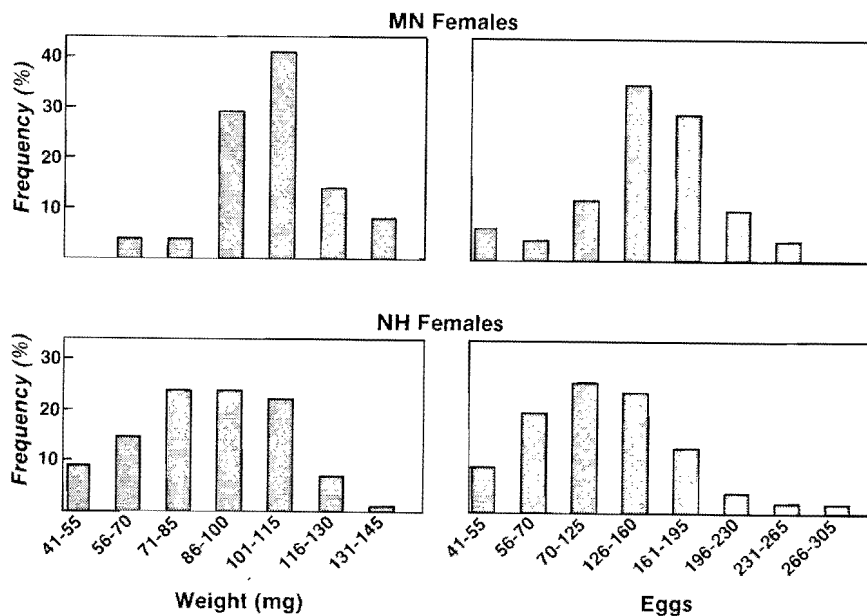


Fig. 1. Frequency distributions of pupal weight and numbers of eggs per female for spruce budworm collected as late instar larvae from Minnesota (MN) and New Hampshire (NH).

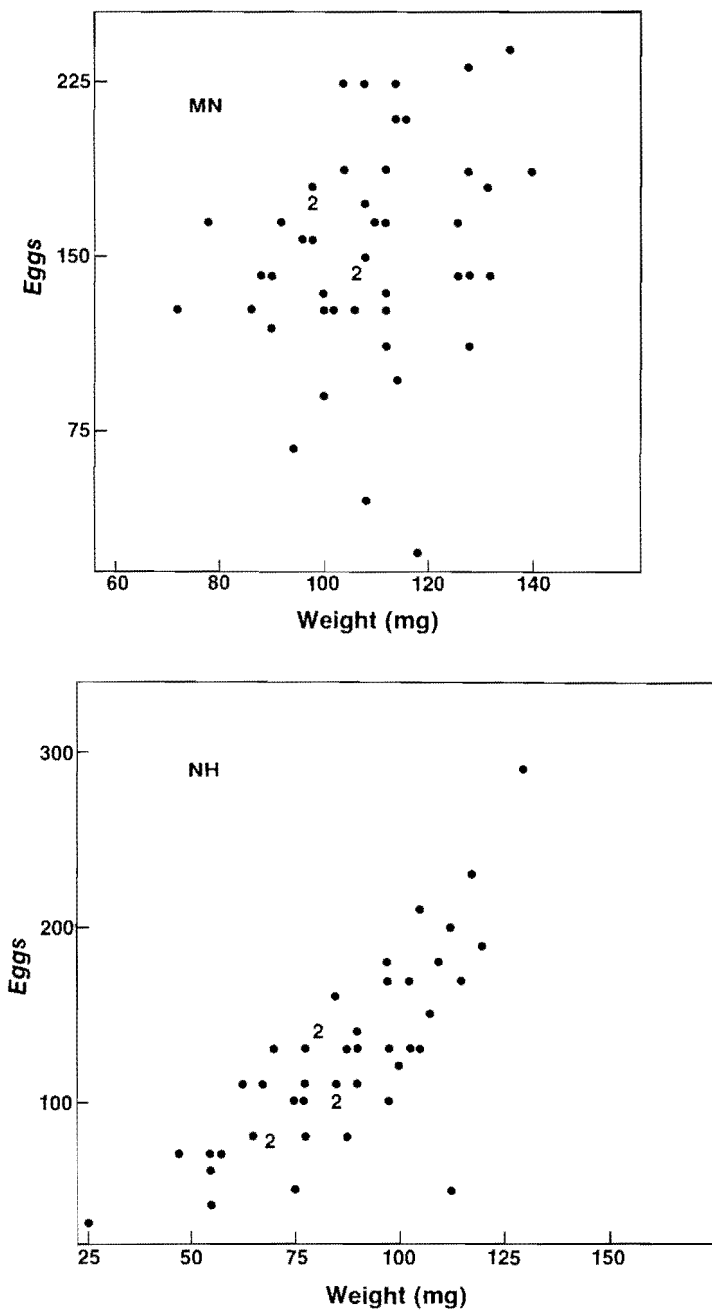


Fig. 2. The relation between pupal weight and fecundity (number of eggs laid) in spruce budworm from Minnesota (MN) and New Hampshire (NH). Each • represents a single female.

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