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OVIPOSITION AND FEEDING BY LUCERNE WEEVIL, *HYPERA POSTICA* GYLL. IN LUCERNE GENOTYPES

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ABSTRACT

Forty three genotypes of *Medicago sativa* L. were evaluated for reaction to alfalfa weevil, *Hypera postica* (Gyllenhal) in a field test. The oviposition and larval feeding were correlated with plant characters like height, stem diameter and crown width. The damage increased with increase in stem girth and plant height, while it decreased with increase in crown width. The most resistant types possessed stem diameter of 1.00–1.33 mm and crown width of 4.67–6.00 cm. Genotypes exhibiting maximum resistance are B–15, B–22, B–135, B–209, Sirsa–9, Sarnac and Dupuits.

Key words: *Medicago sativa* L., lucerne, *Hypera postica*, oviposition, feeding.

Preferential oviposition and antibiosis are the two factors considered vital components of host plant resistance [1]. Beck [2] suggested that recognition and orientation of the host plant followed by selection of specific site, the deposition of eggs and insect feeding in a crop are governed by the inherent physical and chemical factors. Dogger and Hanson [3] reported significant differences among lucerne varieties against the weevil, *Hypera postica*, and these were attributed to differential tolerance behaviour of the varieties.

The present investigation is an attempt to identify the physical plant characters governing tolerance in relation to oviposition behaviour and feeding damage.

MATERIALS AND METHODS

The test material consisted of 43 genotypes including 17 breeding lines, 4 composites, 21 varieties and a polycross line of *Medicago sativa*. These genotypes were planted in single rows of 2 m length. Out of 17 bred lines received from South Australia two collections were derived from wild parentage of *M. falcata*. The 4 composite lines represented as many morphological types developed after intermating similar plant types in isolation. 21 varieties included 4 indigenous and 17 exotic genotypes. The polycross was derived from free interpollination between 12 different plant types in isolation. The data on feeding damage by the weevil were recorded after 30 days of crop cutting in the field on a scale ranging from 0–5 (0 none, 5 heavy). Two largest stems from each replication were cut at random from soil level and examined in the laboratory for recording data on stem length, stem diameter, egg numbers per stem and eggs per egg mass as described by [4]. After 40 days, two stems randomly selected from different plants in each genotype were critically observed for larval counts. The same plants were cut at 15 cm from ground level and the cut surface was measured along the diagonal for crown width.

Analysis of variance and correlation coefficients were computed between stem diameter, stem height, crown width, and number of eggs per stem, number of eggs per egg mass, number of larvae per stem, and feeding damage.

RESULTS AND DISCUSSION

Highly significant differences amongst the genotypes were observed for stem diameter, plant height, crown width, feeding damage, eggs laid per stem, and larvae per stem (Table 1). Average larval feeding damage score ranged from 0.33–4.33. Variety Dupuits exhibited the least larval damage while B-44, Co-1, Ahmednagar local recorded the maximum damage. Average larvae per stem varied from 0.33–6.66. These were maximum in B-44 and Co-1, and minimum in Dupuits.

Table 1. Frequency distribution of *Medicago sativa* L. genotypes in different character grades in respect of oviposition and damage caused by the lucerne weevil

Character	Number of genotype in different character grades			CD (5%)
	low	medium	high	
Crown width (cm)	2.00–3.33	3.34–4.66	4.67–6.00	
	29	9	5	0.41
Stem diameter (mm)	1.00–1.33	1.34–1.66	1.67–2.00	
	5	11	27	0.38
Eggs/stem	1.00–3.20	3.21–5.45	5.46–7.70	
	16	18	9	0.41
Larvae/stem	0.30–2.40	2.41–4.50	4.51–6.70	
	10	21	12	0.92
Feeding damage	0.30–1.70	1.71–3.00	3.01–4.33	
	10	18	15	0.78

Of the 43 genotypes studied, genotypes showing minimum damage (B-15, B-22, B-27, B-135, B-209, Dawson, Sarnac and Dupuits) had the stem diameter of 1.00–1.33 mm, while genotypes showing the maximum damage (B-2, B-44, B-85, Comp-8, Comp-15, HD-1, Wakefield-653 and Wakefield) had the stem diameter of 1.46–1.93 mm, except Composite-15. Average number of eggs laid per stem in the genotypes with minimum damage ranged from 1.00–2.66, while in genotypes with maximum damage the range was 4.00–7.66. This indicates that the genotypes with thin stems had fewer eggs than those with thick stems.

Correlation coefficients between egg number per stem, egg number per egg mass (oviposition), larval number per stem and feeding damage were positive and significant, again indicating that thick stems were preferred by the weevil for egg laying. Egg number per oviposition was positively associated with larvae per stem, which ultimately caused higher feeding damage. This indicates that feeding preferance and damage are largely governed by the egg laying capacity of the female weevil.

Significant but negative correlation of crown width with eggs per stem, eggs per egg mass, larvae per stem, and feeding damage (Table 2) indicates that wide crown plants were not preferred by the weevil. Plant height was significantly correlated with eggs per oviposition and feeding damage. This shows that tall plants are preferred by the weevil for egg laying, feeding of larvae, and number of eggs are more per egg mass, but the height of plants does not affect the preference for egg laying by the weevil.

Table 2. Correlation coefficients between resistance criteria and plant growth characters (d.f. 41)

Parameter	Stem diameter	Crown width	Plant height
Eggs/stem	0.74**	-0.55**	0.05
Eggs/oviposition	0.88**	-0.56**	0.31*
Larvae/stem	0.34**	-0.53**	0.06**
Feeding damage	0.65**	-0.65**	0.80**

* Significant at 5% and ** at 1%.

It was evident that egg number per stem, egg number per egg mass, larvae per stem, and feeding damage were associated with the plant growth parameters, such as, stem diameter, plant height and crown width. The weevil showed nonpreference for small stem diameter, wide crown width and lower plant height.

The indigenously bred cultivars like Comp-37, Comp-15, Comp-8, HD-1 and PC-7 were developed for high yield and aggressive growth which are also congenial for weevil growth. However, amongst the indigenous collections a widely adapted native lucerne variety, Sirsa-9, has evolved as a resistant variety by virtue of its wider crown spread, tends to receive fewer eggs, and suffers less due to larval feeding. Among all the materials studied, 4 out of 17 Australian lines exhibited high degree of tolerance to this weevil, 2 of these lines had the wild parent species *M. falcata* which is a spreading, thin stemmed medic, and can be used as a source of insect-pest resistance being easily crossable with *M. sativa*. The cultivars from the temperate regions of Europe and America exhibited variable degree of weevil resistance. Among these Sarnac and Dupuits were conspicous by their comparatively high degree of resistance, unlike other temperate types. These varieties are characterised by wide crown spread and thin stems which, in turn, do not provide very favourable niche for egg laying.

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