

ALFALFA WEEVIL RESISTANCE

March, 1991

Hypera postica (Gyllenhal); R. H. Ratcliffe

PLANT CULTURE

Field

Planting Broadcast or drill-row plots planted in year prior to rating for weevil resistance (tolerance)

Plot Size 4.5 m² minimum

No. of Reps 4 minimum

INFESTATION

Source Natural infestation by weevil adults with oviposition leading to larval infestation in spring or early summer; chances of having a sufficient infestation level may be improved by collecting adults in fall, storing them at 4°C covered with a damp paper towel and releasing 1 to 2 adults per 0.1 m² in spring

Rate 2 to 3 larvae per plant are needed to cause at least 20 to 30% defoliation of tolerant standard for valid test results

RATING FOR TOLERANCE

Estimate the percent defoliation on the basis of total leaves available for the entire plot of each entry. Defoliation data are presented for each entry with the tolerant standard Arc given a base value of 100. Defoliation of other plots is presented as a ratio of the foliar area **remaining** (eg. Arc with 30% and Saranac with 60% defoliation, the ratio would be 70:40::100:54 where 70 and 40 are the amounts of foliar tissue remaining in the plots; 100 is the base value for Arc and 54 is the relative value for Saranac when Arc is at 100). Evaluate plots on more than one date per season for 2 years minimum to accurately assess performance of entries. By this system, the tolerance rating is actually a mean value for foliar tissue remaining relative to the tolerant standard.

Table 1. Percent foliar tissue remaining on cultivars after defoliation by alfalfa weevil larvae in relation to the tolerant standard (Arc), Raleigh, NC, 1970

Cultivar	Relative Tolerance (% of Arc)*			
	Date			
	4/22	5/1	5/6	Avg.
Saranac	68	50	45	54
Cherokee	47	29	40	39
Arc	100	100	100	100
Fol. tissue on Arc (%)	70	73	53	66

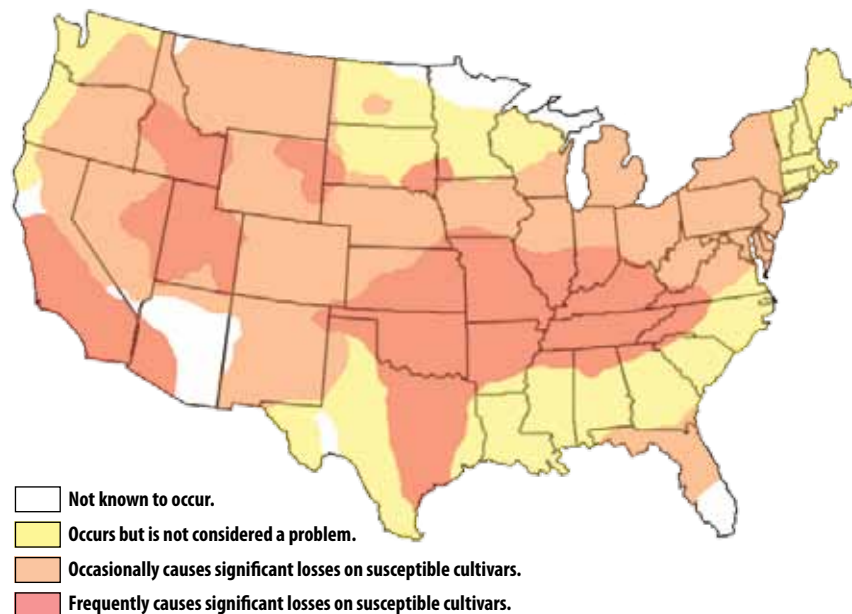
*Arc is rated at 100.

CHECK CULTIVARS

Tolerant*	% Defol.	% Fol. Tissue Left	Adjusted Tolerance Rating
Arc	35	65	100
Susceptible			
Ranger	70	30	46
Saranac	52	48	74

*Data on percent resistant plants are not available. Ratings are based on percent tissue remaining relative to Arc.

DISTRIBUTION AND SEVERITY OF ALFALFA WEEVIL



Alfalfa Weevil, *Hypera postica* (Gyllenhal)

(Click on the map above for a larger version.)

SCIENTISTS WITH EXPERTISE

T.C. Elden
USDA-ARS
Soybean and Alfalfa Research Lab
Rm 208, Bldg 467
Beltsville, MD 20705
(301) 344-2392

R.H. Ratcliffe
USDA-ARS
Soybean and Alfalfa Research Lab
Rm 208, Bldg 467
Beltsville, MD 20705
(301) 344-2392

R.E. Shade
Purdue University
Department of Entomology
West Lafayette, IN 47907
(317) 494-4612

C.G. Summers
University of California
9240 S Riverbend Ave
Parlier, CA 93648
(209) 891-2500

ALFALFA WEEVIL COMPLEX

Eastern and western strains of the alfalfa weevil and the closely related Egyptian Alfalfa Weevil, *H. brunneipennis*, may be a single species⁽³⁾. The tolerance ratings can be used for all members of the complex.

HELPFUL INFORMATION

Some conditions that influence plant growth and insect infestation levels are difficult to control in the field; therefore, tolerance rating data for feeding of weevil larvae should be taken for a minimum of 2 years for each set of plots. Variation in results can be reduced when tests are conducted in areas with consistently high weevil population levels. This may necessitate evaluation of cultivars in areas for which they are not well-adapted and may influence their tolerance ratings. Potential for weevil populations and cultivar adaptation must both be considered in selecting a test location.

ALTERNATIVE METHODS

Methods are available for laboratory selection of germplasm with antibiosis for weevil larvae or antixenosis (nonpreference) for adult feeding and oviposition^(1,4,5,7,8). Levels of antibiosis or antixenosis that have been determined at present are too low to recommend use of laboratory methods for cultivar evaluation. The laboratory methods are not effective for rating tolerance.

REFERENCES

1. Barnes, D.K., and R.H. Ratcliffe. 1969. Evaluation of annual species in *Medicago* as sources of alfalfa weevil resistance. *Crop Sci.* 9:640-642.
2. Devine, T.E., R.H. Ratcliffe, T.H. Busbice, J.A. Schillinger, L. Hofman, G.R. Buss, R.W. Cleveland, R.L. Lukezic, J.E. McMurtrey, and C.M. Rincker. 1977. Arc, a multiple pest-resistant alfalfa. *USDA Tech. Bull.* 1559.
3. Hsiao, C., and T.H. Hsiao. 1984. Cytogenetic studies of alfalfa weevil (*Hypera postica*) strains (Coleoptera: Curculionidae). *Can. J. Genet. Cytol.* 26:348-353.
4. Johnson, K.J.R., E.L. Sorensen, and E.K. Horber. 1980. Resistance in glandular-haired annual *Medicago* species to feeding by adult alfalfa weevils (*Hypera postica*). *Environ. Entomol.* 9:133-136.
5. _____ 1980. Resistance of glandular-haired *Medicago* species to oviposition by alfalfa weevils (*Hypera postica*). *Environ. Entomol.* 9:241-244.
6. Ratcliffe, R.H. 1984. Standard tests to characterize pest resistance in alfalfa cultivars. *USDA Misc. Pub.* 1434, p. 28.
7. Ratcliffe, R.H., and J.H. Elgin, Jr. 1987. A seedling test to select for alfalfa weevil (Coleoptera: curculionidae) resistance in alfalfa. *J. Econ. Entomol.* 80:975-978.
8. Shade, R.E., T.E. Thompson, and W.R. Campbell. 1975. An alfalfa weevil larval resistance mechanism detected in *Medicago*. *J. Econ. Entomol.* 68:399-404.