

EVALUATION OF GLANDULAR HAIRED ALFALFA: A TOOL FOR  
RESISTANCE TO POTATO LEAFHOPPERS AND MORE

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ABSTRACT

Numerous wild relatives of alfalfa have glandular hairs. These wild relatives have varying degrees of resistance to potato leafhopper, alfalfa weevil, pea aphid, and seed chalcid. This resistance has been attributed to the glandular hair trait. The glandular hair trait has been genetically transferred to cultivated alfalfa. Numerous experimental and released varieties are currently being evaluated for resistance to potato leafhopper in the midwest using spray vs. no-spray yield trials. Early data suggests that the first generation of varieties with the glandular hair trait are still slightly agronomically inferior to the best nonglandular varieties. The glandular hair trait provides some level of protection in a no spray test, however the best yields were achieved by spraying. Producers that never spray but should are the ones that would benefit from this first generation of varieties.

Key Words: alfalfa, potato leafhopper

INTRODUCTION

Many wild relative of alfalfa have glandular hairs. These are small, club-shaped hairs on the leaves and stems that are glandular in nature. These glandular hairs secrete a sticky exudate that seems to impart resistance to several insect species. In the 1970's, many of these wild relatives were evaluated for resistance to alfalfa weevil, potato leafhopper, pea aphid, and seed chalcid by researchers at Purdue and Kansas State (Kitch, et al., 1985). Both universities released germplasm that traced to these wild relatives in the mid 80's that was resistant to the potato leafhopper and was genetically compatible with cultivated alfalfa (Sorenson, et al., 1985: and Shade and Kitch, 1986). Since then, several commercial alfalfa breeding companies have been working to incorporate this resistance into varieties that are agronomically acceptable for yield, persistence, and multiple pest resistance. Six glandular haired varieties were released for sale in 1997. These varieties have some level of enhanced resistance to potato leafhopper and are adapted to the midwest and the northeast where the potato leafhopper is a severe problem.

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## PROCEDURES AND RESULTS

A four state trial was established in the spring of 1996 to determine the performance of a number of alfalfa varieties under natural infestation of potato leafhoppers. This effort is being coordinated by R. M. Sulc of Ohio State. In each state it is being conducted by the forage extension specialist for that state. Trials were established in Ohio, Indiana, Wisconsin, and Minnesota. Nine commercial and experimental glandular haired varieties were compared with five standard commercial varieties. Each trial had a treated component (insecticide) and an untreated component. The data is summarized in the following tables.

Table 1. Total seeding year forage yield of potato leafhopper resistant (six varieties) and commercial checks (five varieties) grown with and without insecticide treatment in four states in 1996.

		-----tons dry matter per acre-----							
		Ohio		Indiana		Wisconsin		Minnesota	
		Untrtd	Trt	Untrtd	Trt	Untrtd	Trt	Untrtd	Trt
Resistant		1.57	2.05	2.71	2.94	2.48	2.81	0.93	0.94
Checks		0.75	2.34	2.45	2.95	2.54	2.84	0.96	0.99
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		Averaged across states							
				Untrtd	Trt				
Resistant				1.92	2.18				
Checks				1.67	2.28				

Table 2. Total second year forage yield of potato leafhopper resistant (six varieties) and commercial checks (five varieties) grown with and without insecticide treatment in Ohio in 1997.

		---tons dry matter per acre---	
		Ohio	
		Untreated	Treated
Resistant		5.25	5.86
Checks		4.74	5.81

Cal\West seeds has also conducted a similar test in Wisconsin at their research station near Lacrosse Wisconsin in 1997. The seeding year data is summarized in the following table.

Table 3. Total seeding year forage yield data of potato leafhopper resistant (five varieties) and commercial checks (three varieties) grown with and without insecticide treatment in Wisconsin in 1997.

	----tons dry matter per acre----	
	Untreated	Treated
Resistant	1.23	1.81
Checks	1.07	1.79
"Best Resistant"	1.41	1.79

It should be noted that among the three varieties that were included as the susceptible checks is Ranger, which is very old and low yielding. This skewed the susceptible check data downward, especially in the treated section.

#### DISCUSSION

The potato leafhopper is very damaging, especially with a severe infestation on a seeding year, such as in Ohio in 1996 (table 1) and in Wisconsin in 1997 (table 3). Indiana and Wisconsin had a lighter infestation in 1996, and Minnesota had little damage due to the potato leafhopper in 1996 (table 1). The resistant glandular-haired varieties benefited from insecticide treatment in the three states that had potato leafhopper injury in the four state test (Table 1) and in the private test (Table 3). However, the susceptible checks benefited even more. This data suggests that the first generation of varieties still has insufficient resistance to the potato leafhopper to provide economic levels of protection in non spray situations. However, there are many growers who never spray, no matter how high the infestation. These growers would obviously benefit from the "resistant" varieties.

#### REFERENCES

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