

Root Rot Tolerance In New Alfalfa Strains Now Available to Plant Breeders

W. F. LEHMAN · D. C. ERWIN · E. H. STANFORD



Tolerant plants selected from test A66-1 compared with Moapa in soil infested with *Phytophthora megasperma*.

COOPERATIVE RESEARCH between the University of California departments of Agronomy at Davis and Plant Pathology at Riverside has resulted in the release of two related strains of alfalfa tolerant to *Phytophthora* root rot. The release is early-generation material intended for breeding purposes and is available only to bona fide plant breeders.

Phytophthora root rot is caused by a fungus called *Phytophthora megasperma*. The fungus attacks alfalfa roots, rots them and usually results in the death of the plant. This disease is serious on heavily irrigated or poorly drained land. Although good water management, both surface and subsurface, will reduce the severity of disease, planting resistant varieties, along with good water management practices offers the best means of control.

Tests on a number of varieties have shown that Lahontan and an old nondormant variety called Arabian had tolerance to *Phytophthora* root rot. The *Phytophthora* tolerance found in Arabian was judged best but it had no other noteworthy characteristics. Seed set was low, and (of most importance) Arabian was susceptible to the spotted alfalfa aphid.

Crosses were made between *Phytophthora*-tolerant Arabian plants and nondormant plants of a good agronomic type. Two related strains were developed, Expt. 38 and Expt. 46. Both strains are in the second-crossed generation. For Expt. 38 the cross was made and the resulting progeny were intercrossed in an effort to mix the genes and produce more seed. In Expt. 46, eight crossed plants with good agronomic characteristics were selected and then intercrossed with about 63 other selected plants. Tests for *Phytophthora* tolerance (see table) show that the two strains have a tolerance similar to Lahontan, but better than African, and Moapa. The nature of the material in experiments 38 and 46 indicates that lines could be derived, through selection and recombination, that would have a higher level of tolerance. Estimated average germplasm source for the two strains was Arabian 39.0, African 51.0, Lahontan 8.5 and Sirsa 1.5%.

AVERAGE ROOT ROT SCORE AND PERCENTAGE OF TOLERANT PLANTS OF ALFALFA VARIETIES IN GREENHOUSE INOCULATIONS WITH PHYTOPHTHORA

	Test A66-1 score*	Test A66-5 score*	TEST A66-6		
			Score*	% Tolerant	% Highly tolerant
Expt. 38	--	--	3.4	23.1	3.8
Expt. 46	1.4	3.2	3.3	19.2	0.4
Lahontan	1.7	--	2.9	38.3	1.9
African	3.3	--	4.3	0.8	0.0
Moapa	--	4.1	--	--	--

* Average score, 0 = no disease, 5 = root completely rotted.

Tolerant plants were selected from Expt. 46 in Test A66-1. Seed will be produced on these plants (Expt. 47) during the summer of 1967.

Expt. 38 and Expt. 46 contain an array of genotypes ranging from susceptibility to a high level of tolerance to *Phytophthora* root rot. Genes for resistance or tolerance to spotted alfalfa aphid, pea aphid, and downy mildew are also present in the germplasm. The material is intended as a source from which clones having a level of *Phytophthora* tolerance plus some other characters can be obtained. By using adequate screening and breeding techniques, plant breeders will be able to identify the desired plants and combine them into new varieties.

Alfalfa growers and plant breeders have expressed a desire to obtain resistant varieties or a source of resistance to *Phytophthora* root rot for some time. Release of this material in this early stage will make it possible for plant breeders with varying interests and different techniques to develop varieties for grower use much faster than if used exclusively by a few plant breeders.

Small amounts of seed are being distributed to bona fide plant breeders upon written request and with the understanding that the source will be acknowledged if the germplasm contributes to the development of a new variety or hybrid. Seed of Expt. 38 and 46 is available now. Expt. 47 will be available in the fall of 1967. Requests should be addressed to W. F. Lehman, University of California, Route 1, Box 121, El Centro, California 92243.

William F. Lehman is Associate Agronomist, Imperial Valley Field Station, El Centro; D. C. Erwin is Plant Pathologist, University of California, Riverside; E. H. Stanford is Agronomist, U. C., Davis.