

fully capable of causing abortion. This type of immunity is known as "infection immunity," and it operates in some diseases caused by the Psittacosis-LGV group, psittacosis being an example. However, it is an unstable type of immunity since stresses which lower the resistance of the body enable the virus to resume its disease-producing activities.

Should this be the type of immunity associated with EBA, vaccination with an inactivated virus would be futile since the virus, being inert, could not multiply and localize in the uterus. However, if a living but weakened EBA virus could be established in the uterus by vaccination before field exposure to virulent virus, it is possible that abortions could be prevented. Such a delicately balanced mechanism might provide a very unreliable and unsatisfactory immunity, however, so additional means of control of EBA must be considered.

As mentioned previously in this report, EBA was once believed to occur widely in dairy herds in California, but since about 1955, it has occurred almost exclusively in beef cattle. One possible explanation for the disappearance of the disease from dairy herds is that artificial insemination was first introduced on a large scale at about that time. This measure greatly reduces the incidence of venereally-transmitted diseases. Infectious infertility of cattle, a disease spread by breeding operations, has been practically eradicated in South Africa by means of artificial insemination. While it has yet to be proved that EBA is a venereally-transmitted disease, this possibility must be taken into account in any long-range planning for its prevention and control. Efforts to develop a satisfactory method of immunization against this disease will be continued, but artificial insemination may be the final resort in bringing the disease under control.

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These investigations were made possible through funds provided by the Animal Disease and Parasite Research Branch, Agricultural Research Service, United States Department of Agriculture.

New Alfalfa Variety Resists Spotted Aphids and Produces High Yields

SONORA

W. F. LEHMAN · E. H. STANFORD · V. L. MARBLE · W. H. ISOM

Since 1954, the spotted alfalfa aphid has severely damaged alfalfa in California, Arizona, and Nevada. Plant breeders and entomologists from all three states have worked to develop Sonora—a new variety, resistant to the aphid and high producing, particularly in winter and early spring. The purple-flowered, upright-growing Sonora recovers rapidly after cutting and is adapted to areas of the Southwest, formerly planted to African, where winter forage production is desired.

Testing plants for resistance to the spotted alfalfa aphid. A single alfalfa stem was placed in each cage and infested with aphids. Only plants on which growth and reproduction of spotted alfalfa aphids were severely reduced or stopped were used as parents of Sonora.



YIELD IN TONS OF DRY HAY PER ACRE AND HEIGHT IN INCHES OF SONORA, MOAPA AND AFRICAN ALFALFA GROWN IN FIELD PLOTS AT EL CENTRO, CALIFORNIA, IN 1961 AND 1962. PLOTS WERE PLANTED FEBRUARY 9, 1961, IN FOUR REPLICATIONS

Variety	Spring 1961 May-July three harvests	Summer, Fall 1961 August- November four harvests	Winter 1962 January- April four harvests	Spring 1962 May-July three harvests	Summer 1962 July- August two harvests	Total 1961 1962	% of Moapa 1961-1962
Sonora	3.71	3.06	2.82	4.14	1.70	15.43	110.0
Moapa	3.51	2.83	2.26	3.87	1.56	14.03	100.0
African	3.63	2.78	2.35	3.78	1.50	14.04	100.1
	Average height in inches					Average	
Sonora	21.4	20.5	23.2	24.5	20.5	22.0	
Moapa	20.0	18.7	19.4	23.7	19.2	20.2	
African	20.6	18.8	20.7	23.8	19.6	20.7	

all other named alfalfa varieties, is susceptible to northern root knot nematodes.

Adaptation

No long-term test information is available to show whether Sonora will persist as long as Moapa, which is measurably more persistent than African. Sonora is expected to be equally as persistent or superior to African, in the absence of the spotted alfalfa aphid.

For hay production, Sonora is best adapted to the lower desert valley areas of California and Arizona. It is also adapted to areas of California south of Fresno County and in southern Nevada where African was grown and where winter forage production is desired. Sonora is not expected to be adapted as far north as Moapa.

Availability

Foundation seed of Sonora can be obtained from the California or Arizona Crop Improvement associations. A limited supply of certified seed will be available to growers in the fall of 1963. There will be no registered class. The maximum eligibility of a stand of Sonora to produce a given class of seed will be limited to four years; otherwise, certification requirements are the same as for other alfalfa varieties.

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THE FIRST STEP in the search for the parent plants of the synthetic variety, Sonora, was to select plants with a high resistance to the spotted alfalfa aphid. Thirteen parent plants were selected, six from the Imperial Valley of California, two from Bakersfield, California, two each from Mesa and Yuma, Arizona, and one from Logandale, Nevada. The parent plants were crossed in isolation, and seed was combined in equal amounts to produce breeder seed of Sonora.

Forage yield

Tests in the lower desert valley areas near El Centro, California, and Mesa, Arizona, showed a forage production average for Sonora 1 to 12% above Moapa. The greatest yield differences were during the winter and spring months when Sonora consistently produced as much or more forage than Moapa as shown on the graph. Test plots of Sonora planted at El Centro on February 9, 1961, produced a total of 15.43 dry tons of hay per acre in 1961 and 1962, 10% more than Moapa or African, both of which produced slightly over 14 tons.

A similar but even more striking result was obtained for plant height in the El Centro tests. Sonora was as tall or slightly taller than Moapa all year, but during the winter and spring Sonora grew as much as four inches taller than Moapa. The average difference in height through the year was 1.8 inches, with Sonora averaging 22, Moapa, 20.2 and African, 20.7 inches.

In yield trials grown at Logandale, Nevada, Sonora produced essentially the same as Moapa.

From yield data obtained at Davis, California, it appears that Sonora is less adapted than Moapa to the more northern areas where Moapa is presently grown. In these areas there is no winter

production from any of the varieties, hence Sonora loses the advantage of its better winter production.

The resistance of Sonora to the spotted alfalfa aphid is similar to that of Moapa. In a seedling test conducted in Arizona where three varieties were compared under relatively severe greenhouse conditions, about the same number of seedlings were killed by the spotted alfalfa aphid in each variety, 35.3% in Sonora and 31.4% in Moapa. In contrast, 63.3% of African was killed.

Sonora appears to have less susceptibility to downy mildew than Moapa or African. In field observations made at El Centro, California, during periods of fairly heavy infection by downy mildew, Sonora obtained an average score better than either Moapa or African.

In Arizona, Sonora was resistant to two species of the root knot nematode, as are Moapa and African. Sonora, like

Seasonal relationship in forage production of Sonora, Moapa and African through a typical harvest year, data from trial found in table.

