ALFALFA VIRUS DISEASES

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Summary

Two virus diseases, alfalfa mosaic and pea streak, were found to be common in Arizona alfalfa fields. While neither virus consistently caused recognizable symptoms in the field, greenhouse studies showed that size and vigor of infected plants was less than healthy. These diseases were judged to be moderate constraints to alfalfa production in Arizona.

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Two virus diseases were consistently found in alfalfa fields. The two diseases were caused by alfalfa mosaic virus (AMV) and pea streak virus (PSV). Alfalfa mosaic is common wherever alfalfa is grown in the world and has received much attention from researchers. Only recently has the presense of pea streak virus been shown to be widespread in alfalfa in Arizona and other states. Diagnosis of the two viruses was accomplished either by sap inoculation of a series of test plants in the greenhouse or by examining plant sap in the electron microscope. The latter technique was particularly important for PSV since good test plants for greenhouse diagnosis of PSV do not exist.

Both AMV and PSV are transmitted by the pea aphid (Acyrthosephon pisum). This aphid is particularly active in the early spring and transmits these viruses from diseased to healthy plants within a field and from older to younger fields. In addition AMV is seed transmitted in alfalfa so it is introduced early in young fields.

Periodic surveys were conducted of alfalfa fields over several years in Arizona to determine general virus distribution in the state within fields, between varieties and between planting age. This work was originally undertaken in response to grower concerns that extensive yellowing during some springs in alfalfa might be disease related. It was found that AMV is distributed in all areas of Arizona where alfalfa is grown. Pea streak virus follows the same pattern except that it was not found in Cochise County. Both viruses had infected up to 30 percent of the plants of a first year field. Maximum infection of approximately 50 percent was reached after the second or third year.

Because alfalfa is a perennial crop, conventional strategies used for control of viruses in other crops are not applicable. The viruses are perpetuated continuously by transmission from old to younger fields and by seed in the case of AMV. No attempt has ever been made to grow virus free alfalfa seed because the longevity of the crop makes such an expensive undertaking of questionable value.

One of the important issues addressed was the question of losses associated with the presence of these viruses in Arizona alfalfa. Greenhouse experiments with cloned alfalfa plants showed that virus infected plants were less vigorous and lacked longevity, in greenhouse pots, in comparison to healthy plants. The quantitative dimensions of these effects were hard to accurately measure in these experiments and even more difficult to transpose to the highly variable (genetically) plant populations characteristic of alfalfa fields.

In summary it is our opinion that these viruses separately or collectively are only a moderate constraint to alfalfa production.

What can be done to control these problems - or should anything be done? The following are some suggestions of practices to be followed if possible to minimize losses due to these viruses.

1. Do not plant new fields within a half mile of old fields if possible.
2. When fields are plowed down take special care to prevent survival of any old plants.
3. Plant large fields rather than small ones.
4. Avoid planting lettuce, potatoes, tomatoes, peppers adjacent to alfalfa fields. These crops (plus other vegetables and many ornamentals) are susceptible to infection by AMV.