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Continued studies of plant pathogenic fungi for biocontrol of leafy spurge in North Dakota

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During 1984-1985 we have further studied pathogenic fungi, with potential for biocontrol of leafy spurge, *Euphorbia esula*.

Sclerotium rolfsii isolates have been obtained from other parts of the country. Inoculum is being prepared for greenhouse testing in the winter of 1985.

During the summer of 1984, field inoculations with greenhouse effective *Alternaria tenuissima* f. sp. *euphorbiae* were made onto leafy spurge. At the three field sites (two North Dakota and one Montana) only a few inoculated plants were infected, and leafy spurge growth as measured by dry weight was not reduced significantly, compared to checks. Moisture appeared to be inadequate for severe disease.

To overcome the problem of applying alternaria during periods of inadequate moisture an approach using pellets have been initiated. Sodium alginate-pellets (1) containing alternaria have been prepared in our laboratory. In the greenhouse and field this winter and next summer the pellets will be scattered among the spurge. It is hoped that the fungus will survive in the pellets and during periods of adequate moisture spores that will infect spurge will be produced from the mycelium in the pellets.

Melampsora rust spp. occur on *Euphorbia* spp. and are highly specific for their hosts. This combined with their urediospore on *Euphorbia* spp. makes them good candidates for biocontrol of leafy spurge. *Melampsora euphorbiae* was collected at Victoria, B.C. by Dr. Littlefield in August, 1984 and sent to the Plant Disease Research Laboratory (PDRL) at Frederic, Maryland. *Uromyces euphorbiae* was collected by Dr. Littlefield on a collecting trip to Eastern Europe in the spring of 1984, and that rust was also sent to PDRL. Evaluation of these rusts for host range, prior to release to us, is in progress. As recommended by Dr. Littlefield, Dr. Hosford plans to collect physiological races of *Melampsora* spp. on leafy spurge in Oregon and Washington in the fall of 1985 for evaluation at Fargo, North Dakota.

The rust, *Uromyces striatus*, was found on leafy spurge in the southeast corner of North Dakota in 1982 and diseased plants were labeled and plotted. In 1983, 1984, and 1985 diseased plants died and disease spread slowly to adjoining spurge plants presumably through systemic mycelium in their roots. We considered *U. striatus* to be a poor

candidate for biocontrol of leafy spurge in 1984. This was because the uredial stage occurs on alfalfa, an economic crop in North Dakota, and the slow spread of the rust on leafy spurge. However, alfalfa rust is a minor problem in the northern states, and this pathogen appears to attack the roots that regenerate spurge when its top is killed by herbicides. Also, in 1985 the area of infected spurge dramatically increased from the initial plots to cover an area of approximately three acres, indicating spread by airborne spores. We found in the spring of 1985 for the first time the rust on alfalfa plants close to diseased leafy spurge plots. The continued and accelerated spread of this rust without the need for repeated application of mycoherbicide and its low incidence on alfalfa has renewed our interest in this fungus. We will continue following its spread in the field. Studies are underway in the greenhouse to increase the rust on two susceptible alfalfa cultivars and to infect leafy spurge from the rusted alfalfa. Histological work is underway to stain systemic mycelium in horizontal roots joining diseased aerial plant parts, so that fungal spread through the roots can be examined in preparation for attempts to accelerate the spread of disease in leafy spurge.

References

1. Walker, L. H. and W. J. Connick, Jr. 1983. Sodium alginate for producing and formulation of mycoherbicides. *Weed Sci.* 31:333-338.