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Project 2327: Biological control of leafy spurge

DR. LARRY LITTLEFIELD, 1982 - May 1985.

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Major accomplishments

The rust, *Uromyces striatus* was detected killing leafy spurge in southeastern North Dakota in 1982. It spread slowly from plant to plant through 1982-84. In 1985 it spread quickly by aerial spores over 3 acres of spurge. In 1985 its ureospores were found on alfalfa in the fields, then produced in the greenhouse and stored in liquid nitrogen. We are seeking ways to assist this rust in killing spurge while minimizing its affect on alfalfa.

In September 1985 we discovered a disease killing the inflorescence and then the stem of *Euphorbia esula* (leafy-spurge) in low to high numbers of plants in scattered patches to solid stands of over 100 acres in western North Dakota, central Montana and southern Oregon. We have isolated a white to pink mycelium from the diseased tissues and bacteria, and are preparing pathogenicity tests. We are also isolating fungi from purple and brown leaf and stem spots from numerous sites.

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. In September 1985 we found a *Melampsora euphorbiae* like rust on *E. esula* collected in Medford, Oregon in 1964 at the herbarium at Oregon State University (O.S.U.).

The county weed specialists at Medford (including the retired collector of 1964) are searching for the rust to send it to us. We found an unknown fungus killing the stems of *E. esula* at the base in specimens from Quebec, Canada in the herbaria at O.S.U. and at Washington State University.

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 appears to be inadequate for severe disease. In 1985 severe leaf spotting of *E. esula* in the greenhouse with *Alternaria tenuissima* f. sp. *euphorbiae* was perfected.

To overcome the problem of applying alternaria during periods of inadequate moisture an approach using pellets have been initiated. Sodium alginate-pellets (Weed Sci. 31:333-338) 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.

Dr. Littlefield obtained *Sclerotium rolfsii* isolates from other parts of the country. Inoculum is being prepared for greenhouse testing of its ability to rot leafy spurge in the winter of 1985. It is assumed that this fungus will not survive North Dakota winters. Since it damages many crop plants this must be checked carefully. In 1986 we plan to look for new diseases attacking leafy spurge where it has advanced through northern North Dakota, northern Montana, Saskatchewan, Alberta, British Columbia and western Washington. In our long range planning we are looking for diseases that will minimize leafy spurge year after year and not damage other plants useful to man.