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Plant pathogenic fungi as potential biocontrol agents for leafy spurge

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During the past year numerous plant pathogenic fungi have been studied for the purpose of determining their potential for use in biological control of leafy spurge, *Euphorbia* × *pseudovirgata*.

The rust fungus, *Uromyces striatus*, occurs sporadically on leafy spurge in eastern North Dakota. It is a systemic rust that remains in the plant for several years and appears in the early spring as pycnia and aecia following emergence of plants from the soil. Typically all above ground portions of the host are killed by early summer, but the systemic mycelium remains viable in the crown or roots and initiates symptoms in the following year's growth. Studies are underway to determine the rate of spread from diseased to healthy plants via the connecting horizontal roots. The repeating uredial stage and the telial stage of *U. striatus* occurs on alfalfa. That fact plus the low rate of spread of the rust within spurge populations precludes its use in biological control. Other rusts, e.g. *Uromyces dictyosperma* on *E. spathulata*, *U. scutellatus* on *E. cyparissias*, *Melampsora euphorbiae* on *E. virgata*, and others are being studied at North Dakota State University or by personnel at the USDA/ARS Plant Disease Research Laboratory, Ft. Detrick, MD. Procedures for inoculation and propagation of those rusts are still being perfected, thus conclusions regarding their biocontrol potential on leafy spurge are not yet available.

Infections of powdery mildew, *Sphaerotheca euphorbiae*, occur occasionally in moist, protected habitats but do essentially no damage to the infected plants. Some leafy spurge ecotypes appear to be more susceptible to powdery mildew than others.

Two soil borne fungi have been studied but they also have serious limitations. *Sclerotinia sclerotiorum* will cause rapid wilting and death of leafy spurge when inoculated into vermiculite in which spurge is growing in a greenhouse. However, healthy plants subsequently grow from crown buds and replace those shoots previously killed. Also, this fungus has an extremely wide host range that includes the most economically important broadleaf crops in North Dakota, e.g. sunflower, potato and dry beans. Research at Montana State University by Dr. David Sands indicates that possibly the wide host range of *S. sclerotiorum* can be limited by genetic manipulation. If that is confirmed and the resulting narrowed host range remains stable, *S. sclerotiorum* might become useful in biocontrol of leafy spurge. Extreme caution, of course, is exercised in such research and field release studies. Another fungus that has a wide host range, i.e. *Sclerotium rolfsii*, has

been studied. Similar to *Sclerotinia*, this fungus rapidly kills shoots of inoculated plants, but those are soon replaced by healthy shoots that arise from crown buds.

To date, the most promising yet very tentative results have come from the foliar pathogen, *Alternaria tenuissima* f. sp. *euphorbiae*, originally reported by Dr. Joseph Krupinsky, USDA/ARS, Mandan, ND. This pathogen occurs commonly on leafy spurge growing in somewhat protected habitats that have longer periods of moisture retention, e.g. within shelterbelts or under shrubby trees. It is not commonly found in open prairie habitats. In greenhouse inoculation with 5.5×10^6 conidia per ml in 0.5% DuPont WK wetting agent caused extensive stem, leaf and floral organ infection and subsequent death. Growth of new shoots from lateral buds below the killed portions of stems provided some replacement for the plant portions killed. Field inoculations made during the recent weeks of May and June 1984 indicated that leafy spurge control in the field with this fungus is much less successful than that obtained in a greenhouse.

A recent collecting trip to eastern Europe (Yugoslavia, Hungary, and Romania) yielded several rusts and *Alternaria* infections that will be tested for their effects on leafy spurge in the USA.

Successful biocontrol of leafy spurge with pathogens remains an elusive goal at best.