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Basic studies on leafy spurge

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The leafy spurge projects under the direction of D. G. Davis are in preliminary status. They cover three general areas described briefly below:

Maintenance and expansion of greenhouse material for use and observation

Material is being built up to obtain genetically uniform material for future studies in such areas as translocation, cold hardiness, or any other research area that seems promising. Seventeen biotypes from the U.S., Canada and one from Europe are being maintained – original material dug from the soil, and 2 cuttings of each biotype. One biotype (arbitrarily labeled No. 13) has been chosen for further expansion. Dr. Donald Galitz, NDSU Botany Dept., will use these for studies of cold hardiness. About 100 young plants and 100 cuttings are being maintained presently. In addition, 53 young plants obtained from 5 original roots and 34 plants obtained from 4 other roots are being maintained. As this material is expanded, it will be used for radiotracer experiments to study translocation of herbicides, microscopy, or other appropriate experiments as needed. Samples of each biotype will be sent to Dr. William Bruckhart and Ms. Sherry Turner, Fort Detrick, Maryland to use in their screening program for new pathogens of leafy spurge.

Tissue culture

(a) Cell suspension cultures of several biotypes are being maintained. Biotype No. 13 is being used for surveys of potential herbicides. A growth curve has been run on the culture, and a study of 2,4-D effect's as a function of concentration is underway. Other known herbicides will be studied for their phytotoxicity to these cultures. As potential herbicides are available, they will be screened for their effects on cell growth. The objective is to find chemicals that kill leafy spurge cells. Hopefully by appropriate modification these chemicals can be made to penetrate and translocate to vulnerable areas.

(b) Isolated shoot tips have been grown from seedlings. One root out of 10 grown vigorously, two grew quite well, and three had some growth. The rest grew poorly or not at all. Three of the roots formed some shoots along the length of the roots. They were transferred to the greenhouse and are growing in 4-inch pots in vermiculite. Their vigor is

proportional to the vigor they displayed *in vitro*. Other experiments are underway to test the effects of growth regulators on the initiation of shoot buds. The objective is to control bud formation by chemical means.

Microscopy

Detailed studies will be made with the light and electron microscopes to establish the growth patterns of leafy spurge. Emphasis will be on the development of the vascular system and latex cells. Studies are well underway using scanning electron microscopy (SEM) to serve as background information on which to base all other microscopic observations. SEM studies of seed morphology and of leaf morphology have been done. Light microscopy studies are underway to determine developmental patterns of development. Stomatal development is also being monitored on biotype No. 13. Preliminary transmission electron microscopy (TEM) has been done on root buds. All of these studies have been initiated recently. The objective is to determine if there are vulnerable areas in the life cycle of leafy spurge where control methods (chemical or biological) might be applied successfully.

Close cooperation is expected with the Botany and Agronomy Departments at North Dakota State University, with other SE/ARS Scientists at the metabolism laboratory and other scientists nationwide, as these studies progress.