STEDDOM, KARL, GRETCHEN HEIDEL, DAVID JONES, AND CHARLIE RUSH, Texas Agricultural Experiment Station, 2301 Experiment Station Road, Bushland, TX 79012. **Use of remote sensing technology for detection of beet necrotic yellow vein virus and beet soilborne mosaic virus.**

ABSTRACT

Detection of soilborne viruses through soil sampling is expensive and time consuming. In an effort to find more rapid and cost effective detection methods for beet necrotic yellow vein virus (BNYVV), the causal agent of rhizomania and beet soilborne mosaic virus (BSBMV), we have investigated remote sensing techniques. In three fields in the Fargo North Dakota area and four fields in the Wilmer Minnesota area, an apparently healthy area and an apparently diseased area were selected. From these areas beets were examined four times over a two-month period. At each sampling, spectral readings were taken with a CropScan® hand-held radiometer when weather permitted. Root and leaf samples were then collected from directly under where each radiometer reading was taken. These samples were transported back to the laboratory where The leaves were read in an integrating sphere attached to a ASD hyperspectral radiometer. A Minolta SPAD meter was used to measure chlorophyll content in the same location that was read with the integrating sphere. The leaves were then frozen until pigments were extracted with 100% acetone. Pigment extracts were then read in a Schimadzu scanning UV/Visible spectrophotometer. Leaves were then dried and sent for nutrient analysis. Roots were tested for the presence of BNYVV and BSBMV with ELISA. Aerial photos were acquired twice for all fields in the Wilmer area. An IKONOS satellite photo was acquired for three of the fields in the Wilmer area. A Landsat satellite photo was acquired for the three fields in the Fargo area. Four of the seven fields were grid sampled for disease, soil nutrients, and texture with 20 to 30 samples per spot. Infection by BSBMV was low at all locations. Many beets in the apparently healthy area were infected with BNYVV even though they showed no symptoms of rhizomania. Analysis of spectral readings from the hand-held radiometer showed no distinction between BNYVV infected and non-infected plants in apparently healthy areas, though apparently healthy and apparently diseased areas could readily be distinguished at most wavebands. Preliminary analysis of spectral readings with the integrating sphere also showed no distinction between BNYVV infected and non-infected plants in the apparently healthy areas though apparently healthy and apparently diseased areas could readily be distinguished at wavelengths from 500 to 700nm. Preliminary analysis of spectral readings from pigment extracts read in a scanning spectrophotometer showed distinct differences between BNYVV infected and non-infected plants between 550 and 650nm. Differences in yellowing could not be attributed to differences in soil nitrate. It is still unclear if these techniques will be useful for early detection of rhizomania or BSBMV. Further research will be conducted during the 2001-growing season.