WORKNEH, F.*, E. VILLANUEVA, and C. M. RUSH. Texas Agricultural Experiment Station, Bushland 79012. **Spatial Distribution of Beet Necrotic Yellow Vein Virus and Beet Soilborne Mosaic Virus in Sugar Beet Fields.

ABSTRACT

Beet necrotic yellow vein virus (BNYVV) and beet soilborne mosaic virus (BSBMV), also known as rhizomania and TX-7, respectively, are two of the most important soilborne viral pathogens of sugar beet. Both viruses are vectored by the soilborne fungus *Polymyxa betae*. The fungus survives in the soil and infects primary root tissue of the young roots thereby transmitting the viruses to the plant. Information on spatial distribution of the viruses in the field would be helpful in understanding disease spread and development. Knowledge of the spatial patterns of the pathogens can also be a useful guideline in devising sampling strategies. In a field with structured spatial distribution, pathogen levels in an entire field may be estimated from values sampled from a few locations in the field. In addition, information on spatial distribution pattern of the viruses may be helpful for implementing site-specific management. However, information on spatial distribution of the viruses is currently lacking. In 1999, a one-acre grid soil samples from sugar beet fields in Colorado, Minnesota, and Texas were collected from entire fields (large grids). In addition, a one-acre area in each field was intensively sampled (small grids) for comparison with the larger grids. The soil samples were bioassayed in the greenhouse and bait plants tested by indirect DAS ELISA for presence or absence of both viruses. The data then were subjected to geostatistical analysis to determine spatial distribution of the viruses in each field. There was a significant autocorrelation among the sampling locations in samples from Minnesota for both viruses in the intensively sampled grids (small grids). This suggests that within a limited distance, the sampling locations are interrelated in incidence of the viruses. The presence of the interrelationships (spatial continuity) enables one to estimate the incidence of viruses in the unsampled locations in the field with certain degree of confidence. A field map containing estimates of the levels of the viruses can be generated as an aid to making management decisions. There was little or no spatial structure for either virus in intensively sampled grids in samples from fields in Colorado and Texas. There was no autocorrelation between the sampling locations, and hence, the incidence of the viruses in the unsampled locations cannot be interpolated with any degree of confidence. Samples collected from the entire field (large grids) in all states also showed no spatial dependence, suggesting that the viruses may be randomly distributed in these fields. However, further analysis is required to confirm the randomness. In all fields, both viruses followed similar distribution patterns. This is expected since both viruses are vectored by the same fungus. It is well documented that tillage practices affect spatial distribution of pathogens in the soil. In this investigation, differences in tillage practices may have contributed to variations among the fields in spatial distribution of the viruses. In addition, autocorrelation in any given field decreases with increasing separation distance. In this investigation, the one-acre grid, therefore, may have been too large to detect any spatial autocorrelation that may have been present at micro level. The small area sampled intensively may not have been representative of the field. Over all, the results presented here were based on samples from three fields only. More fields need to be investigated to make a general conclusion on spatial distribution of the two viruses in sugar beet fields. Currently, we are working on samples from seven additional fields, which we hope may give us further insight into the spatial distribution of BNYVV and BSBMV in sugar beet fields.