

EFFECT OF TEMPERATURE ON INFECTION OF *CHENOPODIUM QUINOA* BY BEET SOILBORNE MOSAIC VIRUS AND BEET NECROTIC YELLOW VEIN VIRUS AND SUBSEQUENT DISEASE DEVELOPMENT

E. VILLANUEVA, F. WORKNEH AND C.M. RUSH

*Department of plant pathology, Texas Agricultural Experiment Station,
Bushland TX 79102.*

ABSTRACT

Beet soilborne mosaic virus (BSBMV) is a close relative to beet necrotic yellow vein virus (BNYVV) and both infect sugar beets (*Beta vulgaris*). These two pathogens are wide spread in sugar beet growing regions of the United States. BSBMV and BNYVV are vectored by zoospores of the obligate plasmodiophorous root parasite *Polymyxa betae* (Kesseler) and they have similar genomic organization. *Chenopodium quinoa* is a local lesion host for both viruses. The temperature requirements for BNYVV have been described previously (Horak and Schlosser 1980), however, the effect of temperature on *Chenopodium quinoa* were mechanically inoculated with BSBMV, and BNYVV, or with a combination of both BSBMV and BNYVV. Inoculated plants were incubated in growth chambers at 10, 15, 20, 25 and 30 °C for 18 days. Leaves were harvested and rated for disease severity. Lesions were further tested by ELISA for presences of each virus. Results showed that BSBMV alone and in combination with BNYVV was able to infect *C. quinoa* at all temperatures from 10 °C to 30 °C. However, for BNYVV no indication of infection was detected at 10 °C or 30 °C alone or in combination with BSBMV. When BSBMV and BNYVV were combined, BNYVV had minimal effect on BSBMV although a small increase in BSBMV titer was observed at 20 °C. On the other hand, BNYVV titer was significantly reduced at 20 and 25 °C when the two viruses were combined. In symptom expression, BNYVV showed significantly greater symptoms at 15 and 20 °C than at 10 °C, but there was no difference between symptoms expression at 20 and 15 °C. With BSBMV, there was no significant difference in symptoms development at 15 and 10 °C, but symptoms were significantly more severe at 20 °C. When the two viruses were combined symptom expression significantly increased as temperature increased. These results suggest that BSBMV has a greater range of temperatures for infection than BNYVV and there is an interaction between the two viruses when plants are infected with both viruses simultaneously.