

ACOSTA-LEAL, RODOLFO\*, BECKY BRYAN and CHARLES M. RUSH, Texas Agricultural Experiment Station, 6500 Amarillo Blvd. West, Amarillo, TX 79106. **Host and viral factors that promote the emergence of resistance breaking variants of Beet necrotic yellow vein virus (BNYVV).**

#### ABSTRACT

The determination of conditions that facilitate the appearance of highly pathogenic viral strains is critical for the development of sustainable disease management strategies. These determinants might reside in the host, or in the infecting viral populations. Resistance breaking (RB) variants of BNYVV have emerged in the "Imperial Valley" of California possibly as a response to the selection pressure imposed by sugar beets (*Beta vulgaris* L.) carrying the resistant *Rz1* gene. These new variants can be differentiated from the wild type virus by specific mutations in its RNA 3 p25 gene. Another characteristic of the pathosystem is that genetic diversity of infecting BNYVV populations apparently increases during the process of overcoming resistance. Thus, in order to test this hypothesis and explore the influence of the host, the genetic structure of a wild type BNYVV isolate was evaluated before and after serial passage through two resistant (*Rz1*, or *Rz2*) and one susceptible sugar beet genotypes. The relative virus titer was  $1-2 \times 10^4$  and  $2-6 \times 10^4$  times lower in *Rz1*- and *Rz2*-plants, respectively. However, consensus sequencing of single-plant isolates revealed that BNYVV accumulated mutations at least two times faster in resistant plants than in the susceptible control. Preliminary results also suggest that viral factors, such as variant-to-variant competition and virus-to-virus interactions, increase the size and heterogeneity of infecting populations.