

## COMBINING TOLERANCE TO BEAN YELLOW MOSAIC VIRUS AND *PYTHIUM ULTIMUM* DISEASES IN ARROWLEAF CLOVER

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**Background.** A disease complex affecting arrowleaf clover (*Trifolium vesiculosum* Savi) in east Texas includes both viral and fungal pathogens. Poor stand establishment in the fall, failure to recover after grazing in spring, and premature plant death are manifestations of this complex. As a result, utilization of arrowleaf clover as a forage crop in the southeastern United States decreased dramatically in the 1980s and 1990s.

The most prevalent virus disease on arrowleaf clover in east Texas is Bean Yellow Mosaic Virus (BYMV), observed during spring months. This is an aphid-transmitted virus with a broad host range, including 29 clover species. Fungal pathogens found in the soil can attack arrowleaf clover at various growth stages, including germinating seed. Germinating seed and emerging seedlings are killed or severely weakened. *Pythium*, *Rhizoctonia*, and *Fusarium* species are among the fungi isolated from diseased arrowleaf clover roots.

Apache arrowleaf clover was released by the Texas Agricultural Experiment Station in 2001. This new cultivar, developed at Overton, exhibits BYMV tolerance. Apache is an excellent replacement for the older cultivar, Yuchi, which can be severely affected by the fungal-viral disease complex. However, there is still a need for an arrowleaf clover with improved tolerance to the fungal pathogens found in east Texas pastures.

**Research Findings.** Yuchi seed are typically rust colored, but a small percentage of dark purple, black, and yellow seed can be observed in a bag of seed. Within our germplasm collection were arrowleaf clover lines that had produced only very dark seed. Also, there were a few that produced only yellowish seed. Our objective was to determine if the dark arrowleaf seed were more tolerant to *P. ultimum* than lighter seed. After two cycles of selection, emergence in the presence of *P. ultimum* ranged from 43 to 57 percent for the improved, dark-seeded lines, but only 8 and 7 percent for Yuchi and Apache, respectively (Figure 1). Survivors from the assay were crossed and seed harvested from individual plants, resulting in eighteen SYN3-PUT black-seeded lines.

A greenhouse study to evaluate the SYN3-PUT lines for reaction to BYMV was conducted, with 4 percent of the plants scoring a "2" or better on a scale of 1 to 4 (1=mildest virus symptoms). Sixteen plants were polycrossed and seed produced; these lines were designated SYN3-PUT-V1. Plants from this generation are currently being evaluated for BYMV tolerance.

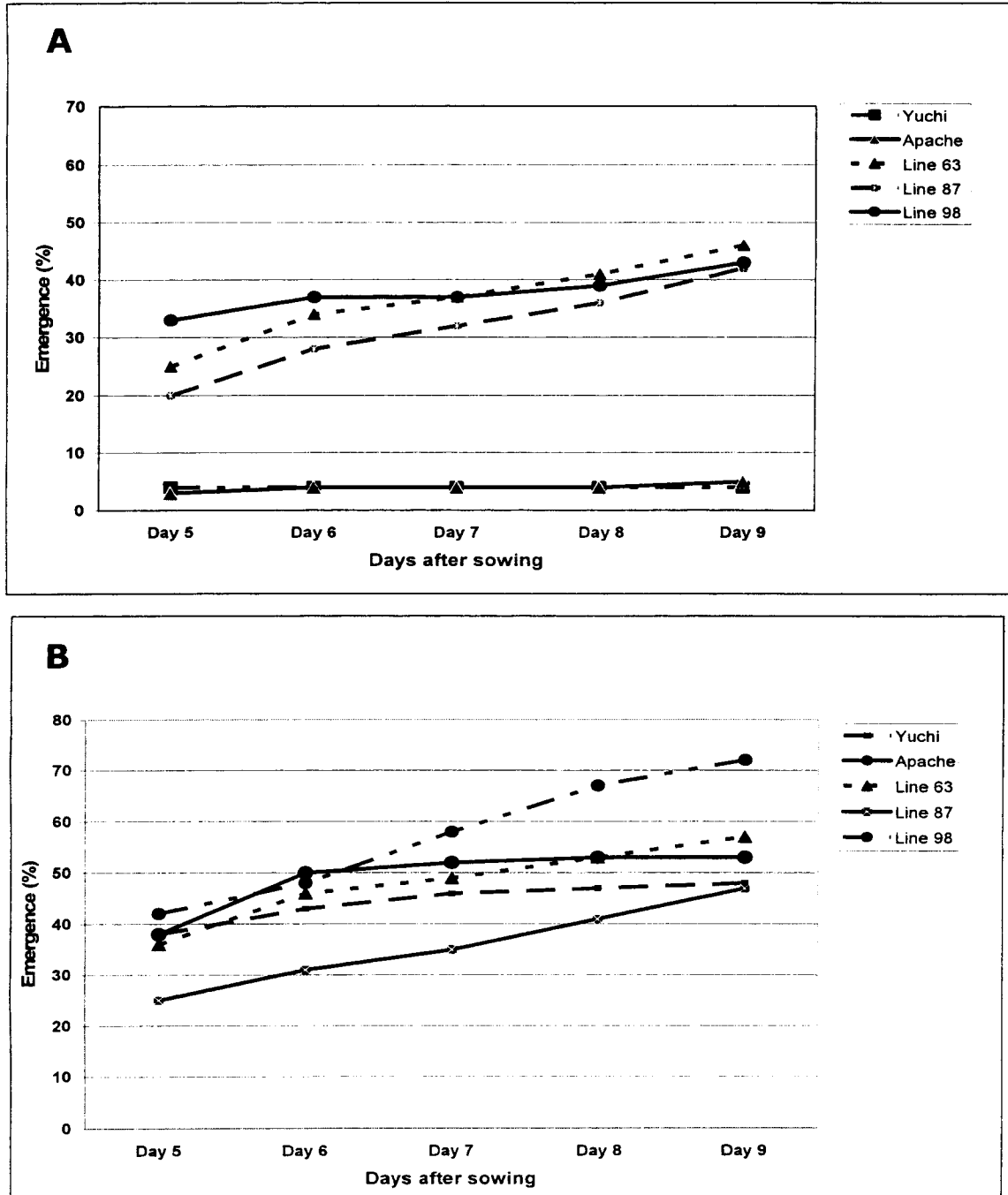


Figure 1. Emergence of Yuchi, Apache, and three SYN2-PUT lines of arrowleaf clover seedlings in the presence of *Pythium ultimum* (graph A) and controls (graph B).