ASSAYS OF TEXAS VINEYARD SOILS FOR EFFECTS ON PIERCE'S DISEASE OF GRAPE

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ABSTRACT

Central Texas vineyards with clayey limestone-based soils have usually developed Pierce's disease (PD) caused by *Xylella fastidiosa* (*Xf*) sooner, and epidemics have been more severe compared to vineyards with sandy granite-based soils. Soils collected from two vineyards representing each soil group (granite: McCulloch and Gillespie Counties; limestone: Gillespie, Blanco Counties) and MetroMix 366 (SunGro Horticulture, Bellevue, WA) peat-based potting mix were planted with highly susceptible Chardonnay (bare-root 1-yr old plants). Blow-molded black plastic pots (28 cm dia. x 24 cm ht '2.9 gal.') were fitted with one fiberglass wick (knit rope, 1.9 cm diameter, fired 4 hr at 400 C) across the inside bottom of the pot with one end protruding 46 to 61 cm below the bench top to enhance drainage. Experimental design was an unbalanced split-plot with soils as main plots and inocula (five pots inoculated, three pots not inoculated) as sub plots. No-inoculum treatments (checks) were mock-inoculated with SCP buffer. Runs one, two, and three had 9, 2, and 10 replications, respectively. A screened structure (woven HDPE insect screen 20x20 mesh, 40% shade) excluded xylem-feeding insect vectors. White shade cloth (22%) was positioned over the screen for the duration of runs one and two, but was removed during run three after plants were established. Irrigation was with distilled or RO (after softening) water to minimize potential for minerals in water to alter soils. Minimal urea fertilizer (0.1 g urea per pot in RO water) was used periodically to maintain growth. Young cultures of *Xf* isolate GILBEC625-2 on PWG medium were suspended in SCP buffer until visibly turbid and standardized ($0.200<OD<0.300$, 600 nm). For run one, one 10-µl drop was placed on each of two adjacent internodes (20 µ/plant) and probed gently to xylem-depth with sterile 28- or 30-gauge syringes. Runs two and three were repeat-inoculated one or two days later on the opposite sides of the same internodes (40 µ/plant). Symptoms of PD were recorded (one to five index, one for no symptoms, five for dying/dead plants) and petiole samples were tested with ELISA (Agdia, Inc., Elkhart, IN). Data were analyzed with PC SAS PROC GLM. Run one was evaluated in November 2005 and June 2006. Run two was evaluated in June 2007. Run three was evaluated in August 2007. Soil effects were never significant for ELISA OD, incidence (proportion plants with ELISA OD>0.300), or PD symptoms intensity. Inoculum effects were always significant ($P<0.05$) for OD, incidence, and symptom intensity as expected because the comparison was some vs. none. Soil x inoculum interaction was never significant for OD, incidence, or symptom severity. We conclude that soil type has no direct effect on PD in Central TX. Our previous work showed that vineyard sites with granite- or limestone-based soils vary for certain important plant species. Some supplemental plant host species for *Xf* (*Helianthus annuus*, *Ambrosia trifida* var. *texana*, *Iva annua*) were mostly absent on droughty granite-based soils, but very frequent on higher-water-holding-capacity limestone-based soils. We propose an indirect soil effect on PD due to soil effects on plant communities. These three annual weeds sometimes occur in highway rights-of-way and farm staging yards in areas of granite-based soils, apparently because seeds were introduced on mowing and other equipment. These may represent significant corridors for vectors and the PD pathogen into usually low risk sites.

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