

SPATIAL VARIATION IN VELVETLEAF EMERGENCE AS INFLUENCED BY SOIL MOISTURE AND TEMPERATURE. Misti E. Tatro, J. Anita Dille, Jeffery W. Vogel, and Gerard J. Kluitenberg, Undergraduate Research Assistant, Assistant Professor, Undergraduate Research Assistant, and Professor, Department of Agronomy, Kansas State University, Manhattan, KS 66506.

Velvetleaf emerges in the spring in flushes. In order to control velvetleaf post-emergence effectively, information about where and when it emerges is important. The objective of this study was to determine how soil temperature and soil moisture affect the timing and location of velvetleaf emergence across the field. Soil physical properties play an important role in soil temperature and moisture and were explored to support this objective.

Studies were conducted in the field across two 200-m transects. Corn was no-till planted on April 20, 2001. Thermocouple probes were placed 2.5 cm below the soil surface at 1-m intervals on April 25 and 26. In the center of each 1-m interval, 100 velvetleaf seed were sown in 30-cm lengths at a depth of 2.5 cm on April 27. Soil temperature was recorded at 4-h intervals over a 24-h period on April 28, May 2, and May 8. Gravimetric soil water content was also measured on those days at 1-m intervals. Emergence was recorded by counting seedlings with cotyledons unfolded at 5, 7, 11, 15 and 18 days after planting (DAP). Seedlings were removed each time. The field site was surveyed to document elevation along the two transects. Soil texture, organic matter, and pH were determined from samples (0- to 5-cm depth) collected at 1-m intervals.

The field site had a relative elevation change of 1.92 meters, with a high center from 53 to 120 meters along the transect. Clay content varied from 10 to 27%, organic matter ranged from 1.5 to 2.9%, and pH varied from 6.5 to 7.8 across both transects. Obvious patterns in cumulative velvetleaf emergence (ranging from 0% to 57%) appeared across both transects at 5, 7, and 11 DAP. By 14 and 18 DAP, minimal patterns in cumulative velvetleaf emergence appeared across the transects as most seedlings had emerged. During 6-9 DAP there was a total of 71 mm of rainfall for a four day period. Gravimetric moisture was 15.2% on April 28 (1 DAP), 14.1% on May 2 (5 DAP), and 20.6% on May 8 (11 DAP). Average soil temperature was 22 C at 1 DAP and 18 C at 11 DAP over a 24-h cycle. Based on non-spatial correlation analysis, there were positive relationships between clay content and soil temperature measured on May 8 at 2:00, 6:00, and 10:00 p.m. Transect two showed a strong negative correlation between cumulative emergence at 11 DAP and clay content. Through additional non-spatial and spatial analysis, we expect to further identify how these key soil physical factors drive soil temperature and moisture variation across the two transects to influence velvetleaf emergence.