

TEMPERATURE REGULATION OF SEED DORMANCY OF THREE WEEDS. Ramon G. Leon-Gonzalez* and Micheal D. K. Owen, Graduate Research Assistant and Professor, Iowa State University, Ames, IA, 50011.

Common waterhemp, giant foxtail and velvetleaf are three of the most important weeds in the Midwest United States. In a previous study conducted in Iowa, it was shown that these three species emerged at different times during the growing season. Giant foxtail emerged shortly after velvetleaf at the beginning of the growing season, and common waterhemp emerged several weeks after giant foxtail. We hypothesized that differences in the emergence characteristics of these weeds were due to differences in their temperature requirements for germination.

Seed germination of common waterhemp, giant foxtail, and velvetleaf in response to temperature was studied with a two-way thermogradient plate in order to evaluate responses to steady and alternating temperatures. The range of mean temperature evaluated was from 8 to 32 C with 2 C intervals. The amplitudes of temperature alternation analyzed were 0, 6, 12, 18, and 24 C.

Minimum and optimum temperatures for velvetleaf germination were approximately 8 and 24 C, respectively. Temperature alternation did not affect the germination of this species. The minimum temperature for common waterhemp germination was 10 C and 14 C for giant foxtail. The optimum germination of giant foxtail occurred at approximately 24 C, but common waterhemp optimum germination was variable depending on temperature alternation. The maximum temperature was not reached in the studied temperature range for any of the three species. Increasing the amplitude of the diurnal temperature alternation increased the germination of common waterhemp and giant foxtail, and this was more evident at lower mean temperatures. Amplitudes of temperature alternation 18 and 24 C promoted the highest germination. In addition, in the case of common waterhemp, the temperature required to reach specific germination percentages was reduced by increasing the amplitude of the temperature alternation. Therefore, temperature alternation played a very important role in reducing the dormancy level of common waterhemp and not only the number of dormant seeds.

The minimum and optimum temperatures shown by giant foxtail and velvetleaf were in agreement with the emergence timing that they show during the growing season. However, because temperature alternation reduced the optimum temperature of common waterhemp germination and the minimum temperature was only slightly higher than the other two species, one would expect common waterhemp emerging also at similar times than giant foxtail and velvetleaf. The results suggested that other factors besides alternation and mean temperature are important in controlling common waterhemp dormancy and germination.