

Effect of Shade and Soil Moisture Level on the Efficacy of Selected Postemergence Herbicides in Control of Junglerice (*Echinochloa colona*).

Ryan Cox, Larissa Larocca de Souza, Mala To and Anil Shrestha, Department of Plant Science, California State University, Fresno, CA 93740

Junglerice (*Echinochloa colona*) is a problematic weed in annual and perennial cropping systems of California. Further, the discovery of glyphosate-resistant (GR) populations of junglerice in the Central Valley has aggravated the problem. Two alternatives that have been identified in perennial cropping systems are sethoxydim and glufosinate, both of which are postemergence herbicides. However, the performance of these herbicides can be influenced by environmental conditions such as light intensity and soil moisture. Junglerice, in orchards, are usually growing under shaded conditions. Further, increasing incidents of drought in the Central Valley are promoting regulated deficit irrigation (RDI) of crops. The combination of drought and RDI can create soil moisture stress conditions. Both shade and soil moisture deficiency can reduce the efficacy of these herbicides on plants that are growing under stressful conditions.

A study was conducted in Fresno, CA in summer 2015 to evaluate the effect of light intensity and soil moisture levels on the efficacy of sethoxydim, glufosinate, and glyphosate on potted junglerice plants. Four to 6-leaf stage junglerice plants were grown in 3" size plastic pots containing field soil. Three levels of shade (70% shade, 50% shade, and 0% shade) were imposed using shade cloth of various transparency and three soil moisture regimes (100% , 50%, and 25% of field capacity) were imposed using the gravimetric method. The plants were treated with label rates of the selected herbicides between the second leaf and the first tiller stage. An untreated control was also included. Shade was simulated by using shade cloth of various transparencies. The experimental design was a split-split-split plot with shade as the main effect, soil moisture as the sub-effect, and herbicide type as the sub-sub effect. Mortality and other biomass of these plants were evaluated every 7 days after treatment. Data were analyzed using analysis of variance procedures in SAS at a significance level of 0.05.

Results indicated that mortality of the plants was affected differentially by light intensity, moisture level, and herbicide type. There was a significant interaction between light intensity and soil moisture level. Therefore, data were analyzed separately for each shade level. Interactions occurred between moisture level and herbicide type under shade but not under full sun. Glufosinate provided 100% control of the junglerice plants at all light and moisture levels. Sethoxydim provided 70 to 100% control of the plants under full sun. Although all the plants were controlled at 100% FC with sethoxydim under 50 and 70% shade, mortality of the plants was reduced to 20 to 50% at 50% FC. Similarly, the efficacy of glyphosate was also affected by shade and moisture levels. The efficacy of glyphosate was generally greater under shade than under full sun conditions and mortality was greater at 100% and 75% FC than at 50% FC. Among the herbicides compared, glufosinate was the best treatment under all levels of shade and moisture conditions. Control of junglerice with sethoxydim was lower under shaded and low moisture conditions, whereas control with glyphosate was better under shaded conditions at 100% and 75% FC moisture conditions. Therefore, both shade and soil moisture conditions should be taken into consideration when selecting postemergence herbicides for control of junglerice.