Is Glyphosate Resistance in Junglerice (*Echinochloa colona* L.) Temperature-Dependent? Samikshya Budhathoki, Katrina Steinhauer, and Anil Shrestha, Department of Plant Science, California State University, Fresno, CA 93740

Junglerice (*Echinochloa colona* L.) is considered to be amongst the world's top ten worst weeds. It is a summer annual grass belonging to the Poaceae family. In recent years, glyphosate-resistant (GR) biotypes of junglerice have been documented in various parts of the Central Valley of California. These plants have shown four-fold resistance to glyphosate than the label rate. As such, various studies on the biology, ecology, genetics, and alternative control measures are being conducted by several researchers in California. In another weed species, *Conyza bonariensis* (hairy fleabane) it was reported that some of the GR biotypes were susceptible to glyphosate when the herbicide was applied at cooler times of the year. However, it is not known if the results would be similar in junglerice. Therefore, the objective of this study was to compare the susceptibility of GR and glyphosate-susceptible (GS) biotypes of junglerice grown under different temperature regimes to an application of label rate of glyphosate.

A study was conducted in spring and summer of 2016 in growth chambers at California State University, Fresno. Seeds of confirmed GR and GS biotypes were obtained from University of California, Davis. The seeds were germinated in plastic cells and then transplanted to 4 inch plastic pots and grown in a greenhouse set at 72° F till they reached 4- to 5- leaf stage. Each pot contained one plant. Once the plants reached the aforementioned growth stage, six potted plants each of GR and GS biotypes were placed in different growth chambers programmed for a day/night temperatures of 60° F /50° F, 77° F /68° F, and 95° F /86° F, respectively and acclimatized to the temperatures for 72 hours. After 72 hours, three potted plants of each biotype were removed from the growth chambers and sprayed outdoors with a label rate (22 fl. oz/ac) of glyphosate. The remaining three potted plants of each biotype were not sprayed and used as controls. The plants were immediately placed back in the growth chambers after spraying and grown in the respective temperatures mentioned above for 7 additional days. On the eighth day, all the plants were moved to the greenhouse set at 72° F and allowed to grow for 21 additional days. The plants were then evaluated for mortality on a 0 to 100 scale (where 0 = complete death of the plant with no green tissue and 100 = completely alive with no herbicide damage). The plants were then clipped at the surface of the soil and their dry weights were recorded after drying them in a forced air oven set at 140° F for 72 hours. The experiment was repeated four times. The experimental design was a randomized complete block where the blocks were the experimental runs over time. Data were analyzed at the 0.05 level of significance.

Results showed that none of the glyphosate-treated GS junglerice plants survived at any of the temperature regimes tested while all of the untreated control GS plants survived in all the growth chambers. Among the GR plants, all the sprayed and untreated control plants survived in the 77° F /68° F and 95° F /86° F temperature treatments. However, all the GR plants sprayed with glyphosate died in the 60° F /50° F treatment, whereas the untreated control plants survived in these chambers. The biomass of both GR and GS junglerice untreated control plants were reduced under cooler temperatures. Therefore these results showed that glyphosate resistance in junglerice was dependent on the temperatures they were exposed to before and after they were sprayed with glyphosate. It needs to be determined what the practical implications of this finding may be for field conditions and what role temperature has in regulating the resistance mechanism of junglerice to glyphosate.