Junglerice (*Echinocloa colona*) Growth and Development in Response to Temperature and Shade.

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Glyphosate-resistant junglerice (*Echinocloa colona*) in orchards and vineyards is a significant concern as there are few herbicide options registered for its control, relative to non-specialty crop systems. It is, therefore, critical to understand the biological and physiological factors driving the evolution and spread of this species in order to develop effective and economical management options. In 2015, we conducted several experiments to describe the germination, growth, and development of seven (A3, A8, C6, H5, L2, N3, SV2) junglerice accessions from California to differing temperature (15, 20, 25, 30, 35, 40°C) and light conditions (0, 30, and 60% shade) that could be encountered in tree and vine crops throughout the Central Valley.

Temperature and germination: Junglerice seed were scarified in concentrated sulfuric acid for 30 minutes; 50 seeds of each biotype were placed in Petri dishes containing 7.0mL of 0.2% Captan fungicide solution. The Petri dishes were held in nested cardboard flats to exclude intense, direct light and minimize desiccation potential. Seed germination was monitored, daily; a seed was considered germinated when the protruded radicle was as long as the length of the seed coat. Germinated seeds were counted and then discarded at each observation point. Results showed that the rate of seed germination increased with increased temperature. All biotypes reached 50% germination 2-4 days after plating for all temperatures except 15°C, where it took 5-37 days to reach 50% germination. Maximum germination was reached by 49 days after plating for all biotypes at 15°C; by 40 days for all biotypes, but L2, at 20°C; and by 5 days for most biotypes at temperatures between 25-40°C. This study is currently in the process of being repeated.

Temperature and growth: Seedlings of each biotype were planted in 1600 cm plastic pots filled with a mixture of peat, compost, sand and perlite, grown out to the 3-tiller stage, and then placed into growth chambers programmed to constant temperatures between 20-40°C. Plant growth and development was monitored for 28 days after which each specimen was destructively harvested and the aboveground biomass separated into three, distinct tissue classes: stems, leaves, and panicles. Results from this experiment demonstrated that junglerice growth and development can occur over a wide range of temperatures (20-40°C). Maximum basal stem production occurred at 25°C and ranged from 37 stems/plant (C6) to 67 stems/plant (SV2) with an average (across accessions) of 53 stems per plant. Per plant panicle production was greatest at 30-35°C; maximum panicle production ranged from 18 panicles per plant (C6) to 45 panicles per plant (N3) with an average maximum production of 24 panicles per plant (across all accessions). This study is currently being repeated in its entirety.

Light quantity and growth: In the summer of 2015, two to three seedlings (at the three tiller stage) of each biotype were transplanted into field plots (1 m wide by 15 m long) that were exposed to either full sunlight (0% shade) or 30% and 60% shade environments. The shade treatments were established by covering the entire plots with black, plastic fabric of differing mesh size on PVC frames. Plant growth and development was monitored for four weeks after which each specimen was destructively harvested. Each shade environment was replicated three

times and the entire study was conducted at two locations: UC Davis and CSU Fresno. With few exceptions, junglerice plants were largest when gown in full sunlight. In general, tissue number and biomass (stem, leaf, panicle) decreased as the amount of transmitted light decreased. For example, tiller number per plant averaged between 79 and 134 at 0% shade; at 30% shade, tiller number ranged from 62 to 88 per plant; at 60% shade, the mean number of tillers per plant did not exceed 61. Similar observances were made with respect to leaf number and panicle production. Knowledge of the growth and development of junglerice under different environmental conditions is critical for understanding the species' invasive potential. Results from our study show that junglerice populations collected from the Central Valley of California can grow and develop under a range of temperatures and light environments. Continuing analyses will help us describe how multiple environmental variables affect the potential for junglerice invasion across a diverse array of habitats.