



## Modeling germination of *Cyperus difformis* L. seeds from rice fields in California across sub-optimal temperatures

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*Cyperus difformis* L. is a prolific annual sedge commonly found in rice fields worldwide. Due to the increasing infestation of multiple herbicide-resistant *C. difformis* populations in California, innovative tools are needed to provide adequate levels of control of this important C<sub>3</sub> weed. Understanding the dynamics of weed seed germination can help optimize the timing and efficacy of control measures, but literature is still limited regarding thermal requirements for *C. difformis* seed germination in California. Field-collected *C. difformis* seeds were placed in a thermogradient table set at constant temperatures ranging from 11.7 to 41.7 °C, and germination assessed daily for 30 days. Thermal-time model parameters (e.g. thermal time to germination of the median cohort,  $\theta_{T(50)}$ ; base temperature for germination,  $T_b$ ; and standard deviation of thermal times for germination,  $\sigma_{\theta_{T(50)}}$ ) were estimated from germination data using probit regression analysis, and model parameters derived using the Solver tool in Microsoft Excel<sup>®</sup>. Germination rates increased linearly below the estimated optimum temperature range (33.5 to 36° C). Estimated  $T_b$  averaged 16.7 °C, whereas  $\theta_{T(50)}$  equaled 17.1 °Cd (degree-days), and  $\sigma_{\theta_{T(50)}}$  was only 0.1 °Cd. The calculated  $T_b$  for *C. difformis* germination is remarkably higher than that of *japonica* and *indica* types of rice, as well as  $T_b$  of other troublesome rice weeds. Results suggest *C. difformis* displays faster thermal-time accumulation to germination and greater germination synchronicity, but it would also initiate germination later in the field relative to weeds in the *Echinochloa* complex, given low soil temperatures early in the rice growing season

**Palavras-chave:** Thermal-time model, seed germination, degree-days, *Cyperus difformis* L., *Oryza sativa* L.

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