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## **Modeling the effects of elevated temperature and weed interference on rice yield**

Do-Soon Kim, Jong-Seok Song

*Seoul National University, Seoul, Korea, Republic of*

Three-year phytotron study was conducted in Suwon, Korea to evaluate and model the effects of elevated temperature on rice-weed competition. The dry weight and the number of panicles in rice were the most susceptible components to weed interference during the early growth of rice, regardless of weed species, while other yield components, including the number of grains, % ripened grain, and 1000-grain weight, were more susceptible to elevated temperature. A rectangular hyperbolic model well demonstrated that rice grain yield was affected by weed interference under elevated temperature, showing that the competitiveness of late watergrass (*Echinochloa oryzicola*) and water chestnut (*Eleocharis kuroguwai*) increased with temperature elevation. Quadratic and linear models well described the effects of elevated temperature on the weed-free rice grain yield and weed competitiveness values of the rectangular hyperbolic model for the two weed species, respectively. Thus, a combined rectangular hyperbolic model incorporated with the quadratic and linear models well demonstrated the effects of elevated temperature and weed interference on rice grain yield across years. Using the combined model and estimated parameters, the rice grain yields were estimated to be 58.9, 48.5, 41.3, and 35.9% of the yields under weed-free conditions for 80 plants m<sup>-2</sup> of late watergrass and 86.8, 64.3, 51.1, and 42.3% of the yields under weed-free conditions for 80 plants m<sup>-2</sup> of water chestnut at 1,300, 1,500, 1,700, and 1,900 °C·days of accumulated growing degree days (GDD; from transplanting to flowering, 89 days), respectively. The combined model developed in this study can provide an empirical description of both the elevated temperature and weed interference effects on rice yield and can be used for predicting rice grain yields due to weed interference under future elevated temperature conditions. This work was carried out with the support of ‘Cooperative Research Program for Agricultural Science & Technology Development (Project No. PJ015723)’, Rural Development Administration, Republic of Korea.