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Modelling rice and multiple weed competition under elevated temperatures

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[Introduction]

Global warming is a challenge to future agriculture. Plants, including both crops and weeds, respond sensitively to temperature rise, so temperature rise may affect both crops and weeds, resulting in change in crop-weed interaction. Compared to crops, weeds are ecologically and genetically diverse than crops, assuming that weeds may get advantage from temperature rise over crops. Therefore, it is expected that temperature rise may result in greater weed competition against crops and consequentially greater yield loss. However, few studies have been conducted to investigate the effects of temperature rise on crop-weed competition. Therefore, this study was conducted to investigate the effects of elevated temperature on rice-weed competition under multiple weed interferences and to model them.

[Materials and Methods]

Rice was cultivated in competition with multiple weed species (*Echinochloa oryzicola*, *Eleocharis kuroguwai*, *Scirpus juncoides and Scripus maritimus*) with various density combinations under elevated temperature conditions (ambient, +1.5°C, +3.0°C, +5.0°C). Rice biomass and yield components were assessed at harvest. Combined model for prediction of rice yield loss by competition with weeds was established based on rectangular hyperbolic model (Cousens, 1985).

[Results and Discussions]

Rice yield decreased with elevated temperature, which was due to significant decrease in grain maturity under elevated temperature. Rice yield resulting from weed competition under elevated temperature was regressed to a combined rectangular hyperbolic model. The combined rectangular hyperbolic model well described rice yield due to rice-multiple weed competition under elevated temperatures.

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