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Modeling the Effect of Density, Emergence Time, Inter- And Intra-Specific Competition of *Echinochloa Crus-Galli* on Growth and Yield of Dry-Seeded Rice: Simulations with INTERCOM

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Dry-seeded rice (DSR) is an emerging resource-conserving technology in many Asian countries but weeds remain the major threat to the production of DSR systems. DSR crop yields on-farm rarely approach their production potential, partly as a result of growth reduction due to weed interference. Among the weeds, *Echinochloa crus-galli* is a stronger competitor of rice for resources. This weed has developed resistance to herbicides and adequate knowledge of the biology, ecology and critical period of competition with DSR is fundamental in designing effective, sustainable and integrated weed management for DSR. Effects of weeds on crop yield are highly variable across weed density and their time of emergence. This may be accomplished through early crop vigor or delaying the weed emergence. An Eco physiological model of rice-barnyard grass competition (INTERCOM) may be useful for predicting the effects of weed density and their time of emergence on crop and weed growth and competitive ability. To evaluate model to predict barnyardgrass interference on DSR growth and yield loss two season rice field data has been used. Model calibration efficiency is good as normalized deviation for all growth and yield values is near zero, which means Model-simulated results were very much similar to our field-observed results. The simulated results depicted that rice panicle yield was affected by the increasing weed density at early emergence. As weed emergence was delayed, there were no observed effects of different densities as the weed was usually unable to survive and did not cause much reduction in panicle yield. Percentage yield reduction decreased with the decrease in weed density and the delay in their emergence. Barnyardgrass at 70 plants m², emerging 2 days after rice emergence (DARE), reduced the grain yield by 65-70%. When the weed emergence was delayed to 45 DARE, the reduction in grain yield was only 2-5%. The model predicted that barnyard grass emergence with any densities at 45 DARE had negligible effect on rice growth and yield. The model suggests that the use of competitive rice cultivars or delaying the weed emergence may reduce the need for chemical weed control.