Evaluation of a New Natural Product Herbicide for Rice Weed Control

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To date, no selective herbicides are available to control weeds in organic rice. Means to control both broadleaf and grass weeds in organically grown rice are limited to water management and hence, yield loss in organic rice due to weeds can exceed 50%. Thaxtomins (4-nitroindol-3-yl-containing 2,5-dioxopiperazines) are a group of natural product phytotoxins produced by microbes of the genus *Streptomyces.* In preliminary tests, thaxtomin A, a metabolite produced by *Streptomyces acidiscabies*, an actinomycete isolated from a marine environment, has shown high levels of crop selectivity and potential utility in weed control on rice. In a greenhouse study where thaxtomin A at 0 - 0.4 mg/mL was applied to four common rice weeds: *Ammania sp*. (redstem), *Alisma plantago-aquatica* (common waterplantain), *Cyperus difformis* (smallflower umbrella sedge), and *Leptochloa fascicularis* (sprangletop), thaxtomin A at 0.2 mg/mL provided good control (70%) of redstem and excellent control of common waterplantain (100%) and sedge (90%). No phytotoxic effects were observed in rice plants treated with the same concentrations of thaxtomin A, which suggests that thaxtomin A could be used alone and in combination with other rice herbicides to control weeds in both organic and conventional rice.