BIOHERBICIDES AS POTENTIAL ALTERNATIVES TO METHYL BROMIDE FOR WEED CONTROL

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As public pressures increase for reducing chemical inputs in agricultural and horticultural production systems, researchers are challenged to develop effective weed management strategies that result in reduced chemical inputs while maintaining the high levels of control that are required by current agricultural practices. The loss of methyl bromide for use as a soil fumigant represents such a challenge.

The use of indigenous plant pathogens and certain of their derived phytotoxins as bioherbicides provides an environmentally responsible approach for controlling weeds in agronomic crops as well as in some horticultural systems. Several weeds, such as yellow and purple nutsedges, annual bluegrass, crabgrass, barnyardgrass, johnsongrass, carpetweed, dodder, evening primrose, lambsquarter, morninglories, nightshades, jimsonweed, pigweeds, cocklebur, prickly sida, and velvetleaf can be problematic weeds both in agricultural and horticultural crops. Previously, methyl bromide was recommended for control of these weeds in some crops. Researchers at the Southern Weed Science Laboratory and elsewhere have discovered several plant pathogenic bacteria, fungi, and phytotoxic compounds derived from plant pathogenic organisms and evaluated them as control agents for all of these weeds. In some cases, the biologicals performed as well or better than methyl bromide in controlling weeds. Examples of current research to control these weeds and their possible uses as alternatives to methyl bromide will be presented.

TABLE 1. Examples of Weed Control Efficacies of Selected Bioherbicidal Organisms

Pathogen	Target Weed Host	Weed Control Efficacy (%)
Alternaria alternata (**AAL-toxin**)	jimsonweed	90-100
A. cassiae	sicklepod	90-98
A. crassa	jimsonweed	87-96
A. macrospora	spurred anoda	85-95
Colletotrichum dematium	beggarweed	80-85
C. gloeosporioides f. sp. *aeschynomene*	northern jointvetch	95-100
C. gloeosporioides f. sp. *cassiae*	coffee senna	95-100
C. gloeosporioides f. sp. *jussiae*	winged water-primrose	93-98
C. gloeosporioides f. sp. *malvae*	round-leaved mallow	85-95
C. coccodes	nightshades	80-95
Dichotomophthora portulacaceae	common purslane	75-90
Dreschlera monoceras	barnyardgrass	90-100
Fusarium lateritium	velvetleaf prickly sida	80-90 75-85
F. moniliforme (**fumonisin**)	jimsonweed	95-100
F. oxysporum	sicklepod	85-95
F. solani f. *cucurbitae*	Texas gourd	88-96
Gibbago trianthemae	horse purslane	86-94
Puccinia canaliculata	yellow nutsedge	85-95
Phytopthora palmivora	stranglervine	90-100