P035

Allelopathy potential of *Stylosanthes guianensis* and its phytotoxic substances

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Objectives

This experiment was examined the herbicidal effects of stylo plant on noxious paddy weeds and observed the possibility of using this leguminous plantfor paddy weed control. The identification of allelopathic substances in *S. guianensis* was also conducted.

Materials and Methods

- Plants: stylo (*Stylosanthes guianensis*) plant, seeds of barnyardgrass and monochoria were as indicator plants
- Bioassay: aqueous extraction and dilution at ½ and ¼ dose, 10 ml of each extracted solution was added in Petri dish (9cm dia) with 20 seeds of each weeds.
- Greenhouse and field:. Applied a dose of 0.5 and 1.0 ha-1 of stylo dried leaves in the containers (30 x 40 x 30 cm) with field soil in greenhouse. The same doses were applied to plots (2 x 3 m) in field. After 45 days, weed emergence was determined.
- Analysis of phytotoxic substances: powder leaves of stylo extracted with 70% methanol, adjusted dilution 50, 100 and 250 ppm and tested germination and growth of barnyardgrass. Diluted solution in acetone for GC-MS analysis.

Results and Discussion

Significantly reduced germination and growth of barnyardgrass and monochoria at 1/4 applied dose of stylo leaves, at 1/2 concentration, about 80% emergence of monochoria was suppressed. Complete inhibition with monochoria and barnyarngrass at greatest application was observed. A dose of 0.5-1.0 ton ha-1 of stylo gave 80% reduction of weed biomass and 10-15% increase of rice yield than either herbicide or hand-weeding application in greenhouse and field trials. Application of stylo leaves enhanced rice yield from 28.1 to 40.6% at 0.5 and 1 ton ha-1,either hand-weeding or herbicide application were 18.8 and 25%, respectively.

At 100 ppm, the root length of barnyardgrass was significantly inhibited. At 250 ppm, the shoot and root length was reduced by 25.8 and 70%. Results from GC-MS analysis reveal the presence of five compounds including salicylic acid, vanillin, coumarin, palmitic and stearic acids in stylo leaves, are putative growth inhibitors and involved in allelopathic activity of stylo plant.

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Table 1. Effects of stylo aqueous extract on germination and growth of barnyardgrass and monochoria

Treatments	Barnyardgrass			Monochoria		
	Germination (%)	Shoot length (mm)	Root Length (mm)	Germination (%)	Shoot length (mm)	Root Length (mm)
Control	95.0a(0.0)	20.5a(0.0)	15.7a(0.0)	83.0a(0.0)	11.2a(0.0)	8.8a(0.0)
1/4	80.5a(10.6)	14.7b(28.3)	8.2b(47.7)	50.6b(39.0)	6.9b(38.4)	4.7b(46.6)
1/2	55.3b(41.8)	4.1c(80.0)	3.2c(79.6)	15.3c(81.6)	2.6c(76.8)	0.8c(90.9)
1.0	32.3c(66.0)	1.8c(91.2)	0.1d(99.4)	0.0d(100.0)	0.0d(100.0)	0.0d(100.0)
$LSD_{0.05}$	15.2	3.1	2.6	12.7	1.8	1.3

Table 2. Effects of styloplant on the spontaneous growth of weeds and rice yield in greenhouse and fields

Treatments (ton ha^{-1})	Greenhouse	Fields	
	Total dry weight (g m^{-2})	Total dry weight (g m^{-2})	Rice yield (ton ha^{-1})
0.0 (control)	20.9a(0.0)	47.6a(0.0)	3.2c(0.0)
0.5	12.3b(41.1)	29.5b(38.0)	4.1ab(-28.1)
1	4.4c(78.9)	7.7c(83.8)	4.5a(-40.6)
Hand-weeding	-	1.6c(96.6)	3.8b(-18.8)
Herbicide	-	2.7c(94.3)	4.0ab(-25.0)
LSD (0.05)	3.7	6.6	0.6

Table 3. Effects of stylo leavesmethanol extracts on germination and growth of barnyardgrass

Concentration (ppm)	Germination (%)	Shoot length (mm)	Root length (mm)
0.0 (control)	95.0a(0.0)	28.7a(0.0)	35.6a(0.0)
50	95.0a(0.0)	33.6a(-17.1)	35.8a(-0.6)
100	100.0a(-5.3)	27.9ab(2.8)	22.6b(36.5)
250	100.0a(-5.3)	21.3b(25.8)	13.9c(70.0)
LSD (0.05)	22.5	6.7	6.9

Note: Means with the same letters in a column are not significantly at P=0.05
Values in the parentheses are inhibition percentages over the control
Values in the parentheses with (-) are stimulation percentage over the control

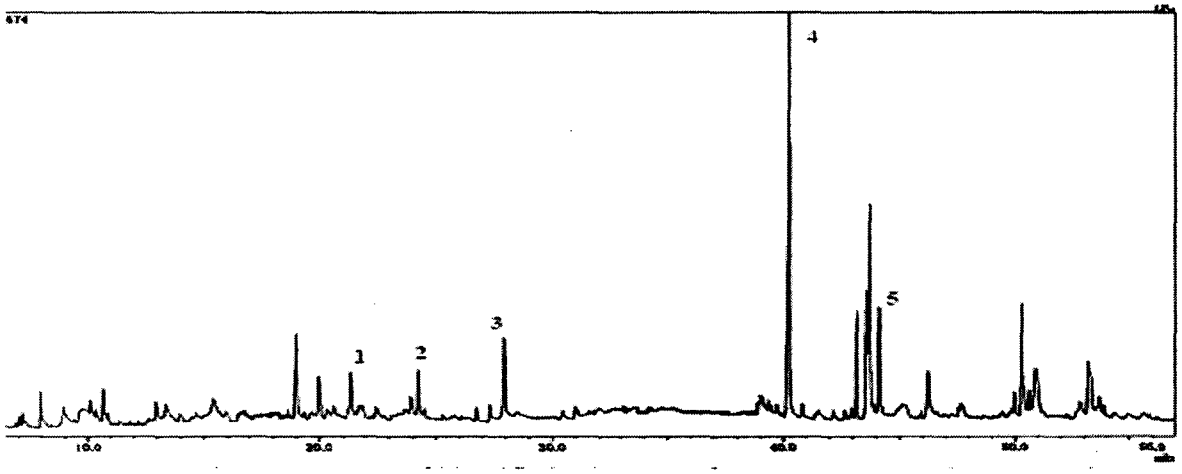

Figure 1. GC chromatograms of identified substances from stylo leaves

(1: Salicylic acid, 2: Vanillin, 3: Coumarin, 4: Palmitic acid, 5: Stearic acid. The other peaks remain unknow.)