SHORT COMMUNICATION

STUDY ON FUNGI CONTROLLING BARNYARD GRASS (*Echinochloa crus-galli* (L.) AND RED SPRANGLETOP (*Leptochloa chinensis* (L.) Nees)

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Weeds are an important problem, particularly in rice direct seeding practice. Herbicides have been used commonly by farmers because there are many selective rice herbicides available in the market, their input cost is acceptable actually. The trend of dependency on herbicides has been noticed to enhance accumulation of herbicidal residues in the environment. Farmers tend to use the same compound for many years which can create the new problems of herbicide resistant weeds. The possibility of using biological control method as one component of integrated weed management should be explored. Fungus is the most feasible way because the mass production of spores can be done in small scale industry to produce mycoherbicides to meet the demand in target areas. The Cuu Long Delta Rice Research Institute (CLRRI) has collaborated with the Australian Center for International Agricultural Research (ACIAR) to study this subject since 1995. The primary results are presented briefly in this paper.

MATERIALS AND METHOD

Attentions have been paid to the two most important grass weeds in rice cultivation namely *Echinochloa crus-galli* and *Leptochloa chinensis* so far in our research. The infected specimens of those species were collected in rainy season of 1997, at Omon and Thotnot districts. Infection symptoms in leaves were paid more attention than those in sheaths and culms. The infected samples were sterilized by the solution of $HgCl_2$ 0.1%. Fungi were propagated in the PDA culture (Potato-Dextrose-Agar). Rice and weed seeds were sown in pots. The solution containing 10^6 spores per 1 ml was sprayed on rice and weed seedlings at different leaf-stage. Seedlings were brought to dark chamber at 26^0C, and relative humidity of 98% for incubation at different periods of 8, 12 and 48 hours. The promising species were sent to the International Mycology Institute (IMI) U.K for identification.

RESULTS AND DISCUSSION

Identification of fungi

The isolates are coded E-10-97 and L-8-97. The specimens of those isolates were sent to IMI for identification. Isolates E-10-97 was identified as *Cochliobolus lunatus* R.R. and L-8-97 as *Setosphaeria sp.cf. rostrata*

Effect of *C. lunatus* on barnyard grass and rice

It took 8 hrs, and 12 hrs for incubation in dark room at 26^0C 48 hrs inoculation

obtained the best effectiveness, 98% relative humidity. This condition is not sufficient for the fungi to cause substantial effect to kill weeds effectively. The percentage of dead weed was 75% at 10 days after inoculation (DAI) and 100% at 15 DAI. Two rice varieties IR50404 and CR203 were also tested for selectivity. Both rice varieties are still healtly, not affected by the fungi except five percent of IR50404 seedings which was noticed to be affected by *C.lunatus*. Only 5% of IR 50404 rice plants was affected by *C. lunatus*.

Table 1. Effect of *C. lunatus* on barnyard grass and IR50404, CR203 varieties at 5, 10, and 15 DAI (% of dead plants).

Treatments	5 DAI			10 DAI			15 DAI		
	8 hr	12 hr	48 hr	8 hr	12 hr	48 hr	8 hr	12 hr	48 hr
A. *E. crus-galli*									
Untreated check	0	0	0	0	0	0	0	0	0
Treated with *C. lunatus*	0	0	10	0	0	75	0	0	100
B. IR 50404									
Untreated check	0	0	0	0	0	0	0	0	0
Treated with *C. lunatus*	0	0	5	0	0	0	0	0	0
C. CR 203									
Untreated check	0	0	0	0	0	0	0	0	0
Treated with *C. lunatus*	0	0	0	0	0	0	0	0	0

Effect of *S. rostrata* on red sprangletop and rice

Plant height of *L. chinensis* was broken down due to the infection of *Setosphaeria sp. cf. rostrata*. The percentage of infected leaves reached 100% at 7, 14 and 21 DAI. IR 64 was not affected by the fungi. Plant height, panicle length, number of panicles/hill, unfilled grain percentage of rice are similar in both treated and untreated treatments (table 2 and table 3).

Table 2. Percentage of infected leaves of *L. chinensis* at different time of inoculation.

Treatments	Days after inoculation (DAI)			
	3	7	14	21
T1. Spray water at 7DAS*	0.0	0.0	0.0	0.0
T2. Spray 2 x 10^7 spores/pot at 7DAS**	99.4	100.0	100.0	100.0
T3. Spray water at 14DAS	3.7	1.7	15.1	14.5
T4. Spray 2 x 10^7 spores/pot at 14DAS**	97.7	100.0	100.0	100.0
T5. Spray water at 21DAS	7.5	17.5	15.9	14.0
T6. Spray 2 x 10^7 spores/pot at 21DAS**	95.0	100.0	100.0	100.0
T7. Spray water at 28DAS	20.4	21.1	15.2	23.3
T8. Spray 2 x 10^7 spores/pot at 28DAS**	89.2	100.0	100.0	100.0

** Remark: DAS = days after sowing; ** Spray 20 ml water diluted with 2 x 10^7 spores solution onto pot ∅ 30cm.*

Table 3. Yield components and dry matter accumulation of. IR 64 variety treated with the fungi

Treatments	Panicle length (cm)	No. panicles /hill	Unfilled grain percentage (%)	1000-grain weight (gr)	Dry matter accumulation (gr. /hill)
T1. Spray water at 7DAS	23.7	8.7	14.4	26.9	30.0
T2. Spray 2 x 107^7 spores/pot at 7DAS	20.2	7.3	12.8	24.1	35.6
T3. Spray water at 14DAS	23.2	6.7	12.4	27.2	31.8
T4. Spray 2 x 10^7 spores/pot at 14DAS	20.5	5.7	17.5	26.1	30.1
T5. Spray water at 21DAS	23.0	6.3	10.7	26.2	32.4
T6. Spray 2 x 10^7 spores/pot at 21DAS	21.3	6.0	13.0	24.8	27.5
T7. Spray water at 28DAS	22.9	7.0	12.9	26.7	33.7
T8. Spray 2 x 10^7 spores/pot at 28DAS	20.6	7.7	12.0	27.6	30.9

CONCLUSIONS

- The pathogenic activity can be given to major weed species in rice fields by some species of fungi living in rice ecosystem. Those fungi can be collected, propagated and produce mycoherbicides and considered as one component of the integrated weed management (IWM).
- Inoculation time of 8 and 12 hours is not sufficient to cause the epidemic effect on weeds. Inoculation for 48 hrs. The 48 hrs inoculation obtained good result.
- *C. lunatus* controls *E. crus-galli* effectively and safe to rice var. (IR 50404 and CR 203 e. g. ..).
- *S. rostrata* can kill *L. chinensis* completely and safe to rice IR 64.
- Further research is needed to formulate the mycoherbicides to control grass weeds in rice field.

TÓM TẮT

Các mẫu cỏ lồng vực (*Echinochloa crus-galli*) và cỏ đuôi phụng (*Leptochloa chinensis*) bị bệnh được thu thập trong mùa mưa năm 1997 tại hai huyện là Ô Môn và Thốt Nốt, tỉnh Cần Thơ. Các dòng nấm gây bệnh trên cỏ được nuôi cấy trong môi trường nhân tạo cho sản xuất bào tử và chủng lại trên cỏ và lúa. Các dòng nấm triển vọng diệt cỏ được gởi đến Viện khuẩn học quốc tế tại Anh quốc để định danh. Tên khoa học của nấm diệt cỏ lồng vực *Cochliobolus lunatus* là và nấm diệt cỏ đuôi phụng là *Setosphaeria rostrata*. Kết quả từ các thí nghiệm cho thấy ủ bệnh trong 8 hoặc 12 giờ đã dẫn đến cỏ bị lây bệnh nhưng không đủ thời gian phát triển bệnh trên toàn cây, do đó đã không làm chết cỏ. Ủ trong 48 giờ ở 26^0C trong phòng tối, ẩm độ tương đối 98% gây bệnh và diệt cỏ tốt. Nấm *C. lunatus* diệt cỏ lồng vực hiệu quả và an toàn đối với lúa IR 50404 và CR 203. Nấm *S. rostrata* diệt tốt cỏ đuôi phụng và an toàn với lúa IR 64. Triển vọng phân lập nấm tại chỗ trong nước để sản xuất thuốc diệt cỏ hòa bản trên lúa là khả thi tại Việt Nam.