Short communication

Autecology of blood grass in wetland rice ecosystem

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Autecological studies envisage the study of an organism in its environment. A thorough knowledge about the weeds in terms of its growth and development, propagation, adaptation, response to various stimuli or resources in a particular habitat in association with crops is highly essential before adopting any control measures (Duary *et al.* 2000). A careful consideration of these facts in relation to different crop management practices may provide a suitable strategy for suppression of the weeds. However, there is a considerable lack of information on the biology and ecology of many weeds occurring in rice in the tropics (Moody 1980). Development of an appropriate and effective weed management programme is dependent on the sound knowledge of weed biology (Rao 2000). Such studies are important in saving the precious crops from devastation. *Isachne miliacea* Roth ex Roemet Schult is one such troublesome dominant grass weed found in the wetland rice ecosystem of Thiruvananthapuram district, Kerala state. The weed spreads mainly by seed and rooted portions of the stem and is hard to eradicate once established. A sound knowledge of biology of *I. miliacea* will help to develop strategies for its efficient and eco-friendly management. With this background information, an investigation was carried out to examine the growth and developmental pattern of blood grass (*I. miliacea*) as influenced by nutrient management and spacing of associated rice with an approach to assess the possibility for managing them through agronomic manipulations.

The field experiments were conducted during the first and second crop seasons of 2010 in the wetlands of the Instructional farm attached to College of Agriculture, Vellayani located at 8.5^{o}N latitude and 76.9^{o}E longitude and at an altitude of 29 m above mean sea level (MSL). The rice variety used for the experiment was '*PTB 52 (Aiswarya)*' released from Rice Research Station, Moncompu. The experimental area was puddled twice and leveled. Weeds and stubbles were removed by hand picking. Five blocks with 12 treatment combinations each were laid out in strip plot

design. The plots were separated with channels of 60 cm width and each block was separated with channels of 1 m width. The treatments included N_1-NPK 90:45:45 kg/ha with 100% N as chemical fertilizer (POP), N_2-NPK 90:45:45 kg/ha with 75% N as chemical fertilizer and 25% N as organic, N_3- NPK 112.5:56.25:56.25 kg/ha with 100% N as chemical fertilizer, N_4-NPK 112.5:56.25:56.25 kg/hawith 75% N as chemical fertilizer and 25% N as organic under three type of spacing S_1-15 x 15, S_2-20 x 15, S_3-20 x 20 cm(Table 1). All the treatments uniformly received FYM 5 t/ha as per package of practices recommendations for rice, Kerala Agricultural University. Periodic observations on general growth habit, floral characters, seed production and days taken for germination and 50% flowering were taken from 10 sample plants each during the entire crop season and the averages were worked out and were statistically analyzed.

I. miliacea was found to be widely creeping prostrate plant, branching and rooting at nodes with slender culms. The leaves were small, hispid with sparingly hairy sheath. The ligule was a ring of hairs. Average leaf size was 2.0 cm x 4.5 mm. The shoot length of the weed was vary from 23.4 to 25.6 cm with an average of 24.5 cm. The root length varied from 12.2 to 13.8 cm and the average plant spread was 62.2 cm. Inflorescence emergence was noticed from 35 days of transplanting of rice crop. The spikelets were in pairs, unequally stalked and purplish. These biometric characters were in conformity with earlier reports (Ravi and Mohanan 2002). It was observed that the perennial weed formed large clumps with mat like root system which in the rice field created problems during weeding. Its density increased as rice matured thus making competition more severe at critical periods. Weed propagation was both through seeds and rooted stem bits.

The results revealed that the growth and development of *I. miliacea* was significantly influenced by the management practices for the associated rice crop. The main effect of nutrient management and plant density of rice crop and their interaction effects were

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significant in deciding the shoot and root length of the weed plant. The general trend was that higher dose of NPK applied as chemical fertilizers only along with wider spacing increased all the vegetative parameters (shoot/root length and plant spread) of the weed throughout the study (Table 1). Several other workers have confirmed that addition of higher dose of fertilizers permitted the luxuriant growth of crops and weeds alike almost all the year round (Zimdahl 1980).

Table 1. Shoot length and root length of *I. miliacea* as influenced by nutrient management and plant density of rice

Treatment	First season		Second season	
	Shoot length (cm)	Root length (cm)	Shoot length (cm)	Root length (cm)
N_1S_1	23.4	12.2	23.4	12.2
N_1S_2	23.8	12.5	23.8	12.5
N_1S_3	24.3	13.3	24.1	13.3
N_2S_1	24.2	12.2	24.2	12.3
N_2S_2	24.3	12.4	24.3	12.4
N_2S_3	24.4	12.8	24.6	12.8
N_3S_1	25.1	13.8	25.0	13.6
N_3S_2	25.3	13.7	25.2	13.7
N_3S_3	25.3	13.8	25.3	13.7
N_4S_1	25.1	12.7	24.4	12.5
N_4S_2	25.1	12.8	24.4	12.8
N_4S_3	25.6	13.4	24.5	13.4
LSD P=0.05)	0.63	0.14	0.52	0.21

The data indicated that the nutrient levels and plant spacing for the rice crop had significant influence on the reproduction characteristics of the grass weed. During both the crop seasons *I. miliacea* growing in rice fields treated with 100 per cent NPK with 25 per cent organic substitution (N_2) and plants in rice crop planted at wider spacing (P_3) recorded delayed flowering but produced more seeds/panicle when compared to the other treatments and the difference was statistically significant (Table 2). Though there was variation among the interaction effect ,no distinct pattern could be elucidated.

SUMMARY

Based on the data on the effect of nutrient management and crop spacing on the growth and development of *I. miliacea,* it could be elucidated that ap-

Table 2. Growth and yield attributes of *I. miliacea* as influenced by nutrient management and plant density of rice

Treatment	First season			Second season		
	Plant spread (cm)	Number of days to 50% flowering	Number of seeds / panicle	Plant spread (cm)	Number of days to 50% flowering	Number of seeds/ panicle
N_1S_1	57.9	50.6	66.8	57.6	50.6	66.4
N_1S_2	62.4	54.4	62.2	61.8	52.8	61.8
N_1S_3	70.1	55.8	59.8	69.0	55.2	63.8
N_2S_1	54.3	51.4	64.6	54.3	51.6	65.0
N_2S_2	61.3	53.6	63.2	61.3	53.4	64.8
N_2S_3	65.7	53.8	67.8	64.3	54.0	66.6
N_3S_1	56.5	49.8	65.4	56.7	50.4	65.4
N_3S_2	60.9	51.6	68.4	60.3	51.6	65.4
N_3S_3	62.3	50.0	73.2	61.8	50.0	73.2
N_4S_1	62.4	51.4	68.0	62.4	50.8	67.2
N_4S_2	60.8	50.2	68.0	60.6	50.2	68.0
N_4S_3	58.4	49.4	72.0	57.8	49.8	70.4
LSD (P=0.05)	1.02	1.43	2.63	1.59	1.48	5.14

plication of enhanced nutrients exclusively as chemical fertilizers in combination with wider spacing stimulated growth and vigour of the weed. Hence an integrated approach in nutrient management is suggested for efficient and economic management of the weed. By altering nutrient management and adjusting the plant population, the competitive ability and productivity of rice crop can be improved and weed management made more efficient and economic. Considering the practical importance of the study, detailed investigation in similar lines needs to be conducted on such major weeds for the entire state under all systems of rice cultivation including upland rice.

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