Journal of Aquatic Biology and Fisheries Vol. 2/2014/ pp. 570 to 573

AUTECOLOGY OF BLOOD GRASS (*ISACHNE MILIACEA* ROTH EX ROEM ET SCHULT.) IN WETLAND RICE ECOSYSTEM

Sajith Babu, D*., Sansamma George and Nishan, M.A.
College of Agriculture, Vellayani, Thiruvananthapuram, Kerala, India - 695522
**Email: sajithbabu@gmail.com*

Received on: 10 October 2013, accepted on: 12 December 2013

Abstract: An investigation was carried out during the first and second crop seasons of 2010 at College of Agriculture, Vellayani,Thiruvananthapuram, Kerala to examine the growth and developmental pattern of blood grass (*Isachne miliacea* Roth ex Roem et Schult.) as influenced by nutrient management and spacing of associated rice with an approach to assess the possibility for managing the weed through agronomic manipulations. The treatments included NPK @ 90:45:45 kg ha^{-1}(100% NPK) and 112.5:56.25:56.25 kg ha^{-1}(125% NPK) at two levels (100 % N as chemical fertilizer and 75% N as chemical fertilizer + 25% N as organic) under three spacings (15 X 15, 20 X 15, 20 X 20cm). The results of the present study revealed that both vegetative and reproductive characteristics of *Isachne miliacea* were significantly influenced by the management practices for the associated rice crop. During the first crop season the weed plants growing in rice fields treated with 125 percent recommended NPK with 25 per cent organic substitution recorded the maximum shoot length while during the second season the value was significantly higher when the same dose was applied as chemical fertilizers only. During both the seasons the root length and plant spread were the highest when full dose of NPK was given as chemical fertilizer. Thus higher dose of NPK applied as chemical fertilizers only, along with wider spacing increased all the vegetative parameters of the weed throughout the study. During both the seasons *Isachne miliacea* growing in rice fields treated with 100 per cent NPK with 25 per cent organic substitution and plants in rice crop planted at wider spacing recorded delayed flowering but produced more seeds per panicle. Thus it could be elucidated that application 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 shall be 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 can be made more efficient and economic.

Key words: Ecology, Crop-weed interference, Weed biology, Isachne miliacea

INTRODUCTION

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 Roem et Schult. is one such troublesome dominant grassy 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 it spreads. A sound knowledge of biology of *Isachne 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 (*Isachne miliacea*) as influenced by nutrient management and spacing of associated rice

with an approach to assess the possibility for managing them through agronomic manipulations.

MATERIALS AND METHODS

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°N latitude and 76.9°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^{-1} with 100 % N as chemical fertilizer (POP) N_2 – NPK @ 90:45:45 kg ha^{-1} with 75 % N as chemical fertilizer and 25 % N as organic N_3 – NPK @ 112.5:56.25:56.25 kg ha^{-1} with 100 % N as chemical fertilizer N_4 – NPK @ 112.5:56.25:56.25 kg ha^{-1} with 75 % N as chemical fertilizer and 25 % N as organic under three spacings (p_1 15 X 15, p_2 20 X 15, p_3 20 X 20cm). All the treatments uniformly received FYM @ 5 t ha^{-1} 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.

Table 1. Shoot length and root length of *Isachne miliacea* Roth ex Roem et Schult. as influenced by nutrient management and plant density of rice crop

Treatments	First crop season		Second crop season	
	Shoot length (cm)	Root length (cm)	Shoot length (cm)	Root length (cm)
n_1	23.8	12.7	23.8	12.7
n_2	24.3	12.5	24.4	12.5
n_3	25.2	13.8	25.2	13.7
n_4	25.3	12.9	24.5	12.9
SEM(3,12)	0.198	0.032	0.157	0.040
C.D (0.05)	0.611	0.099	0.484	0.124
p_1	24.4	12.7	24.3	12.6
p_2	24.6	12.8	24.5	12.8
p_3	24.9	13.3	24.6	13.3
SEM(2,8)	0.029	0.025	0.053	0.043
C.D (0.05)	0.095	0.081	0.174	0.140
n_1p_1	23.4	12.2	23.4	12.2
n_1p_2	23.8	12.5	23.8	12.5
n_1p_3	24.3	13.3	24.1	13.3
n_2p_1	24.2	12.2	24.2	12.3
n_2p_2	24.3	12.4	24.3	12.4
n_2p_3	24.4	12.8	24.6	12.8
n_3p_1	25.1	13.8	25.0	13.6
n_3p_2	25.3	13.7	25.2	13.7
n_3p_3	25.3	13.8	25.3	13.7
n_4p_1	25.1	12.7	24.4	12.5
n_4p_2	25.1	12.8	24.4	12.8
n_4p_3	25.6	13.4	24.5	13.4
SEM(6,24)	0.208	0.048	0.175	0.072
C.D (0.05)	0.629	0.138	0.519	0.208

Table 2. Plant spread, number of days to 50 % flowering and number of seeds / panicle in *Isachne miliacea* Roth ex Roem et Schult. as influenced by nutrient management and plant density of rice crop

Treatments	First crop season			Second crop 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_1	63.5	53.6	62.9	62.8	52.9	64.0
n_2	60.5	57.7	65.2	60.0	53.0	65.5
n_3	59.9	50.5	69.0	59.6	50.7	68.0
n_4	60.5	50.3	69.3	60.3	50.3	68.5
SEM(3,12)	0.192	0.385	0.586	0.287	0.354	1.089
C.D (0.05)	0.593	0.186	1.805	0.885	1.091	3.357
p_1	57.8	50.8	66.2	57.8	50.9	66.0
p_2	61.4	52.3	65.5	61.0	52.0	65.0
p_3	64.1	52.3	68.2	63.3	52.3	69.0
SEM(2,8)	0.202	0.201	0.313	0.329	0.224	0.758
C.D (0.05)	0.659	0.656	1.020	1.074	0.731	2.471
n_1p_1	57.9	50.6	66.8	57.6	50.6	66.4
n_1p_2	62.4	54.4	62.2	61.8	52.8	61.8
n_1p_3	70.1	55.8	59.8	69.0	55.2	63.8
n_2p_1	54.3	51.4	64.6	54.3	51.6	65.0
n_2p_2	61.3	53.6	63.2	61.3	53.4	64.8
n_2p_3	65.7	53.8	67.8	64.3	54.0	66.6
n_3p_1	56.5	49.8	65.4	56.7	50.4	65.4
n_3p_2	60.9	51.6	68.4	60.3	51.6	65.4
n_3p_3	62.3	50.0	73.2	61.8	50.0	73.2
n_4p_1	62.4	51.4	68.0	62.4	50.8	67.2
n_4p_2	60.8	50.2	68.0	60.6	50.2	68.0
n_4p_3	58.4	49.4	72.0	57.8	49.8	70.40
SEM(6,24)	0.355	0.495	0.919	0.556	0.518	1.801
C.D (0.05)	1.017	1.435	2.626	1.595	1.485	5.141

RESULTS AND DISCUSSION

Isachne miliacea was found to be a 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 found to vary from 23.4 to 25.6 cm with an average of 24.5 cm. The root length varied from 12.2 cm to 13.8 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 more critical periods. Weed propagation was both through seeds and rooted stem bits.

The results of the present study revealed that the growth and development of *Isachne miliacea* Roth ex Roem et Schult. 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 significant in deciding the shoot and root length of the weed plant. During the first crop

season the weed plants growing in rice fields treated with 125 percent recommended NPK with 25 per cent organic substitution (n_4) recorded the maximum shoot length and was on par with n_3 while during the second crop season the value was significantly higher when the same dose was applied as chemical fertilizers only (n_3) (Table 1.). During both the crop seasons the root length and plant spread were the highest when full dose of NPK was given as chemical fertilizer (n_3) (Table 1.). Thus 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. 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).

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 *Isachne miliacea* Roth ex Roem et Schult. 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 and when compared to the other treatments, the difference was of statistical significance (Table 2). Though there was variation among the interaction effect no distinct pattern could be elucidated.

Thus based on the preliminary data on the effect of nutrient management and crop spacing on the growth and development of *Isachne miliacea* it could be elucidated that application 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 shall be 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.

ACKNOWLEDGEMENTS

We are grateful to Kerala Agricultural University for providing financial assistance for the work.

REFERENCES

Ravi, N. and Mohanan, N. 2002. Common Tropical and sub tropical sedges and grasses. Oxford and IBH Publishing C. Pvt. Ltd., 219 p.

Duary, B., Mukhopadhyay, S.K. and Das, T.K. 2000. Autecological studies of Pimpernel (*Anagallis arvensis* L). *Ann. Agric. Res.*, 21(2): 242-247

Moody, K. 1980. *Crop Loss Assessment in Rice*. International Rice Research Institute, Los Banos, Laguna, Philippines, 193 p.

Rao, V.S. 2000. Principles of Weed Science. Oxford and IBH publishing Co., New Delhi, p.555

Zimdahl, R.L. 1980. Weed-crop competition – Review. *Int. Plant Protection Center, Orgegon State Univ., Corvallis.* pp.41-46