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Lovekesh Kumar Gilhare
S.G. College of Agriculture & Research Station, IGKVV, Jagdalpur, Chhattisgarh, India

A Pradhan
S.G. College of Agriculture & Research Station, IGKVV, Jagdalpur, Chhattisgarh, India

AK Thakur
S.G. College of Agriculture & Research Station, IGKVV, Jagdalpur, Chhattisgarh, India

Rahul Jaiswal
D.T.C College of Agriculture & Research Station, IGKVV, Bilaspur, Chhattisgarh, India

Corresponding Author:
Lovekesh Kumar Gilhare
S.G. College of Agriculture & Research Station, IGKVV, Jagdalpur, Chhattisgarh, India

Effect of water imponding period on NPK content in weed under midland situation

Lovekesh Kumar Gilhare, A Pradhan, AK Thakur and Rahul Jaiswal

Abstract
A field experiment was conducted during the *Kharif* 2017 at S.G. College of Agriculture and Research Station, Jagdalpur on sandy loam soil with five treatments *viz.*, water imponding of 15, 30 and 45 days 10 days after transplanting, bispyribac sodium 25 g ha^{-1} as post-emergence and without water imponding (Control) in factorial randomized block design with four replications. Significant reduction of nitrogen content in weed was recorded with *Panicum repens* (0.61%), *Brachiaris reptans* (0.60%), *Cyperus difformis* (0.47%), *Eleocharis indica* (0.49%), *Fimbristylis miliacea* (0.48%), *Dopatrium junceum* (0.53%), *Ammania baccifera* (0.52%), and others (0.45%) under water imponding was maintained till 30 days 10 days after transplanting as compared to weedy check. Similarly, phosphorus and potassium content (%) showed the trends for weeds.

Keywords: Water imponding, weed management, bispyribac-Na, rice and NPK

Introduction

Rice (*Oryza sativa* L.) is one of the world's most important food crops. Currently, more than one third of the human population relies on rice for their daily sustenance. Rice is the vital food for more than two billion people in Asia and four hundred million people in Africa and Latin America (IRRI, 2006) [1]. In country scenario, rice is grown in nearly 44 million ha of land with the productivity of 2.2 t ha^{-1} which is less than the productivity of many countries. Annual population growth rate of the country is nearly 1.8% and if per capita consumption of rice is expected to be 400 gm per day then the demand for rice in 2025 will be 130 m. tonnes. In Chhattisgarh, rice occupies average of 3.6 million ha with the productivity of the state ranging between 1.2 to 1.6 t ha^{-1} depending upon the rainfall. The state is comprised with three agro-ecological zones *i.e. Chhattisgarh plain, Bastar plateau and Northern hill* region of Surguja. Various method of rice production on different land farms of farming situation. Rice is typically grown in bunded fields that are continuously flooded up to before harvesting. Continuous flooding helps ensuring sufficient water which control weeds and rice is an aquatic crop and mostly grown under submergence or variable imponding conditions.

Rice being adapted to submerged environments, the seed germination and emergence would take place even at some water depths. This would provide opportunities to suppress weeds by direct seeding rice in plots impounded with water. Imponding has the potential to eliminate weeds, and thereby avoiding rice-weed competition, and help rice farmers to avoid extra costs incurred on early weed removal. Management of water imponding in rice field is one of the most successful methods used by the rice farmers. Williams (1987) [2] in California reported that the level of water in rice field to 5-7 cm prevented the growth of major weeds in rice, but yields were only about 70% compared to herbicide methods. He reported that flooding was the most effective cultural control method of weeds in rice, and flooding to a depth of 10cm had prevented germination of most weed seeds and killed majority of weed seedlings.

Bastar plateau is situated southernmost part of state with cultivating rice in all farming situations like *uplamd, midland* and *lowland*. Mostly midland and low land farming is very unique system of compartmentation, in which water ponding is very common during rainy days but stagnation of water in their compartments provide small aquatic ecosystem of the field restricted many activities and supports many practices. The imponding system creates anaerobic condition leading to grow limited number of weeds up to some extend and reduces floral composition, but it is not known exact timing even not reported by various workers, so, this has targeted under experiment by extending time of water imponding. The substitution of rice crops in low lying region becomes more difficult due to continuous rains and development of perched water table at the surface of the soil for short duration during rice growing season. The present experiment was undertaken to study the effect of different water imponding periods on rice.

Keeping that view in mind of all fact the present experiment was undertaken to find out the effect of different water imponding periods on NPK content in weed.

Materials and Methods

The field experiment was conducted at S.G. College of Agriculture and Research Station, Jagdalpur during the rainy (*Kharif*) seasons of 2017. The normal average annual rainfall of the area is 1400 mm but its distribution is very erratic. Major amount of precipitation occurs between June and September (about 3-4 Months). The soil was sandy loam, low in organic carbon (0.53%), available N (245.24 kg/ha) and available P (7.00 kg/ha) and medium in available K (238.41 kg/ha), EC (ds m^{-1}) 0.30 with acidic (pH 5.80) in reaction. 100 kg N: 60 kg P_2O_5: 40 kg K_2O ha^{-1}. The whole quantity of P and K was applied as basal dressing, while nitrogen was applied in two equal splits at basal and active tillering stages (40 DAT). Transplanting was done on 6^{th} July 2017 with 25 days old seedlings keeping distance of 20x10 cm in each plot of replications and harvesting of rice was done on 18^{th} November 2017. The plot consisted of five treatments *viz.*, 15, 30 and 45 days water imponding 10 days after transplanting, bispyribac sodium 25 g ha^{-1} as post-emergence and without water imponding (Control). The water drained out from the field through drain channels opening to down side of experimental fields, for maintaining water level refilling was also done when water needed. Plant height, number of tillers/m^2, panicle length, grains/panicle, test weight, grain and straw yield and nutrient uptake were recorded from each plot at 10 randomly selected plants. Data on dry matter were recorded on five random places in each plot and plant biomass taken from these places to ensure the increase in biomass production overtime. Weed control efficiency was worked out on the basis of the following formula: WCE (%) = DWC-DWT/ DWC×100, Where, WCE = Weed control efficiency, DWC = Dry matter production of weeds in control plot and DWT = Dry matter production of weeds in treated plot. The cost of cultivation and returns were calculated by taking into account the prevailing cost of inputs and finger millets of output. The weed plant samples were collected and after proper drying, analysis for N, P & K content was done at 60 and 90 DAT.

Results and Discussion

Nitrogen content

The nitrogen content (%) is directly proportionate to dry matter of the plants, as dry matter increases the nitrogen content (%) increases. Significant reduction of nitrogen content in weed was recorded with *Panicum repens* (0.61%), *Brachiaris reptans* (0.60%), *Cyperus difformis* (0.47%), *Eleocharis indica* (0.49%), *Fimbristylis miliacea* (0.48%), *Dopatrium junceum* (0.53%), *Ammania baccifera* (0.52%), and others (0.45%) when water imponding was maintained till 30 days 10 days after transplanting and application of bispyribac-sodium @ 25 g ha^{-1} at 15 DAT and both were at par. The higher degree of nitrogen removal was occupied by the weeds in weedy check plot. The higher content (%) nitrogen was in weedy check due more weed biomass attained by weeds. Ours results confirm with the finding of Meyyappan *et al.* (2016) [4] and Dada *et al.* (2014) [5].

Nitrogen content (%) in grassy, sedges and broad leaved weeds was also significantly varied with species and water imponding at 90 DAT. *Panicum repens* and *Brachiaris reptans* reduced nitrogen content (%) in biomass under influence of 30 days water imponding 10 days after transplanting at 90 DAT and found comparable to the application of bispyribac-sodium @ 25 g ha^{-1} at 15 DAT in case of *Panicum repens*, similarly *Brachiaris reptans* was found higher content of nitrogen with same treatment. Sedge (*Cyperus difformis*, *Eleocharis indica* and *Fimbristylis miliacea*) as well as broad leaveds weeds (*Dopatrium junceum*, *Ammania baccifera,* and *Rotala indica*) remarkably reduced nitrogen removal. when 30 days water imponding 10 days after transplanting which was being at par with bispyribac-sodium @ 25 g ha^{-1} at 15 DAT except *Brachiaris reptans* and *Dopatrium junceum*. This was also due to the nature of weed not managed by water imponding and herbicides. (Talla and Jena, 2014 and Nayak *et al.*, 2014) [6, 7].

Phosphorus content

The phosphorus content (%) at 60 and 90 DAT was significantly affected by weed species recorded under different treatments. The phosphorus content (%) was increased at 90 DAT as compare to 60 DAT in weed flora. The higher content of phosphorus was recorded with weedy check in case of *Panicum repens* (0.38%), *Brachiaria reptans* (0.30%), *Cyprus difformis* (0.25%), *Eleocharis indica* (0.23%), *Fimbristylis miliacea* (0.21%), *Dopatrium junceum* (0.23%), *Ammania baccifera* (0.23%) and *Rotala indica* (0.22%) at 60 DAT which were gradually decreased as weed management treatments imposed and found significant with 30 days water imponding 10 days after transplanting in lowering removal of phosphorus content (%) in respective weeds being statistically comparable to bispyribac- sodim @ 25 g ha^{-1} at 15 DAT. Similar trend was observed with the same weed in removal of phosphorus from soil at 90 DAT except *Dopatrium junceum,* and *Ammania baccifera* which were not found comparable with 30 days water imponding 10 days after transplanting. Water imponding for 30 days reduced growth of weeds leading to lower weed biomass ultimately lowered the phosphorus content in the weeds. Similar finding was advocated by Nayak *et al.* (2014) [7] in phosphorus removal by weeds.

Potassium content

The occurrence of weeds in plots also affected the removal of potassium content from soil and competed with crop in reduction of soil repository. The potassium content (%) was significantly varied with variation of water imponding treatments and lower removal of potassium content (%) from soil was under 30 days water imponding 10 days after transplanting being at par with application of herbicide (bispyribac-sodium @ 25 g ha^{-1} at 15 DAT). The highest content of potassium was removed by weeds in weedy check plot regardless weed categories. This might be a cause because of adequate suppression of weed up to ETL level limited the sharing of potassium by weeds. (Mukherjee *et al.*, 2009 and Mondal *et al*., 2017) [9].

Table 1: Effect of water imponding period on Nitrogen content on weed

Treatment	Nitrogen Content (%) 60 & 90 DAT															
	Grassy weed				Sedge weed						Broad leaved weed					
	Panicum repens		*Brachiaris reptans*		*Cyperus difformis*		*Eleocharis indica*		*Fimbristylis miliacea*		*Dysphrenia indica*		*Ammania baccifera*		*Rotala indica*	
	60 DAT	90 DAT	60 DAT	90 DAT	60 DAT	90 DAT	60 DAT	90 DAT	60 DAT	90 DAT	60 DAT	90 DAT	60 DAT	90 DAT	60 DAT	90 DAT
T_1	0.73	0.85	0.65	0.77	0.55	0.65	0.56	0.67	0.57	0.70	0.62	0.75	0.67	0.79	0.64	0.78
T_2	0.61	0.72	0.60	0.70	0.47	0.58	0.49	0.60	0.48	0.60	0.53	0.68	0.52	0.65	0.45	0.64
T_3	0.72	0.80	0.67	0.78	0.54	0.65	0.55	0.69	0.52	0.64	0.62	0.77	0.59	0.75	0.67	0.79
T_4	0.63	0.74	0.65	0.74	0.53	0.64	0.50	0.62	0.51	0.63	0.61	0.75	0.55	0.68	0.59	0.70
T_5	0.75	0.88	0.79	0.90	0.65	0.75	0.63	0.77	0.64	0.77	0.67	0.81	0.69	0.83	0.72	0.87
S.Em±	0.05	0.06	0.05	0.06	0.04	0.04	0.04	0.04	0.04	0.04	0.05	0.03	0.05	0.05	0.06	0.05
CD (P=0.05)	0.14	0.18	0.17	0.17	0.12	0.12	0.13	0.13	0.13	0.13	0.15	0.11	0.16	0.15	0.19	0.16

Table 2: Effect of water imponding period of Phosphorus content on weed

Treatments	Phosphorus Content (%) 60 & 90 DAT															
	Grassy weed				Sedge weed						Broad leaved weed					
	Panicum repens		*Brachiaris reptans*		*Cyperus difformis*		*Eleocharis indica*		*Fimbristylis miliacea*		*Dysphrenia indica*		*Ammania baccifera*		*Rotala indica*	
	60 DAT	90 DAT	60 DAT	90 DAT	60 DAT	90 DAT	60 DAT	90 DAT	60 DAT	90 DAT	60 DAT	90 DAT	60 DAT	90 DAT	60 DAT	90 DAT
T_1	0.28	0.35	0.27	0.31	0.20	0.26	0.20	0.26	0.20	0.23	0.19	0.27	0.19	0.24	0.17	0.27
T_2	0.25	0.33	0.20	0.28	0.19	0.25	0.18	0.23	0.15	0.21	0.17	0.23	0.15	0.23	0.16	0.26
T_3	0.26	0.34	0.25	0.33	0.22	0.26	0.21	0.25	0.19	0.25	0.21	0.27	0.18	0.27	0.20	0.30
T_4	0.25	0.31	0.24	0.29	0.20	0.26	0.19	0.24	0.17	0.24	0.17	0.26	0.17	0.25	0.16	0.25
T_5	0.38	0.39	0.30	0.35	0.25	0.29	0.23	0.27	0.21	0.27	0.23	0.32	0.23	0.30	0.22	0.31
S.Em±	0.04	0.02	0.03	0.02	0.02	0.01	0.02	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
CD (P=0.05)	0.13	0.07	0.08	0.07	0.05	0.03	0.06	0.04	0.06	0.06	0.07	0.07	0.06	0.07	0.06	0.07

Table 3: Effect of water imponding period of Potassium content on weed

Treatment	Potassium Content (%) 60 & 90 DAT															
	Grassy weed				Sedge weed						Broad leaved weed					
	Panicum repens		*Brachiaris reptans*		*Cyperus difformis*		*Eleocharis indica*		*Fimbristylis miliacea*		*Dysphrenia indica*		*Ammania baccifera*		*Rotala indica*	
	60 DAT	90 DAT	60 DAT	90 DAT	60 DAT	90 DAT	60 DAT	90 DAT	60 DAT	90 DAT	60 DAT	90 DAT	60 DAT	90 DAT	60 DAT	90 DAT
T_1	0.39	0.47	0.51	0.45	0.33	0.39	0.32	0.40	0.34	0.45	0.30	0.44	0.35	0.38	0.35	0.40
T_2	0.35	0.42	0.33	0.42	0.28	0.38	0.24	0.34	0.28	0.39	0.25	0.36	0.26	0.34	0.25	0.36
T_3	0.39	0.45	0.52	0.49	0.34	0.44	0.38	0.44	0.37	0.41	0.28	0.44	0.30	0.40	0.36	0.41
T_4	0.36	0.43	0.40	0.44	0.31	0.41	0.25	0.36	0.29	0.40	0.28	0.42	0.34	0.36	0.30	0.39
T_5	0.40	0.49	0.59	0.51	0.38	0.49	0.39	0.50	0.46	0.52	0.35	0.47	0.36	0.42	0.39	0.50
S.Em±	0.02	0.02	0.09	0.03	0.03	0.03	0.04	0.04	0.05	0.08	0.04	0.05	0.03	0.02	0.04	0.04
CD (P=0.05)	0.06	0.06	0.27	0.08	0.10	0.10	0.13	0.12	0.14	0.25	0.14	0.15	0.08	0.08	0.13	0.11

References

1. IRRI (International Rice Research Institute). 2006. World Rice Statistics. http;//www.irri.org/science/wrs.
2. Williams JF, Managing water for weed control in rice, California agriculture, 1987.
3. Yan YF, Fu1 JD, Lee1 BW. Rice Bran Application under Deep Flooding. Can Control Weed and Increase Grain Yield in Organic Rice Culture. Research articles. J. Crop Sci. Biotech. 2010; 10(2):79-85.
4. Meyyappan M, Ganapathy M, Sriramachandrasekharan, MV, Sujatha S. Influence of Agronomic practices on rice yield and nutrient uptake under SRI. J Rice Research. 2016; 9(2):47-50.
5. Dada OA, Togun AO, Adediran JA, Nwilene FE. Growth, Nutrient Uptake Efficiency and Yield of Upland Rice as Influenced by Two Compost Types in Tropical - Derived Savannah Transition Zone. Agricultural Sciences. 2014; (5):383-393.
6. Talla A, Jena SN. Nutrient composition, uptake by weeds and rice under different crop establishment and weed management practices. Int. J Agri., Envi. & Bio. 2014; 7(4):811-816.
7. Nayak BNS, Khan Md M, Mosha K, Rani PP. Effect of plant population and weed control treatments on weed popullation, npk uptake in direct Wetseeded rice (*Oryza sativa* L.) sown through drum seeder. International Journal of Scientific & Engineering Research. 2014; 5(5):343-351.
8. Mukherjee PK, Sarkar A, Maity SK. Critical Period of Crop-weed Competition in Transplanted and Wet-seeded Kharif Rice (*Oryza sativa* L.) under *Terai* Conditions. Indian J Weed Sci., 2008; 40(3, 4):147-152.
9. Mondal D, Ghosh A, Roy D, Kumar A, Shamurailatpam D, Bera S *et al*. Yield loss assessment of rice (*Oryza Sativa* L.) due to different biotic stresses under system of rice intensification (SRI). Journal of Entomology and Zoology Studies. 2017; 5(4):1974-1980