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WILD RICE BOON FOR PRODUCTION POTENTIAL AT GUJAR TAL ECOTONE BELTS

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ABSTRACT

The present paper deals with an evaluation of the magnitude of changes in biomass, net primary productivity and final grain yield of *Oryza rufipogon* Griff (wild rice or 'Tinni rice') of family Poaceae. It has contributed its peak total biomass value 1571.44 g m^{-2} (October, 2008).The estimated final grain yield was 85 kg per hectare and is a good source of income of local farmers and also provides habitat for rearing of duck birds and migratory birds during winter season.

KEYWORDS : Wild Rice, Ecotone Belts, Biomass, Productivity, Grain Yield

The lake ecosystem is flanked by upland terrestrial habitat. The transition zone between two adjacent plant communities is referred as ecotone (Ambasht, 2008). The land-water ecotone enjoys not only the greater diversity but quite often higher productivity (Ambasht and Ambasht, 2008).

There are number of Tals in district Jaunpur and among these Gujar Tal is the biggest one, about 200 ha and 4.5 m deep. The area of present 'Tal' margin in the lower zone is mostly occupied by self-grown *O. rufipogon*. It provides habitat for domesticated duck birds that visit the area in thousands during the winter season. Earlier, the basic ecological study of this lake was confined to deep water (Verma, 1979).

Therefore, the present investigation has been carried out to understand the ecological attributes of biomass accumulation, net primary productivity pattern and final grain yield.

MATERIALS AND METHODS

This study was carried out on the north western part, 28 km from Jaunpur city and 1.5 km west of Khetasarai town area, at lower lake margins of 'Gujar Tal' ($24^0$6' - 25^0.5'N and 80^0- 82^0E longitude) by selecting a study site (80×125m , 5-8^0 slope, lower zone). The total rainfall during the study period (April, 2008 to March, 2009) was 1346.8, mm out of which about 1295. 4 mm was during the rainy season. Therefore, duration of inundation was also noted. The tillers of wild rice survived during the rainy season (July to September) but it was not possible to collect the plant samples due to inundation.

Standing dry matter was estimated by short term harvest method (Odum, 1960) in which variation was estimated at monthly intervals from April, 2008 to March, 2009 because some of the tillers survived throughout the year. In order to get shoots and roots intact of *O. rufipogon* six monoliths (25×25 cm area up to a depth of 30 cm) were dig out, washed carefully with water in wire cage every month in the selected study site. The samples of wild rice were fractionated into AG (aboveground) and UG (underground). Samples were dried at 80^0C for 48 h in an oven and weighed to find out the value of biomass. It was expressed in gm^{-2}. The differences of biomass value between two consecutive months were used to calculate net production in the period of eight months (Singh and Yadava, 1974). Grain yield was estimated at maturity of the crop. Analysis of variance was applied to the biomass of *O. rufipogon* and standard error was also calculated (Campbell, 1974).

RESULTS AND DISCUSSION

O. rufipogon showed a decreasing trend of biomass after post rainy season period as their tillers also survived during the winter and summer seasons. Its average growth was 0.7 to 1.5 m tall depending on the depth of water. It has peak biomass (1571.44 g m^{-2}) in October, in which the respective contribution of aboveground and underground parts were 1080.34 g m^{-2} and 491.10 g m^{-2}, respectively leading to contribution of AG and UG 68.75 and 31.25 per cent (Table,1). The site significance of variation in biomass of *O. rufipogon* was tested by analysis of variance. The biomass was highly significant at ($p<0.01$) between aboveground and underground, and also among months at study site (Table, 2).

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Table 1 : Monthly Variation in Standing Biomass (gm^{-2}) and Net Primary Productivity (gm^{-2} day^{-1} in Small Parenthesis) of *Oryza rufipogon* at Lower Zone of Gujar Tal Ecotone Belts

Plant Components	Months												
	Apr., 2008	May	Jun.	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan., 2009	Feb.	Mar.	Apr., 2009
AG	114.24 ±11.62 (*)	110.52 ±10.01 (0.12)	235.45 ±14.12 (4.03)	Inundated			1080.34 ±26.16 (*)	898.38 ±14.92 (-6.07)	680.78 ±13.87 (-7.25)	413.49 ±20.39 (-8.62)	250.46 ±16.22 (-5.82)	130.48 ±14.37 (-3.87)	105.74 ±6.73 (-0.82)
UG	68.49 ±9.56 (*)	60.37 ±8.01 (0.26	98.10 ±12.16 (1.22)	Inundated			491.10 ±14.09 (*)	479.58 ±13.69 (0.38)	406.95 ±14.14 (2.42)	208.20 ±14.10 (-6.63)	120.37 ±12.12 (-3.14)	62.37 ±12.80 (1.87)	55.40 ±6.73 (0.23)
Total	182.73 (*)	170.89 (0.38)	333.55 (5.25)	Inundated			1571.44 (*)	1377.96 (-6.45)	1087.73 (-9.67)	621.66 (-15.25)	370.83 (-8.96)	192.35 (-5.75)	161.14 (-1.06)

AG= Aboveground, UG=Underground; ± =Standard Deviation; * Values Were Not Calculated Due to Lack of Previous Months Biomass Values.

Table 2 : ANOVA for biomass (gm^{-2}) of *Oryza rufipogon* Between Above Ground and Underground Across The Months at Study Site

Source of Variation	SOS	df	Mean Square	F
Between AG & UG	34488861.93	1	34488861.93	122.63*
Among months	30542033.32	9	3393559.25	12.07**
Error	23437.73	10		
Total	65054332.98	20		

*Significant at $p < 0.01$, **Significant at $p < 0.01$

The trend of net productivity of *O. rufipogon* was positive in June, i.e. 5.25 g m^{-2} day^{-1} in which the respective contribution of AG and UG was 4.03 and 1.22 g m^{-2} day^{-1}. The trend of productivity could not be observed during the months of July to October as the study site was flooded with water all around. The trend of productivity was negative during the winter and the summer seasons (Table, 1).

Farmers use a very special technique for collection of the grains of *O. rufipogon* growing naturally in abandoned lake margins before maturity of grain in ears. Needy farmers tie a bunch of apical portion of tillers by twisting with 10-20 plant stems together and it indicates the ownership of the crop. On maturity of grains they beat them with the small wooden stick and collect in a basket but some time if the water is more people use earthen tubs or Karaha (Figure 1). The estimated average yield was 85 kg per ha. Mostly poor women play an important role in grain collection and make it source of their livelihood.

Grains of wild rice (*O.rufipogon*) used by local people most prominently in their diets and eaten by ladies on the occasion of fast of Lalahichatt festival mostly in the eastern U.P. People of this area are not able to get proper price of the grains of wild rice (Tinni). There must be some co-operative system for selling their yield with the participation of local people.

Therefore, these biotopes if managed properly may lead to material benefit of mankind (Singh, 2013). Wild rice will raise the GDP of the nation with zero investment

Figure 1 : An Enlarged View of Collection of Seeds of *O. rufipogon* Griff. at Site, in the Lower Zone

and it may also provide good habitat for rearing of duck birds and fish culture, etc. It will be helpful to raise the economy and food nutrition of people of this backward area.

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