

DENSITY AND BIODIVERSITY OF BGA IN RICE FIELDS OF GOA

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INTRODUCTION

Ø Goa is a coastal region with a hot, humid and tropical climate with about 54 thousand hectares of land under rice cultivation, which is the staple food of Goans (Sakshena, 2003).

Ø Rice (*Oryza sativa L*), the staple food of Goans is being cultivated over an area of 54,000 hectares both in Kharif (44,000 ha) and Rabi (10,000 ha).

Ø This cereal crop accounts for 31% of the total cropped area and 86% of the food grain production. It is cultivated on different land types viz Khazan lands (coastal saline lands).

Ø Our investigation was directed towards evaluating the density and diversity of BGA in four different types of rice fields in Goa which are influenced by different environmental conditions.

MATERIALS AND METHODS

- Ø Four sites selected viz. Hinterlands, Coastal area, Khazan lands, Mining area.
- Ø The physicochemical characteristics of the sampling sites were analyzed for EC and pH.
- Ø Collection and identification of BGA from paddy fields in all the sites during Khariff and Rabi season.
- Ø For quantitative analysis the sample was analyzed by lackey's drop method (1938) as mentioned in APHA (1985), The formula used was:-

$$\text{Phytoplankton unit per liter} = \frac{n \times c}{V} \times 1000$$

Where n= number of phytoplanktons counted in 0.1ml. (1 drop of concentrate)

c= total volume of concentrate in ml.

V=total volume of water filtered in liters.

- Ø The data collected for three years of study period was statistically analyzed using PAST statistical package. Shannon (H), Simpson (1-D) and Margalef diversity indices were analyzed.

RESULTS

- Ø The slightly alkaline pH of 7 was recorded in the hinterland paddy fields of Quepem with an EC of 3.5 d sm^{-1} whereas coastal region of Utorda recorded a pH of 6.8 with a moderate EC of 3.0 d sm^{-1} . The other two sampling sites recorded acidic pH in the range of 5 to 6 with a high EC of 7.6 d sm^{-1} in Quelossim khazans and a low EC of 0.5 d sm^{-1} in Velguem mining area fields.
- Ø Density data shows the highest a density of 640cells/ml in khariff season of heterocystous forms in the hinterlands of Quepem in the year 2006-2007 followed by coastal region of Utorda which recorded 540cells/ml and the least were recorded in mining fields 320cells/ml followed by khazan lands with 500cells/ml.
- Ø Rabi season recorded comparatively less than khariff in hinterlands (610 cells/ml) and khazan lands (470 cells/ml) and comparatively more in the remaining two habitats. Overall the data indicates the predominance of heterocystous forms in all the 4 habitats followed by non-heterocystous and unicellular forms (Table 2)

Table 1: Details of physicochemical characteristics of soil and water of the sampling area during study period of 2006-2009.

Location	Soil		Water	
	parameters	EC $\text{dsm}^{-1} \pm \text{SD}$	pH $\pm \text{SD}$	EC $\text{dsm}^{-1} \pm \text{SD}$
Quepem hinterlands		3.5 ± 0.1	7.3 ± 0.2	3.2 ± 0.1
Utorda coastal		3.0 ± 0.2	6.8 ± 0.1	2.8 ± 0.2
Quelossim khazans		7.68 ± 0.1	5.0 ± 0.1	7.5 ± 0.1
Velguem mines		0.5 ± 0.2	5.2 ± 0.2	0.48 ± 0.2
				4.9 ± 0.1

Table 2: Density of BGA at different habitats during the study period 2006-2009.

Group/place		2006-2007 seasons		2007-2008 seasons		2008-2009 seasons	
Quepem Hinterlands		khariff	rabi	khariff	rabi	khariff	rabi
Heterocystous	number/ml	640	610	620	600	510	560
Non-Heterocystous	number/ml	470	400	430	440	440	480
Unicellular	number/ml	480	500	510	480	440	440
Utorda-coastal							
Heterocystous	number/ml	540	560	530	550	600	550
Non-Heterocystous	number/ml	540	540	530	500	530	540
Unicellular	number/ml	440	470	460	500	530	540
Quelossim- Khazans							
Heterocystous	number/ml	500	470	450	460	420	390
Non-Heterocystous	number/ml	430	450	440	440	460	470
Unicellular	number/ml	350	380	360	390	340	400
Velguem mines							
Heterocystous	number/ml	320	340	340	320	350	310
Non-Heterocystous	number/ml	310	290	290	310	340	330
Unicellular	number/ml	260	270	220	290	250	220

Table 3: Comparative diversities of BGA of different habitats.

Year of study	2006-2007						2007-2008						2008-2009					
Season	Khariff			Rabi			Khariff			Rabi			Khariff			Rabi		
Diversity indices	Shannon	Simpson	Margalef	Shannon	Simpson	Margalef	Shannon	Simpson	Margalef	Shannon	Simpson	Margalef	Shannon	Simpson	Margalef	Shannon	Simpson	Margalef
Heterocystous																		
Hinterlands	1.597	0.7949	0.9618	1.608	0.7992	0.973	1.606	0.799	0.9692	1.602	0.7972	0.977	1.601	0.797	1.017	1.604	0.798	0.9937
coastal	1.605	0.7984	1.003	1.601	0.7966	0.9937	1.607	0.799	1.007	1.596	0.7947	0.9982	1.608	0.799	0.977	1.593	0.793	0.9982
khazans	1.604	0.7976	1.022	1.608	0.7995	1.039	1.607	0.799	1.051	1.606	0.7987	1.045	1.608	0.799	1.07	1.605	0.798	1.092
mining	1.607	0.7988	1.154	1.603	0.7976	1.134	1.603	0.798	1.134	1.607	0.7988	1.154	1.601	0.797	1.125	1.602	0.797	1.165
Non-heterocystous																		
Hinterlands	1.606	0.7986	1.039	1.6	0.7962	1.084	1.605	0.798	1.063	1.603	0.7975	1.057	1.606	0.799	1.057	1.608	0.8	1.033
coastal	1.605	0.7984	1.003	1.598	0.7956	1.003	1.605	0.798	1.007	1.607	0.7992	1.022	1.603	0.797	1.007	1.6	0.796	1.003
khazans	1.593	0.7939	1.063	1.602	0.797	1.051	1.606	0.799	1.057	1.6	0.7965	1.057	1.606	0.799	1.045	1.604	0.798	1.039
mining	1.602	0.7971	1.165	1.601	0.7967	1.188	1.601	0.797	1.188	1.597	0.795	1.165	1.608	0.799	1.134	1.607	0.799	1.144
Unicellular																		
Hinterlands	1.606	0.7986	1.033	1.604	0.7976	1.022	1.603	0.797	1.017	1.608	0.7995	1.033	1.606	0.799	1.057	1.606	0.799	1.057
coastal	1.606	0.7986	1.057	1.606	0.7986	1.039	1.606	0.799	1.045	1.607	0.7992	1.022	1.603	0.797	1.007	1.6	0.796	1.003
khazans	1.601	0.7967	1.125	1.607	0.7992	1.1	1.604	0.798	1.116	1.605	0.7982	1.092	1.603	0.798	1.134	1.606	0.799	1.084
mining	1.599	0.7959	1.228	1.592	0.7929	1.214	1.603	0.798	1.294	1.601	0.7967	1.188	1.587	0.79	1.243	1.603	0.798	1.294

CONCLUSION

The present study indicates a moderately rich but variable diversity of BGA in Goan rice fields. It is evident from the results that though the count of heterocystous BGA was the highest in all rice fields but the diversities of all groups are moderately high in all the four habitats. Thus the present investigation throws light on the density and diversities of BGA in Goan rice fields especially with regard to the indigenous species which could help in development of niche specific inocula for Goan rice fields.

Thank you

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