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RESEARCH ARTICLE OPEN ACCESS

TO ESTIMATE THE HERITABILITY OF *MARSILEA MINUTA* IN PURBA BARDDHAMAN

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ABSTRACT

Marsilea minuta is a very common leaf vegetable to the people in west Bengal. The common name in Bengali of this pteridophytic plant is "Sushni sak". It grows in tropical humid climate in all classes of soil round the year except the winter months. It has good medicinal potentiality as well as nutrient components. Though it grows in marshy fallow land in neglected conditions, but it could gain valuable leafy vegetable considering its nutrition quality as well as palatability. But indeed it is not freshly available in the market round the year. Because of its adaptability and life cycle pattern. It has been found that the sporophytic phase starts in the month of February – March and runs still month of August – September, particularly, in tropical humid agro-climatic location environment. Considering all these views in mind we undertake a venture for its adaptability, growth and development in the location of Burdwan Raj College garden. The local germplasm of this plant species was procured from Rajgram, Bankura, during April – May, 2018 and grown in the garden of the college. Different major chemicals viz – N, P, K were considered during its plantation in the nursery.Treatments viz – 10% N, 10% P, 10% K, 10% NPK, 10% NP, 10% NK, 10% PK, Control were applied as foliar spray during its cropping period.Various phenotypic characters such as leavesnode^{-1}, total number of leaves, petiole length, fresh weight of leaves, dry weight of leaves etc. were observed and all the data were recorded to measure its heritability in this particular location. The aims and objectives of this experiment were to study the growth, behaviour and heritability values in this particular location.

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INTRODUCTION

Pteridophyte is a the group of vascular plants consists of leaves, roots and sometimes true stems. Tree ferns are consisting of full trunks. Pteridophytes are also known as cryptogams though their means of reproduction is hidden. As this group of cryptogams have vascular system, they are called vascular-cryptogams. Pteridophytic plants are very common in their occurrence and are uncommon from the aspects of consumption. Pteridophytes reproduce by spore formation. *Marsilea minuta* is a pteridophytic plant and is grow in all soil conditions of tropical humid climates. The species of *Marsilea* can be found from all part of the world such as Australia, tropical Africa, India atc. *Marsilea* is very common pteridophyte and is aquatic in habitat, grows in shallow pond, marshy fallow water body. *Marsilea minuta* is an amphibious species and grows in water logged soil, shallow ponds either submerged or partially out of water. Nine species of *Marsilea* have been reported from all over India (Gupta and Bhardwaja, 1957-1958). Among them *Marsilea minuta* is widely distributed. In Bengali *Marsilea minuta* is known as "Sushni sak" are consumed by people as a good leaf vegetable. It has also good medicinal potentiality as well as nutrient components. But, indeed, it is not freshly available in the market. According to Ramachandran (2007), *Marsilea minuta* is consumed by various tribal communities like Pulaiyars. Malawar, Mudhuvars etc. of Anamailais hills, Western Ghats, Coimbatore district etc. Formation of sporocarp is the characteristics feature of the genus *Marsilea*. The sporophytic phase of *Marsilea* is starts in the month of February – March and runs still month of August – September.

MATERIALS AND METHODS

Materials: Fresh *Marsilea minuta* plant, Urea as the source of nitrogen (N), Super-phosphateas the source of Phospohrus (P)

and muriate of potash as the source of potassium (K), distilled water, plastic pot, weigh balance, spray bottle etc.

METHODS

Fresh Marsilea minuta plants were procured from Darkeswar river bank of Bankura district. Eight different plastic pots fill with soil and organic manure were taken and labelled with permanent marker as N, P, K, NPK, NP, NK, PK and Control. Eight different Marsilea minuta nodes along with 2 – 4 leaves were cut out and properly planted in the plastic pots. Regular poured the in the plastic pots twice in a day. 10% treatments of various major chemicals were prepared and made foliar spray to the Marsilea plants at 15 days of interval. Various metrical characters such as petiole length (cm), leaves node$^{-1,}$ fresh weight of leaves, dry weight of leaves etc. were observed and recorded carefully. The data were critically analysed to check the heritability of the plants.

RESULTS

The metrical characters viz petiole length (cm), leaves node$^{-1,}$ fresh weight of leaves, dry weight of leaves were observed from the replicated randomised blocked designed field having 4 replications of the experimental crop. The mean of five observations were noted in each treatment in the respective two-way table 1 to 16 in each duration of plant canopy.

Table 1. Two way table of petiole length of *Marsilea minuta*after 15 days

SV	df	SS	MSS	F
Replication	3	33.8875	11.2958	2.526822
Treatment	7	58.959	8.37071	1.872492
Error	21	93.8775	4.470357	

Table 2. Two way table of petiole length of *Marsilea minuta* after 30 days

SV	df	SS	MSS	F
Replication	3	41.68594	13.8953	1.75128
Treatment	7	144.6949	20.67031	2.60516
Error	21	166.6216	7.93436	

Table Two way table of petiole length of *Marsilea minuta* after 45 days

SV	df	SS	MSS	F
Replication	3	219.5159375	73.1719791667	33.8934290062
Treatment	7	57.9946875	8.2849553571	3.8376103724
Error	21	45.3365625	2.1588839286	

Table 4. Two way table of petiole length of *Marsilea minuta* after 60 days

SV	df	SS	MSS	F
Replication	3	240.4734375	80.1578125	46.9837183268
Treatment	7	51.7371875	7.3910267857	4.3321781098
Error	27	46.0640625	1.7060763889	

Table 5. Two way table of Leaves node^{-1} of *Marsilea minuta* after 15 days

SV	df	SS	MSS	F
Replication	3	9.0	3.0	13.2684
Treatment	7	1.75	0.25	1.1057
Error	21	4.75	0.2261	

Table 6. Two way table of Leaves node^{-1} of *Marsilea minuta* after 30 days

SV	df	SS	MSS	F
Replication	3	0.75	0.25	0.3442625
Treatment	7	7.5	1.07142	1.475399
Error	21	15.25	0.726190	

Table 7. Two way table of Leaves node^{-1} of *Marsilea minuta* after 45 days

SV	df	SS	MSS	F
Replication	3	3.25	1.0833333333	1.596491228
Treatment	7	8	1.1428571429	1.6842105263
Error	21	14.25	0.6785714286	

Table 8. Two way table of Leaves node^{-1} of *Marsilea minuta* after 60 days

SV	df	SS	MSS	F
Replication	3	3.25	1.0833333333	1.2465753425
Treatment	7	11	1.5714285714	1.8082191781
Error	21	18.25	0.869047619	

Table 9. Two way table of fresh weight of *Marsilea minuta* after 15 days

SV	df	SS	MSS	F
Replication	3	1.4652	0.4884094	6.4914
Treatment	7	0.005886	0.00084085	0.011175
Error	21	1.580067	0.07523841	

Table 10. Two way table of fresh weight of *Marsilea minuta* after 30 days

SV	df	SS	MSS	F
Replication	3	0.034346	0.0114486	2.344103
Treatment	7	4.536702	0.64810	132.69
Error	21	0.102576	0.004884	

Table 11. Two way table of fresh weight of *Marsilea minuta* after 45 days

SV	df	SS	MSS	F
Replication	3	0.0005117187	0.0001705729	0.2261628454
Treatment	7	4.6612367187	0.6658909598	882.9057497771
Error	21	0.0158382813	0.0007542039	

Table 12. Two way table of fresh weightof *Marsilea minuta* after 60 days

SV	df	SS	MSS	F
Replication	3	0.0004872187	0.0001624062	0.0022977646160114
Treatment	7	1.0114432001	0.1444918857285714	2.044308298130739
Error	21	1.4842817999	0.0706800857095238	

Table 13. Two way table of dry weightof *Marsilea minuta* after 15 days

SV	df	SS	MSS	F
Replication	3	0.000229830	0.00007661	0.08590
Treatment	7	0.05279872	0.0754267	84.58201
Error	21	0.01872692	0.0008917581	

Table 14. Two way table of dry weight of *Marsilea minuta* after 30 days

SV	df	SS	MSS	F
Replication	3	0.004529	0.001596	0.0046093
Treatment	7	0.140308	0.020044	34.6867
Error	21	0.004045	0.0001926	

Table 15. Two way table of dry weightof *Marsilea minuta* after 45 days

SV	df	SS	MSS	F
Replication	3	0.003098	0.0010326667	0.0002989383
Treatment	7	0.20137	0.0287671429	0.0083275676
Error	21	72.543392	3.4544472381	

Table 16. Two way table of dry weightof *Marsilea minuta* after 45 days

SV	df	SS	MSS	F
Replication	3	0.0023662187	0.0007887396	-0.1844852534
Treatment	7	0.0998087187	0.0142583884	-3.3350200712
Error	21	-0.08978241553	-0.0042753531	

Table 17. Components of co-variances in *Marsilea minuta* after 15 days

Component of covariences [After 15 days]						
Components	Petiole length VS Node leaves^{-1}	Petiole length VS Fresh weight	Petiole length VS Dry weight	Node leaves^{-1} VS Fresh weight	Node leaves^{-1} VS Dry weight	Fresh weight VS Dry weight
Δg1g2	39.362	25.14	17.708	6.882	1.209	0.789
Δe1e2	-42.550	-27.236	-4.825	-11.042	-1.940	-1.248
Δp1p2	-3.188	-2.096	12.883	-4.16	-0.731	0.459

Table 18. Components of co-variances in *Marsilea minuta* after 30 days

Component of covariences [After 30 days]						
Components	Petiole length VS Node leaves^{-1}	Petiole length VS Fresh weight	Petiole length VS Dry weight	Node leaves^{-1} VS Fresh weight	Node leaves^{-1} VS Dry weight	Fresh weight VS Dry weight
Δg1g2	72.59	81.787	16.789	11.955	2.451	2.781
Δe1e2	-116.418	-130.070	-26.731	-19.223	-3.927	-4.424
Δp1p2	-43.828	-48.283	-9.945	-7.278	-1.476	-1.643

Table 19. Components of co-variances in *Marsilea minuta* after 45 days

Component of covariences [After 45 days]						
Components	Petiole length VS Node leaves^{-1}	Petiole length VS Fresh weight	Petiole length VS Dry weight	Node leaves^{-1} VS Fresh weight	Node leaves^{-1} VS Dry weight	Fresh weight VS Dry weight
Δg1g2	88.445	87.570	17.875	12.949	2.632	2.679
Δe1e2	-141.061	-140.409	-28.560	-20.292	-4.250	-4.243
Δp1p2	-52.616	-52.839	-10.685	-7.98	-1.618	-1.564

Table 20. Components of co-variances in *Marsilea minuta* after 60 days

Component of covariences [After 60 days]						
Components	Petiole length VS Node leaves^{-1}	Petiole length VS Fresh weight	Petiole length VS Dry weight	Node leaves^{-1} VS Fresh weight	Node leaves^{-1} VS Dry weight	Fresh weight VS Dry weight
Δg1g2	92.661	91.714	16.898	13.068	2.422	2.391
Δe1e2	-148.180	-146.727	-27.038	-20.852	-3.850	-3.815
Δp1p2	-55.519	-55.013	-10.14	-7.784	-1.428	-1.424

The ANCOVA table of 4 different duration i.e. 15days, 30days, 45days, 60days were calculated and cited in the table-17, 18, 19, 20 following Singh Chaudhary (2014). Different matrix, genotypic, phenotypic and environmental correlation values have been calculated and cited below:

DISCUSSION

From the diagonal matrix table in case of genotype correlations it has been distinctly evident that the growth and development of the experimental plant was found to be improved gradually but in case of phenotypic and environmental correlations most of the cases were found to be negative values. The trend of growth increment was found to be negative increment in most of the cases. But, indeed, higher the growth parameter increment is positively variable to higher the time consumptionfor the productivity of the leaf of the crop.

Comment: The plastic pots where the plants were grown were kept in random spot selection. Some of the pots were kept in dark condition and some were kept in profuse light condition. The uniformity of growth was observed which were not in a regular positive increment manner. So the pattern of matrix value were very much zigzag.

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