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## OPTIMIZING RICE GROWTH AND YIELD WITH "GRINOPHYLL" FOLIAR APPLICATION

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### ABSTRACT

The present investigation entitled "Optimizing Rice Growth and Yield with "Grinophyll" Foliar Application was carried out during kharif season of the year 2021 and 2022 on the field of ASPEE, Agricultural Research and Development Foundation, Tansa farm, At - Nare, Taluka - Wada, District - Palghar, Maharashtra, India. The experiment was laid out in Randomized Block Design. The three treatments (Control, Grinophyll @ 4 ml, and Grinophyll @ 6 ml per 15 liters of water) were replicated twice times on four varieties of rice namely Dandi, Gurjari, Jaya, and GAR-13. The plant population per meter square (34.5 & 34), plant height (105.9 & 113.5 cm), number of tillers per plant (13.7 & 13), number of panicles per plant (13 & 14.8), number of panicles per square meter (442 & 463.4) and length of panicle (25.8 & 26.2 cm) was recorded maximum in 2021 and for 2022 with application of Grinophyll @ 6 ml / 15 liters of water on rice cv. "GAR-13". However, the highest number of seeds per panicle (203.5 & 209.4), test weight (34.1 & 35.6 g), grain yield (68.6 & 61.2 q/ha) and straw yield (101.7 & 97.1 q/ha) was found in both 2021 and 2022 year respectively, with application of Grinophyll @ 6 ml / 15 liters of water. The data clearly revealed that, the yield obtained with treatment Grinophyll @ 6 ml / 15 liters of water on rice cv. "GAR 13" was significantly higher than all other treatments and also for growth parameters.

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## INTRODUCTION

Rice is deeply engraved in the rich tradition and culture of India. It is the most important human food crop in the world. In addition to this it is also known as backbone of livelihood for millions of rural households and plays vital role in the country's food security. It is critical to global food security and to the welfare of around 800 million impoverished people around the world. The total area under rice cultivation in India is 2.75 million hectares, with an annual production of 105.2 million tonnes and a productivity of 2 62 kg ha<sup>-1</sup>. The area under rice cultivation in Maharashtra, India is 1.56 million ha, with an annual production of about 3.06 million tonnes and a productivity of 1963 kg ha<sup>-1</sup>. The country has managed to maintain the balance between rice supply and demand by applying improved production techniques, including the use of high-yielding varieties/hybrids, expanding irrigation capacities and the use of various fertilizers. As the population continues to increase, the demand for rice is expected to increase further in the future. Therefore, rice production must also increase.

As the area under rice cultivation continues to decrease, there is a need to further improve rice productivity. To begin with limitation for the productivity of country's rice system the major limitations are inefficient use of fertilizers, the scarcity of water and labor, climatic change, inflation and rising socio-economics. In addition to these impacts occurs on the labor migration, urbanization, youth, barren land, and concerns about environmental pollution and climate change due to weather conditions. For overcoming from this alarming situation rice production should meet the needs of a growing population is to increase rice productivity per unit area through more efficient use of resources. To improve rice productivity in India, high-yielding varieties capable of tolerating abiotic and abiotic stress should be explored for climate change. Rice crop production technologies that increase factor productivity, reduce farming costs, increase profits, and efficient use of inputs should be explored. Keeping in view the above facts, the present study was designed with the objective to study the effect of foliar application of Grinophyll on growth and yield attributes of four transplanted rice varieties. Four different varieties seedlings were prepared as per recommended practices local KVK and University.

## MATERIALS AND METHODS

The experiment was conducted at ASPEE, Agricultural Research and Development Foundation Farm, Village - Nare, Taluka - Wada, District- Palghar, Maharashtra, India in kharif season during 2021 and 2022 in Randomized Block Design (RBD) with 2 replications (Panse and Sukhatme, 1967). The experimental site was located at 19.650 N latitudes and 73.130 E longitudes with average annual rainfall of 3600 mm. Four varieties comprising 3 levels of Grinophyll were tested in crop production. Gross plot size and net plot size were 3.30 X 2.85 m and 3.15 X 2.80 m; respectively. There were 12 treatment combinations comprising viz., V1F1, V2F1, V3F1, V4F1, V1F2, V2F2, V3F2, V4F2, V1F3, V2F3, V3F3 and V4F3. However, V1, V2, V3 and V4 were indicates Dandi, Gujrati, Jaya and GAR-13 varieties; respectively. F1, F2 and F3 were indicates 0 ml, 4 ml and 6 ml Grinophyll per 15 liters of water applied; respectively. The recommended dose of fertilizer (120 kg N: 50 kg P<sub>2</sub>O<sub>5</sub>: 50 kg K<sub>2</sub>O: 6 kg Zn) was applied. The recommended dose of NPK was applied in the form of urea (46-0-0), single super phosphate (0-16-0), and the muriate of potash (0-0-60). Every variety was transplanted at the spacing of 20 X 15 cm. Recommended management practices and plant protection measures were taken. The data obtained during the study were subjected to statistical analysis using the WASP (Software developed by ICAR Research complex Goa).

number of tillers per plant (13.7), number of panicles per plant (13), number of panicles per square meter (442) and length of panicle (25.8 cm) was found maximum with application of Grinophyll @ 6 ml / 15 liters of water on rice cv. "GAR-13". However, in year 2022 the plant population per meter square (34), plant height (113.5 cm), number of tillers per plant (13), number of panicles per plant (14.8), number of panicles per square meter (463.4) and length of panicle (26.2 cm) was found maximum with application of Grinophyll @ 6 ml / 15 liters of water on rice cv. "GAR-13". The slightly variation was observed in collected data of the year 2021 and 2022. The non significant variation was observed in the plant population during both years. Grinophyll help to increase chlorophyll concentration in the plant leading to higher degree of photosynthesis. This makes crops lush Green. It helps to enhancing rice production (Matsuzakiet al., 1980).

**Yield parameters :** According to the data given in the table 2, the highest number of seeds per panicle (203.5), test weight (34.1 g), grain yield (68.6 q/ha) and straw yield (101.7 q/ha) was found with foliar application of Grinophyll @ 6 ml / 15 liters of water in the year 2021. Similarly, for the year 2022 the maximum number of seeds per panicle (209.4), test weight (35.6 g), grain yield (61.2 q/ha) and straw yield (97.1 q/ha) was found with application of Grinophyll @ 6 ml / 15 liters of water. It is evident that the number of seeds and test weight of seeds were increased in subsequent year from 203.5 to

**Table 1. Effect of application of "Grinophyll" on growth of different rice varieties**

Treatment	Plant population /sq.m		Plant height (cm)		No. of tillers/plant		No. of days to 50% flowering		No. of panicles/plant		No. of panicles/sq.m		Length of panicle (cm)	
	2021	2022	2021	2022	2021	2022	2021	2022	2021	2022	2021	2022	2021	2022
Year	2021	2022	2021	2022	2021	2022	2021	2022	2021	2022	2021	2022	2021	2022
T <sub>1</sub>	31.5	31	99.4	98.8	9.2	7.5	74.8	92.5	9.1	10.6	300.3	313.6	22.2	22.5
T <sub>2</sub>	31.5	31.5	100.4	101.3	9.4	9.5	72.5	88.5	9.2	10.7	276	288.3	23	23.3
T <sub>3</sub>	32	32	101.3	103.2	10.2	9.7	72	88	9.4	10.9	291.4	304.8	23.3	23.7
T <sub>4</sub>	32	32	101.5	103.8	10.8	10.7	76.5	84	9.9	11.4	336.6	352.3	23.7	24.1
T <sub>5</sub>	32.5	32.5	101.7	105.5	11.2	11.1	72.5	81.5	10.3	11.8	339.9	356.1	24.2	24.6
T <sub>6</sub>	33	33	103.1	106.9	11.5	11.4	73.3	79.5	10.9	12.5	370.6	388.2	24.5	24.8
T <sub>7</sub>	33	33	103.2	107	11.6	11.6	75.5	78.5	11.2	12.8	380.8	399.1	24.6	24.9
T <sub>8</sub>	33.5	33	103.7	107.5	11.6	11.5	79	76.5	11.5	13.2	379.5	398	24.8	25.2
T <sub>9</sub>	34	34	104.1	108.4	11.7	11.8	73.8	73.5	11.6	13.2	382.8	401.2	25	25.4
T <sub>10</sub>	34	34	105.2	109.4	12.3	12.3	69.8	72	11.7	13.2	397.8	417.4	25.1	25.5
T <sub>11</sub>	34	34	105.5	110.5	12.9	12.6	76.8	71	12.5	14.3	412.5	431.4	25.3	25.7
T <sub>12</sub>	34.5	34	105.9	113.5	13.7	13	77	68	13	14.8	442	463.4	25.8	26.2
S.Em. (±)	1.14	1.14	0.31	2.26	0.3	0.7	2.27	2.44	0.28	0.25	9.03	11.75	0.26	0.26
CD	NS	NS	0.98	7.02	0.94	2.19	NS	7.6	0.88	0.79	28.1	36.56	0.79	0.81

**Table 2. Effect of Foliar application of "Grinophyll" on Yield of different rice varieties**

Treatment	No. of seeds/ panicle		Test weight (1000 grain weight)		Grain yield (q/ha)		Straw yield (q/ha)	
	2021	2022	2021	2022	2021	2022	2021	2022
Year	2021	2022	2021	2022	2021	2022	2021	2022
T <sub>1</sub>	117.8	120.9	17.7	18.5	39	40.9	57.9	62.3
T <sub>2</sub>	122	125.3	19.4	20.1	47	49.2	69.6	74.9
T <sub>3</sub>	123.1	126.3	20.4	21.2	48.6	51	72.1	77.6
T <sub>4</sub>	124	127.2	23	23.9	52.9	55.4	78.4	84.4
T <sub>5</sub>	125.2	128.6	25.7	26.8	56	56.6	83	89.4
T <sub>6</sub>	131	134.9	29.1	30.4	57.7	56.7	85.5	92
T <sub>7</sub>	141	145.6	29.7	31.1	57.3	57.2	84.8	91.3
T <sub>8</sub>	145.7	150.4	32.1	33.5	58.2	58.4	86.3	91.8
T <sub>9</sub>	158.4	164.1	32.3	33.7	58.9	58.8	87.3	92.2
T <sub>10</sub>	171.1	177.1	32.5	33.9	63.8	59.5	94.5	93.1
T <sub>11</sub>	184.7	191.3	33	34.4	64.9	60.3	96.3	95.2
T <sub>12</sub>	203.5	209.4	34.1	35.6	68.6	61.2	101.7	97.1
S.Em. (±)	11.05	12.68	1.2	1.49	4.77	4.99	7.08	7.62
CD	34.39	39.48	3.72	4.63	14.86	15.54	22.02	23.72

## RESULTS AND DISCUSSION

The results in table 1 indicated that different treatments induced marked variations in number of panicles per plant, number of panicles per square meter, length of panicle, seeds per panicle, test weight, grain and straw yields.

**Plant growth parameters:** The data persist in the table 1 showed the lot of variation in given parameters. As per the table in year 2021 plant population per meter square (34.5), plant height (105.9 cm),

209.4 and from 34.1 gm to 35.6 gm. Nevertheless, the grain yield and straw yield negatively affected in next year 2022. The grain yield declined from 68.6 to 61.2 q/ha and straw yield was decreased from 101.7 to 97.1 q/ha. The data clearly revealed that, the yield obtained with treatment Grinophyll @ 6 ml / 15 liters of water) on rice cv. "GAR 13" was significantly higher than all other treatments and also for growth parameters. Yield attributes viz., seeds per panicle, test weight and grain yield per panicle were significantly affected by Grinophyll in rice for two subsequent years. Grinophyll application increased the number of spike-lets per panicle of rice. This might be due to increased synthesis of carbohydrates and that might have

increased the sink size and capacity (JunfeiGu *et al.*, 2017). The contribution of carbohydrates from photosynthetic activity for longer period might have resulted in efficient translocation of food material into the sink (grain) thereby increased the number of filled grains percentage. Grain yield per panicle of rice also increased by Grinophyll than controls (Raj and Tripathi, 1999). Grinophyll is a unique concentrated herbal formulation which stimulates the process of chlorophyll formation in leaves. This product is able to form chlorophyll in any plant irrespective of scarcity of water and other climatic variations. This product may be used separately or with other products to improve chlorophyll content in leaf. It relieves plant from stress conditions as well don't have any limitations as in the case of chemical fertilizers (Verma *et al.*, 2004). The grain weight increased with the increase in the carbohydrate production in source. It helps to increase transportation of carbohydrate from source to sink (Arif *et al.*, 2012 and Dekhane *et al.*, 2022).

## CONCLUSION

The experiment revealed that, the yield obtained with treatment Grinophyll @ 6 ml / 15 liters of water) on rice cv. "GAR 13" was significantly higher than all other treatments and also for growth parameters. Yield attributes viz., seeds per panicle, test weight and grain yield per panicle were significantly affected by Grinophyll in rice for two subsequent years.

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