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AN Gawate
P.G. Students, Agronomy Section, College of Agriculture, Nagpur, Maharashtra, India

SN Potkile
Associate Professor, Agronomy Section, College of Agriculture, Nagpur, Maharashtra, India

BS Naidu
P.G. Students, Agronomy Section, College of Agriculture, Nagpur, Maharashtra, India

VS Kirnapure
P.G. Students, Agronomy Section, College of Agriculture, Nagpur, Maharashtra, India

SA Ambhore
P.G. Students, Agronomy Section, College of Agriculture, Nagpur, Maharashtra, India

Corresponding Author:
AN Gawate
P.G. Students, Agronomy Section, College of Agriculture, Nagpur, Maharashtra, India

Effect of seed sowing and nutrient management on growth and yield in drilled paddy (*Oryza sativa*)

AN Gawate, SN Potkile, BS Naidu, VS Kirnapure and SA Ambhore

Abstract
A field experiment was carried out to study the "Effect of seed sowing and nutrient management in drilled paddy (*Oryza sativa*)" during kharif 2018-19 at Research Farm of College of Agriculture, Nagpur. The experiment was laid out in split plot design with four spacing and three treatments of fertilizer doses. Growth attributing characters such as total number of tillers plant^{-1}, number of effective tillers plant^{-1}, functional leaves plant^{-1}, dry matter accumulation plant^{-1} was significantly influenced due to drilling soaked seed at 30 cm and application of 125:62.5:62.5 kg NPK ha^{-1}. The yield attributing character *viz.* number of panicle plant^{-1}, length of panicle, number of grains panicle^{-1} and weight of grains panicle^{-1} recorded maximum in Drilling soaked seed at 30 cm and grain yield, straw yield, biological yield (q ha^{-1}) and harvest index were significantly highest at drilling of soaked seed at 20 cm and application of 125:62.5:62.5 kg NPK ha^{-1}.

Keywords: Rice, seed soaking, fertilizer, seed soaking, nutrient management

Introduction
Rice (*Oryza sativa* L.) is an important daily diet as a cereal grain of the world's human population belong to family *Poaceae* and rank second highest in cereal grain production. It is a staple food of 90 million Asians. Rice contribute 16% to the gross value added (GVA) of agriculture and 3.5% of gross domestic product (GDP) (Dept. of Agri. and Co-op. GOI. 2016). At the same time, it provides about 11.5 million farmers as a source of income and employment (Upland rice production). Total geographical area under rice in India is 44.10 million ha and annual production of 112.90 million tones with productivity of 2.6 tons ha^{-1} in 2018-2019 (Anonymous, 2018) [1]. Hence a significant portion of the world's agricultural research has been focused on rice.

One of the major reasons of low productivity of rice is low maintenance of optimum plant population and nutrient management in rice production in achieving high production but also providing sustainability in crop production. Improper spacing reduced yield up to 20-30%. The optimum spacing ensures the plant to grow in their both aerial and underground parts through efficient utilization of solar radiation and nutrients (Khan *et al.*, 2005; Mohaddesi *et al*., 2011) [7, 8]. Nutrient management helps to restore and sustain soil fertility and crop productivity. It may also help to check the emerging deficiency of nutrient. It bring economy and efficiency in fertilizer use and favourably affect the physical, chemical and biological environment of soil, also helps to produce grain having high nutritional quality.

Materials and Methods
A field experiment was carried out to study the effect of seed sowing and nutrient management in drilled paddy (*Oryza sativa*) at Agronomy Section Farm, College of Agriculture, Nagpur during *kharif* season of 2018-19. The soil of experimental plot was vertisol, fairly uniform and leveled which is low in available nitrogen, medium in available phosphorus and organic carbon, very high in available potassium and slightly alkaline in reaction. The experiment was laid out in split plot design with 12 treatments with four spacing *viz.* D_1 (drilling dry seed at 20 cm), D_2 (drilling dry seed at 30 cm), D_3 (drilling soaked seed at 20 cm) and D_4 (drilling soaked seed at 30 cm), and three treatments of fertilizer doses *viz.* F_1 (75:37.5:37.5 kg NPK ha^{-1}), F_2 (100:50:50 kg NPK ha^{-1}) and F_3 (125:62.5:62.5 kg NPK ha^{-1}) replicated thrice.

The seed of paddy variety Sye-1 was used for present investigation. Before sowing the seeds were treated with 3% brine solution (300 g salt in the 10 lit of water). The healthy seeds which sunk at the bottom were dried in shadow for 24 hours and that seeds were treated with Thiram (3g Kg^{-1} seed) used for sowing.

Result and Discussion

Growth Attributes

From the data given in Table no. 1 revealed that growth attributing characters such as plant height, total number of tillers plant^{-1}, number of effective tillers plant^{-1}, functional leaves plant^{-1}, dry matter accumulation plant^{-1} was significantly influenced by different spacing and fertilizer treatments. Maximum plant height was obtained with Drilling soaked seed at 20 cm (D_3) was found significantly superior over drilling dry seed at 30 cm (D_2) and drilling soaked seed at 30 cm (D_4), but was found at par with drilling dry seed at 20 cm (D_1). It is also revealed that total number of tillers plant^{-1} (17.06), number of effective tillers plant^{-1} (12.78), functional leaves plant^{-1} (20.56), dry matter accumulation plant^{-1} (28.06 g)was significantly influenced due to drilling soaked seed at 30 cm which was significantly superior over drilling dry or soaked seed at 20 cm. This might be due to due to advantage of space and less competition for nutrition under wider spacing. It is also due to higher availability of nutrients, light and moisture to the plants leading to vigorous growth, and less competition for nutrients, light and moisture among the plants due to less plant population. These results are in conformity with the findings of Basavaraja *et al.* (2010) [2], Jadhav *et al.* (2014) [6] and Jadeyegowda *et al.* (2019) [5].

Among the fertilizer doses, Application of 125:62.5:62.5 kg NPK ha^{-1} produced significantly higher total number of tillers plant^{-1} (16.79), number of effective tillers plant^{-1} (12.83), functional leaves plant^{-1} (19.88), dry matter accumulation plant^{-1} (26.80 g) found significantly superior over 75:37.7:37.7 kg NPK ha^{-1}, but at par with 100:50:50 kg NPK ha^{-1}. It might be due to more availability and translocation of nutrients by growing plants which boosted the plant leading to vigorous vegetative growth of plant. The results are in accordance with those reported by Sahu *et al*. (2015) and Roy *et al.* (2018).

Yield attributes and yield

The data given in Table no. 2 revealed that drilling soaked seed at 30 cm recorded maximum number of panicle plant^{-1} (12.78), length of panicle (21.58), number of grains panicle^{-1} (133.89) and weight of grains panicle^{-1} (2.18 g) and were significantly superior over drilling dry or soaked seed 20 cm, however, it was at par with drilling dry seed at 30 cm. This might be due to lesser competition among the plant for space, nutrient, moisture and air and better availability of space and interception of solar radiation which might have allowed a luxurious growth of the plant. Similar results were also reported by Basavaraja *et al.* (2010) [2] and Jadeyegowda *et al.* (2019) [5].

Application of 125:62.5:62.5 kg NPK ha^{-1} recorded maximum number of panicles plant^{-1} (12.83), length of panicle (20.93), number of grains panicle^{-1} (130.04) and weight of grains panicle^{-1} (2.10 g) and was significantly superior over application of 75:37.5:37.5 kg NPK ha^{-1}, however, it was at par with application of 100:50:50 kg NPK ha^{-1}. This might be attributed due to increased availability of nutrients resulting in improved metabolic activity, increased flowering and seed setting. These results are close in conformity with Shrinivas and Krishnamurthy *et al.* (2017) [13] and Bhat *et al.* (2018) [3].

The grain yield (31.11 q ha^{-1}), straw yield (46.67 q ha^{-1}), biological yield (77.78 q ha^{-1}) and harvest index (40.35) were significantly highest at drilling of soaked seed at 20 cm over drilling dry or soaked seed at 30 cm, but found at par with drilling dry seed at 20 cm. This might be due to more plant population in closer spacing than wider spacing. Similar results were also observed by Saoji *et al.* (2007) [12] and Borkar *et al*. (2008) [4].

Among fertilizer doses application of 125:62.5:62.5 kg NPK ha^{-1} produced highest grain yield (29.72 q ha^{-1}), straw yield (44.58 q ha^{-1}), biological yield (74.31 q ha^{-1}) and harvest index (40.52) were significantly superior over application of 75:37.5:37.5 kg NPK ha^{-1}. Increased yield of rice under higher dose of fertilizer is due to significant increase in various yield attributes *viz*. number of panicle plant^{-1}, number of grains panicle^{-1} and grain yield. This is confirmation with the results of Shrinivas and Krishnamurthy *et al.* (2017) [13] and Bhat *et al.* (2018) [3].

Interaction effect of seed sowing (spacing) and different fertilizer doses on yield and yield attributes was found to be non-significant.

Table 1: Growth and growth attributes of rice influenced by various treatments

Sr. No.	Treatments	Plant height cm	Total number of tillers plant^{-1}	Number of effective tillers plant^{-1}	Functional leaves plant^{-1}	Dry matter accumulation plant^{-1} g
A	**Seed sowing (Spacing)**					
	D_1 – Drilling dry seed at 20 cm	88.89	12.50	8.39	14.89	24.09
	D_2 –Drilling dry seed at 30 cm	82.20	14.92	11.59	18.17	27.10
	D_3 – Drilling soaked seed at 20 cm	91.67	13.11	9.56	15.33	25.62
	D_4 – Drilling soaked seed at 30 cm	85.33	17.06	12.78	20.56	28.06
	S.E. (m) ±	0.94	0.86	0.64	0.75	0.28
	C.D. at 5%	3.25	2.96	2.22	0.62	0.98
B	**Fertilizer doses**					
	F_1 – 75:37.5:37.5	81.50	12.23	8.73	14.25	25.68
	F_2 – 100:50:50	87.42	14.17	10.17	17.58	26.17
	F_3 – 125:62.5:62.5	92.15	16.79	12.83	19.88	26.80
	S.E. (m) ±	1.62	0.93	0.93	1.04	0.21
	C.D. at	4.8	2.97	2.79	3.12	0.64
C	**Interaction**					
	S.E. (m) ±	3.2	1.86	1.86	2.08	0.42
	C.D. at 5%	NS	NS	NS	NS	NS
	G. M.	87.02	14.39	10.57	17.23	22.07

Table 2: Yield attributes and yield of rice as influenced by various treatments

Sr. No.	Treatments	No. of panicles plant^{-1}	Length of panicle	Number of grains panicle^{-1}	Wt. of grains panicle^{-1} g	Grain yield q ha^{-1}	Straw yield q ha^{-1}	Biological yield q ha^{-1}	Harvest index
A	**Seed sowing (Spacing)**								
	D_1 – Drilling dry seed at 20 cm	8.39	19.51	110.11	1.94	28.70	43.05	71.76	40.09
	D_2 –Drilling dry seed at 30 cm	11.59	21.00	125.17	2.08	24.44	36.67	61.12	39.78
	D_3 – Drilling soaked seed at 20 cm	9.56	20.58	121.22	2.00	31.11	46.67	77.78	40.35
	D_4 – Drilling soaked seed at 30 cm	12.78	21.58	133.89	2.18	25.55	38.33	63.89	40.04
	S.E. (m) ±	0.64	0.41	3.00	0.03	0.83	1.10	2.08	-
	C.D. at 5%	2.22	NS	10.39	0.11	2.88	3.81	7.20	-
B	**Fertilizer doses**								
	F_1 – 75:37.5:37.5	8.73	20.57	114.67	1.99	24.03	37.25	60.07	40.23
	F_2 – 100:50:50	10.17	20.50	123.08	2.06	28.58	42.83	71.53	40.32
	F_3 – 125:62.5:62.5	12.83	20.93	130.04	2.10	29.72	44.58	74.31	40.52
	S.E. (m) ±	0.93	0.17	2.66	0.01	0.73	1.14	1.83	-
	C.D. at	2.79	NS	7.99	0.05	2.19	3.44	5.49	-
C	**Interaction**								
	S.E. (m) ±	1.86	0.35	5.33	0.03	1.46	2.29	3.66	-
	C.D. at 5%	NS	NS	NS	NS	NS	NS	NS	NS
	G. M.	10.57	20.66	122.59	2.47	27.44	41.34	68.64	40.05

Conclusion

Drilling soaked or dry seed at 30 cm and application of 100:50:50kg NPK ha^{-1} recorded significant increase in all growth attributing characters *viz*. total number of tillers plant^{-1}, number of effective tillers plant^{-1}, functional leaves plant^{-1}, dry matter accumulation plant^{-1} (g) except plant height and yield attributing character *viz*. number of panicle plant^{-1}, length of panicle, number of grains panicle^{-1} and weight of grains panicle^{-1}(g). Significantly higher grain, straw, biological yield (q ha^{-1}) and harvest index was recorded with drilling soaked seed at 20 cm and application of 100:50:50 kg NPK ha^{-1}.

Reference

1. Anonymous. Annual report, International Rice Research Institution, Philippines, 2018.
2. Basavraja MK, Murali K, Siddaram YM, Ramesha H, Yogeshappa, Prakash H. Effect of spacing and genotypes on growth and yield of aerobic rice. Inter. J Agric. Sci. 2010; 6(2):485-487.
3. Bhat MA, Hussain A, Ganai MA, Jehangir IA, Teli NA. Effect of different crop establishment method and nutrient management practices on yield of rice under Kashmir valley condition. J Crop & Weed. 2018; 14(1):30-34.
4. Borkar LS, Khawale VS, Raut PB, Patil TS, Kolte HS. Studies on spacing and nitrogen management under system of rice intensification (SRI). J Soils & Crops. 2008; 18(2):438-441.
5. Jadeyegowda M, Bandi AG, Reddy VC, Kalyanmurthy KN. Effect of varieties and planting geometry on the yield performance of rice under aerobic system of cultivation. Inter. J Curr. Microbiol. App. Sci. 2019; 8(1):2284-2288.
6. Jadhav KT, Nayak SK, Khazi GS, Ambhore NU. Effect of seed rate and different spacing on rice grain yield under aerobic situation (*Oryza Sativa*). Inter. J Tropic. Agric. 2014; 33(3):2289-2292.
7. Khan MB, Yasir TA, Aman M. Growth and yield comparison of different genotypes planted at different row spacing. Inter. J Agric. Biol. 2005; 7:515-517.
8. Mohadessi A, Abbasian A, Bakhshipour S, Aminpanah H. Effect of different levels of nitrogen and plant spacing on yield, yield components and physiological indices in high yield rice. Amer-Eur. J Agric Environ. 2011; 10:893-900.
9. Murthy P, Prasad SR, Siddaraju R, Lakshmi J. Influence of varieties and spacing on growth, seed yield and quality of rice under aerobic condition. Mysore J Agric. Sci. 2011; 45(3):521-527.
10. Roy AM, Sarkar AR, Paul. Effect of age of seedlings at staggered transplanting and nutrient management on yield performance of aeromatic fine rice (cv BRRI dhan 38). SAARC J. Agric. 2018; 16(1):49-59.
11. Sahu YK, Chaubey AK, Mishra VN, Rajput AS, Bajpai RK. Effect of integrated nutrient management on growth and yield of rice (*Oryza sativa* L.) in inceptisol. Plant Archives. 2015; 15(2):983-986.
12. Saoji BV, Patil MJ, Moon MK. Response of rice hybrid to spacing and number of seedlings hill^{-1}. J Soils & Crops. 2007; 17(1):178-180.
13. Shrinivas S, Krishnamurthy N. Response of nutrient management practices under rice establishment methods. Mysore J Agric Sci. 2017; 51(2):414-419.