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Short Communication

Effect of Seedling Age and Spacing on Seed Yield and its Quality in Paddy cv. Mahamaya

P.K. CHANDRAKAR, A. KUMAR AND N. K. RASTOGI

Department of Plant Breeding and Genetics, Indira Gandhi Agricultural University, Raipur 492 006

Age of seedling and spacing at the time of transplanting are the important factors for uniform establishment of rice, which directly influence the seed quality and yield. Mahamaya is one of .the most promising variety of paddy and covers about 30 per cent area under rice cultivation in Chhattisgarh and Madhya Pradesh due to its good tillering capacity with long bold seeds, resistance to gall midge, tolerance to blast, sheath rot, brown spot and bacterial leaf blight. Quality seeds play a crucial role in realizing the full genetic potential of variety as well as benefits of other agricultural inputs. However, little information is available on the seed production practices of high yielding variety Mahamaya. To fulfill the requirement of graded seed by maximizing seed productivity an attempt was made to optimize proper age of seedling and level of spacing for quality seed production programme of paddy cv. Mahamaya.

Experiment was conducted on clay loam soil at NSP farm, Indira Gandhi Agricultural University, Raipur during *Kharif* 2004. The cultivar Mahamaya was used for this experiment. The experimental plots of 3.0 x 5.4m were laid out in split plot design using three replications. Various age of seedling were allotted in main plots, while level of spacings into sub plots. The seedlings of four different ages *i.e.* 21,28, 35 and 42 days with three levels of spacings *viz.*, 10 x 15cm, 15 x 15cm and 20 x 15cm, were transplanted in puddled conditions on 23rd July, 2004. The nutrients (N:P:K) were applied @ 120:50:30 kg ha^{-1} as urea, super phosphate and murate of potash. The crop was raised with all the recommended package of practices for growing seed crop of paddy.

Yield attributes were recorded at the time of harvesting and the seed yield is reported at 12 per cent moisture content. The 1000-seed weight were counted in seed counter and weighed. Seeds were germinated between towel papers in seed germinator at 25°C. The observations were recorded on 14th day according to ISTA [1], which included the germination percentage and total length of seedling. Seedling vigour index was calculated by multiplying germination per cent with total length of seedling [2]. The per cent recovery was obtained by using 2.70 mm (top) and 1.60 mm (bottom) oblong size of sieves in Agrosaw seed grader machine. Correlations between graded seed weight and seedling characteristics were worked out [3].

The yield attributing traits *viz.*, number of productive tillers/plant were reduced significantly in 28, 35 and 42 days old seedlings in comparison to 21 days old seedlings and similar trend was observed in length of panicle, number of seeds per plant and test weight (Table 1). The maximum graded seed yield was obtained from 21 days old seedling which was more than 28,35 and 42 days old seedling, respectively. Higher seed yield may be attributed to significant improvement in tillers/ plant, seeds per plant, length of panicle and test weight. Similarly, higher seed yield from younger seedling also reported by earlier workers due to significant improvement in number of tillers plant^{-1} [4, 5, 6, 7]; seeds plant^{-1} [8,9]; panicle length [8,10]; test weight [7]. Since, the medium duration varieties possess maximum tillering stage within

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Table 1. Effect of seedling age and spacing on seed yield, its attributes and quality parameters

Characters	Seedling age (days) at transplanting					Spacing (cms)			
	21	28	35	42	CD(P=0.05)	10x15	15x15	20x15	CD(P=0.05)
Days to 50% flowering	93.33	96.55	102.99	105.88	1.66	99.99	98.91	100.16	1.30
Productive tillers/plant	11.19	9.68	8.68	8.01	0.78	8.40	9.29	10.61	1.20
Plant height (cm)	114.62	113.96	113.90	112.22	5.25	112.39	114.36	114.27	6.09
Panicle length (cm)	24.68	23.56	23.23	22.55	0.89	23.34	23.39	23.78	0.69
Seeds per plant	1531.80	1348.44	1218.91	1099.44	328.72	1156.02	1265.25	1477.66	238.02
Test weight (g)	29.78	28.84	28.43	28.34	0.55	28.02	28.66	29.92	0.66
Paddy length (mm)	8.82	8.74	8.68	8.65	0.05	8.66	8.71	8.80	0.06
Paddy breadth (mm)	2.70	2.68	2.63	2.60	0.02	2.64	2.65	2.67	0.03
L:B ratio	3.26	3.27	3.30	3.33	0.03	3.28	3.29	3.30	0.04
Graded seed yield (q/ha)	61.98	59.17	53.13	50.42	4.10	54.07	55.82	58.61	2.03
Seed recovery (%)	88.40	86.94	83.42	82.50	2.43	79.66	85.22	90.77	3.14
Germination (%)	93.67	90.22	89.11	85.33	2.44	88.24	89.33	91.16	2.10
Vigour index*	3091.90	2224.49	2152.55	1865.54	969.70	2192.32	2310.38	2498.18	344.12

*Germination x seedling length

40-45 days of sowing, so transplanting during this period led to maximum yield depression.

Significant effects of seedling age were also noticed for .paddy length, paddy breadth, L:B ratio, seed recovery percentage and germination percentage. Paddy length of 8.82 mm was observed in seedling transplanted after 21 days of sowing, which was significantly more as compared to 28, 35 and 42 days old seedlings. Similar results were also reported by Singh *et al.* [11] for paddy length; Singh *et al.* [12] for paddy breadth; Singh *et al.* [6] for seed recovery per cent and germination per cent. The bold seed having higher paddy length and breadth in younger seedlings might have produced healthy seeds. Seedling transplanted at the age of 21 days also produced the highest seed recovery (88.40%) may be due to well developed seeds related indirectly to seed weight and ultimately showing good effects on recovery percentage of sized seeds. On the other hand, the decreasing trend was observed with the decrease in age of seedling. The highest L:B ratio was registered in highest age (45 days) of seedling. The breadth of paddy increased marginally, which caused L:B ratio to decrease with decrease in age of seedling. However, Singh *et al.* [12] reported maximum value for L:B ratio with younger age of seedling. Vigour index of younger seedlings (21 and 28 days old) had also shown significant increase over 35 and 42 days old seedlings. Chopra *et al.* [13] and Rahman *et al.* [8] also reported similar findings.

Similarly, wider spacing (20 x 15 cm) also shown significant increase in the yield and yield attributing traits in comparison to medium (15 x 15 cm) and narrow (10x10 cm) spacing (Table 1). Wider spacing had shown significant increase in number of productive tillers plant^{-1}, test weight, paddy length, graded seed yield (q/ha) and seed recovery per cent over medium and narrow spacings. Similar results were also reported by Krishnan *et al.* [14], Verma *et al.* [15] and Chandrakar *et al.* [16] for tillers plant^{-1}; Chandrakar *et al.* [16] and Kanna Babu *et al.* [17] for seed recovery per cent; Raju *et al.* [4] and Geethadevi *et al.* [18] for seed yield. Whereas, panicle length, seeds plant^{-1}, paddy breadth, germination percentage and vigour index were found at par with wider over moderate and narrow spacing. Chandrakar *et al.* [16] reported significant increment for panicle length, germination per cent and vigour index at wider spacing over medium and narrow spacing. Superiority for above traits at wider spacing might be due to less competition between neighbouring plants for various resources.

Significant effects of interaction between age of seedling and spacing were noticed for number of productive tillers/plant, panicle length, test weight, graded seed yield (q/ha) and seed recovery per cent (Table 2). The best treatment combination was recorded in younger age of seedling with wider spacing. Raju *et al.* [4] also reported significant increase in test weight with younger age of seedling at wider spacing. This may be due to efficient use of nutrients by younger age of seedlings (21 days old) at wider spacing (20 x 15 cm) in establishment of crop. While, characters like days to 50 per cent flowering, plant height, panicle length, paddy breadth, L:B ratio, germination per cent and vigour index did not reveal any significant result with interaction of age of seedling and spacing.

It can be inferred from the above findings that 21 days old seedling at wider spacing (20 x 15 cm) produced maximum seed yield and it also had highest seed recovery per cent, germination per cent and vigour index which are the pre-requisites for a good crop stand. Therefore, this treatment combination could be regarded as ideal for quality seed production programme of paddy cv. Mahamaya.

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Table 2. Effect of interaction of seedling age and spacing on seed yield, its attributes and quality parameters of paddy cv. Mahamaya

Interactions of age of seedling with spacings	Characteristics											
	Days to 50% flowering	Plant height (cm)	Productive tillers/ plant	Panicle length (cm)	Test weight (g)	Paddy length (mm)	Paddy breadth (mm)	L:B ratio	Graded seed yield (q/ha)	Seed recovery (%)	Germination (%)	Vigour index
A_1 S_1	93.66	112.94	10.36	24.57	29.01	8.76	2.69	3.25	59.98	82.64	92.00	2876.52
S_2	93.00	114.58	11.13	24.31	29.21	8.80	2.70	3.26	62.05	89.36	93.67	3068.69
S_3	93.33	116.36	12.07	25.18	31.33	8.90	2.72	3.27	63.93	93.18	95.33	3330.11
A_2 S_1	96.33	111.85	7.73	23.68	27.85	8.70	2.66	3.26	57.68	82.26	89.33	2138.83
S_2	95.66	115.62	9.93	23.44	28.42	8.72	2.67	3.26	58.28	88.43	89.33	2147.88
S_3	97.66	114.42	11.37	23.58	30.27	8.81	2.69	3.27	61.54	90.14	92.00	2386.76
A_3 S_1	103.66	110.84	8.80	23.23	27.81	8.59	2 61	3.29	49.90	78.29	87.33	1980.83
S_2	101.66	115.15	8.43	22.83	28.22	8.69	2.63	3.30	54.34	82.98	89.00	2165.65
S_3	103.66	115.72	9.40	23.63	29.27	8.77	2.65	3.31	55.13	89.01	91.00	2311.24
A_4 S_1	106.33	113.94	6.73	21.90	27.42	8.60	2.60	3.31	48.75	76.66	84.33	1773.10
S_2	105.33	112.12	7.67	23.01	28.79	8.64	2.60	3.32	48.63	80.11	85.33	1859.32
S_3	106.00	110.60	9.62	22.75	28.81	8.70	2.61	3.34	53.87	90.74	86.33	1964.22
CD (5%): Two S at same level of A	1.29	6.00	1.18	0.68	0.65	0.06	0.03	0.04	2.03	3.10	2.12	339.10
CD (5%): Two A at same level of S	1.76	6.95	1.26	0.94	0.75	0.07	0.03	0.04	3.67	3.46	2.75	811.19

*Germination x Seedling length.

A_1 = 21 days old seedling; A_2 = 28 days old seedling; A_3 = 35 days old seedling; A_4 = 42 days old seedling; S_1 = 10 x 15cm; S_2 = 15 x 15cm; S_3 = 15 x 15cm

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