

Short Communication

Study on seed production of *Kharif* onion under lateritic belt of eastern India

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Onion (*Allium cepa*, Alliaceae, 2n=16) is a biennial crop for the purpose of seed production. Commonly, bulbs are produced from seed in one season, and bulbs are replanted to produce seed in the second season. The reasons for lower productivity of onion in India could be attributed to the limited availability of quality seed. Onion seed yield is highly dependent on genotype, locality, season and method of seed production (Brewster, 1994). The reproductive response of onion plants was markedly affected by photothermal conditions (Branca and Ruggeri, 1994). Proper vernalization temperature of mother bulb stimulate early flowering and produces a heavier yield of seeds (Jones and Mann, 1963). Seed production in India is erratic due to varying climatic factors (Singh *et al.*, 1997). *Kharif* onion production is getting momentum in West Bengal; however, the onion growers of this state heavily depend on the other region of India for seed supply, especially for *kharif* onion. The red and laterite zone of West Bengal is relatively drier region and mostly experiences long rain free period during spring-summer months. The present study was therefore, designed with the objectives to study the feasibility of *kharif* onion seed production and to find out suitable *kharif* onion cultivar(s) for seed yield in red and laterite zone of West Bengal.

The present investigation was conducted at Horticulture Farm, Institute of Agriculture, Sriniketan during 2013-14. Five *kharif* onion cultivars (Agrifound Dark Red, Arka Kalyan, Arka Niketan, Indam Marshal and Red Stone) were taken for this study. The experiment was laid out in randomized block design with four replications. Six weeks old nursery grown seedlings were transplanted on 30th September, 2013 and allowed to flower to get seed. Seed was harvested on 20th April, 2014. In each

plot, ten plants were randomly selected and tagged leaving the border rows for taking data on scape length and diameter, umbels per plant, umbel diameter, flowers per umbel, seeds per umbel, seed weight per umbel and seed yield per plant. After harvest, 1000 seed weight, % seed germination, seedling length and seed vigour were observed in laboratory of the department.

Scape length and diameter were influenced under different cultivars. Maximum scape length (96.0cm) was recorded in Indam Marshal and Agrifound Dark Red (91.2cm) along with maximum scape diameter (20.6mm) in Indam Marshal and Agrifound Dark Red (18.3mm). Inherent genetic character might be responsible for difference in scape length in these five cultivars. Variation in scape length in different cultivars has also reported by Kimani *et al.* (1994), Garay and Gomez (1996) and Mohanty (2000). Cultivars significantly differed in number of umbels per plant and maximum number of umbels per plant was recorded in Indam Marshal (3.3) which was statistically *par* with Agrifound Dark Red (3.1). Umbel diameter is an important seed yield component of onion (Mohanty *et al.*, 2000; Sidhu *et al.*, 1996). Primary and secondary umbels diameter was positively correlated with seed yield of onion (Mathankar *et al.*, 1990). Umbel diameter significantly differed among five studied cultivars. The maximum umbel diameter was obtained in Indam Marshal (77.9mm) followed by Agrifound Dark Red (73.4mm), whereas lowest umbel diameter noted in Arka Niketan (66.6mm). These findings are similar to Garay and Gomez (1996) and Mohanty *et al.* (2000). Significant variation was noticed among the cultivars for number of flowers per umbel. The maximum number of flowers per umbel was obtained in Indam Marshal (965.0) followed by Agrifound Dark Red (927.3) with grand mean of 736.9. Mohanty *et al.* (2000) also reported variation in flowers per umbel.

The number of seeds per umbel was related to seed yield of onion (Mathankar *et al.*, 1990). The effect of cultivars on number of seed per umbel was significant. The maximum number of seed per umbel was found in

Table 1. Effect of cultivars on growth and yield parameter of onion seed production

Treatment	Scape length (cm)	Scape diameter (mm)	No of umbels/plant	Umbel dia. (mm)	No of flowers/umbel	No. of seeds/umbel	Seed weight/umbel (g)	Seed yield/plant (g)
ADR	91.2 ^a	18.3 ^b	3.1 ^a	73.4 ^b	927.3 ^a	1014.0 ^b	3.9 ^a	10.1 ^b
Arka Kalyan	84.4 ^b	17.1 ^c	2.3 ^b	69.0 ^c	643.3 ^b	738.0 ^c	2.4 ^{bc}	6.6 ^c
Arka Niketan	79.4 ^b	16.9 ^c	1.8 ^c	66.6 ^c	477.3 ^c	610.6 ^d	2.2 ^c	5.7 ^d
Indam Marshal	96.0 ^a	20.6 ^a	3.3 ^a	77.9 ^a	965.0 ^a	1116.5 ^a	3.7 ^a	11.3 ^a
Red Stone	80.2 ^b	16.9 ^c	2.2 ^b	68.9 ^c	671.5 ^b	771.8 ^c	2.6 ^b	6.9 ^c
Grand Mean	86.2	18.0	2.5	71.1	736.9	850.2	3.0	8.1
S.E.(±)	2.4	0.4	0.2	1.7	32.8	46.6	0.1	0.3
C.D ($p=0.05$)	5.2	1.0	0.3	3.7	71.4	101.6	0.3	0.6

Table 2. Effect of cultivars on seed quality parameter of onion

Treatment	Test weight (g)	Seed germination (%)	Seedling length (cm)	Seed vigour
ADR	3.7 ^a	92.3 ^a	7.2 ^b	663.3 ^b
Arka Kalyan	3.3 ^a	82.5 ^b	6.6 ^{bc}	562.4 ^c
Arka Niketan	2.4 ^b	72.0 ^d	6.1 ^c	468.8 ^d
Indam Marshal	4.2 ^a	96.0 ^a	8.7 ^a	835.6 ^a
Red Stone	3.1 ^a	77.5 ^c	7.0 ^{bc}	554.8 ^{cd}
Grand Mean	3.3	84.1	7.1	617.0
S.E. (±)	0.5	2.2	0.4	39.5
C.D. ($p=0.05$)	1.1	4.8	0.9	86.1

cultivar in Indam Marshal (1116.5), followed by Agrifound dark Red (1014.0) and lowest number of seed per umbel was obtained in cultivar Arka Niketan (610.6). This finding is similar to Islam *et al.* (2011). Significant variation was noticed among the cultivars for seed weight per umbel. The cultivar Agrifound Dark Red (3.9 g) recorded highest seed weight per umbel and closely followed by Indam Marshal (3.7g). Effect of cultivar on seed yield per plant was statistically significant. The highest seed yield per plant was recorded in Indam Marshal (11.3g), followed by Agrifound Dark Red (10.1g). On the other hand, minimum seed yield per plant was observed in Arka Niketan (5.7g). varietal differences in onion seed yield was also reported by Mathankar *et al.* (1990), Patil *et al.* (1990), Garay and Gomez (1996), Sidhu *et al.* (1996) and Mohanty *et al.* (2001). The mean seed yield per plant was noted 8.1g.

Indam Marshal (4.2g), followed by Agrifound Dark Red (3.7g) recorded maximum weight for 1000 seeds. The lowest value of this trait was noted in the cultivar Arka Niketan (2.4g). Varietal difference for this trait was also reported by Mathankar *et al.* (1990), Garay and Gomez (1996) and Mohanty *et al.* (2000). A germination test determines the maximum germination potential, or viability of the seed. The germination rate of a particular seed lot is a key indicator as to how that seed will perform in the field. Germination rate is expressed in percent. Highest seed germination (96%) was registered in cultivar Indam Marshal followed by Agrifound Dark Red (92.3%). Lowest germination percentage of 72.0%

was noted in Arka Niketan. The maximum seedling length was obtained in Indam Marshal (8.7cm). Agrifound Dark Red, Red Stone and Arka Kalyan showed statistically similar seedling length next to Indam Marshal. Seed vigour reflects the ability of seeds to produce normal seedlings under less than optimum or adverse growing conditions similar to those which may occur in the field. Data revealed that the cultivars differed significantly among each other on seed vigour. The highest seed vigour was obtained in cultivar Indam Marshal (835.6), followed by Agrifound Dark Red (663.3).

It may be concluded that onion cultivars vary in their influence on seed yield and quality parameters. Indam Marshal followed by Agrifound Dark Red produced the highest seed yield per plant and also excels other cultivars in seed quality parameters. Good quality *kharif* onion seed production is highly possible following seed to seed method in red and laterite zone of West Bengal.

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