

Effect of Transplanting Dates and Spacing on Seed Yield and Quality of Cauliflower (*Brassica oleracea* var. *botrytis* L.) cv. Pusa Early Synthetic

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Early cauliflower is one of the remunerative crops in terai zone of West Bengal. The yield of the crop is generally poor due to non-availability of quality seeds of recommended early varieties. Pusa Early Synthetic, a high yielding cultivar of cauliflower is successfully grown as early crop in terai zone. Although information on agro - techniques for curd production is partially available for this zone but literature is meager on quality seed production. The optimum transplanting date and spacing for seed production of early cauliflower cultivars varies with a change in agro - climatic condition. Keeping in view of the importance of early cauliflower in terai zone, an experiment was undertaken to standardize the optimum transplanting date and spacing for obtaining maximum seed yield and quality of cultivar Pusa Early Synthetic of cauliflower under terai zone of West Bengal.

The experiment was carried out during 2002-2003 at the experimental farm of Uttar Banga Krishi Viswavidyalaya, Pundibari (26°19'86"N latitude and 89°23, 53" E longitude and 43 m above msl). The soil was well drained sandy loam with a pH of 5.83. The organic carbon was 1.14%, total N 0.01%, available P₂O₅ and K₂O were 22.64 kg/ha and 128.25 kg/ha respectively. The treatment schedule comprised of four dates of transplanting (1st September, 15th September, 1st October and 15th October 2002) and four spacing (45cm x 45cm, 60cm x 45cm, 60cm x 60cm, 90cm x 60cm). Thus, sixteen treatment combinations were laid out in split plot design with three replications, keeping

transplanting dates in main plot and spacing in sub plots. The plot size was 3.6m x 3.6m. Thirty days old seedlings of Pusa Early Synthetic were transplanted in all the experimental plots. The crops received a uniform dose of FYM at the rate of 20 t/ha and fertilizers at the rate of 100 kg nitrogen, 80 kg phosphate, 80 kg potash and 20 kg borax per hectare [1]. FYM was applied at four weeks before transplanting of seedling while full dose of phosphate, potash, borax and one third of nitrogen were applied at the time of transplanting of seedlings and remaining nitrogen was top dressed in two equal split doses at curd initiation and flowering stage. Recommended cultural and plant protection measures were followed equally in all the plots as and when required. For seed production, seed to seed method was followed as per the recommendation of Choudhury and Ramphal [2]. The seed crop was harvested at 70 per cent pod maturity. The observations were recorded on ten randomly selected plants from each plot on twelve different growth and seed characters (Table 1). The data was analysed statistically as suggested by Panse and Sukhatme [3].

The results indicated that the seed yield attributes and seed yield of the cultivar Pusa Early Synthetic were significantly influenced by different transplanting dates (Table 1). Seed plot transplanted on 15th September 2002 recorded the maximum curd weight (384.17gm), curd diameter (22.38cm) and curd length (15.86 cm) and these attributes declined gradually in each successive delay of transplanting

Table 1. Effect of different transplanting dates and spacing on growth and seed yield of early cauliflower cv. Pusa Early Synthetic

Treatments	Days to curd initiation	Curd diameter (cm)	Curd length (cm)	Curd weight (gm)	Days to stalk initiation	Number of stalk/plant	Number of siliquae/plant	Number of seed/siliqua	Seed yield/plant (gm)	Seed yield/ha(q)	1000-seed weight (gm)	Seed germination (%)
Transplanting dates												
1 st September (D ₁)	55.45	18.64	14.33	350.50	65.36	17.84	414.00	10.28	14.73	3.86	3.4	84(9.16)
15 th September (D ₂)	52.38	22.38	15.86	384.17	56.22	21.77	454.00	11.57	19.37	5.02	3.5	86(9.27)
1 st October (D ₃)	46.09	21.73	14.91	364.67	54.09	19.30	422.00	10.26	18.09	4.64	3.5	85(9.22)
15 th October (D ₄)	44.97	19.90	14.93	308.08	51.43	15.08	415.00	8.03	12.63	3.22	3.3	84(9.16)
SE.m±	0.65	0.37	0.25	5.64	0.68	0.42	5.76	0.25	0.92	0.32	0.02	-
CD(P=0.05)	2.24	1.28	0.86	19.52	2.35	1.45	19.92	0.86	3.18	0.91	NS	NS
Spacing												
45cm x 45cm(S ₁)	49.31	19.63	14.04	345.33	55.10	16.78	433.00	10.24	12.08	4.12	3.3	86(9.27)
60cm x 45cm(S ₂)	50.11	20.94	15.43	355.92	56.81	18.20	467.00	10.00	16.06	5.28	3.4	85(9.22)
60cm x 60cm(S ₃)	49.59	21.02	14.45	374.91	56.55	19.74	408.00	9.91	17.46	4.96	3.3	85(9.22)
90cm x 60cm(S ₄)	49.89	21.05	15.21	386.25	55.98	21.71	362.00	9.99	19.37	3.61	3.3	84(9.16)
SEm±	0.65	0.53	0.29	5.45	0.92	0.67	5.38	0.44	0.86	0.27	0.01	-
CD (P=0.05)	N.S.	N.S.	0.85	15.96	N.S.	1.96	15.70	N.S.	2.51	0.78	N.S.	N.S.

* Figures in the parenthesis are square root transformed values.

Table 2. Return cost ratio of transplanting dates and spacing on seed production of early cauliflower cv. Pusa Early Synthetic

Treatments	Seed yield (q/ha)	Gross return (Rs/ha)*	Cost of cultivation (Rs/ha)	Return cost ratio
D ₁ S ₁	3.49	157050	121437	1.29
D ₁ S ₂	4.65	209250	118968	1.76
D ₁ S ₃	4.31	193950	117481	1.65
D ₁ S ₄	2.98	134100	115196	1.16
D ₂ S ₁	4.65	209250	113358	1.85
D ₂ S ₂	5.81	261450	111262	2.35
D ₂ S ₃	5.49	247050	109351	2.26
D ₂ S ₄	4.14	186300	107622	1.73
D ₃ S ₁	4.27	192150	108287	1.77
D ₃ S ₂	5.23	235350	106728	2.21
D ₃ S ₃	5.11	229950	105404	2.18
D ₃ S ₄	3.76	169200	104208	1.62
D ₄ S ₁	2.85	128250	105646	1.21
D ₄ S ₂	4.01	180450	104708	1.72
D ₄ S ₃	3.69	166050	104084	1.59
D ₄ S ₄	2.34	105300	103688	1.02
CD (P=0.05)	0.16	-	-	-

*The sale rate of Pusa Early Synthetic seed was Rs. 450/- per kg.

dates. As the early varieties of cauliflower are sensitive to temperature variation, the delayed transplanted crop may be transformed into reproductive phase without completing their vegetative growth. Similar findings were observed by Mishra [4] and Gautam *et al.* [5]. Again, the favourable temperature might have enhanced the expression of yield attributes of 15th September 2002 planting to produce higher number of siliquae/plant (454) and number of seeds/siliqua (11.57) and thus finally resulted in an increased seed yield of 19.37 gm/plant and 5.02 q/ha respectively compared to other transplanting dates. Like date of transplanting, plant spacing significantly influenced the curd length, curd weight and seed yield (Table 1). Maximum curd weight (386.25gm) was observed at 90cm x 60 cm (S₁) plant spacing. It may be due to the fact that wider spacing might have provided less competition between plants for light, air and available nutrients. Maximum seed yield (5.28q/ha) obtained with 60cm x 45cm (S₂) plant spacing was significantly higher than other spacing which came out as the optimum plant population/plot to utilize the available resources efficiently. The interaction effect between transplanting dates and spacing was significant for seed yield (Table 2). It was observed that 15th September transplanting and 60cm x 45cm spacing (D₂S₂) produced the maximum seed yield (5.81q/ha), being significantly higher than other treatment combinations. This combination also

recorded the highest gross return (Rs 261450/-) and return cost ratio (2.35).

The study concludes that higher seed yield and economic return from the seed crop of early cauliflower cv. Pusa Early Synthetic can be achieved by transplanting the seedlings on 15th September at 60cm x 45cm plant spacing in terai zone of West Bengal.

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