

Effect of sowing time and crop geometry on growth and seed yield of dill (*Anethum sowa* L.)

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Abstract

A field experiment was carried out with an objective to find out the optimum sowing time and crop geometry in dill for realising higher yield and benefit. Fifteen treatment combinations comprising of five dates of sowing viz., 1st October, 15th October, 30th October, 15th November and 30th November in main plots and three crop geometry viz., 40 cm x 10 cm, 50 cm x 10 cm and 60 cm x 10 cm spacing in sub plots were taken in split plot design with three replications. The results revealed that sowing of dill on 15th October exhibited significantly higher plant height and number of branches per plant at all the growth stages with maximum number of umbels per plant (60.15), umbellates /umbel (44.10) and seeds /umbellate (57.18). The maximum seed weight (4.89 gm), seed yield (1631.75 kg /ha), net returns (Rs. 94222/ha) with highest benefit: cost ratio (5.36) was recorded in the same treatment. Significantly higher plant height at all the growth stages, yield attributes, seed yield (908.57 kg /ha), net returns (Rs. 43600 /ha) and BCR (2.83) were obtained with sowing of dill at 40 cm x 10 cm spacing over wider spacing. Therefore, sowing of dill on 15th October at 40 cm X 10 cm spacing was found most suitable for realising higher growth, seed yield, net returns and BCR.

Key words : Dill, sowing time, crop geometry, growth, seed yield.

Introduction

Dill (*Anethum sowa* L) is a minor seed spice crop mainly grown during *Rabi* season for spices and medicinal uses. It is considered to be native to the Mediterranean West Asia and is one of the oldest cultivated seed spices from ancient times. Initially dill was used as one of the herbs for flavouring in dynastic Egypt and for flavouring and medicine by the Greeks and Romans. In India it is widely cultivated with the name of sowa in the states of Rajasthan, Gujarat, J & K, Uttar Pradesh, Orissa, Madhya Pradesh and Punjab. In Rajasthan dill producing districts are Chittorgarh, Jhalawar, Udaipur, Kota and Bundi. In India, the area covered under dill cultivation is 0.06 lakh ha with the production of 0.04 lakh tons. Dill seeds are used, both whole and ground, as a condiment in soups, salads, processed meats, sausages. The green herb is used as a flavorings agent in various preparations. Dill stems and blossom heads are used for dill picking and for flavouring soups. Grounds seed is an ingredient for seasoning various food materials. The growth and development of crop need proper spacing and a particular set of climatic condition which is influenced by sowing time of the crop. The proper crop geometry and date of sowing influence crop germination, establishment as well as growth and development of the crop. Very meagre information are available on optimum date of sowing and crop geometry in dill. Therefore, the investigation was conducted with an objective to find out optimum sowing

date and crop geometry for realising higher growth, yield and net returns.

Materials and methods

A field experiment was carried out for two consecutive years i. e. 2009-10 and 2010-11 at the research farm of National Research Centre on Seed Spices, Ajmer. The soil of the experimental area was loamy sand having low organic matter (0.23%), combined with low available nitrogen (178.65 kg ha⁻¹), medium available phosphorus (12 kg ha⁻¹) and medium available potassium (165 kg ha⁻¹), slightly alkaline with pH (8.04) and EC (0.076 dSm⁻¹). Fifteen treatment combinations comprising of five dates of sowing viz., 1st October, 15th October, 30th October, 15th November and 30th November in main plots and three crop geometry viz., 40 cm x 10 cm, 50 cm x 10 cm and 60 cm x 10 cm spacing in sub plots were taken in split plot design with three replications. The plot size was 3 m x 3.5 m. The seeds of variety Ajmer Dill-1 was sown using 6 kg per ha on respective dates during both the years. Recommended dose of fertilizers viz., 90 kg nitrogen and 50 kg P₂O₅ ha⁻¹ were supplied through urea and DAP, respectively. Full quantity of phosphorus and half of the nitrogen was applied as basal dose at the time of sowing and the remaining nitrogen was applied 30 days after sowing. Irrigations were applied at recommended IW/CPE ratio of 0.8. Other agro techniques were followed as per recommendation for raising healthy crop of dill. The harvesting of rows of net plot was done manually. The

Table 1. Effect of sowing dates and crop geometry on growth parameters of dill (Pooled data of two years)

Treatment	Plant height (cm)			Number of days taken to branching	Number of branches /plant		
	60 DAS	90 DAS	At harvest		60 DAS	90 DAS	At harvest
Date of sowing							
1 st October	28.72	99.43	128.25	25.50	6.54	9.27	10.99
15 th October	46.04	115.35	134.24	40.50	8.23	10.16	11.80
30 th October	19.16	96.00	118.36	45.50	6.12	8.65	9.38
15 th November	13.74	39.00	50.13	44.50	3.84	5.62	7.17
30 th November	9.95	29.09	49.34	52.50	3.15	5.06	5.92
SEm ±	0.63	2.67	3.32	1.44	0.17	0.24	0.29
CD (P=0.05)	2.07	8.72	10.84	4.71	0.57	0.79	0.94
Crop geometry							
40 x10 cm	25.90	80.84	101.65	41.70	6.39	8.36	9.75
50x10 cm	23.86	74.28	95.31	41.70	5.58	7.91	9.09
60 x10 cm	20.80	72.20	91.25	41.70	4.76	6.99	8.32
SEm ±	0.47	1.90	2.40	0.83	0.12	0.17	0.20
CD (P=0.05)	1.38	5.61	7.07	NS	0.35	0.50	0.59

Table 2. Effect of sowing dates and crop geometry on yield attributes and yield of dill (Pooled data of two years)

Treatments	Number of days taken to flower initiation	Number of umbels / plant	Number of umbellates /umbel	Number of seeds /umbellate	1000 seed weight (gm)
Date of sowing					
1 st October	45.50	53.95	32.93	23.47	4.57
15 th October	70.50	60.15	44.10	57.18	4.89
30 th October	78.50	24.36	36.17	24.36	4.04
15 th November	85.50	17.67	18.89	21.88	4.52
30 th November	89.50	9.51	11.85	12.36	3.56
SEm ±	2.50	1.10	0.92	0.71	0.13
CD (P=0.05)	8.15	3.60	3.02	2.32	0.44
Crop geometry					
40 x10 cm	73.90	38.72	30.79	29.65	4.40
50 x10 cm	73.90	30.79	28.49	27.80	4.27
60 x10 cm	73.90	29.87	27.08	26.09	4.28
SEm ±	1.46	0.79	0.67	0.50	0.09
CD (P=0.05)	4.30	2.33	1.99	1.48	0.27

Table 3. Effect of sowing dates and crop geometry on gross returns, net returns and BCR of dill (Pooled data of two years)

Treatments	Seed yield (kg /ha.)	Cost of cultivation (Rs./ha.)	Gross returns (Rs./ha.)	Net returns (Rs./ha)	B:C Ratio
Date of sowing					
1 st October	1425	20000	99778	79778	4.63
15 th October	1632	20000	114222	94222	5.36
30 th October	551	20000	38556	18556	1.57
15 th November	384	20000	26880	6880	0.29
30 th November	333	20000	23310	3310	0.11
SEm ±	27	-	1861	1861	0.27
CD (P=0.05)	87	-	6068	6068	0.87
Crop geometry					
40 x10 cm	909	20000	63600	43600	2.83
50 x10 cm	752	20000	52667	32667	2.28
60 x10 cm	694	20000	48600	28600	2.08
SEm ±	20	-	1394	1394	0.20
CD (P=0.05)	59	-	4111	4111	0.59

five plants were selected from each plot for recording various yield attributes. The plot wise net yield was recorded and converted in kg per hectare. The statistical analysis of the data was done on pooled basis as per procedure suggested by Panse and Shukhatmae (2).

Results and discussion

Sowing dates

Various date of sowing significantly influenced the plant height at various growth stages, days taken to branching, number of branches per plant, days taken to flower initiation, number of umbel per plant, number of umbellate per umbel, seeds per umbellate, test weight, seed yield per plant, seed yield per ha, gross returns, net returns and BCR (Tables 1, 2, 3). Sowing of dill on 15th October exhibited the highest plant height at 60 DAS (46.04 cm), 90 DAS (115.35 cm) and at harvest (134.25 cm) but early branching and flowering initiation was recorded with sowing of crop on 1st October. The number of umbels per plant (60.15), number of umbellates per umbel (44.10), number of seeds per umbellate (57.18) test seed weight (4.89 g), seed yield (1631.75 kg /ha), gross return, (Rs.114222/-), net return (Rs.94222/-) and BCR (5.36)

were recorded significantly higher with sowing of dill on 15th October followed by 1st October. The best performance growth parameters of dill crop with respect to, yield attributes and seed yield with 15th October sowing might be due to suitable climatic conditions, which facilitated better germination, crop establishment and less chances of occurrence of diseases and pest leading to higher gross return, net return and BCR as compared to other sowing times. Randhawa and Singh (3) as well as Singh and Randhawa (5) and Sudesh *et al.*, (7) recorded similar results in dill and Meena *et al.*, (1) in nigella.

Crop geometry

Varying crop geometry significantly influenced the vegetative growth, yield with yield attributes, net returns and benefit cost ratio. (Tables 1, 2 and 3). However, branching of dill plants and flower initiation time were not influenced significantly with different crop geometry. Sowing of dill at 40 cm x 10 cm spacing resulted the highest plant height at 60 DAS (25.90cm), 90 DAS (80.84 cm) and at harvest (101.65cm) as well as higher yield attributes like number of umbel per plant (38.72) number of umbellates per umbel (30.79), number of seeds per umbellate (29.65), test weight (4.40 g), seed yield (908.57

kg/ha), gross return (Rs. 63600/ha), net return (Rs. 43600/ha) and BCR (2.83). The highest growth parameters, yield attributes and yield of dill obtained under 40 cm x 10 cm geometry might be due to presence of higher plant population in unit area as compared to wider spacing which ultimately resulted in higher seed yield, gross returns, net returns and BCR. Though, wider spacing, resulted higher seed yield per plant but on account of less population, the increased yield per plant can not compensate yield loss on account of thin plant population. Randhawa and Singh (3), Sindhu *et al.*, (6) and Singh and Randhawa (5) obtained similarly findings in dill. Singh *et al.*, (4) and Meena *et al.*, (1) also recorded similar results in nigella.

Thus it is inferred from the above study that sowing of dill on 15th October at 40 cm x 10 cm geometry is better for realising higher seed yield, net returns and profitability.

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