Mycopath (2012) 10(2)**:** 83-86 **Research Article**

Growth and yield attributes of black cumin (*Nigellla sativa* L.) as affected by sowing dates and methods

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Abstract

A field trial was carried out at the Research fields of Agronomic Research Institute Faisalabad, Pakistan (2010-11) to estimate the influence of different sowing dates and types of methods on growth and yield attributes of black cumin (*Nigellla sativa* L.). Four no. of planting dates with the interval of 15 starting from 15th October to 30th November 2010 were selected accordingly. Four types of sowing methods like broad casting, line, ridge and bed sowing were appraised. The experiment was laid out as a split plot arrangement of a randomized complete block design with three repeats. Black cumin sown on 15th October produced the highest plant growth and seed yield with higher capsules plant^{-1}, seeds capsules^{-1} and 1000-seed weight than other treatments. The yield was significantly decreased with each late interval in sowing from 15th October to 30th November. Bed sowing produced the highest seed yield followed by ridge sowing, line sowing. The lowest seed yield was recorded in broad cast method of sowing.

Keywords: Black cumin, *Nigellla sativa*, sowing methods, sowing dates, yield.

Introduction

Black cumin (*Nigellla sativa* L.) belongs to family Ranunculaceae, is an annual herb that is cultivated worldwide as a medicinal plant. It is widely cultivated throughout South Europe, Syria, Egypt, Saudi Arabia, Iran, India and Turkey (Davis, 1965; Riaz *et al*., 1996). Plant grows well in cool-dry with light snowfall areas to warm-humid areas. During spring season the branches from the under-ground parts sprout and produce a luxurious crop. Cool and humid weather favors flowering and seed setting. Plant grows to 20-30 cm tall, bearing delicate flowers and large fruit, each containing numerous seeds. The black cumin seeds are frequently used for flavouring of vegetables, legumes and different types of bakery products (Atta, 2003). It has been used as an herbal medicine for more than 2000 years and extensively utilized as a food additive and flavour in many countries. In Pakistan farmers are not growing this crop on commercial basis, however due to its medicinal properties the farmers are cultivating this on very small areas for their own domestic consumptions. So, a very small quantity of yield obtained that is insufficient to meet the national requirements and there is a gap between its production and demand. So, there is a huge scope for improvement of the production potential of black cumin in Pakistan.

Various factors can be helpful in improving the yield on the basis of per unit area, however sowing dates and methods are most important. Ahmad and Haq (1986) revealed that early sowings were the best for black cumin seed yield. Significant loss in yield owing to the unpromising sowing dates was quantified by Bianco *et al*. (1994) and Barros *et al*. (2004). Sadeghi *et al*. (2009) reported that early sowing as compared to late resulted in higher seed yield, number of umbrella plant^{-1}, no. of seeds umbrella^{-1} and plant height. Sadeghi *et al*. (2009) and Tuncturk *et al*. (2005) reported that different agricultural practices affected differently the number of seeds umbrella^{-1} and seed yield.

Different planting methods improved the seed yield up to 38% than that of direct sowing (Yadav and Khurana, 1999). Ashiq and Shah (1993) found that ridge sowing of *Foeniculum* gave higher and flat sowing gave less seed yield. However, Ashiq (1995) contradicted this and shown that flat sowing resulted in more seed yield when compared with ridge sowing method.

It is therefore, decided to appraise the influence of different sowing dates and types methods on the growth and yield attributes of black cumin.

Materials and Methods

A field trial was carried out during winter 2010-11 at Agronomic Research Institute, Faisalabad to assess the influence of broadcasting, bed, ridge, line methods of sowing on growth and

yield attributes of black cumin which was sown on 15th October, 30th October, 15th November and 30th November 2010.

The trial was conducted in a split plot arrangement under the randomized complete block design (RCBD) and replicated thrice. The effect of sowing dates and sowing methods were checked by randomizing in main plots and sub plots, respectively. At each point, three seeds were sown but thinned to one plant per site after germination. Broadcast method was used for the seed sowing at a rate of 6 kg ha^{-1} and single row hand drill was used for line sowing. The line to line distance was kept 50 cm and B×B was 100 cm, whereas P×P distance was maintained at 10 cm in all the methods except broadcasting.

Phosphorus was applied at 25 kg ha^{-1} while sowing, whereas nitrogen was applied 50 kg ha^{-1} in two doses i.e., 50% during sowing while remaining at the time of first irrigation, by keeping other cultural practices same for all the treatments. For data collection on different parameters like plant height, branches $plant^{-1}$, seed capsules $plant^{-1}$ and seeds $capusle^{-1}$, ten plants were selected randomly from every plot. From the seed yield of each treatment three samples of seeds were collected to record 1000-seed weight.

Data was subjected to Fishers analyses of variance and means were compared using least significance difference (LSD) at 5% probability level (Steel *et al*., 1997).

Results and Discussion

Influence of sowing dates

The crop sown on 15th Oct, produced significantly tallest plants and maximum number of branches followed by 30th October and 15th Nov. Drastic decrease in plant height with each delay in sowing from 15th Oct to 30th Nov might be attributed to gradual decrease in vegetative growth period resulting in reduction of dry matter accumulation. Mohan *et al*. (2001) have also indicated decrease in plant height with late sowing. Sadeghi *et al*. (2009) have documented that early sowing in black cumin resulted in higher plant height.

Significant decline in number of branches $plant^{-1}$ with each delay in sowing form 15th Oct to 30th Nov again may be due to gradual decrease in vegetative growth period and even continuous decrease in temperature during germination and early growth period probably resulted in short stature of plants with less branches $plant^{-1}$.

The capsules $plant^{-1}$ is the major yield contributing factor which was significantly affected both by changed sowing dates and different types of sowing methods. The difference among sowing dates for the number of capsules $plant^{-1}$ was highly significant. The no. of capsules $plant^{-1}$ decreased with each shift in sowing date. The maximum capsule $plant^{-1}$ was acquired with 15th Oct sowing, while decreased significantly with 30th Oct followed by 15th Nov and 30th Nov sowing. Drastic decrease in the number of capsules $plant^{-1}$ with each delay in sowing date may be attributed to shorter growth period, smaller stature of plants & less number branches $plant^{-1}$ accordingly. Sadeghi *et al.* (2009) were also noticed that different sowing dates significantly affected the no. of umbrella $plant^{-1}$ in black cumin. Furthermore, maximum no. of seeds $capsule^{-1}$ in 15th Oct sowing and thereafter significant decrease with delay in sowing night have been attributed to long and favourable reproductive period providing good seed setting conditions in early sowing as compared to late sowing (Ayub *et al*., 2008).

Seed weight is also an important yield contributing factor in *N. sativa* and is determined by the soil and environmental conditions during seed filling stage of the plant Significant decrease in 1000-seed weight with each delay in sowing was probably due to shorter reproductive period with unfavourable distribution of seed filling material towards reproductive parts/sink of the plant as compared to earlier sowing. These findings are in contradiction with the results of Sadeghi *et al*. (2009), who reported non-significant effect of sowing date on 1000-seed weight. These conflicting results might because of climate change and genetic behaviours of the crop plants.

The crop sown on 15th October 2010 gave significantly more seed yield which was decreased enormously by subsequent sowing dates. This is due to shorter availability of growth period. In case of late sowings, the crop plants were not capable of making full usage of the available resources which resulted in lowering all of the growth and yield parameters. This eventually resulted in significant decrease in yield ha^{-1} with each delay in sowing date. Our results are in concordance with many previous findings (Ahmad and Haq, 1986; Bianco *et al*., 1994; Sadeghi *et al*., 2009).

Influence of sowing methods

Different sowing methods also affected significantly the plant height. In case of broadcasting taller plants were produced and it might be attributed due to lesser space among crop

plants resulted in more competition as compared to rest of the sowing methods. These findings are in line with Ayub *et al*. (2008) and Yadav and Khurana (2000) who documented the significant effects of sowing methods on plant height.

Bed sowing produced significantly maximum number of branches plant^{-1} and broadcast the minimum. This might be due to less lodging and better agricultural practices in bed sowing method. On the other hand due to less availability of plant space causing more competition of crop plants for all the growth attributes in broadcasting. These results are in accordance with Tuncturk *et al*. (2005), who stated that different agricultural practices affect differently on the branches per plant.

Maximum capsules plant^{-1} were produced with bed sowing and minimum with broadcast may be due to variation in the number of branches plant^{-1} in the particular sowing methods. Ayub *et al*. (2008) and Yadav and Khurana (1999) have also documented significant effect of sowing methods on the umbels plant^{-1}. Significantly highest number of seeds capsule^{-1} in bed sowing may be due to highly favourable reproductive conditions leading to better seed setting in this method as compared to rest of the sowing methods. Kafi (1990) reported that different agricultural practices have different influence on number of seeds per umbrella. Ayub *et al*. (2008) have also reported that different methods of sowing have significant effect on the no. of seeds per umble.

Among the sowing methods although bed sowing produced maximum 1000-seed weight and was followed by ridge and drill sowing methods, however, all the above three methods were statistically at par to each other. Significantly lowest 1000-seed weight was recorded with broadcast method of sowing. Interaction was non-significant. Minimum 1000-seed weight in broadcast method may be attributed to less available along with unfavourable distribution of seed filling material from source to sink of the plants because of greater competition among the crop plants. These results are in contrast with those of Ayub *et al*. (2008) who documented non-significant influence of sowing methods on 1000-seed weight which may be due to genetic variation of crop plants.

Highest seed yield ha^{-1} was obtained in bed sowing method than rest of the sowing methods. It is attributed to higher number of branches per plant, number of capsules per plant, number of seed per capsule and 1000-seed weight. The results further led to the conclusion that plants with bed sowing utilized efficiently the available resources which resulted in higher seed yield on the other hand significantly minimum seed yield ha^{-1} was obtained in broadcast method of sowing. These findings are in line with the results of Ashiq and Shan (1993) and Ashiq (1995) who have documented significant effect of sowing methods on the yield of fennel crop seed.

Conclusion

Amongst the varying sowing dates and different types of sowing methods, the maximum growth and produce of black cumin was obtained when sown on 15th October and bed sowing was found as preferred method.

Table 1: Effect of sowing dates on the growth and yield attributes of *Nigellla sativa.*

Sowing methods	Growth and Yield parameters					
	Plant height (cm)	**Branches plant^{-1}**	**Capsules plant^{-1}**	**Seeds capsule^{-1}**	**1000 seed weight**	**Yield (kg ha^{-1})**
Broad cast	74.67 a	3.83 d	5.63 d	65.88 c	2.05 b	443.6 d
Drill/line sowing	68.00 c	5.82 c	7.31 c	68.29 b	2.10 a	583.2 c
Ridge sowing	70.42 b	6.00 b	8.77 b	69.45 b	2.12 a	647.9 b
Bed sowing	73.08 a	6.53 a	10.73 a	71.83 a	2.13 a	722.9 a
LSD	1.635	0.153	0.353	2.50	0.046	25.54

In a column, values with different letters show significant difference (P≤0.05) as determined by LSD Test.

Table 2: Effect of sowing methods on the growth and yield attributes of *Nigellla sativa*.

Sowing methods	Growth and Yield parameters					
	Plant height (cm)	Branches plant^{-1}	Capsules plant^{-1}	Seeds capsule^{-1}	1000 seed weight	Yield Kg ha^{-1}
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LSD	1.635	0.153	0.353	2.50	0.046	25.54

In a column, values with different letters show significant difference (P≤0.05) as determined by LSD Test.

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