

Influence of organic and inorganic sources of nitrogen on growth and yield of Rabi drilled fennel (*Foeniculum vulgare* Mill.)

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ABSTRACT

Effect of organic and inorganic nitrogen sources were studied during 2007-08 on growth, yield and economics of winter fennel (*Foeniculum vulgare* Mill.) under south Gujarat condition at the Instructional Farm, N.M. College of Agriculture, Navsari Agricultural University, Navsari. Maximum seed yield and its attributes were obtained when recommended dose of fertilizer applied through inorganic sources. Different organic sources (castor cake, neem cake and biocompost) with inorganic fertilizer 1:1 ratio gave higher yield than recommended dose of N through inorganic source. The higher seed yield (2047.33 kg ha⁻¹), net profit (29237.44) and benefit cost ratio (3.91) were obtained when recommended dose of fertilizer applied through inorganic sources.

Key words : Fennel, Castor cake, Neem cake and Biocompost

INTRODUCTION

Fennel is an important rainy season seed spice crop, transplanted or winter drilled under Gujarat and Rajasthan conditions where light textured soils are poor in fertility. Green seeds with uniform size and free from chemical residues; bioagent or physical impurities are preferred by customer and have high demand in national as well as international market with premium price. Among the various factors contributing towards the attainment of potential yield with good quality, fertilizer management has considerable practical importance. Injudicious use of chemical fertilizer not only harms the soil health but also increase in cost of production. In view of the escalating prices and high demand supply gap of chemical fertilizer, there is a strong need to adopt integrated nutrient supply system to improve soil health and quality production. Therefore, present study was taken to develop a suitable nutrient management practice for fennel crop based on organic farming.

MATERIALS AND METHODS

The field experiment was conducted at the Instructional Farm, N.M. College of Agriculture, Navsari Agricultural University, Navsari, during winter season of 2007-08 in Randomized Block Design having 4 replications. There were eight treatments, comprising three organic sources (castor cake, neem cake and biocompost) alone or in combination with inorganic fertilizers. The soil was clayey in texture with slightly alkaline in soil reaction (7.8 pH), low in organic carbon (0.35%), low in available nitrogen (175.00 kg ha⁻¹), medium in available P₂O₅ (31.00 kg ha⁻¹) and rich in available potassium (349.00 kg ha⁻¹). The recommended fertilizer

dose, i.e. 90 + 45 N + P ha⁻¹ applied through chemical fertilizer. Gujarat Fennel 2 was sown during the fourth week of October, keeping 60 cm inter-row spacing and intra-row spacing of 20 cm was maintained by thinning operation. Recommended cultural practices were also adopted as per need of crop.

RESULTS AND DISCUSSION

The results obtained from the present investigation are summarized in Table 1 and 2 :

Growth attributes :

Growth characters like plant height, number of branches per plant and dry matter accumulation were significantly influenced by different treatments (Table 1). Significantly the maximum values of plant height, number of branches per plant and dry matter accumulation (g plant⁻¹) were found under recommended dose of fertilizer through inorganic sources being at par with recommended dose of N through neem cake with inorganic source 1:1 ratio, recommended dose of N through biocompost with inorganic source 1:1 ratio and recommended dose of N through castor cake with inorganic source 1:1 ratio. This might be attributed to increase in rate of nitrogen availability under adequate nitrogen application which resulted in higher uptake of nitrogen and increased growth attributes. Efficient utilization of phosphorus helped in better canopy development and vigorous growth. Almost similar findings were also reported by Randhawa *et al.* (1978) and Bhati *et al.* (1988) in fennel.

Yield attributing characters :

Most of yield attributing characters of the fennel,

viz., number of umbels per plant, number of umbellates per umbel and number of seeds per umbellate were equally effective when recommended fertilizer dose applied in form of various organic sources (castor cake, neem cake and biocompost) alone or in combination with inorganic fertilizer (Table 1). Significantly maximum number of umbels per plant, number of umbellates per umbel and number of seeds per umbellate were recorded at recommended dose of fertilizer through inorganic sources (T_7) but it was at par with recommended dose of N through neem cake with inorganic source 1:1 ratio (T_6), recommended dose of N through biocompost with inorganic source 1:1 ratio (T_5) and recommended dose of N through castor cake with inorganic source 1:1 ratio (T_4). It is evident that better vegetative growth attributed with regard to plant height, number of branches per plant

and dry matter accumulation were higher which ultimately resulted in adequate supply of photosynthates for development of sink. Positive response of fennel crop was in terms of yield attributes to inorganic fertilizer. The results support the finding of Amin and Patel (2001) as well as Patel *et al.* (2000) in fennel.

Seed yield :

Seed yield of fennel was significantly influenced by various treatments (Table 2). The maximum seed yield (2047.33 kg/ha) was obtained with application of recommended dose of fertilizer through inorganic fertilizers (T_7) and it was at par with treatments T_6 , T_5 and T_4 but significantly superior to rest of the treatments. The higher seed yield was recorded under inorganic fertilizer alone or in combination with organic fertilizer might be owing

Table 1 : Growth and yield attributing characters of winter drilled fennel as influenced by organic and inorganic sources of nitrogen

Sr. No.	Treatments	Plant height	No. of Branches per plant	Dry matter accumulation (g plant ⁻¹)	No. of umbels per plant	No. of umbellates per umbel	Seed per umbellates
T ₁	RD of N through CC	157.54	10.65	53.87	16.80	17.40	16.50
T ₂	RD of N through BC	163.46	11.35	58.90	18.80	19.65	17.85
T ₃	RD of N through NC	168.58	12.25	59.93	19.70	20.00	18.70
T ₄	RD of N through CC + inorganic source 1:1 ratio	179.38	14.40	66.01	22.90	23.05	23.25
T ₅	RD of N through BC + inorganic source 1:1 ratio	179.87	14.55	66.24	23.10	23.35	23.45
T ₆	RD of N through NC + inorganic source 1:1 ratio	180.98	14.90	67.38	23.60	24.10	23.85
T ₇	RDF through inorganic sources (N and P)	190.79	15.75	69.11	24.80	25.50	25.90
T ₈	RD of N as inorganic source (only N)	174.03	13.85	59.97	19.80	20.60	20.05
	C.D. (P=0.05)	15.53	1.47	5.67	2.97	2.64	2.83
	C.V. %	6.06	7.49	6.15	9.53	8.26	9.08

Table 2 : Seed yield and economics of winter drilled fennel as influenced by organic and inorganic sources of nitrogen

Sr. No.	Treatment	Seed yield (kg/ha)	Gross realization	Total cost of production	Net realization	Cost benefit ratio
T ₁	RD of N through CC	1301.20	25026.44	17763.00	7263.44	1.41
T ₂	RD of N through BC	1325.05	25480.84	17403.00	8077.84	1.46
T ₃	RD of N through NC	1409.72	27109.93	18441.46	8668.47	1.47
T ₄	RD of N through CC + inorganic source 1:1 ratio	1834.50	35214.62	13591.70	21622.92	2.59
T ₅	RD of N through BC + inorganic source 1:1 ratio	1845.24	35419.37	13411.70	22007.67	2.64
T ₆	RD of N through NC + inorganic source 1:1 ratio	1923.38	36908.55	13930.93	22977.62	2.65
T ₇	RDF through inorganic sources (N and P)	2047.33	39276.58	10039.14	29237.44	3.91
T ₈	RD of N as inorganic source (only N)	1566.66	30108.57	9420.391	20688.18	3.20
	C.D. (P=0.05)	263.59	-	-	-	-
	C.V. %	10.82	-	-	-	-

Purchase price (kg ha⁻¹): Castor cake - Rs. 5.2 kg⁻¹; Biocompost - Rs. 1.5 kg⁻¹; Neem cake - Rs. 5.8 kg⁻¹; Urea - Rs. 5.2 kg⁻¹; SSP - Rs. 3.3 kg⁻¹ Selling price (kg ha⁻¹): Rs.19 kg⁻¹

to quick availability of primary nutrients, which accelerated the photosynthesis rate. Similar finding were also obtained by Singh *et al.* (1979) and Patel *et al.* (2003).

Economics :

Application of recommended dose of fertilizer through inorganic fertilizer (T₇) recorded maximum net realization (Rs. 29237.44/ha) and benefit cost ratio (3.91) followed by treatment T₈ *i.e.* only nitrogen applied in the form of inorganic sources. The lowest values of net realization and benefit cost ratio were accrued with application of castor cake because lower seed yield (Table 2).

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Received : May, 2009; Accepted : July, 2009