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Effect of different doses of NPK on growth and yield of *Nigella* (*Nigella sativa* L.) near coastal belt of Mahuva, Bhavnagar - Gujarat

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Abstract

An experiment was conducted to study the effect of different doses i.e., 0:0:0 (control), 30:20:15, 35:25:20, 40:30:25, 45:35:30, 50:40:35, 55:45:40, 65:55:45, 75:65:50 and 80:70:60 kg/hectare of NPK on growth and yield of *Nigella sativa* L. near coast of the Arabian sea belt of Mahuva distt Bhavnagar - Gujarat. An experiment designed by randomized block design with three replications. As a result, in the study, plant height in (cm), days to 50% flowering, number of leaves/plant, no primary and secondary branches/plant, no of capsule/plant, number of seed/capsule, seed yield (g)/plant, test weight (g) and seed yield (qt/ha) were determined. It was observed that increasing dose of NPK fertilizer had a parallel effect on plant growth characters and yield attributes traits. Among the plant growth characters and yield attribute traits applied different level of NPK doses showed significant variation. the highest values were obtained in plant height (cm) 23.59, 25.59 & 46.53 at 30, 60 and 90 days after sowing, days to 50% flowering (59.06), number of leaves/plant (84.00), number of primary branches/plant (13.47), number of secondary branches/plant (25.47), number of capsule/plant (39.53), number of seed/capsule (90.99), seed yield (g)/plant (20.51), test weight (g) 3.80 and seed yield (q/ha) 11.66 from NPK - 75:65:50 kg/ha application as a result of the study, varying NPK doses influenced the growth characters and yield attributes traits. Excessive fertilizer applications had a negative effect on the growth and seed yield.

Keywords: *Nigella*, nitrogen, phosphorus, potash, growth, seed yield

Introduction

Nigella (*Nigella sativa* L.) is generally short leaved an annual small herb seed spices crop, growing to a height of about 45 to 55 cm. It is commonly known as kalonji or black cumin. *Nigella* belongs to the family Ranunculaceae (Arslan *et al.*, 2000) ^[2] having chromosome number 2n = 12. It is cultivated in the winter season. The crop is native to the mediterranean region of Turkey and Cyprus (Davis, 1965) ^[4]. In India, it is cultivated in Rajasthan, Uttar Pradesh, West Bengal, Punjab, Himachal Pradesh, Jharkhand, Madhya Pradesh, Andhra Pradesh, and Assam (Vijay and Malhotra, 2002) ^[29]. In India *Nigella* is estimated produced in an area of about 9000 hectares with production of about 7000 -8000 tons.

The seed of *Nigella* have been used since ancient times as spices for making pickles and cooked vegetables. It can also be used in culinary, confectionary, perfumery, cosmetics, and pharmaceuticals industry (Ozel *et al.*, 2009) ^[17]. Dried *Nigella* seeds have several medicinal properties, and they are used for stomach disease, diarrhea, rheumatism, asthma, and skin disorder (Sultana *et al.*, 2015) ^[22], antifungal (Bita *et al.*, 2012) ^[4], antidiabetic (Zaoui *et al.*, 2002) ^[31] and contain contraceptive and antifertility activity (Keshri *et al.*, 1995) ^[11]. Roasted black seed can be used as anti-vomiting (Morsi, 2000) ^[15].

Growth and seed yield of *Nigella* are largely influenced by the nutrient's fertility status of the soil apart from genetic potential of the variety. Nutrients are one of the most important factors to increasing crop productivity. Maintain soil fertility status by providing a basic dose of fertilizers and adequate major nutrients like nitrogen, phosphorus, and potassium as per the crop requirement to increase seed yield production. Nitrogen plays an important role in the synthesis of plant components by various enzymes (Khalid and Shedeed, 2015) ^[32]. Application of fertilizers especially nitrogen, phosphorus and potash had a considerable effect not only on quantity but also on the quality of the seed.

Nitrogen is beneficial for plant height, number of branches per plant, number of capsule/plant and seed yield of the *Nigella* spp. Khaled *et al.*, (2007) ^[12], Ozgmen and Sekeroglu (2007), Mollafilabi *et al.*, (2009) ^[14] and Tuncturk *et al.*, (2012) ^[25]. Nitrogen fertilization increases the plant growth rate, essential oil%, fatty oil, carbohydrates, and soluble sugar amount (Khalid, 1996, 2001) ^[33, 34]. Nitrogen, one of the primary nutritional elements, also influences the yield in addition to the seed quality. Nitrogen plays a role in respiration, photosynthesis, and protein synthesis, it gives the leaves their dark green color, promotes vegetative and shoot growth and high seed yield (Pawar *et al.*, 2007) ^[19].



Fig 1: *Nigella* crop at flowering stage in experiment

Phosphorus nutrients in the soil have development activity in the plant root growth. Depending on the amount of phosphorus application the contact area of the root expands with the growth of the root which in turn gives values in the range of 30.70 cm to 35.30 cm in *Nigella* spp (Geren *et al.*, 1997) ^[9]. Phosphorus has been found to significantly affect the number of capsules, weight of 1000 seed and seed yield (Ozguven and Sekeroglu, 2007 and Tuncturk *et al.*, 2011) ^[18, 24].

Potassium fertilizer is another essential component to reduce the severity of disease and most abundant cation in higher plants. Application of potassium 30 kg/ha along with 30 kg/ha nitrogen decrease plant death due to disease and increase yield in *Nigella* spp (Champawat and Pathak, 1982) ^[5].

In this study, research near the coast of the Arabian Sea of Mahuva is known for its mild weather located in Bhavnagar district of Gujarat was conducted to investigate effect of different level of nitrogen, phosphorus, and potash fertilizers and to determinate the optimum fertilizer doses on growth and yield components of *Nigella* crop.

Materials and Methods

The experiment was conducted at a progressive farmer field, under supervision of agriculture scientist, Pidilite Industries Limited at Bhanavad village Mahuva during winter season year 2023 to 2024. The experiment site was located 71° 45' 58.97"E longitude 21° 5' 9.85" N latitude from mean sea level. The location is near the coast of the Arabian Sea, providing 600-700 mm annual rainfall. The temperature was 20 to 35°C during the month of October to March and relative humidity 40-50% during the period of study.

The soil characteristic of the experiment field was clay loam, medium in salt (0.61 milli mS cm⁻¹) and pH 7.34 light alkaline. In upper layer of the soil had low concentration of organic matter (0.50%) and nitrogen (250 kg/ha). Available phosphorus content of the soil was highly low (12 kg/ha), potassium content was good (603 kg/ha), available sulphur content was medium (12 ppm), available zinc content was low (0.20 ppm), available Iron content was low (1.12 ppm), available mg content was high (10.60 ppm), available copper content was high (1.98 ppm) and available boron content was very low (0.072 ppm).



Fig 2: A view of experimental field of *Nigella* crop at harvesting stage

Nigella seed material variety AN -1 used in the experiment field. The experiment field was laid out in Randomized Block Design (RBD) with three replications. Seeds were soaked in water for 24 hours to facilitate good germination. Seed were dried and treated with carbendazim @ 2 g/kg of seed to minimize the soil born disease. Seed sowing in the rate of 06 kg/acre by seed drill machine with a spacing of 25 x 35 cm apart from plant to row on October 20, 2023. Each plot size was 3 x 2 m (6 m²). Weeding and hoeing were applied to the plot during growth period. Area harvested by 2.25 m² and plants were harvested by hand.

Treatments consisted of 10 doses of Nitrogen Phosphorus and Potash fertilizers level i.e. T₁ control (0:0:0), T₂: 30:20:15, T₃: 35:25:20, T₄: 40: 30:25, T₅: 45:35:30, T₆: 50:40:35, T₇: 55:45:40, T₈: 65:55:45, T₉: 75:65:50 and T₁₀: 80:70:60 kg/hectare. A full dose of phosphorus and potash and half dose of nitrogen were given as basal dose at the time of soil preparation. The remaining nitrogen was applied in two split doses at top dressing in standing crop at 30 and 60 days after sowing. The NPK was applied in the form of fertilizer urea, di-ammonium phosphate (DAP) and murate of potash (MOP). In the study, the data observation such as plant height, number of leaves/plants, number of primary branches/plants, number of secondary branches/plants, number of capsule/plants, number of seed/capsules, 100 seed weight (g) and seed yield q/ha and five plants were selected from each plot/replication. The data were subjected to analysis of variance and the average values were compared using Duncan Multiple Range Test (DMRT) at $p \leq 0.05$ level of significance.

Table 1: ANOVA for simple randomized block design (rbd)

Source of variation	Degree of freedom	Sum of square	Mean sum of square	f value	f t 05% or 01% table value
Replication	r - 1	RSS	RMS	RMS/EMS	-
Treatment	t - 1	TSS	TMS	TMS/EMS	-
Error	(r - 1) (t - 1)	ESS	EMS	-	-
Total	rt - 1	TSS	-	-	-

Where, r = Number of replications, g = Number of genotypes, d.f.= degree of freedom, RSS = Replication Sum of Square, TSS = Treatment Sum of Square, ESS = Error Sum of Square, RMS = Replication Mean of Square, TMS = Treatment Mean of Square, EMS = Error Mean of Square. A significant value of F test indicates that the test entries differ significantly among themselves, which requires computing CD.

$$CV = \frac{\sqrt{EMS}}{GM} \times 100$$

$$SE\ m \pm = \sqrt{EMS/r}$$

$$SE\ diff. = \sqrt{2EMS/r}$$

CD at 5% Probability Level = SE difference x t 5% (table value).

- Where, C.V% = Coefficient of Variation
- Sem $\pm$ = Standard error of mean
- S E diff = Standard Error of difference
- GM = General Mean
- C.D. = Critical Difference

t 5% = t, table value 5% probability level at error degree of freedom.

Mean was calculated by using following formula.

$$\text{Mean } (\bar{X}) = \frac{\sum_{i=1}^n x_i}{N}$$

Where

- $\sum_{i=1}^n x_i$ = the sum of all the observation
- N = Number of observations

Table 2: Analysis of variance for various plant growth and yield attribute traits in *Nigella* (*Nigella sativa* L.) for individual environment.

SN	Parameters	Mean Sum of Square		
		Replication ^[2]	Treatment ^[9]	Error ^[18]
1	Plant height (cm) at 30 DAS	0.65	45.79**	2.72
2	Plant height (cm) at 60 DAS	0.22	42.10**	3.20
3	Plant height (cm) at 90 DAS	11.56**	132.80**	1.44
4	Days to 50% flowering	1.41	93.98**	2.34
5	No of leaves/plant	2.43	266.37**	6.40
6	No of primary branches/plant	0.59	18.37**	0.81
7	No of secondary branches/plant	1.45	67.25**	0.92
8	No of capsules/plant	3.91	88.20**	3.00
9	No of seeds/capsule	39.50	174.38**	21.80
10	Seed yield (g)/plant	0.70	46.03**	1.20
11	100 - Test weight (g)	0.05	0.84**	0.13
12	Seed yield (q/ha)	0.54	8.27**	0.46

Note: DAS = days after sowing, No = number, g = gram, qt/ha = quintal per hectare, % = percentage. Significant at 5% and 1% respectively

Results and Discussion

The significant difference for various plant growth and yield attribute traits for individual environment at 1% level of significance are presented in Table 1.

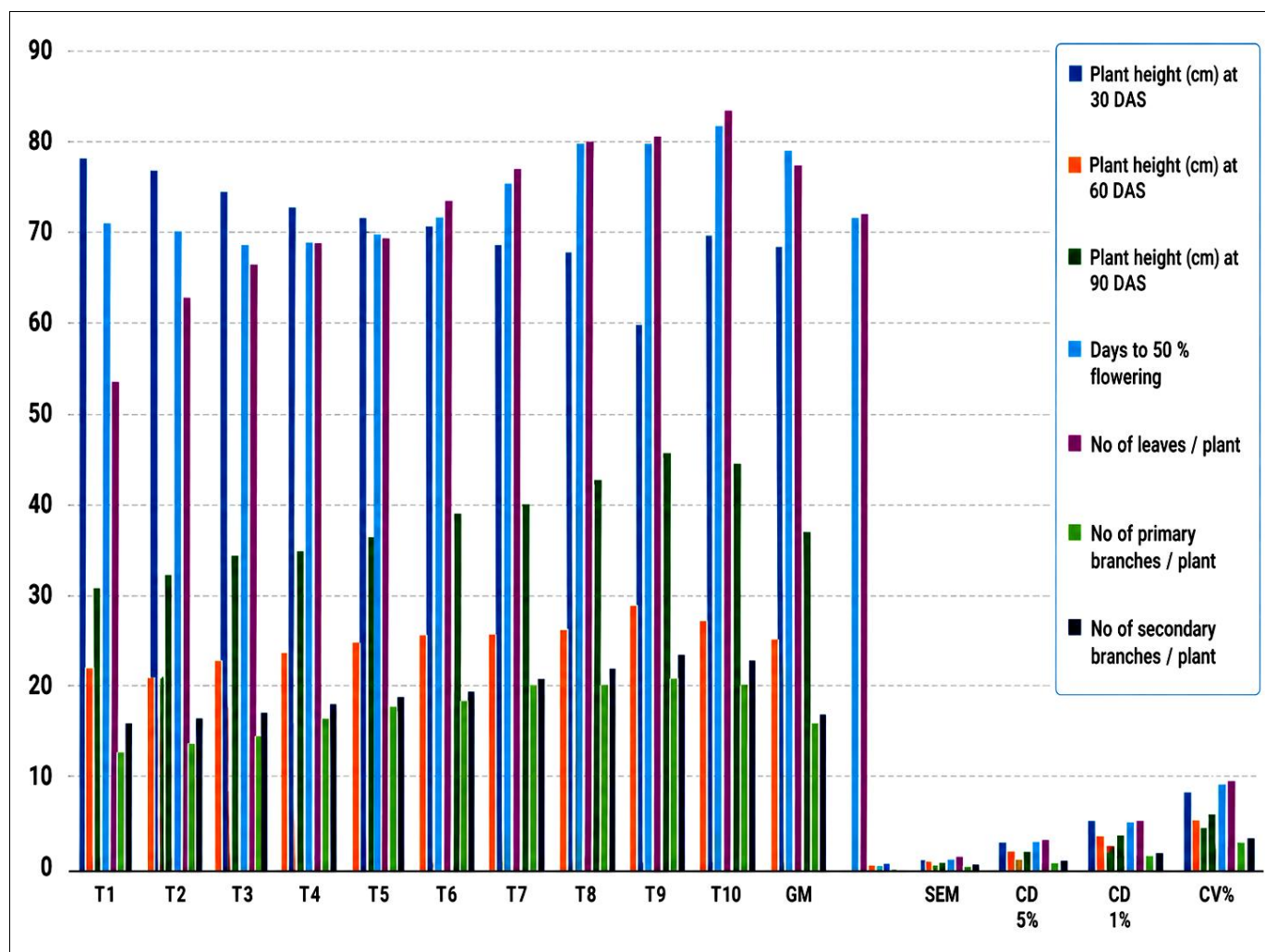
The significant difference at 1% level of significance were found in all the parameters viz. number of leaves/plant, number of seeds/capsule, plant height (cm) at 90 DAS, days to 50% flowering, number of capsules/plant, number of secondary branches/plant, seed yield (g)/plant, plant height

(cm) at 30 DAS, plant height (cm) at 60 DAS, number of primary branches/plant and seed yield (q/ha) except 100 - test weight (g). The maximum significant difference at 1% level of significance was found in character number of leaves/plant (266.37**) followed by number of seeds/capsule (174.38**), plant height (cm) at 90 days after sowing (132.80**) and days to 50% flowering (93.98**). Minimum significant difference was found in character 100 - test weight (g) 0.84** and seed yield (q/ha) 8.27.

Table 3: Effect of different level of nitrogen, phosphorus, and potash on plant height (cm) at 30 das, plant height (cm) at 60 das, plant height (cm) at 90 das, days to 50% flowering, number of leaves/plants, number of primary branches/plant and number of secondary branches/plants.

SN	Treatments	Plant height (cm) at 30 DAS	Plant height (cm) at 60 DAS	Plant height (cm) at 90 DAS	Days to 50% flowering	No of leaves/plant	No of primary branches/plant	No of secondary branches/plant
T ₁	NPK -0:0:0 (Control)	11.69	12.77	25.59	78.62	53.00	4.98	9.70
T ₂	NPK -30: 20: 15	13.19	18.51	31.34	77.27	63.33	7.28	13.27
T ₃	NPK -35: 25: 20	14.15	19.99	32.97	74.68	68.33	7.76	14.35
T ₄	NPK -40: 30: 25	14.78	20.97	35.75	72.92	69.67	8.01	16.18
T ₅	NPK -45: 35: 30	15.66	21.52	38.82	71.71	73.33	8.91	17.06
T ₆	NPK -50: 40: 35	16.84	22.68	40.74	70.26	76.67	9.63	17.52
T ₇	NPK -55: 45: 40	17.85	23.04	41.63	68.52	80.00	10.35	19.76
T ₈	NPK -65: 55: 45	19.74	24.26	42.57	66.92	80.33	11.83	22.80
T ₉	NPK -75: 65: 50	23.59	25.59	46.53	59.06	84.00	13.47	25.47
T ₁₀	NPK -80: 70: 60	22.31	24.75	45.41	70.12	79.00	11.09	21.39
	G M	16.98	21.41	38.13	71.01	72.77	9.33	17.75
	SEM $\pm$	0.95	1.03	0.69	0.88	1.46	0.52	0.55
	C D at 05% level of Significance	2.83	3.07	2.06	2.62	4.34	1.54	1.64
	CD at 01% level of Significance	3.88	4.21	2.83	3.60	5.95	2.11	2.26
	C V (%)	9.71	8.35	3.15	2.15	3.48	9.62	5.40

Note: Cm = Centimetre, DAS = Days After Sowing, % = Percentage, No = Number, NPK = Nitrogen, Phosphorus, Potash, G M = General Mean, CD = Critical Difference, CV = Coefficient of Variation

**Fig 3:** Effect of different level of nitrogen, phosphorus, and potash on plant height (cm) at 30 DAS, plant height (cm) at 60 DAS, plant height (cm) at 90 DAS, days to 50% flowering, number of leaves/plants, number of primary branches/plant and number of secondary branches/plants.

Growth parameters

Effect of different level of nitrogen, phosphorus, and potash on plant height (cm) at 30 DAS, plant height (cm) at 60 DAS, plant height (cm) at 90 DAS, days to 50% flowering, number of leaves/plants, number of primary branches/plant and number of secondary branches/plants are presented in Table 2. It was found that the variation in various plant growth traits at different doses of NPK fertilizer on *Nigella* crop. The magnitude of influenced of plant growth and yield traits by the application of different doses of nitrogen, phosphorus, and potash. All the parameters investigated in this study were positively affected by varying doses of NPK fertilizers except 100 - test weight in g. Increasing dose of NPK at standard level, increased the data in all the parameters. It's seen in the data presented on Table 2 and graphically illustrated on figure 3. The highest plant height (cm) at 30, 60 and 90 days after sowing were observed in treatment T₉ - NPK -75: 65: 50 kg/ha (23.59, 25.59 and 46.53) respectively followed by 22.32 & 25.59 in T₁₀ at 30 and 60 days after sowing and 42.57 in T₈ at 90 days after sowing. The highest value of plant height (cm) at 30, 60 & 90 DAS was obtained as 23.59, 25.59 and 46.53 at T₉ treatment with applied of 75: 65: 50 NPK dose kg/ha. The lowest value of plant height (cm) at 30, 60 & 90 days after sowing was obtained as 11.69, 12.77 & 25.59 in treatment (T₁) control plot. Yimam *et al.*, (2015) ^[30] stated that the plant height of *Nigella sativa* was maximum 57.3 cm at 6 kg ha⁻¹ nitrogen fertilizer. Tuncurk *et al.*, (2012) ^[25] expressed that increasing nitrogen doses enhance plant height of black cumin in their experimental years.

Days taken to 50% flowering (59.06) was recorded under fertilizer dose of NPK - 75: 65: 50 kg/ha which was found significantly superior over rest fertilizers doses. Minimum days to taken 50% flowering was observed in treatment T₉ (59.06) followed by T₈ (66.92) and T₁₀ (70.12). Highest days taken to 50% flowering was recorded in control (T₁) plot 78.62. Applied of lower level of NPK fertilizer dose took the maximum days to 50% flowering whereas increasing level of NPK dose took the minimum days to 50% flowering.

Number of leaves/plants was found maximum in treatment T₉ (84.00) followed by T₈ (80.33), T₇ (80.00) and T₁₀ (79.00). Highest value of number of leaves/plant (84.00) was obtained as applied NPK 75: 65: 50 kg/ha and the lowest value 53 numbers of leaves/plant was obtained as applied NPK dose nil in the control plot.

NPK is an important nutrient that improves vegetative growth of the plants. Over results showed that the number of branches/plants augmented with increasing NPK doses. The effect of varying level of NPK doses on the number of primary and secondary branches/plant found significantly. The number of branches increased by increasing NPK dose up to 75: 65: 50 kg/hectare and there was a slightly decreasing in increased further NPK doses showed in Table 2. In this experiment, increased NPK doses in proper ratio were supposed to encourage vegetative growth and number of branch initiation. Among the treatment combination with higher NPK level produced the maximum number of branches whereas, lower NPK doses showed the minimum amount of branches/plant. The highest value of primary branches/plant was obtained (13.47) as applied NPK dose 75: 65: 50 kg/hectare followed by T₈ (11.83), T₁₀ (11.09) and T₇ (10.35), whereas the lowest value (4.98) was observed in control plot. Similarly, the maximum value of

secondary branches/plant was observed in treatment T₉ (25.47) followed by treatment T₈ (22.80), T₁₀ (21.39) and T₇ (19.76). Tulukeu stated that the highest number of branches (5.41 plant⁻¹) was obtained from 120 kg Nitrogen ha⁻¹. Tuncurk *et al.*, (2012) ^[25] expressed that the number of branches increased by increasing Nitrogen doses up to 60 kg ha⁻¹.

Yield parameters

The data on various yield attributes viz. number of capsules/plant, number of seeds/capsule, seed yield (g)/plant, 100 - seed test weight (g) and seed yield (qt/ha) are presented in Table 3. Yield and yield attribute traits were also influenced by the different doses of NPK combination. Number of capsule/plants at harvest stage was significantly influenced by the different levels of NPK fertilizer doses showed in Table 3 and graphically illustrated in figure 4. The data showed that treatment T₉ - NPK -75: 65: 50 kg/hectare found statistically superior (39.53) as compared to rest of the treatments. Whereas treatment T₈ - NPK -65: 55: 45 kg/ha (32.57) was found to be the second highest followed by treatment T₇ NPK -55: 45: 40 kg/ha (30.75) and T₆ NPK -50: 40: 35 kg/ha (30.30). The lowest number of capsule/plants was obtained (19.57) in control plot T₁ - NPK -00: 00: 00. Tuncurk *et al.*, (2012) ^[25] discovered the number of capsules within the range of 5.3 to 7.5 pieces plant⁻¹. Tuncurk (2012) ^[25] stated that the number of capsules was increased by increasing nitrogen doses and they produced more capsules. Shah (2004) ^[21] reported the number of capsules as 15.25 -35.74. These findings are closely related to Nataraja *et al.*, (2003) ^[16] in *Nigella sativa*, Channabasavanna *et al.*, (2008) ^[6] in ajwain and Bhat and Sulikeri (1992) ^[3] in coriander.

Seed yield (g)/plant was significantly influenced by the different levels of NPK fertilizer doses. The findings showed that among the treatment combination level, the highest seed yield (g)/plant was obtained in the treatment T₉ (20.51) followed by T₈ (19.01), T₇ (17.66) and T₁₀ (16.62). The lowest seed (g/plant) was recorded under treatment T₁ (7.43) in control plot. Treatment T₉ with dose of NPK -75: 65: 50 kg/ha produced the maximum seed yield (20.51) g/plant.

Test weight is another important yield contributing trait. The 100 seed weight (g) of *Nigella sativa* Spp did not vary significantly with combination of different level of NPK fertilizer doses. Among the treatment combination, T₉ with dose of NPK -75: 65: 50 kg/ha was recorded highest test weight (3.80) g followed by treatment T₈ (3.69), T₇ (3.56) and T₆ (3.50) g, whereas in control plot with no fertilizer dose showed minimum seed weight (2.21 g). Rana *et al.*, (2012) ^[10] and Kaheni *et al.*, (2013) ^[20] also found significant effect of fertilizer levels on 1000 seed weight of black cumin.

Seed yield (qt/ha) of *Nigella sativa* spp were significantly influenced by the applied of different levels of NPK fertilizer doses showed in Table 3 and graphically illustrated in figure 4. The highest value of yield qt/ha (11.66) was obtained in treatment T₉ with dose of NPK -75: 65: 50 kg/ha followed by treatment T₈ (11.15), T₇ (10.57) and T₁₀ (10.54) kg/ha. The lowest value (6.29) qt/ha was obtained in T₁ control plot. Treatment T₉ with dose of NPK -75: 65: 50 kg/ha was found maximum seed yield qt/ha. Seed yield (qt/ha) was increased by increased NPK dose kg/hectare, but slightly decreased yield with increased NPK dose above

doses of NPK level. Valabadi and Alibadi found yield up to 1.43 qt/ha. Tuncturk *et al.*, (2012) ^[25] reported that

increasing phosphorus doses positively influenced seed yields in black cumin.

Table 4: Effect of different levels of nitrogen, phosphorus, and potash on number of capsules/plant, number of seeds/capsule, seed yield (g)/plant, test weight (g) and seed yield (qt/ha)

SN	Treatment	No of capsules/plants	No of seeds/capsules	Seed yield (g)/plant	Test weight (g)	Seed yield (qt/ha)
T ₁	NPK -00: 00: 00 (Control)	19.57	59.54	7.43	2.21	6.29
T ₂	NPK -30: 20: 15	22.93	71.13	10.99	2.51	7.67
T ₃	NPK -35: 25: 20	25.85	71.40	12.52	2.77	8.84
T ₄	NPK -40: 30: 25	28.48	71.92	13.48	3.07	9.79
T ₅	NPK -45: 35: 30	29.13	72.67	14.67	3.17	10.31
T ₆	NPK -50: 40: 35	30.30	74.21	15.53	3.50	10.45
T ₇	NPK -55: 45: 40	30.75	74.78	17.66	3.56	10.57
T ₈	NPK -65: 55: 45	32.57	75.69	19.01	3.69	11.15
T ₉	NPK -75: 65: 50	39.53	90.99	20.51	3.80	11.66
T ₁₀	NPK -80: 70: 60	29.74	75.14	16.62	3.40	10.54
	G M	28.88	73.75	14.84	3.17	9.73
	SEM ±	1.00	2.70	0.63	0.21	0.39
	C D at 05% level of Significance	2.97	8.01	1.88	0.61	1.16
	CD at 1% level of Significance	4.07	10.98	2.58	0.84	1.59
	C V %	5.99	6.33	7.38	11.31	6.95

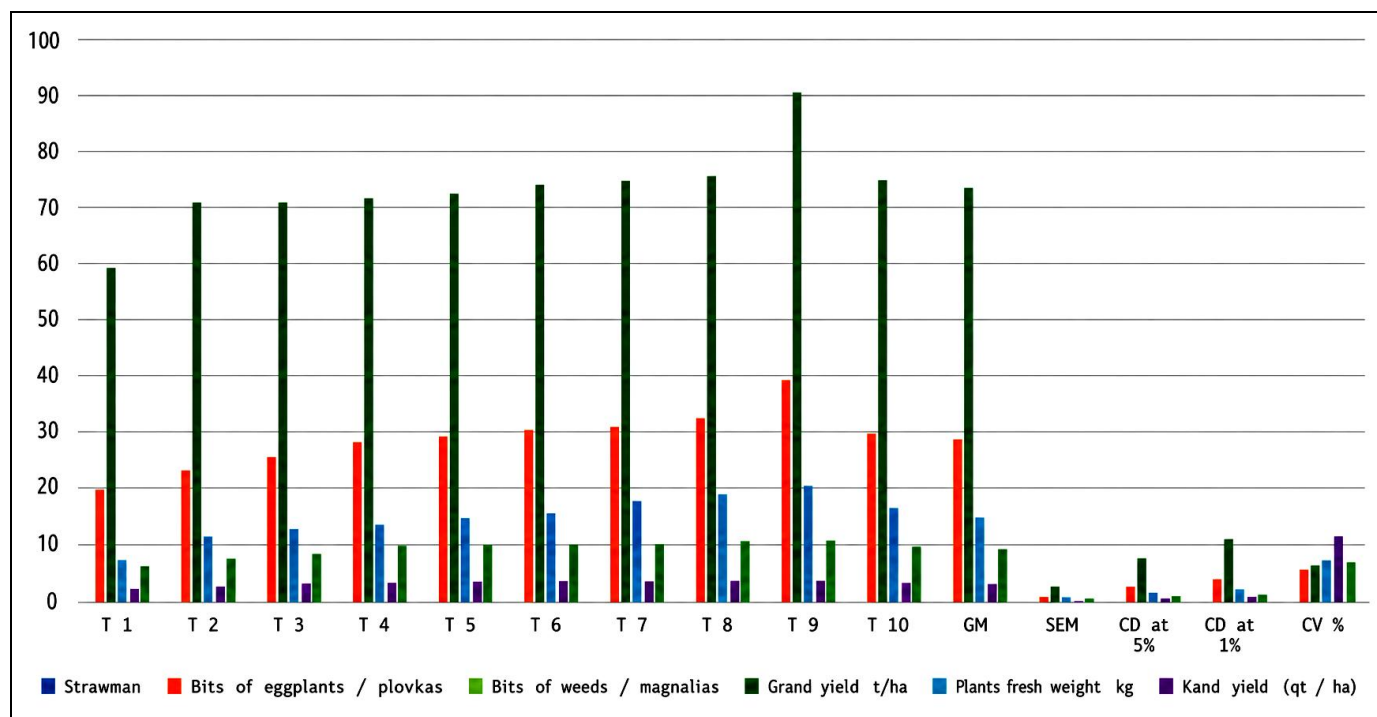


Fig 4: Effect of different levels of nitrogen, phosphorus, and potash on number of capsules/plant, number of seeds/capsule, seed yield (g)/plant, test weight (g) and seed yield (qt/ha)

Conclusions

An experiment was conducted near coastal belt of Mahuva distt Bhavnagar, Gujarat with the objectives of determining the effect of nitrogen, phosphorus and potash on plant growth and yield traits of *Nigella* crop. Treatment combinations of NPK of 10 levels arranged in simple Randomized Block Design with three replications. It was concluded from the results noted that NPK plays an important role in growth and yield of *Nigella* crop. As a result of the study, it was found that dose of NPK -75: 65: 50 kg/ha fertilizer effect to the increase in the plant growth characters values such as plant height, no of leaf/plant, number of primary and secondary branches/plant, days to 50% flowering and yield traits such as no of capsules/plant, no of seeds/capsule, seed yield (g)/plant, 100 seed test weight (g) and seed yield qt/ ha. Treatment T9 with dose of

NPK -75: 65: 50 kg/ha was found superior to rest of treatment combination of NPK doses.

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References

1. Ali MMK, Hasan MA, Islam MR. Influence of fertilizer level on the growth and yield of black cumin (*Nigella*

- sativa* L.). The Agriculturists. 2015;13(2):97-104.
2. Arslan N, Gurbuz B, Ozcan S. Türkiye’de dogal bitkilerin kullanimi ve ticareti. Ekin Dergisi. 2000;12:98-102.
3. Bhat VR, Sulikeri GS. Effect of nitrogen, phosphorus and potassium on seed yield and yield attributes of coriander (*Coriandrum sativum* L.). Karnataka J Agric Sci. 1992;5(1):26-30.
4. Bitu A, Rosu SF, Calina D, Rosu L, Zlatian O, Dindera C. An alternative treatment for Candida infections with *Nigella sativa* extracts. Eur J Hosp Pharm. 2012;19:162.
5. Champawat RS, Pathak VN. Role of nitrogen, phosphorus and potassium fertilizers and organic amendments in cumin (*Cuminum cyminum* L.) infected with *Fusarium oxysporum* f. sp. cumin. Indian J Agric Sci. 1982;58(9):728-730.
6. Channabasavanna AS, Nagappa, Biradar DP. Productivity and economic analysis of ajowan as influenced by spacing and fertilizer levels. Karnataka J Agric Sci. 2008;21(1):106-107.
7. Davis PH. *Nigella sativa* L. In: Davis PH, editor. Flora of Turkey and the East Aegean Islands. Edinburgh: Edinburgh University Press; 1965. p. 98-105.
8. Dijana H, Marija V, Krunoslav K, Vesna Z. Influence of sowing period and fertilization on yield and quality of seeds of *Nigella damascena* and *Nigella sativa*. Acta Sci Pol Agric. 2017;16(1):35-43.
9. Geren H, Bayram E, Ceylan A. Effect of different sowing dates and phosphorus fertilizer application on the yield and quality characteristics of black cumin (*Nigella sativa* L.). Proc Second Natl Field Crops Congr. 1997:376-380.
10. Kaheni A, Ramajani SHR, Ganjali HR, Mobaser HR. Effect of nitrogen fertilizer and plant density on yield and its components in cumin (*Cuminum cyminum* L.) in South Khorasan Province. Int J Agric Crop Sci. 2013;6(5):248-251.
11. Keshri G, Singh MM, Lakshmi V, Kamboj VP. Post-coital contraceptive efficacy of the seed of *Nigella sativa* in rats. Indian J Physiol Pharmacol. 1995;39(1):59-62.
12. Khaled AT, Nasri IH, Butros IH, Butro K, Kharallah K. Effect of some agricultural practices on the productivity of black cumin (*Nigella sativa* L.) grown under rainfed semi-arid conditions. Jordan J Agric Sci. 2007;3(4):385-396.
13. Izgi MN. Effect of different nitrogen dose applications on black cumin (*Nigella sativa* L.): some vegetative parameters and oil ratio. J Agric Fac Gaziosmanpasa Univ. 2020;37(1):38-43.
14. Mollafilabi A, Rashed MH, Moddi H, Kafi M. Effect of plant density and nitrogen on yield and yield components of black cumin (*Nigella sativa* L.). Acta Hortic. 2009;853:115-126.
15. Morsi NM. Antimicrobial effect of crude extracts of *Nigella sativa* on multiple antibiotics-resistant bacteria. Acta Microbiol Pol. 2000;49(1):63-74.
16. Nataraja A, Farooqi AA, Sreeramu BS, Srinivasappa KN. Influence of nitrogen, phosphorus and potassium on growth and yield of black cumin (*Nigella sativa* L.). J Spices Aromat Crops. 2003;12(1):51-54.
17. Ozel A, Demirel U, Güler İ, Erden K. Effect of different row spacing and seed rates on yield and some agricultural characteristics of black cumin (*Nigella sativa* L.). Harran Univ Ziraat Fak Derg. 2009;13(1):17-25.
18. Ozguven M, Sekeroglu N. Agricultural practices for high yield and quality of black cumin (*Nigella sativa* L.) cultivated in Turkey. Acta Hortic. 2007;756:329-337.
19. Pawar PM, Naik DM, Damodhar VP, Shinde VN, Bhalerao RV. Influence of graded levels of spacing and nitrogen on growth and yield of coriander (*Coriandrum sativum* L.). Asian J Hortic. 2007;2(1):58-60.
20. Rana S, Singh PP, Naruka IS, Rathore S. Effect of nitrogen and phosphorus on growth, yield and quality of black cumin (*Nigella sativa* L.). Int J Seed Spices. 2012;2(2):5-8.
21. Shah SH. Morphophysiological response of black cumin (*Nigella sativa* L.) to nitrogen, gibberellic acid and kinetin application [PhD thesis]. Aligarh (India): Aligarh Muslim University; 2004.
22. Sultana S, Asif HM, Akhtar N, Iqbal A, Nazar H, Rahman RU. *Nigella sativa*: Monograph. J Pharmacogn Phytochem. 2015;4(4):103-106.
23. Tulukçu E. The effect of varying nitrogen doses on some yield components of *Nigella sativa* L. Selcuk J Agric Food Sci. 2015;29(2):67-70.
24. Tuncturk M, Tuncturk R, Yildirim B. The effect of varying phosphorus dose on yield and some yield components of black cumin (*Nigella sativa* L.). Adv Environ Biol. 2011;5(2):371-374.
25. Tuncturk R, Tuncturk M, Ciftci V. The effect of varying nitrogen doses on yield and some yield components of black cumin (*Nigella sativa* L.). Adv Environ Biol. 2012;6(2):855-858.
26. Tuncturk R, Tuncturk M, Ciftci V. Effects of varying nitrogen doses on yield and some yield components of black cumin (*Nigella sativa* L.). Adv Environ Biol. 2012;6(2):855-858.
27. Ved Kant, Meena SS, Meena NK, Lal G. Influence of different dates of sowing, fertilizer level and weedicides on growth and yield of *Nigella* (*Nigella sativa* L.) under semi-arid conditions. Int J Curr Microbiol Appl Sci. 2018;7(9):1156-1167.
28. Verma I, Naruka IS, Patel R. Effect of different doses of NPK fertilizer on yield characters of *Nigella* (*Nigella sativa* L.). Pharma Innov J. 2022;11(4):1139-1144.
29. Vijay OP, Malhotra SK. Seed spices in India and world. Seed Spices Newslett. 2002;2(1):1-4.
30. Yimam E, Nebiyu A, Mohammed A, Getachew M. Effect of nitrogen and phosphorus fertilizers on growth, yield and yield components of black cumin (*Nigella sativa* L.) at Konta district, southwest Ethiopia. J Agron. 2015;14(3):112-120.
31. Zaoui A, Cherrah Y, Mahassini N, Alaoui K, Amarouch H, Hassar M. Acute and chronic toxicity of *Nigella sativa* fixed oil. Phytomedicine. 2002;9(1):69-74.
32. Khalid AK, Shedeed MR. Effect of NPK and foliar nutrition on growth, yield and chemical constituents in *Nigella sativa* L. Journal of Mater of Environmental of Science. 2015;6(6):1709-1714.
33. Khalid AK. Effect of NP fertilization and trace elements on growth and chemical constituents of some medicinal Apiaceae plants. J Agric Sci. 1996.
34. Khalid AK. Effect of nitrogen fertilization on vegetative growth, essential oil and chemical composition of medicinal plants including *Nigella sativa*. J Herbs Spices Med Plants. 2001.