

Response of plant growth regulator on growth and yield of fenugreek (*Trigonella foenum - graecum* L.)

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Accepted : May, 2010

ABSTRACT

An experiment was conducted to study the effect of bio-regulators viz., *Triacontanol* @0.5 ml/liter of water, NAA @50 ppm, GA @50 ppm and water sprayed at one, two and three times on growth and yield of fenugreek (*Trigonella foenum - graecum* L.) variety Rajendra Kanti. Spraying of *Triacontanol* @0.5 ml/liter water, NAA @50 ppm and GA @50 ppm gave significant effect on yield and yield attributing character as compare to water sprayed. Maximum plant height (80.47 cm), number of branches per plant (7.04), number of pods per plant (49.09), length of pod (10.82 cm), number of grains per pod (16.90) and yield (1.86 t/ha) was recorded by spraying *Triacontanol* @0.5 ml/l. Three spray (at 25, 45 and 70 DAS) produced maximum plant height (79.92 cm), number of branches per plant (7.07), number of pods per plant (50.50), pod length (11.03 cm), number of grain per pod (17.70) and yield per hectare (1.85 t/ha) followed by two spray (25 and 45 DAS). Interaction of bio-regulator and number of sprays were found non-significant regarding yield and yield attributing characters.

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Key words : Fenugreek, Yield, *Triacontanol*, NAA

Fenugreek (*Trigonella foenum-graecum* L.) is an important condiment occupying third place in area and fourth in production among all the minor spices grown in our country. It is a small seed with yellowish brown colour. It is a rich source of proteins, minerals, vitamin-A and C. Fenugreek belongs to family Leguminosae, subfamily papilionaceae and genus *Trigonella*. It has chromosome no. $2n=2x8=16$. It is an annual crop. The nodules found at the tip of side roots have nitrogen fixing bacteria which fix nitrogen in the soil and thus add to the fertility of the soil. Saxena and Ahmed (1983), reported that fenugreek fixes about 283 kg nitrogen per hectare per year.

Beneficial effect of various plant growth regulators have been reported on many spices crops and proved beneficial for improving yield and quality. Mostly the plant growth substances have been used for various beneficial effects such as promoting roots growth, number of branches per plant, number of pods per plant, pod length, number of grains per pod, yield and grain quality.

The main objective of present study was to assess the quantitative parameters with regard to application of different plant growth regulator in fenugreek viz., stage of application, number of application to see its effect on crop yield.

MATERIALS AND METHODS

A field experiment was conducted under AICRP on spices during 2006-07 to 2008-09 at Horticultural Research

Farm, Department of Horticulture, Tirhut College of Agriculture, Dholi, Muzaffarpur. The soil was sandy loam in texture and slightly alkaline (pH-7.4). It was low in available nitrogen (155 kg ha^{-1}), trace in available phosphorus (10 kg ha^{-1}) and low in available potash (160 kg ha^{-1}). The experimental design was F-Randomized Block Design (FRBD) with three replications having plot size $3.0 \times 2.4 \text{ m}$. The fenugreek variety "Rajendra Kanti" was sown in *Rabi* season (during 20-25 October every year) at spacing of $30 \times 10 \text{ cm}$ with application of $25 : 40 : 40 \text{ kg} :: \text{N} : \text{P} : \text{K ha}^{-1}$ and following other recommended package of practices. Observations were recorded for seven traits on ten randomly selected plants per treatment from each replication. The experiment consisted of 12 treatments. The treatments details are given below:

Combination of the treatments:

F ₁ D ₁	:	@ 0.5 ml/l at 25 DAS
F ₁ D ₂	:	@ 0.5 ml/l at 25 and 45 DAS
F ₁ D ₃	:	@ 0.5 ml/l at 25, 45 and 70 DAS
F ₂ D ₁	:	@ 50 ppm at 25 DAS
F ₂ D ₂	:	@ 50 ppm at 25 and 45 DAS
F ₂ D ₃	:	@ 50 ppm at 25, 45 and 70 DAS
F ₃ D ₁	:	@ 50 ppm at 25 DAS
F ₃ D ₂	:	@ 50 ppm at 25 and 45 DAS
F ₃ D ₃	:	@ 50 ppm at 25, 45 and 70 DAS
F ₄ D ₁	:	Water spray at 25 DAS
F ₄ D ₂	:	Water spray at 25 and 45 DAS
F ₄ D ₃	:	Water spray at 25, 45 and 70 DAS

Note:

F ₁ : Triacantanol @ 0.5 ml/l water @ 25 ppm	D ₁ : One spray 25 DAS
F ₂ : NAA @ 50 ppm	D ₂ : Two spray 25 and 45 DAS
F ₃ : GA @ 50 ppm	D ₃ : Three spray 25, 45 and 70 DAS
F ₄ : Water spray	DAS : Days after sowing

RESULTS AND DISCUSSION

Effect of bio-regulators *viz.* Triacantanol, NAA, GA and water sprayed at one, two and three times were tested for high yield and yield attributing characters. Pooled data of three consecutive years of experimentation is presented in Table 1.

Effect of bio-regulators:

Effect of bio-regulator *viz.*, Triacantanol @0.5 ml/l of water, NAA @50 ppm, GA @50 ppm on yield and

yield attributing characters were found significant. It has been found that growth regulators are essential for vegetative growth because it affects apparently the photosynthesis, respiration and catalase activities of leaf. Plant growth regulators being an important catalyst in the enzymatic reactions of metabolism would have enhanced biological yield. Application of both the plant growth regulators markedly influenced the number of leaves. Spray of Triacantanol @0.5 ml/l of water, NAA @50 ppm and GA@50 ppm gave significant effect on yield and yield attributing character as compared to only water sprayed. Maximum plant height (80.47 cm), number of branches per plant (7.04), number of pods per plant (49.09), pod length (10.82 cm) and yield (1.86 t/ha) were recorded by spraying of Triacantanol @0.5 ml/l of water followed by GA @50 ppm regarding number of pods (46.60), pod length (10.74 cm) number of grains per pod (17.36) and yield (1.78 t/ha). Higher rate of photosynthesis and reduced respiration due to Triacantanol

Table 1 : Effect of bio-regulator on fenugreek (Pooled mean data 2006 to 08)

Characters Treatments	Plant height (cm)	No. of branches per plant	No of pods per plant	Pod length (cm)	No. of grains per pod	Yield per plot (kg/7.2 m ²)	Yield (t/ha)
F ₁	80.47	7.04	49.09	10.82	16.90	1.30	1.86
F ₂	75.68	6.78	45.51	10.34	16.76	1.26	1.74
F ₃	75.32	6.76	46.60	10.74	17.36	1.29	1.78
F ₄	67.03	6.20	40.60	9.90	15.63	1.07	1.48
S.E.(±)	1.20	0.11	1.07	0.14	0.21	0.04	0.04
C.D. (P=0.05)	3.54	0.33	3.13	0.43	0.64	0.11	0.13
D ₁	68.09	6.23	40.71	9.89	15.28	1.11	1.58
D ₂	75.86	6.79	45.14	10.43	17.00	1.25	1.73
D ₃	79.92	7.07	50.50	11.03	17.70	1.33	1.85
S.E.(±)	1.05	0.09	0.92	0.12	0.19	0.03	0.03
C.D. (P=0.05)	3.07	0.28	2.71	0.37	0.55	0.09	0.10
F ₁ D ₁	70.91	6.42	43.29	10.28	14.90	1.14	1.75
F ₁ D ₂	82.96	7.04	48.94	10.73	17.62	1.36	1.89
F ₁ D ₃	87.55	7.67	55.03	11.44	18.17	1.40	1.94
F ₂ D ₁	68.67	6.49	40.73	9.88	15.62	1.17	1.62
F ₂ D ₂	78.01	6.84	45.57	10.43	17.02	1.27	1.77
F ₂ D ₃	80.38	7.01	50.23	10.71	17.62	1.33	1.85
F ₃ D ₁	68.13	6.29	41.30	9.89	16.23	1.18	1.64
F ₃ D ₂	76.83	6.89	46.16	10.76	17.41	1.28	1.77
F ₃ D ₃	80.98	7.09	52.33	11.57	18.44	1.41	1.96
F ₄ D ₁	64.64	5.71	37.50	9.51	14.38	0.96	1.33
F ₄ D ₂	65.66	6.39	39.89	9.80	15.95	1.07	1.48
F ₄ D ₃	70.78	6.50	44.40	10.39	16.55	1.18	1.64
S.E.(±)	2.09	0.19	1.85	0.25	0.38	0.06	0.07
C.D. (P=0.05)	NS	NS	NS	NS	NS	NS	NS
CV (%)	4.85	5.08	7.05	4.21	3.96	9.33	7.49

NS-Non significant

application might have resulted in the higher accumulation of photosynthates resulting in highest grain yield. The above findings are in agreement of findings of Shukla and Prabhakar (1989) and Shrama (1995) in tomato.

Effect of number of sprays (DAS):

Among three sprays *viz.*, one spray (25 DAS), two sprays (25 and 45 DAS) and three sprays (25, 45 and 70 DAS) had significant effect on yield and yield attributing character. Effects of three sprays (25, 45 and 70 DAS) were observed significant as compare to one spray (25 DAS). However, three spray (25, 45 and 70 DAS) produced maximum plant height (79.92 cm), number of branches per plant (7.07), number of pods per plant (50.50), pod length (11.03 cm), number of grains per pod (17.70) and yield (1.85 t/ha) followed by two spray (25 and 45 DAS). Number of sprays regulating yield and yield attributing characters were also observed earlier by Venkatesan and Arumugum (2008) in medicinal solanum, Narayanamma *et al.* (2006) in brinjal; Palaniappan *et al.* (1999) in tomato and chilli, Singh *et al.* (2008) in coriander, Shakhda and Gajipara (1998) in onion.

Effect of interaction (Bio-regulators x number of spray):

Interactions of bio-regulator x number of sprays were found non-significant regarding yield and yield attributing characters (Table 1). However, three sprays (25, 45 and 70 DAS) of bio-regulator Triacantanol @0.5 ml per liter of water gave the maximum height of the plant (87.55 cm), number of branches per plant (7.67) and number of pods per plant (55.03) while three spray (25, 45 and 70 DAS) of bio-regulator GA @50 ppm produced the maximum pod length (11.57 cm, number of grains per pod (18.44) and yield per hectare (1.96 t/ha). These results are in conformity with the results of Memane *et al.* (2008). Singh *et al.* (1995) Singh *et al.* (2002) and Thapa *et al.* (2005) who also observed same results in onion crop.

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