

## YIELD AND NODULATION OF FENUGREEK (*TRIGONELLA FOENUM- GRAECUM*) AS INFLUENCED BY GROWTH REGULATORS AND VERMI-WASH

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### ABSTRACT

A field study was conducted during *rabi* season of 2008-09 at Sardarkrushinagar to find out optimum level of suitable growth regulator for higher yield of fenugreek. The experiment consisting of ten treatments, viz., NAA (10, 20 and 30 ppm) Ethephon (50, 100 and 150 ppm) vermi-wash (1, 2 and 3 lit. ha<sup>-1</sup>) and water spray was laid in simple RBD with three replications. The result revealed that highest number of nodules /plant and their dry weight a 60 DAS as well as seed, straw and biological yield were recorded with foliar spray of NAA @ 30 ppm being at par with Ethephon @ 150 ppm and NAA @ 20 ppm which were significantly higher over rest of the treatments but initial and final plant population as well as number of effective nodules dry weight of nodules /plant were not significantly influenced with varying levels of growth regulators. Water spray treatment recorded significantly lower values of number of effective nodules and their dry weight per plant at 40 and 60 DAS as well as seed, straw and biological yields. Thus, it is inferred that foliar spray of NAA @ 30 ppm, Ethephon @ 150 ppm and NAA @ 20 ppm has been found to be better for nodulation and higher yield of fenugreek.

**Key words:** Fenugreek, Growth regulator, Nodulation, Yield

### INTRODUCTION

Fenugreek commonly known as "*methi*" is an important major seed spices crop grown mainly in North India. Its seed are used as seasoning agent for pickles and vegetables. The seeds are also used in chronic dysentery, diarrhoea chronic and cough enlargement of liver, spleen and rickets. Recently importance of fenugreek has increased manifold due to role of diosgenin in major health problem. The role of plant bio-regulators in enhancing the production of crop has long been recognized and now this low cost technology has emerged as a boon for enhancing the agricultural production at an unprecedented rate. It has been observed that synthesis and translocation of photosynthates into sink is very poor at later stage of the crop. Besides, poor vegetative growth and flowering, plant hormones play an important role as the small quantities regulate the various physiological process and balance the source and sink thereby increase the productivity. Use of growth regulators, delay

senescence and retards abscission of reproductive organs (Gardner *et al.*, 2003). The plant growth regulators viz., NAA and Ethephon *etc.*, has been reported to influence the growth and yield in various crops by Bairwa and Kushik (2007) in fenugreek. In the present paper effect of NAA, Ethephon and vermiwash has been discussed on the yield and nodulation of fenugreek.

### MATERIALS AND METHODS

A field study was carried out during *rabi* season of 2008-09 on loamy sand soil of research farm of S.D. Agricultural University, Sardarkrushinagar (Gujarat). The soil had pH value of 7.4 containing low organic carbon (0.20) available nitrogen (170kg /ha), medium in available P<sub>2</sub>O<sub>5</sub> (39.1 kg /ha) and good in respect to available K<sub>2</sub>O (310 kg /ha). The experiment consisting of ten treatments, viz., NAA (10, 20 and 30 ppm) Ethephon (50, 100 and 150 ppm) vermi-wash (1, 2 and 3 lit. ha<sup>-1</sup>) and water spray was laid in simple RBD with three replications. Full recommended dose of nitrogen

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TABLE 1: Effect of different growth regulators and vermi-wash on plant population, number of branches /plant number of effective nodules /plant and nodules weight /plant

Treatments	Plant population /m <sup>2</sup>		Number of branches /plant	Number of nodules /plant		Nodules weight (mg /plant)	
	Initial	At maturity					
				40 DAS	60 DAS	40 DAS	60 DAS
Control (W.S.)	32.9	31.3	3.0	4.52	6.20	8.25	14.11 <sup>x</sup>
NAA 10 ppm	33.3	31.5	3.3	4.92	7.80	8.75	16.68 <sup>vi</sup>
NAA 20 ppm	31.9	31.4	4.0	5.04	8.80	8.45	19.43 <sup>iii</sup>
NAA 30 ppm	33.1	31.6	4.3	5.06	9.90	9.05	19.73 <sup>i</sup>
Ethephon 50 ppm	31.3	31.6	3.1	4.85	7.30	8.50	16.37 <sup>ii</sup>
Ethephon 100 ppm	31.8	31.1	3.3	4.92	8.14	8.75	16.95 <sup>iv</sup>
Ethephon 150 ppm	32. <sup>i</sup>	31.3	4.1	4.70	9.46	8.80	19.61 <sup>ii</sup>
Vermi-wash 1 lit. ha <sup>-1</sup>	31.9	30.6	3.1	4.65	6.90	8.24	14.54 <sup>ix</sup>
Vermi-wash 2 lit. ha <sup>-1</sup>	32.2	31.3	3.2	4.78	7.10	8.60	15.89 <sup>viii</sup>
Vermi-wash 3 lit. ha <sup>-1</sup>	31.2	31.5	3.3	4.80	8.00	8.24	16.84 <sup>v</sup>
SEm.(±)	1.5	1.6	0.2	0.23	0.34	0.41	0.79
CD (P=0.05)	NS	NS	0.6	NS	1.00	NS	2.35

and phosphorus was applied through DAP and urea at the time of sowing basal dose. Sowing was done at 30 cm row-to-row spacing using 20 kg seeds per ha. The fenugreek variety GF-2 was sown on 18 th Nov,2008. The foliar spray of Ethephon @ 50, 100 and 150 ppm, NAA @ 10,20 and 30 ppm was done at pre-flowering stage using a spray volume of 600 liter/ ha. Spray of vermi-wash was done @ 1.0, 2.0 and 3.0 liter/ha with dilution of 1:5 in normal water at pre-flowering stage. Soil around five randomly selected plants, was moistened and dug out carefully from each plot, washed and used to count the effective nodules having pinkish colour from each plant's root. The dry weight of nodules/ plant was recorded by electronic balance and expressed as mg /plant.

## RESULTS AND DISCUSSION

### Nodulation and number of branches per plant

The results obtained indicated that highest number of nodules /plant and their dry weight on 60 DAS and branches /plant were recorded with foliar spray of NAA @ 30 ppm being at par with Ethephon @150 ppm and NAA @ 20 ppm which were significantly higher over rest of the treatments but initial and final plant population as well as number of effective nodules dry weight nodules /plant were not significantly influenced with varying levels of growth regulators. Water spray treatment recorded significantly lower values of number of effective nodules, dry weight of nodule/ plant at 40 and 60 DAS. The number of nodules per plant and weight of nodules per plant increased under higher concentration of NAA and Ethephon, which clearly indicated that atmospheric nitrogen fixation capacity

TABLE 2: Effect of different growth regulators and vermi-wash on seed, straw and biological yields as well as harvest index of fenugreek

Treatments	Seed yield (kg/ ha)	Straw yield (kg/ ha)	Biological yield(kg/ ha)	Harvest index (%)
Control (W.S.)	920X	1664 X	2584 X	35.6
NAA 10 ppm	1064VI	1916 VI	2980 VI	35.7
NAA 20 ppm	1218III	2175 III	3393 III	36.0
NAA 30 ppm	1235I	2186 I	3421 I	36.1
Ethephon 50 ppm	1004VII	1816 VII	2820 VII	35.6
Ethephon 100 ppm	1074IV	1926 IV	3000 IV	35.8
Ethephon 150 ppm	1220II	2178 II	3398 II	35.9
Vermi-wash 1 lit. ha-1	971IX	1749 IX	2720 IX	35.7
Vermi-wash 2 lit. ha-1	998VIII	1790 VIII	2788 VIII	35.8
Vermi-wash 3 lit. ha-1	1070V	1919 V	2989 V	35.8
SEm.(±)	48	83	117	0.9
C D ( P=0.05)	142	247	348	NS

of fenugreek has increased as a result of dry matter accumulation in plants. Number of branches per plant was maximum in foliar spray of NAA @ 30 ppm than that in water spray treatment. Similar results have been reported by Jat (1996) in coriander and Alagukannan and Vijaykumar (1999) in fenugreek.

#### **Seed , straw and biological yields as well as harvest index**

The results obtained indicated that higher seed, straw and biological yields in fenugreek were recorded with foliar spray of NAA @ 30 ppm followed by Ethaphon @ 150 ppm and NAA @ 20 ppm which were at par with each other and significantly higher over rest of the treatments. The lowest values of these yield were obtained with water spray (Table 2). The harvest index was not significantly influenced by the application of varying levels of growth regulators. The possible reason for increased yield was due to

higher photosynthetic activity of treated plants as compared to control (Audus, 1960). This may be due to greater accumulation of photosynthate in plant body owing to higher photosynthesis, which would have enhanced the yields. The another possible reason may be explained in the light of the report of Crane and Overbreek (1965) who stated that sole function of fertilized ovules or seeds in relation to growth of fruits is to synthesize one or more hormones, which initiate and maintain a metabolic gradient along which foods can be translocated from parts of plants towards the pods. Therefore higher seed, straw and biological yields were obtained with foliar spray of NAA @ 30 ppm followed by Ethaphone 150 ppm and 20 ppm. Thus foliar application of NAA @ 30 ppm or Ethaphone @ 150 ppm or NAA @ 20 ppm is the best way of increasing nodulation and yield of fenugreek.

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