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RESEARCH ARTICLE

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Effect of mini-sprinkler and integrated nutrient management practices on growth and yield attributes of fenugreek (*Trigonella foenum-graecum* L.)

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ABSTRACT

A field experiment was conducted during *Rabi* season of 2008-09 at Soil and Water Management Research Farm, Navsari Agricultural University, Navsari to study the effect of mini-sprinkler and integrated nutrient management practices on growth and yield attributes of fenugreek (*Trigonella foenum-graecum* L.). The result of the experiment revealed that application of irrigation through mini-sprinkler at 0.8 IW/CPE ratio recorded significantly higher growth and yield attributes, seed and straw yield (1994 and 3488 kg ha^{-1}, respectively) compared to 0.6 IW/CPE ratio through mini-sprinkler. Amongst the integrated nutrient management practices, combined application of RDF + bio-compost @ 5 t ha^{-1} registered higher seed and straw yield (1875 and 3284 kg ha^{-1}, respectively). Net realization was also higher with mini-sprinkler at 0.8 IW/CPE ratio with combined application of RDF + bio-compost @ 5 t ha^{-1} (Rs. 52884 and 54566 ha^{-1}, respectively).

KEY WORDS : Fenugreek, Mini-sprinkler, Bio-compost, Net realization

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INTRODUCTION

Fenugreek (*Trigonella foenum-graecum* L.) commonly known as *Methi*, is one of the important seed spices of India. The use of fenugreek is multipurpose. Its seeds are used as condiment and vegetable for human consumption and as a concentrate for cattle. It is believed that the place of origin of fenugreek lies between Iran and North India. In India, fenugreek occupies an area of about 32.66 thousand hectares, producing 35.71 thousand tonnes of seeds with an average productivity of 1093 kg ha^{-1} (Anonymous, 2007). In India, it is widely grown in the states of Rajasthan, Gujarat, Tamil Nadu, Uttar Pradesh, Himachal Pradesh, Madhya Pradesh and Andhra Pradesh.

Mini-sprinkler is an advanced system of micro-irrigation (Sivanappan, 1987). This method of irrigation offers opportunity for reducing the total depth of irrigation. Further, it offers the benefit of fertigation and increase the fertilizer use efficiency which not only reduces the application cost of fertilizers, but curtail fertilizer dose also. Bio-compost improves physical as well as properties of soil. It inadvertently added some amount of major and micro nutrients in the soil. The productivity of fenugreek can be enhanced considerably if proper nutrient and water management practices are followed. Keeping these points in view, the present investigation the feasibility study on mini-sprinkler in fenugreek with integrated nutrient management on growth and yield attributes was undertaken.

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MATERIALS AND METHODS

Field experiment was conducted at Soil and Water Management Research Farm, N.A.U., Navsari during *Rabi* season of 2008-09. The 12 treatments comprising combinations of four levels of irrigation *viz.,* 0.4 IW/CPE ratio (R_1), 0.6 IW/CPE ratio (R_2), 0.8 IW/CPE ratio (R_3) were applied through mini-sprinkler with 50 mm depth of irrigation water at each irrigation and 1.0 IW/CPE ratio (R_4) through surface method with 60 mm depth of irrigation water at each irrigation and three INM treatments *viz.*, 20 kg N + 40 kg P_2O_5 ha^{-1} *i.e.*, RDF (F_1), RDF + FYM @ 5 t ha^{-1} (F_2) and RDF + bio-compost @ 5 t ha^{-1} (F_3) were tried in FRBD with 3 replications. The Fenugreek variety Gujarat *methi*-2 was sown on 13

November, 2009 keeping 30 cm inter-row spacing and intra-row spacing of 10 cm was maintained by thinning operation. The soil of the experimental plot was clay in texture, low in available nitrogen, high in available phosphorus, fairly rich in potassium and low in organic carbon content.

RESULTS AND DISCUSSION

The result obtained from the present investigation as well as relevant discussions have been presented under following heads:

Growth attributes:

Observations on plant height, number of branches per plant and dry matter accumulation were significantly influenced by various irrigation and integrated nutrient management practices (Table 1). Among irrigation practices, significantly higher plant height of 55.98 cm, number of branches plant^{-1} (11.67) and dry matter accumulation (61.41 g plant^{-1}) were recorded with 0.8 IW/CPE ratio through mini-sprinkler. The results are in conformation with the findings of Patel *et al.* (1989) in fenugreek. Among integrated nutrient management practices, application of RDF + bio-compost @ 5 t ha^{-1} registered significantly higher plant height (53.73 cm), number of branches plant^{-1} (11.05) and dry matter accumulation (59.14g/plant) and which was remained at par with RDF + FYM @ 5 t ha^{-1}. Similar results were also reported by Reddy and Ahlawat (1998) at New Delhi.

Table 1: Effect of irrigation and integrated nutrient management on growth attributes of Fenugreek

Treatments	Plant height (cm)	No. of branches plant^{-1}	Dry matter accumulation (g plant^{-1})
Irrigation levels (R)			
R_1 = 0.4 IW/CPE (Through mini-sprinkler)	45.60	9.27	48.63
R_2 = 0.6 IW/CPE (Through mini-sprinkler)	51.86	10.47	54.57
R_3 = 0.8 IW/CPE (Through mini-sprinkler)	55.98	11.67	61.41
R_4 = 1.0 IW/CPE (Through surface method)	53.90	10.98	59.19
S.E. ±	1.26	0.32	1.26
C.D. (P=0.05)	3.70	0.94	3.68
INM (F)			
F_1 = Control (RDF)	49.22	9.88	51.74
F_2 = RDF + FYM @ 5 t ha^{-1}	52.56	10.85	56.22
F_3 = RDF + bio-compost @ 5 t ha^{-1}	53.73	11.05	59.14
S.E. ±	1.09	0.28	1.09
C.D. (P=0.05)	3.21	0.81	3.19
Interaction (R x F)	NS	NS	NS

NS = Non Significant

Table 2: Effect of irrigation and integrated nutrient management on yield and yield attributes of Fenugreek

Treatments	No. Pods plant^{-1}	No. of Seeds plant^{-1}	Seed weight plant^{-1}	Seed yield (kg ha^{-1})	Straw yield (kg ha^{-1})
Irrigation levels (R)					
R_1 = 0.4 IW/CPE (Through mini-sprinkler)	35.27	393	5.25	1409	2676
R_2 = 0.6 IW/CPE (Through mini-sprinkler)	40.08	529	7.34	1670	2993
R_3 = 0.8 IW/CPE (Through mini-sprinkler)	44.67	573	8.35	1994	3488
R_4 = 1.0 IW/CPE (Through surface method)	41.31	534	7.84	1786	3277
S. E. ±	1.55	24.39	0.21	74	103
C.D. (P=0.05)	4.54	71.54	0.61	218	302
INM (F)					
F_1 = Control (RDF)	36.91	455	6.24	1537	2864
F_2 = RDF + FYM @ 5 t ha^{-1}	40.98	520	7.38	1732	3177
F_3 = RDF + bio-compost @ 5 t ha^{-1}	43.11	547	7.96	1875	3284
S. E. ±	1.34	21.12	0.18	65	89
C.D. (P=0.05)	3.93	61.96	0.53	189	261
Interaction (R x F)	NS	NS	NS	NS	NS

NS = Non Significant

Yield and yield attributes:

The data on yield and yield attributes varied significantly due to various irrigation and integrated nutrient management practices (Table 2). The result indicated that, significantly higher pod plant^{-1} (44.67), number of seeds plant^{-1} (573), seed weight plant^{-1} (8.35g), seed yield and straw yield of fenugreek (1994 and 3488 kg ha^{-1}, respectively) was noticed with 0.8 IW/CPE ratio through mini-sprinkler. The yield and yield attributes remarkably influenced by frequent irrigation at an 0.8 IW/CPE ratio through mini-sprinkler method which was probably due to improvement in microclimatic conditions, soil moisture availability, effective root zone and better aeration which resulted in congenial soil-plant-water condition, cooler canopy and more interception of photo-synthetically active radiation. These findings are sustained with those reported by Bhati (1993). The integrated use of RDF + bio-compost @ 5 t ha^{-1} registered significantly the highest seed and straw yields (1875 and 3284 kg ha^{-1}, respetively) over RDF + FYM @ 5 t ha^{-1}. Significantly higher seed yield with conjunctive use of RDF and bio-compost @ 5 t ha^{-1}was attributed to higher yield attributes like pods plant^{-1}, number of seeds plant^{-1}, seed weight plant^{-1} (43.11, 547 and 7.96 g, respectively). It might due to improvement in physico-chemical properties of the soil and more availability of essential nutrients to plants. Application of inorganic in combination with in organics proved its superiority in increasing the seed yield compared to their individual effect. These findings corroborate with the observations of Singh and Verma (2002), Selvarajan and Chezhiyan (2003).

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