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Efficacy of Sprinkler Irrigation in Chickpea

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ABSTRACT

An experiment on ascertaining the relative efficacy of sprinkler and surface irrigation in chickpea was conducted on sandy loam soil at Agricultural Research Station, Derol (Gujarat). It was evident from this study that there was 43.75 per cent saving in water with an increase in grain yield by 60 per cent. Three sprinkler irrigations of 60 mm each at sowing time, branching time and pod formation stages were found best suited to chickpea crop. Further, higher economic returns were obtained with 62.5 per cent saving in water over surface irrigation, when the crop was given only two sprinkler irrigations at sowing and branching stages.

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INTRODUCTION

Gram (*Cicer arietinum* L.) is an important pulse crop cultivated in Gujarat during winter season. To get higher yield per unit area, farmers are applying irrigation to the crop. For proper use of irrigation water, it becomes imperative to study the new method of sprinkler irrigation in chickpea crop specifically, where the soils are deep sandy loam with a high infiltration rate. With this objective, it was planned to study the efficacy of sprinkler method of irrigation over surface method.

MATERIALS AND METHODS

The experiment was conducted at Agricultural Research Station, Derol for three years (1994-95 to 1996-97). The soils of the experimental site was sandy loam in texture and neutral in reaction. The gram variety ICCC-4 was used in the study. The sowing was done on 22-11-94, 14-11-95 and 29-10-96 keeping a seed rate of 60 kg per hectare with a spacing of 30 x 10 cm. The crop was given a basal dose of 20 : 40 kg nitrogen and phosphorous per hectare, respectively. The treatment consisting of four irrigation schedules applied through sprinkler system (T_1 - two irrigations at sowing and branching T_2 - three irrigations at sowing, branching and pod formation, T_3 - three irrigations at sowing, branching and flowering and T_4 - four irrigation at sowing, branching, flowering and pod formation stage) compared with four irrigation given through check basin method of surface irrigation. In sprinkler irrigation, the depth of irrigation was fixed to 60 mm, while in surface irrigation it was kept 80 mm due to water losses. The twin nozzle sprinkler placed at 12

x 12 M were operated to get a water application rate of 1.67 cm/hr with 2.74 kg/cm² pressure for three and half hours duration. The experiment was conducted on a non-replicated large plot size (36 x 36 M) and the treatments were compared individually by 't' test.

RESULTS AND DISCUSSION

The pooled results of three years experimentation have indicated the superiority of sprinkler method of irrigation over surface irrigation method (Table 1). This was evident from the increased grain yield as well as water saving. The best time of application of sprinkler irrigation was found at sowing, branching and pod formation stages (T_2) indicated by the increased grain yield (62.93%) and water saving (43.75%). Similarly Shinde *et al.* (1985) found that sprinkler irrigation at presowing, branching and pod formation stage resulted in maximum seed yield in chickpea. Maximum water saving was observed, when irrigation through sprinkler

TABLE 1

Yield and water use parameters under different methods of Irrigation (three years pooled data).

Sr No.	Particulars	Sprinkler treatments				Surface method (control)
		T_1	T_2	T_3	T_4	
1.	Grain yield (kg/ha)	1417.17	1873.67	1176.00	1577.67	1150.00
	S. Em. = ± 58.43		C. D. = 166.92		C. V. = 13.78%	
2.	Straw yield (kg/ha)	1614.17	2465.83	1826.67	2610.00	2007.50
	S. Em. = ± 132.17		C. D. = 430.95		C. V. = 9.83%	
3.	Total water applied (mm)	120	180	180	240	320
4.	Water use efficiency (kg/ha-mm)	11.81	10.40	6.54	6.57	3.59
5.	Saving in water over control (%)	62.50	43.75	43.75	25.00	—
6.	Change in grain yield over control (%)	23.23	62.93	2.46	37.26	—
7.	Net income Rs. ha.	4855	9136	2156	5887	3210
8.	Additional area can can be covered (ha)	0.33	0.78	0.78	1.67	—
9.	Cost benefit ratio	1.52	1.95	1.22	1.60	1.39

Selling Price
Gram - Rs. 10 0/kg grain.

was given at time of sowing and branching stage (T_1) but it reduced the grain yield significantly. It was evident from these findings that the sprinkler irrigation at the time of flowering (T_3) was detrimental as it reduced the grain yield in chickpea Raman *et al.* (1983) also reported that grain yield in chickpea was reduced when irrigation was given at flowering stage.

The cost of cultivation was higher in sprinkler method of irrigation than the traditional surface method. In surface method, the cultivation cost was Rs. 8290/-. The highest net income over control (Rs. 5926/-) was realised, when sprinkler irrigation was given at the time of sowing, branching and pod formation stage (T_2). In addition to this income, there was a saving of 43.75 per cent in irrigation water. With this saving of water an additional 0.78 hectare land can be brought under irrigation which will result in further additional income. Basu *et al.* (1995) have also observed higher net profit by sprinkler irrigation than surface irrigation in blackgram.

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