be due to the ameliorative nature of the tree species and their leaf fall, inter crop residues added to the soil through ploughing and incorporation in the alleys. There existed a significant interaction between the depth of soil and irrigation methods. The rate of decrement was less as the depth advanced which might be due to the native high soil pH in the subsoils with sodicity.

Salt dynamics study showed that EC decreased from 1.9 to 1.53 dSm^{-1} after three years especially under drip irrigation in the top 0-15 cm soil layer. Interaction between irrigation methods and soil showed that there is a significant reduction in EC as the depth of soil increased. Among the irrigation methods drip irrigation had recorded significantly low EC levels when compared to surface basin and pitcher methods of irrigation. The minimal water usage through drip under sodic soil coditions might have minimized the problems of salt accumulation even when the irrigation water is sodic. This is inline with the observations of Panjab Singh (1996) and Sivanappan (1994).

Similarly the ESP of the soil decreased from 20 to 19 in the top layer but not significantly as the soil depth increased. The SAR values decreased significantly at different so depths irrespective of the irrigation metho at the end of three years. There was no significar interaction between different treatments on ES or SAR values.

Among the irrigation methods drip irrigatio performed better with an overall water savin upto 60 percentage. The drip system suits we to neem, pungam and casuarina with slightl saline water under sodic soil conditions.

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Research Notes

Response of chickpea to soil and foliar application of DAP

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Chickpea (*Cicer arientinum* L.) is one of the foremost *rabi* pulse crops of Maharashtra and premier pulse of India. With the advent of new high yielding varieties responsive to fertilizer nutrients, it is necessary to test three varieties with different fertilizer levels under protective irrigation. Phosphate fertilizers when added to soil undergo chemical reactions and get fixed with soil and thereby become unavailable to plants. Foliar application of P using water soluble fertilizers is one possible way to avoid such temporary fixation. Even small quantities of fertilizers applied through foliage 2-3 time at different growth stages of crops would mee out the nutrient requirements of the crops an thus productivity could be enhanced with lo input cost. With this consideration in viev the present investigation was undertaken.

A field experiment consisting of thre DAP levels (i. 100, ii. 150 and iii. 200 k ha^{-1} and three levels of 2% foliar spray c DAP (i. control, ii. once (50% flowering) an iii. twice (one week after first spray) was conducte

Table 1. Mean plant height, plant spread, number of branches and dry matter per plant, grain yield, protein percentage and protein yield as influenced by different treatments.

Treatments	Plant height (cm)	Plant spread (cm)	No.of branches plant^{-1}	Dry matter plant^{-1}	Grain yield (q ha^{-1})	Protein (%)	Protein yield (q ha^{-1})
DAP levels (kg ha^{-1})							
1. 100	51.10	47.06	25.31	29.53	28.53	25.08	7.17
2. 150	54.77	51.10	27.81	32.55	31.54	26.32	83.1
3. 200	56.40	53.60	29.60	33.36	32.35	27.70	8.98
S.E. ±	0.38	0.41	0.36	0.19	0.20	0.30	0.12
CD at 5%	1.33	1.44	1.24	0.69	0.69	1.04	0.40
Foliar sprays (2% DAP)							
1. Control	52.22	48.76	25.78	30.20	29.19	24.94	7.29
2. Once at 50% flowering	54.33	50.52	27.82	32.08	31.07	26.44	8.23
3. Twice (one week after first spray)	55.72	52.47	29.15	33.16	32.18	27.72	8.94
S.E. ±	0.36	0.57	0.27	0.32	0.33	0.20	0.10
C.D. at 5%	1.08	1.71	0.80	0.95	0.98	0.60	0.30

Table 2. Cost of cultivation, gross monetary returns, net monetary returns and B:C ratio as influenced by different treatments.

Treatment	Cost of cultivation (Rs. ha^{-1})	Gross monetary returns (Rs. ha^{-1})	Net monetary returns (Rs. ha^{-1})	B:C ratio
I) DAP levels (kg ha^{-1})				
1. 100	16756	44181	27448	2.63
2. 150	17175	48458	31286	2.81
3. 200	17596	49949	32520	2.84
S.E. ±		371	315	0.01
C.D. at 5%		1284	1090	0.06
II) Foliar sprays (2% DAP)				
1. Control	17091	44913	28011	2.63
2. Once at 50% flowering	17176	47949	30774	2.78
3. Twice (one week after first spray)	17260	49726	32466	2.87
S.E. ±		446	418	0.02
C.D. at 5%		1325	1241	0.07

in split plot design with four replications at Mahatma Phule Krishi Vidyapeeth, Rahuri during *rabi* season 1996-97. The soil of the experimental field was clayey in texture, low, medium and high in available NPK, respectively. The sowing of crop (cv. Vishal) was done by dibbling on ridges and furrows (45 x 15 cm). The whole quantity of DAP was applied at the time of sowing as a basal dose as per the treatments while the first foliar spray of 2 per cent DAP was applied at 50% flowering and second spray after a week from the first spray.

The values of growth attributes (Table 1) *viz.* mean plant height (56.40 cm), plant spread (53.60 cm), number of branches (29.66) and dry matter per plant (33.36 g) were maximum and significantly higher due to application of 200 kg DAP per hectare compared to other levels. This might be due to the fact that the soil fertility status measured in terms of available N and P, was low to medium in range due to which there was significant respone to higher level of fertilizer i.e. upto 200 kg DAP ha^{-1}. The productivity of chickpea measured as grain yield increased significantly with increase in the level of DAP. The values of grain yield (32.35 q ha^{-1}), protein percentage (27.70%) and protein yield (8.98 q ha^{-1}) of chickpea were significantly more due to application of 200 kg DAP ha^{-1} which were 13.39, 10.45 and 25.24% higher than 100 kg DAP/ha. The maximum value in net returns (Rs.32520/ha) and benefit cost ratio (2.84) was accounted with application of 200 kg DAP/ha. The increase in yield and net returns with increased level of DAP might due to enhancement of vegetative growth. Three results are in agreement with those reported by Kumpawat *et al.* (1990) Jagtap (1991) and Jat and Mali (1992).

The differences in growth attributes differed significantly due to foliar sprays. The values of growth attributes *viz.* plant height, plant spread, number of branches and dry matter $plant^{-1}$ were 55.72 cm, 52.47 cm, 29.15 and 33.16 g, respectively, which were maximum and significantly higher with foliar spray of 2% DAP at two different growth stages (and 75 DAS) than those observed in one foli spray of 2% DAP at 68 DAS and contr The plant nutrients supplied through folia might have been better used more efficient by the plants resulting in enhanced on pla growth. The grain yield, protein percenta and protein yield showed improvement for foli spray of 2% DAP at two different growt stages compared to one foliar spray and contro The values of grain yield, protein percentag and protein yield were 32.18 q ha^{-1}, 27.72 and 8.94 q ha^{-1}, respectively. Consequent upo the favourable effect on growth attributes an yield due to foliar spray of 2% DAP at tw different growth stages, the gross monetary return (Rs.49726), net monetary returns (Rs.32466 and benefit cost ratio (2.87) also increase considerably (Table 2). Varughese and Pathal (1987) reported similar results. The interactio effect between fertilizer levels and foliar spra failed to reach the level of significance.

Based on the results it could be conclude that the application of 200 kg DAP ha^{-1} a basal may be an ideal proposition for achievin higher productivity in chickpea. However, when adequate water is available, foliar spraying of 2 per cent DAP on 68 and 75th day could sustain the productivity of chickpea.

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