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Effect of Sowing Dates, Nitrogen and Phosphorus on Growth and Yield of Isabgul (*Plantago ovata* Forsk)

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Isabgul (*Plantago ovata* Forsk) is an important medicinal crop and plays vital role in agricultural economy in India and holds a monoploy in production and trade in the world. Gujarat and Rajasthan are major isabgul producing states in the country. In Gujarat, it is cultivated on an area of 28,900 hectares producing 20,000 tonnes of seeds annually yielding 691 kg/ha (Anonymous, 1997). Though, it is a traditional cash crop of North Gujarat, its cultivation is extended to Saurashtra region. Hence, a replicated field experiment was conducted at the Instructional Farm of Gujarat Agricultural University, Junagadh during the *rabi* season of 1993-94. The experiment was laidout in a split plot design with three dates of sowing (5th & 20th November and 5th December) in main plots and six treatment combinations consisting three levels of nitrogen (0.10 and 20 kg N ha^{-1}) and two levels of phosphorus (0 and 20 kg P_2O_5 ha^{-1}) in sub plots. Isabgul var. Guj. Isabgul-2 was sown as per treatments and harvested accordingly. The soil of the experimental site was clayey in texture, low in available nitrogen (231 kg ha^{-1}), medium in available phosphorus (31.62 kg ha^{-1}) and high in potash (371.0 kg ha^{-1}) with pH 7.7 and EC 0.29 dS m^{-1}.

The morphological parameters, yield attributes and yield were recorded and N and P_2O_5 content for uptake by grain and straw were determined by micro-kjeldahl's method and vanadomolybde phosphoric acid yellow colour method, respectively (Jackson,1967) during the course of experimentation.

Different sowing dates (Table 1 & 2) significantly influenced the grain and straw yields and N and P_2O_5 uptake as well as growth and yield attributes. Significantly the highest grain (1032 kg ha^{-1}) and straw (4552 kg ha^{-1}) yields were produced when the crop was sown on 20th November than earlier (5th November) and later (5th December) sowing. As compared to earlier or later sowing the higher yield under 20th November sowing might be resulted from significant improvement in growth viz., plant height (33.32 cm) and yield attributes viz., number of spikes/plant (15.87), spikelength (4.04 cm) and grain yield/plant (2.78 g) as well as N (15.07 and 18.10 kg ha^{-1}) and P_2O_5 (3.17 and 1.80 kg ha^{-1}) uptake through grain and straw, respectively. 20th November sowing also resulted in the highest net realization of Rs. 6384 ha^{-1}. This results indicated that 20th

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TABLE 1

Effect of different treatments on yield, economics and N & P_2O_5 uptake by isabgul.

Treatment	Yield (kg ha^{-1})		Net realization (Rs ha^{-1})	Uptake (kg ha^{-1}) N		P_2O_5	
	Grain	Straw		Grain	Straw	Grain	Straw
Date of sowing							
5th Nov.	934	3652	5406	14.01	16.83	2.22	1.51
20th Nov.	1032	4552	6384	15.07	18.10	3.17	1.80
5th Dec.	911	3702	5186	13.84	15.57	2.09	1.46
S.Em.±	21	120	-	0.14	0.25	0.06	0.04
C.D. at 5%	80	470	-	0.57	0.99	0.25	0.14
C.V. %	9.05	12.80	-	4.29	6.35	10.74	9.53
Nitrogen (kg ha^{-1})							
0	792	3798	4138	13.76	15.70	2.12	1.42
10	1006	3952	6113	14.34	16.02	2.38	1.48
20	1080	4155	6765	14.82	18.79	2.99	1.87
S.Em.±	18	69	-	0.13	0.21	0.06	0.02
C.D. at 5%	53	200	-	0.38	0.61	0.17	0.07
Phosphorus (kg ha^{-1})							
0	901	3885	5252	14.01	16.28	2.23	1.49
10	1017	4051	6092	14.60	17.39	2.76	1.69
20	15	56	-	0.11	0.17	0.05	0.02
S.Em.±	43	163	-	0.31	0.50	0.14	0.06
C.D. at 5%	8.11	7.38	-	3.92	5.34	10.20	6.52
Interaction							
D X N							
S.Em.±	32	120	-	0.23	0.37	0.10	0.04
C.D. at 5%	NS	NS	-	NS	NS	NS	NS
D X P							
N X P							
S.Em. ±	26	98	-	0.19	0.30	0.09	0.03
C.D.at 5%	NS	NS	-	NS	NS	NS	NS
D X N X P							
S.Em.±	45	169	-	0.32	0.52	0.15	0.06
C.D. at %5	NS	NS	-	NS	NS	NS	NS

NS = Non Significant.

TABLE 2

Effect of different treatments on growth and yield attributes of isabgul.

Treatment	Plant height (cm)	No. of spikes / plant	Spike length (cm)	Grain yield/ plant (g)	1000 grain weight (g)
Date of sowing					
5th Nov.	31.90	13.86	2.28	2.35	1.52
20th Nov.	33.32	15.87	4.04	2.78	1.61
5th Dec.	30.11	12.76	2.20	1.95	1.48
S.Em.±	0.60	0.40	0.09	0.07	0.02
C.D. at 5%	2.37	1.56	0.34	0.29	NA
C.V.%	8.06	11.93	12.89	13.08	4.50
Nitrogen (kg ha^{-1})					
0	31.04	13.00	2.48	1.90	1.47
10	31.37	13.71	2.84	2.32	1.52
20	32.92	15.77	3.21	2.86	1.52
S.Em.±	0.50	0.31	0.07	0.07	0.02
C.D. at 5%	1.45	0.91	0.21	0.20	0.05
Phosphorus (kg ha^{-1})					
0	31.06	13.49	2.74	2.17	1.49
20	32.49	14.83	2.95	2.55	1.51
S.Em.±	0.41	0.26	0.06	0.06	0.01
C.D. at 5%	1.18	0.74	0.17	0.16	NS
C.V.%	6.68	9.41	10.68	12.20	4.44
Interaction					
D X N					
S.Em.±	0.87	0.54	0.12	0.12	0.03
C.D. at 5%	NS	NS	NS	NS	NS
D X P					
N X P					
S.Em.±	0.71	0.44	0.10	0.10	0.02
C.D. at 5%	NS	NS	NS	NS	NS
D X N X P					
S.Em.±	1.23	0.77	0.18	0.17	0.04
C.D.at 5%	NS	NS	NS	NS	NS

NS = Non Significant

November is the optimum time for sowing Isabgul in this region. Similar effect of normal sowing (21st October) of Isabgul was earlier reported by Randhawa *et al.*, (1978) for Ludhiana, Punjab.

Increasing the nitrogen form 0 to 20 kg ha^{-1} increased grain as well as straw yield of Isabgul (Table-1). Application of 20 kg N ha^{-1} produced significantly the highest grain (1080 kg ha^{-1}) and straw (4155 kg ha^{-1}) yields. Significant improvement in growth viz., plant height (32.92 cm) and yield attributes viz. number of spikes/plant (15.77), spikelength (3.21 cm), grain yield/plant (2.86g) and test weight (1.52 g) has enhanced the yield under the application of 20 kg N ha^{-1} which also realized the highest net return (Rs. 6765 ha^{-1}) over control and 10 kg N ha^{-1} (Table - 2). These findings are in accordance with those of Tandel (1989).

Application of phosphorus (20 kg ha^{-1}) produced significantly higher grain (1017 kg ha^{-1}) and straw (4051 kg ha^{-1}) yields than the control (Table - 1). Significant enhancement in growth viz. plant height (32.49 cm) and yield attributes viz., number of spikes / plant (14.83), spikelength (2.95 cm) and grain yield/plant (2.55 g) as well as N (14.60 and 17.39 kg ha^{-1}) and P_2O_5 (2.76 and 1.69 kg ha^{-1}) uptake by grain and straw, respectively (Table - 2) under phosphorus application might have resulted in higher yield of Isabgul than control. Phosphorus application (20 kg ha^{-1}) also recorded higher net realization of Rs. 6092 ha^{-1} over the control. The results corroborate with those of Tandel (1989).

Thus, it is evident from this investigation that the higher production and profit from isabgul can be securred by sowing the crop on 20th November with an application of 20 kg N and 20 kg P_2O_5 ha^{-1}.

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REFERENCES

Anonymous, 1997. Districtwise area, production and yield per hectare of important food & non-food crops in Gujarat State. Directorate of Agriculture, Gujarat, Ahmedabad.

Jackson, M. L., 1967. 'Soil Chemical Analysis', Prentice Hall of India Pvt. Ltd., New Delhi. PP. 327-350.

Randhawa, G. S., Sahota, T. S., Bains, D.S. and V. P. Mahajan, 1978. The effect of sowing date, seed rate and nitrogen fertilizer on growth and yield of Isabgul. *J. Agric. Sci. Camb.*, **90** : 341-343

Tandel, A. D., 1989. Response of isabgul (*Plantago ovata* F.) to irrigation, nitrogen and phosphorus. M.Sc. (Agri.) thesis submitted to GAU, S. K. Nagar.