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Research Article

Response of different sources and levels of potash on quality, NPK content and uptake of isabgul (*Plantago ovata* Forsk)

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ABSTRACT : Application of 60 kg K_2O ha^{-1} from potassium sulphate (K_2SO_4) was most effective for securing higher seed yield and yield attributes. The test weight of 1000 seeds, swelling factor, lodging and diseased index were non-significant due to different sources and levels of potash. The nitrogen, phosphorus and potassium content were also found non-significant due to different sources and levels of potash. The significantly maximum nitrogen, phosphorus and potassium uptake of isabgul seed was observed under the treatment S_2 (K_2SO_4) and treatment K_4 (80 kg K_2O/ha) due to influence of different sources and levels of potash, respectively, but in case of isabgul straw had non-significant response. The interaction effect was non-significant.

KEY WORDS : Isabgul, *Plantago ovata*, *Blonde psyllium*, Potash

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INTRODUCTION

Blonde psyllium is an important medicinal crop of Gujarat. Due to low cost of production and higher return from the crop. Gujarat commands near monopoly in the production and export of isabgul seed and seed husk to the world market. It is cultivated in India about 1.3 lakh ha with production of 77000 MT seed. (Desai and Devra, 2008). Earning about 130 crores rupees from the isabgul seed and 150 crores rupees from husk were exported valued together Rs.280 crores. Isabgul is raised as a *Rabi* season crop and grown in all type of soil under irrigated conditions but does best on loamy soils. Water is scare commodity, which if used judiciously along with suitable agrotechniques would substantially increase both plant growth, yield and yield attributes. Application of fertilizers in proper amount and in proper time will go for higher crop production. Potassium application increases the plant's growth and yield because it participates in the mechanisam of stomatal movement, photosynthesis and helps in osmoregulatory adaption of plant due to water stress (Weimberg *et al*., 1982). With these dual purpose agronomic aspects in mind, an attempt has been made to conduct an experiment on response of different sources and levels of potash on growth, yield attributes and yields of isabgul (*Plantago ovata* Forsk).

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EXPERIMENTAL METHODS

A field experiment was conducted during *Rabi* seasons of the year 2009-10 at College Agronomy Farm, B. A. College of Agriculture, Anand Agricultural University, Anand, Gujarat. The soil was sandy loam in texture. The soil was low in available nitrogen, medium in phosphorus and low in potash. The experiment was laid out in Factorial Randomized Block Design (FRBD) with four replications. The treatments consisted of two sources of potash and five different levels of potash *viz.*, S_1: (Potassium chloride, KCl), S_2: (Potassium sulphate, K_2SO_4)

and five different levels of potash *viz.*, K_0: Control; K_1: 20 kg K_2O ha^{-1}; K_2: 40 kg K_2O ha^{-1}; K_3: 60 kg K_2O ha^{-1} and K_4: 80 kg K_2O ha^{-1}. In all, there were ten treatment combinations. Isabgul variety GI-2 was sown in line sowing at 30 cm distance on November 20 during the year 2009-10., at 4.0 kg seed ha^{-1} and fertilized with 30+15 kg NP ha^{-1}.

EXPERIMENTAL RESULTS AND ANALYSIS

The results obtained from the present study have been discussed in detail under following heads :

Effect of sources and levels of potash:

The swelling of seed (cc g^{-1}), lodging (%) and diseases index were found non significant due to different sources and levels of potash.

The appraisal of mean data (Table 1) pertaining to the influence of different sources and levels of potash on the nitrogen, phosphorus and potassium content indicated that there existed non-significant differences. The nitrogen, phosphorus and potassium uptake of isabgul seed had shown significant differences, but in case of isabgul straw had non-significant differences due to influence of different sources and levels of potash. It was observed that increased levels of potash reflected on higher uptake of phosphorus and potassium of isabgul seed. It means higher levels of potash was beneficial in respect to phosphorus and potassium uptake. This might be due to accumulation of the major nutrients was

Table 1 : Influence of different sources and levels of potash on quality, NPK content and uptake of isabgul

Treatments	Test weight of 1000 seeds	Lodging (%)	Diseases index (%)	Nitrogen				Phosphorus				Potassium			
				Content (%)		Uptake (kg/ha)		Content (%)		Uptake (kg/ha)		Content (%)		Uptake (kg/ha)	
				Seed	Straw	Seed	Straw	Seed	Straw	Seed	Straw	Seed	Straw	Seed	Straw
Sources of potash (S)															
S_1 = KCl	1.77	5.00	0.52	1.46	0.17	26.34	21.69	1.65	0.15	29.85	18.80	1.60	0.15	28.82	19.48
S_2 = K_2SO_4	1.76	5.24	0.56	1.46	0.17	29.25	22.16	1.74	0.15	34.73	19.87	1.71	0.16	34.30	21.40
S.E.±	0.01	0.13	0.02	0.04	0.00	1.12	0.67	0.04	0.01	1.17	0.82	0.05	0.01	1.10	0.97
C.D. (P=0.05)	NS	NS	NS	NS	NS	NS	NS	NS	NS	3.40	NS	NS	NS	3.18	NS
Levels of potash (K)															
K_0 = control	1.76	5.68	0.50	1.35	0.16	20.18	20.56	1.66	0.15	25.05	19.47	1.57	0.15	23.53	18.33
K_1 = 20kg K_2O/ha	1.74	5.46	0.54	1.46	0.17	25.08	22.20	1.71	0.14	29.33	18.25	1.63	0.16	27.82	20.36
K_2 = 40kg K_2O/ha	1.80	4.95	0.54	1.41	0.17	29.58	22.13	1.66	0.14	34.73	18.59	1.65	0.16	34.69	20.70
K_3 = 60kg K_2O/ha	1.76	4.87	0.56	1.60	0.16	32.79	21.37	1.71	0.15	35.51	19.02	1.71	0.16	35.49	20.33
K_4 = 80kg K_2O/ha	1.78	4.79	0.57	1.48	0.17	31.35	23.38	1.74	0.16	36.86	21.35	1.72	0.17	36.26	22.47
S.E.±	0.02	0.20	0.02	0.07	0.01	1.77	1.06	0.07	0.01	1.85	1.29	0.08	0.01	1.73	1.53
C.D. (P=0.05)	NS	0.59	NS	NS	NS	5.13	NS	NS	NS	5.38	NS	NS	NS	5.03	NS
Interaction (S × K)	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
C.V. (%)	3.12	11.23	12.71	12.89	10.71	17.97	13.66	11.26	16.23	16.24	18.89	13.16	17.82	15.54	21.18

NS=Non-significant

Table 2 : Gross realization, net realization and cost benefit ratio (CBR) and net cost benefit ratio for treatment combination

Treatment combinations	Seed yield (kg ha^{-1})	Straw yield (kg ha^{-1})	Gross realization (Rs.ha^{-1})	Total cost of production (Rs.ha^{-1})	Net realization (Rs.ha^{-1})	CBR	NET CBR
S_1K_0	1577	13246	69703	7473	62230	1:9.33	1:8.33
S_1K_1	1587	12679	69819	7758	62061	1:8.99	1:7.99
S_1K_2	1940	12790	78675	7943	70732	1:9.90	1:8.90
S_1K_3	1807	12909	78734	8127	70607	1:9.67	1:8.67
S_1K_4	2066	11957	88618	8312	80306	1:10.66	1:11.66
S_2K_0	1444	12060	63790	7473	56317	1:8.54	1:7.57
S_2K_1	1837	12805	79882	7940	71942	1:10.06	1:9.06
S_2K_2	2220	13075	95337	8306	87031	1:11.48	1:10.48
S_2K_3	2334	13159	99939	8673	91266	1:11.52	1:10.52
S_2K_4	2165	15107	94153	9040	85113	1:10.41	1:9.41

Selling Price : Seeds @ Rs. 40.00 kg^{-1}
: Straw @ Rs. 0.5 kg^{-1}

enhanced due to increase in nutrient concentration as well as dry matter yield.

Interaction effect (S × K) with respect to swelling of seed, test weight and NPK content and uptake were found non-significant due to interaction effect of different sources and levels of potash. The non-significant results were observed for lodging (%) and diseased index (%) also.

Economics:

The economical aspect of crop production is the major consideration for the farmers while making a decision on the adoption of a new technology. Among the different treatment combinations S_2K_3 (Potassium sulphate with 60 kg K_2O/ha) had given higher net realization, CBR and Net CBR (91266, 1:11.52, 1:10.52), respectively (Table 2). The second best treatment combination was S_2K_2 (K_2SO_4 with 40 kg K_2O/ha) with net realization (87031), CBR (1:11.48) and Net CBR (1:10.48) (Table 2). The treatment combination S_2K_3 (K_2SO_4 with 60 kg K_2O/ha) yielded (114 kg/ha) higher seed yield over treatment combination S_2K_2 (K_2SO_4 with 40 kg K_2O/ha). If we considered the economics that treatment combination gave higher returns (Rs. 4460/ha) than treatment combination S_2K_2, through higher 20 kg K_2O/ha application from potassium sulphate (K_2SO_4) and increased the cost. These might have been due to the cumulative effect of the superiority of K_2 (40 kg K_2O/ha) and K_1 (20 kg K_2O/ha) treatments. These results were supported by Bose *et al*. (2006) and Annna *et al*. (2008).

Conclusion:

For securing higher seed yield, net realization, CBR and net CBR from from isabgul crop, cv. "Gujarat Isabgul-2" raised on loamy sand soils of middle Gujarat conditions, it is advisable to fertilize the crop with common basal application of 30 kg N + 15 kg P_2O_5 and 60 kg K_2O ha^{-1} from potassium sulphate.

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