

## Inducing Drought Tolerance in Bajra (*Pennisetum typhoides* Stapf & Hubb) by Pre-Sowing Seed Treatments with Special Reference to the Mineral Nutrition in Seedlings

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### ABSTRACT

Pre-sowing treatments namely hardening with water and chemical solutions (CCC, Ethrel, Kinetin and Resistin) were given to Bajra HB-3 strain. The total nitrogen content was more in CCC and Kinetin treatments when compared to others. Regarding total phosphorus the influence of resistin was maximum followed by CCC and Kinetin. But hardening had very little influence in increasing the content of potassium over the control. Some of the pre-treatments were effective in enhancing the calcium content of seedlings.

### INTRODUCTION

It was Genkel and Kolotova (1934) who reported for the first time the beneficial uses of pre-sowing hardening of seeds. Since then we have many reports on this subject. In a recent one Rajasekhar *et al.* (1970) reported that ragi plants from hardened seeds were found to respond better than plants from the unhardened seeds to fertilizer applications, especially in years of low rainfall. In the present study the effect of pre-treatment on the mineral nutrition of Bajra is reported.

### MATERIALS AND METHODS

HB-3 strain of bajra (*Pennisetum typhoides* Stapf & Hubb) was used in this study. Accepted methods were employed in giving the treatments indicated in the table. The treated seeds were sown in conventional germination trays filled with red soil and sand mixture (2:1 ratio) uniformly. About

500 seeds were sown in lines uniformly and watered. After germination, trays were irrigated with one-fourth strength of Hoagland solution uniformly as and when necessary. Samples were taken from replications and pooled for analysis at weekly intervals namely 8th, 15th, 22nd and 30th day of the age of the crop. Total N, P, K and Ca were estimated by adopting standard methods.

### RESULTS AND DISCUSSION

The total nitrogen, phosphorus and potassium contents of the seedlings estimated at chosen stages are given in the Table. The total nitrogen content was more in CCC and Kinetin pre-treatments, when compared to others. Other treatments increased nitrogen slightly more than control. With ageing the differences were not significant among the different pre-treatments. Humphries (1968) found that total nitrogen per

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TABLE. Effect of seed treatments on total nitrogen, total phosphorus, potassium and calcium contents in bajra seedlings (percentage)

Treatment	Age of seedlings in days															
	8				15				27				30			
	N	P	K	Ca	N	P	K	Ca	N	P	K	Ca	N	P	K	Ca
Control	2.58	0.30	2.07	0.32	2.16	0.15	2.23	0.33	1.43	0.04	2.26	0.49	1.75	0.02	2.35	0.44
Hardening	2.83	0.45	2.18	0.35	2.51	0.37	2.24	0.39	1.87	0.07	2.32	0.44	1.77	0.04	2.46	0.50
CCC - 5 ppm	3.50	0.47	2.14	0.55	3.20	0.39	2.25	0.55	2.27	0.08	2.37	0.55	1.77	0.06	2.47	0.60
Ethrel - 5 ppm	2.81	0.42	2.14	0.32	2.44	0.37	2.23	0.33	1.80	0.07	2.39	0.42	1.38	0.06	2.47	0.44
Kinetin - 5 ppm	3.22	0.59	2.18	0.34	3.17	0.46	2.25	0.37	2.17	0.08	2.39	0.42	1.68	0.06	2.49	0.45
Resistine-10 ppm	2.83	0.72	2.23	0.37	2.57	0.54	2.28	0.40	1.96	0.16	2.38	0.50	1.64	0.13	2.57	0.54

leaf increased rapidly for about a week but as soon as maximum was reached, began to decrease. Further he observed that CCC delayed the time when total nitrogen and protein nitrogen diminished but Henckel (1970) reported that the rate of incorporation of  $N^{15}$  into protein during and after drought was higher in maize plants grown from seeds which received pre-sowing hardening. The present report also indicated that as a result of hardening of seeds by chemicals, nitrogen accumulation was more.

The results of pre-treatments of seeds on the content of total phosphorus confirmed the previous reports. Earlier reports by Jayabal (1971) and Shen *et al.* (1967) were that resistant varieties recorded more phosphorus than susceptible ones in rice. Among the treatments, influence of resistine was maximum followed by CCC and Kinetin. The content of phosphorus was maximum in all the four stages of estimations ranging from 360 to 650 per cent on the control. Ethrel and hardening (water) behaved similarly. There

was low accumulation of total phosphorus as a result of water stress. Gates and Bonner (1959) found that water shortage in leaves of young tomato plant was accompanied by depression in net accumulation of phosphorus in leaves. The earlier reports and the present data confirm that higher phosphorus content may be very well correlated with drought tolerance.

As regards potassium content, pre-treatments had very negligible influence. Resistine was better than other pre-treatments while CCC, Ethrel and Kinetin were equal in their effects. The high content of potassium in resistant varieties of rice as against susceptible and medium tolerant varieties was correlated with drought tolerance by Jayabal (1971).

Some of the pre-treatments were effective in enhancing the calcium content of the seedlings at the four stages studied. It is clear from the Table that CCC showed superiority among the treatments followed by resistine.

Hardening was slightly better than Kinetin pre-treatment, while ethrel was not effective at all when compared to the control. In rice, Jayabal (1971) reported lesser accumulation of calcium in susceptible varieties as against resistant varieties.

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