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## RESEARCH ARTICLE

### RESPONSE OF BOREX ON TUBER YIELD OF POTATO AND ITS QUALITY IN RIVERINE TRACT OF UTTAR PRADESH

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Borex, Catchments area of Ganga, *Kufri Bahar*, *Kufri Pukhraj*, Riverine tract.

#### ABSTRACT

The field study was conducted during 2016-17 and 2017-18 on farmer's field of Kannauj block in district Kannauj. The pilot area is situated in the catchments of river *Ganga*. The soil of pilot project was sandy loam, having pH 8.0, organic carbon 0.23%, total nitrogen 0.02%, available phosphorus 9.0 kg/ha and available potassium 273 kg/ha, therefore, the nutrients status of soil was low. The three treatments i.e., farmers practice, 180 kg N+100 kg P<sub>2</sub>O<sub>5</sub>+100 kg K<sub>2</sub>O/ha (RDF) and 180 kg N+100 kg P<sub>2</sub>O<sub>5</sub>+100 kg K<sub>2</sub>O+18 kg Borex were tested under cvs. *Kufri Bahar* and *Kufri Pukhraj*. *Kufri Bahar* yielded tubers by 361.04 q/ha, while *Kufri Pukhraj* gave tubers yield by 366.00 q/ha at 180 kg N+100 kg P<sub>2</sub>O<sub>5</sub>+100 kg K<sub>2</sub>O+18 kg Borex/ha. Other two treatments of fertilizer application were failed to surpass the borex combination treatment. *Kufri Pukhraj* gave higher production over *Kufri Bahar* at each level of fertilizer application. The net return Rs. 115584/ha and BCR (1:1.17) and net return Rs. 118560/ha and BCR (1:2.14) were achieved from cultivars *Kufri Bahar* and *Kufri Pukhraj*, respectively at 180 kg N+100 kg P<sub>2</sub>O<sub>5</sub>+100 kg K<sub>2</sub>O+18 kg Borex/ha, which was higher over farmers practice and recommended dose application of fertilizer i.e. NPK/ha. As regard to quality characters both the tested cultivars proved superior over local checks.

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## INTRODUCTION

Among the potato growing districts, Kannauj is well known for intensive cultivation, because it is situated in riverine tract of Uttar Pradesh. The intensity of cropping is reached upto 300 percent by growing of three crops in a year on the same field. In some places the cropping intensity reached upto 400 percent due to inclusion of double crop of potato i.e., early potato and late potato. Since the potato is the main cash crop of short duration and farming majority use to rotate only those crop which fits well with potato. The main crops grown by farmers with potato rotation consisted of maize, wheat and pumpkin or cucurbits or vegetables, giving rise to maize – early potato – late potato, maize – early potato – wheat, maize – potato – pumpkin and maize-late potato rotations in the dense potato growing area. Therefore, district Kannauj occupies a prestigious position, so far, as potato production is concerned after harvesting of maize. The farmers of district Kannauj are very analytical they compute over all net profitability of cropping system, thereafter, follow the crop rotation. Maize-early potato- late potato, maize – early potato-late wheat, maize-early potato-summer groundnut and maize- potato-hybrid maize cropping systems are in vogue among the farming majority on large area.

Under this situation, the boron deficiency has been observed in potato growing area. In view of the wide spread boron deficiency in Kannauj district soils, boron fertilization is necessary to get higher production of potato crops. The common source of boron recommended with Borex. Therefore, the study was planned and undertaken for application of boron through borex with recommended dose of fertilizer.

## MATERIALS AND METHODS

The present study was carried out during autumn season of 2016-17 and 2017-2018 at Kannauj district of Uttar Pradesh. The soil of experimental site was sandy loam, having pH 8.0, organic carbon 0.23%, total nitrogen 0.02%, available phosphorus 9.0 kg/ha and available potash 273 kg/ha, therefore, the fertility status was poor. The pH was determined by Electrometric glass electrode method (Piper, 1950), while organic carbon was determined by Colorimetric method (Datta et al., 1962). Total nitrogen was analyzed by Kjeldahl's method as discussed by Piper (1950). The available phosphorus and potassium were determined by Olsen's method (Olsen et al., 1954) and Flame photometric method (Singh 1971), respectively. The three treatment i.e. farmers practice, 180 kg N+100 kg P<sub>2</sub>O<sub>5</sub>+100 kg K<sub>2</sub>O/ha (RDF) and 180 kg N+100 kg P<sub>2</sub>O<sub>5</sub>+100 kg K<sub>2</sub>O+18 kg Borex were tested

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Table 1. Yield contributing characters, tuber yield (q/ha) and economic study as influenced by different treatments

(Pooled data of two years)

S. No.	Treatment	Tubers/ plant	Weight of tubers/ plant (g)	Yield (q/ha)	Cost of cultivation (Rs./ha)	Gross return (Rs./ha)	Net return (Rs./ha)	BCR
A.	<i>Kufri Bahar</i>							
(i)	Farmers practice	8.38	402.24	319.68	99240.00	191808.00	92568.00	1.93
(ii)	180 kg N+100 kg P <sub>2</sub> O <sub>5</sub> +100 kg K <sub>2</sub> O/ha (RDF)	8.50	408.00	321.12	99565.00	192672.00	93107.00	1.93
(iii)	180 kg N+100 kg P <sub>2</sub> O <sub>5</sub> +100 kg K <sub>2</sub> O+18 kg Borex/ha	9.20	441.60	361.04	101040.00	216624.00	115584.00	2.14
B.	<i>Kufri Pukhraj</i>							
(i)	Farmers practice	8.70	417.60	322.40	99240.00	193440.00	94200.00	1.95
(ii)	180 kg N+100 kg P <sub>2</sub> O <sub>5</sub> +100 kg K <sub>2</sub> O/ha (RDF)	8.90	427.20	325.17	99565.00	195102.00	95537.00	1.96
(iii)	180 kg N+100 kg P <sub>2</sub> O <sub>5</sub> +100 kg K <sub>2</sub> O+18 kg Borex/ha	9.65	463.20	366.00	101040.00	219600.00	118560.00	2.17

Sale price of potato tubers = Rs. 6000/quintal.

under cvs. *Kufri Bahar* and *Kufri Pukhraj* on farmer's fields. The potato was planted between 15-25 October and harvested after 90-95 days of planting. The recommended packages of practices were given to potato crop. The irrigations were given as and when required. The net return and BCR were calculated after finalization of experiment on pooled results basis.

## RESULTS AND DISCUSSION

The pooled results of two years obtained from the experiment are summarized in Table-1.

**Yield contributing characters and yield of tubers:** The higher tubers/plant 9.20 and 9.55 were recorded under *Kufri Bahar* and *Kufri Pukhraj*, respectively, at 180 kg N+100 kg P<sub>2</sub>O<sub>5</sub>+100 kg K<sub>2</sub>O+18 kg Borex/ha in comparison to farmers practices and 180 kg N+100 kg P<sub>2</sub>O<sub>5</sub>+100 kg K<sub>2</sub>O (RDF). Application of 180 kg N+100 kg P<sub>2</sub>O<sub>5</sub>+100 kg K<sub>2</sub>O in association of 18 kg borex/ha produced 441.60 g/plant weight of tubers by *Kufri Bahar* and 463.20 g/plant weight of tubers by *Kufri Pukhraj*, which were higher over other two tested treatments. *Kufri Bahar* yielded tubers by 361.04 q/ha, while *Kufri Pukhraj* gave tubers yield by 366.00 q/ha at 180 kg N+100 kg P<sub>2</sub>O<sub>5</sub>+100 kg K<sub>2</sub>O+18 kg Borex/ha. It is worthwhile to mention here that other two treatments of fertilizers application were failed to surpass the application of 180 kg N+100 kg P<sub>2</sub>O<sub>5</sub>+100 kg K<sub>2</sub>O+18 kg Borex/ha. The sowing of *Kufri Bahar* and *Kufri Pukhraj* on light soil with borex application had higher number of tuber/plant means it possessed higher sink capacity to utilized the photo assimilates translocated from source. It resulted in, higher weight of tubers/plant and more tubers yield (q/ha). These results are commensurable to the findings of Panwar *et al.* (1986), Shrivastava and Bharadwaj (1986), Pachpor and Shete (2010), Singh *et al.* (2015), Singh *et al.* (2015), Singh *et al.* (2016) and Singh *et al.* (2017).

**Varietal impact:** It is clear from the data available in Table-1 that cultivar *Kufri Pukhraj* registered higher tuber yield (366.00 q/ha) over *Kufri Bahar* (361.04 q/ha). Thus *Kufri Pukhraj* gave higher yield of tubers by a margin of 4.96 q/ha over *Kufri Bahar*. Therefore, cultivar *Kufri Pukhraj* was more responsible to bore application in combination of recommended dose of fertilizer. In general comparison cultivar *Kufri Pukhraj* gave higher productivity over *Kufri Bahar* at each level of fertilizer application.

**Economic study:** The highest net return of Rs. 115584.00/ha and Rs. 118560.00/ha were achieved from cultivar *Kufri Bahar* and *Kufri Pukhraj*, respectively, at 180 kg N+100 kg P<sub>2</sub>O<sub>5</sub>+100 kg K<sub>2</sub>O+18 kg Borex/ha, which was higher over

farmers practice and 180 kg N+100 kg P<sub>2</sub>O<sub>5</sub>+100 kg K<sub>2</sub>O/ha. The BCR in *Kufri Pukhraj* was computed 1:2.17, while it was recorded by 1:2.14 with the cultivar *Kufri Bahar* at 180 kg N+100 kg P<sub>2</sub>O<sub>5</sub>+100 kg K<sub>2</sub>O+18 kg Borex/ha. The good return with *Kufri Pukhraj* was due to equal size and bright tubers, which attracted to the consumers and purchasers and provided good market rate, resulted in, it gave highest net return over *Kufri Bahar*. The similar results have also been reported by Singh *et al.* (2013) and Singh *et al.* (2013).

**Quality study** - It has been observed before the planning and undertaking of the experiment that villager's majority used the very indigenous varieties i.e. "Gola" and "Military" in the preparation of potato chips etc. The home scientist associated with this experiment has tested the quality of these varieties for chips and other potato base preparation through farm families. The observations have been recorded from the selected families, they informed that the borex application produce of tubers gave the nice quality in eating.

**Conclusion and recommendation:** The borex associated fertilizer application was found superior over other two treatments, therefore, the farm families of potato growing tract may be advocated for the application of borex with recommended dose of fertilizer.

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