

ABSTRACT

Field experiments were carried out during 1999-2000 and 2000-2001 at Block Seed Farm, Adisaptagram, Hooghly, West Bengal, to study: (a) the role of biofertilizers in economizing N and P rates for potato production; (b) the effect of levels and methods of potassium ^{application} on growth, yield and storage behaviour of potato and (c) ^{the} physical and biochemical parameters of some Dutch and Indian cultivars in order to identify suitable cultivars on the basis of processing quality and productivity. The objective was to standardize the doses of N, P and K nutrients and the best method of potassium application when used in conjunction with different biofertilizers as inoculants for better economy and efficiency and to identify suitable high yielding potato varieties for processing for the Gangetic Alluvial Zone of West Bengal.

The first experiment comprising eight combinations of inorganic N and P along with biofertilizers was laid out in RBD with three replications. Application of biofertilizers imparted significant influence on plant growth parameters, tubers hill¹, size of tubers, total tuber yield, NPK uptake and soil fertility. Though biofertilizers viz. *Azotobacter* + *Phosphobacteria* along with 100% N and P + 1% urea + 1% sodium bicarbonate recorded highest yield, treatments containing 75% N and P along with 1% urea + 1% sodium bicarbonate + *Azotobacter* + *Phosphobacteria* and *Bacillus* spp. exhibited 3.86 and 1.38 cent⁻¹ higher yield of tuber compared to uninoculated control of 100% N and P alone. The NPK uptake by leaves, stems and tubers were higher in treatment containing 100% N and P + 1% urea + 1% sodium bicarbonate + *Azotobacter* + *Phosphobacteria*. The soil fertility status showed a build up in the initial available NPK after the completion of experiment in both the years. The net return rupee⁻¹ invested was also higher in biofertilizer inoculated treatments.

The second experiment consisting of five levels and four methods of potassium application was arranged in a RBD with three replicates. The maximum values of all the growth attributes, yield and NPK uptake by leaves, stems and tubers were recorded at 200 kg K₂O ha⁻¹ when applied in two equal splits. But potassium applied at 150 kg K₂O ha⁻¹ accrued the maximum number of tubers hill⁻¹ when applied $\frac{2}{3}$ rd as basal + $\frac{1}{3}$ rd as top dressing at 30 days after planting (DAP). There was a build up of available soil N and P after the completion of the experiment with all the levels of potassium; however, in the treatments of 0 and 50 kg K₂O ha⁻¹, a decline in available K was noticed during both the years. The minimum physiological loss in weight and rotting of tubers after 90 days of storage was recorded at 200 kg K₂O ha⁻¹ when applied full at 30 DAP as top dressing. The economic optimum dose of potassium was worked out as 157.8 kg K₂O ha⁻¹.

The trial to evaluate processing quality of nine Dutch and Indian potato cultivars was carried out in a RBD with three replications. The LAI, DM accumulation, LAD and tubers hill⁻¹ was highest in Indian cultivar Kufri Chipsona-1, whereas CGR, TBR and NAR was highest in Dutch cultivar Diamant but Cardinal produced the maximum percentage of large sized tubers, tuber yield and recorded the minimum peeling loss of tubers. Kufri Chipsona-1 and Kufri Chipsona-2 recorded low reducing sugars, total sugars and gave acceptable light colour chips. Total acids and vitamin C content was maximum in Ajax; total soluble solids were maximum in Sante while specific gravity was highest in Kufri Chipsona-2. Kufri Chipsona-1 showed minimum physiological loss in weight while Kufri Chipsona-2 resulted in minimum rotting of tubers after 90 days of storage. Though tuber yield of Dutch cultivars Cardinal and Diamant as well as popular local cultivar Kufri Jyoti was higher, they failed to meet the minimum processing quality standards and were susceptible to late blight. In contrast, late blight resistant cultivars Kufri Chipsona-1 and Kufri Chipsona-2 yielded higher, and met the requirement of processing quality standards of high dry matter content, specific gravity and low reducing sugars to give light colour chips.