YIELD AND QUALITY OF POTATO AS INFLUENCED BY WEED MANAGEMENT PRACTICES AND THEIR RESIDUAL STUDY IN SOIL

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ABSTRACT

A field experiment was conducted during rabi season of 2002-03 and 2003-04 to study the effect of weed management practices on yield and quality of potato. Lowest weed biomass at harvest was found in prometryne (0.1 kg/ha PE) treated plots, followed by pendimethalin (1.0 Kg/ha PE) and metribuzin (0.5 kg/ha PE). Similarly highest yield of potato tubers was recorded in plots treated with prometryne (0.1 kg/ha PE), next best treatments were pendimethalin (1.0 Kg/ha PE), metribuzin (0.5 kg/ha PE) and two hand weedings. Highest dry matter content of potato tubers was recorded in fluchloralin followed by alachlor, one earthing and mulching, all being significantly superior to hand weeding treatment while higher dry matter yield was recorded in prometryne (0.1 kg/ha PE), pendimethalin (1.0 Kg/ha PE) and metribuzin. Ascorbic acid content was highest in pendimethalin treated tubers followed by fluchloralin and paraquat. Protein content was highest in pendimethalin treated tubers followed by metribuzin and prometryne, while maximum starch content was found in prometryne, followed by fluchloralin and mulching treatments. No residual activity of herbicides applied to potato was found in post harvest soil.

Key words : C

Potato, an important food and vegetable crop of the world, produces more weight and calories per unit area as compared to all other field crops (Das, 1993). It provides a source of low cost energy for human diet. Potato tubers are also rich source of starch, vitamins specially C and B and minerals. Potato is commonly grown on highly productive and irrigated soil in which the weeds emerge even before the emergence of potato and get established earlier than the crop if not managed at the proper stage. Yield reduction in potato can be as high as 62% (Singh and Bhan, 1999) and 74% (Ahuja et al., 1999). The effective control of weeds by using different herbicides have been reported in different field experiments. However their feasibility depends on the climate, type of soil and weed flora. Further herbicides may affect the quality of potato adversely and may persist in soil to harm the succeeding crops. In present paper a study has been carried out to evaluate the effect of different weed managements practices on yield and quality of potato. The residual study of herbicides in post harvest soil was also carried out.

The field experiment was conducted during rabi season of 2002-03 and 2003-04 at research farm, College of Agriculture, Gwalior. The soil of the experimental field was sandy clay loam in texture, neutral in reaction (pH 7.5), with 160, 28 and 380 kg/ha available N, P2O5 and K2O and organic carbon 0.41 kg/ha. Potato variety Řufri Loukar was used. The experiment was conducted in randomized block design with three replications having 10 treatments comprised of paraquat (0.5 kg/ha), metribuzine (0.5 kg/ha), pendimethalin (1.0 kg/ha), prometryne (1.0 kg/ha), fluchloralin (0.75 kg/ha), alachlor (1.5 kg/ha), mulching, one earthing, two hand weedings and weedy check (Table 1). Qualitative analysis of potato tubers was carried out in second year of experiment only. Dry matter, ascorbic acid, protein and starch were determined in potato tubers by oven dry, titrametric, Kjeldahl and anthrone methods, respectively.
Post harvest soil (0-15 cm depth) was collected from each plot to study the residues of applied herbicides. Residue of herbicides in soil was studied by bioassay method using cucumber as test plant. The soil from each treatment was dried in shade, sieved and filled in replicated pots of 500 g capacity. Ten seeds of test crop were sown in each pot. After ten days five plants per pot were maintained to avoid competition effect. Water was added to pots as and when required. Plant height, fresh weight and dry weight of cucumber plants were recorded 21 days after sowing.

Data presented in Table 1 indicate significant weed control in all the treatments except mulching 20 DAS, as depicted by total weed biomass at harvest compared with weedy check. The lowest weed biomass was recorded in that prometryne (6.0 q/ha), metribuzin (11.5 q/ha), fluchloralin (14.9 q/ha), alachlor (17.1 q/ha) and two hand weeding (17.8 q/ha), and they were statistically at par among themselves.

Similarly prometryne followed by pendimethalin (181.0 q/ha) and metribuzin (179.1 q/ha) being statistically at par recorded significantly higher yield of potato tubers. Significantly lowest tuber yield was obtained with weedy check which was 55.5, 50.2, 49.7 and 40.9 per cent lower as compared to prometryne, pendimethalin, metribuzin and two hand weedings, respectively. Reason for higher yield of potato tubers may be that the intensity of weeds and weed biomass were low in above treatments resulted in higher yield. Similar results were obtained by Phogat et al. (1991), Singh and Bhan (1999) and Bhattacharya et al. (2005). Increase in crop yield of potato by mulching,
Pendimethalin, metribuzin, earthing and hand weeding was also reported by Reddy et al. (1995). Tripathi et al. (2005) reported that metribuzin supplemented by earthing up at 30 days, being on par with paraquat, pendimethalin, prometryn and hand weeding twice, provided maximum tuber production.

Dry matter content is one of the major factors which decide the suitability of a potato variety for processing. Dry matter percentage of potato tubers of all the treatments was significantly superior over weedy check except paraquat. Ascorbic acid content was highest in pendimethalin treated tubers followed by fluchloralin and paraquat. All other treatments were statistically at par but lower than hand weeding treatment. Protein content was highest in pendimethalin treated tubers followed by metribuzin and prometryne, while maximum starch content was found in prometryne, followed by fluchloralin and mulching treatments. Rai and Singh (1991) recorded decrease in dry matter, ascorbic acid and starch content by application of metribuzine, methabenzthiazuron and hand weeding, but increase in protein content by hand weeding and methabenzthiazuron in potato cv. Kufari Chandramukhi tubers.

Plant height, fresh weight and dry weight of test plant cucumber recorded 21 days after sowing were nonsignificant (Table 2) which indicated that herbicides paraquat, metribuzin, pendimethalin, prometryne, fluchloralin and alachlor does not leave any residue in post harvest soil of potato field.

REFERENCES