

Weed Management in Potato

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Abstract

The field experiment conducted during *rabi* of 2003-04 and 2004-05 at revealed that tuber yield of potato was reduced by 46% by weeds only. All the herbicidal treatments significantly reduced the weed density and weed dry matter production and increased the tuber yield with a weed control efficiency ranging from 62% to 84%. Among the herbicides tested, paraquat and oxyfluorfen recorded the highest tuber yield of 197.2 and 195.4 q/ha, respectively, and were comparable to weed free check. The next best treatments were fluchloralin and pendimethalin and these were comparable to the farmers' practice of hoeing and earthing up. The dry weight of weeds was significantly and negatively correlated with other biometric observations of potato crop.

Key words : Weed management, Potato, Yield, Herbicides.

Potato is an important vegetable crop grown throughout Orissa. Heavy infestation of weeds reduced potato yield to the tune of 10–80% under different agroclimatic conditions (1, 2). Slow growth of the crop during early stage of life cycle coupled with heavy fertilizer application and wider spacing encourage vigorous weed growth. Additionally, the crop takes 12 to 15 days for emergence, which in consequence establishes weeds earlier and smoother the crop. Weed species also vary with ecosystems. Herbicidal control of weeds in potato assumes greater significance being efficient and economical method (3, 4). Information on herbicidal control of weeds in potato in Orissa conditions is meager. Hence, the present experiment was undertaken with the explicit aim to find out the efficacy of different herbicides in controlling weeds and on growth and yield of potato.

Methods

The field experiment was conducted during *rabi* seasons 2003-04 and 2004-05, at the central farm of Orissa University of Agriculture and Technology. The soil of the experimental site was sandy loam in texture, low in nitrogen, phosphorus, potassium and neutral in reaction (pH 6.9). The experiment was laid out in randomized block design with four replications. The herbicidal treatments consisted of preplant incorporation of oxyfluorfen and fluchloralin at 0.10 and 0.75 kg a.i./ha, respectively ; pre-emergence

application of metribuzin, pendimethalin, isoproturon, each at 0.75 kg a.i./ha ; pre-emergence application of thiobencarb at 1.5 kg a.i./ha ; application of paraquat at 0.75 kg a.i./ha at 5% crop emergence. Apart from these one weed free check and one unweeded check were also taken for comparison. The crop cv Kufri Chandramukhi received the recommended dose of 120 kg N, 80 kg P₂O₅ and 100 kg K₂O/ha. The crop was raised with recommended plant protection measures. Observations on weeds and crop yield were made at harvest. Data on weed count and dry matter production of weeds were subjected to square-root transformation before statistical analysis.

Results and Discussion

The most predominant weed flora observed in the experimental field were *Digitaria sanguinalis*, *Echinochloa colonum*, *Eleusine indica*, *Panicum* spp, *Cyperus iria*, *Cyperus rotundus*, *Chenopodium album*, *Eclipta alba*, *Trianthema portulacastrum*, *Amaranthus spinosus*, *Amaranthus viridis*, *Oldenlandia corymbosa*, *Portulaca oleracea*, *Euphorbia hirta*, *Heleotropium indicum* and *Oxalis corniculata*.

All the weed management practices significantly reduced the weed density and weed dry matter production compared to the weedy check (Table 1). Among the herbicides tested, paraquat and oxyfluorfen significantly reduced the weed popula-

Table 1. Effect of weed control treatments on weed density, weed dry weight, weed control efficiency (WCE) and growth and tuber yield of potato (pooled data of two seasons). Figures in parentheses are original values.

Treatments	Dose (kg ai/ha)	Weed density (no/m ²)	Weed dry weight (g/m ²)	WCE (%)	Stems/plant	Tubers/hill	Tuber yield (q/ha)
Oxyfluorfen	0.10	8.3 (67.6)	6.1 (35.2)	82.3	3.7	6.2	195.4
Metribuzin	0.75	11.6 (128.9)	8.2 (64.3)	67.8	3.5	5.3	164.2
Fluchloralin	0.75	9.2 (82.4)	6.7 (44.1)	77.8	3.9	6.0	176.8
Isoproturon	0.75	12.5 (152.7)	8.7 (75.5)	62.0	3.4	4.7	159.2
Pendimethalin	0.75	10.3 (106.4)	7.5 (55.4)	72.1	3.5	5.8	175.4
Paraquat	0.75	8.2 (67.0)	5.7 (31.7)	84.0	4.0	6.9	197.2
Thiobencarb	1.50	11.3 (130.3)	8.4 (69.6)	66.5	3.5	5.8	160.4
Hoeing and earthing up	-	9.2 (86.5)	6.4 (39.5)	80.1	3.7	6.2	180.2
Weed free check	-	1.0 (0.0)	1.0 (0.0)	100.0	4.3	8.4	200.6
Weedy check	-	20.2 (405.6)	14.2 (198.7)	-	2.8	4.2	137.4
CD (0.05)	-	2.6	2.4	-	NS	2.6	13.6

tion and weed dry matter production with a weed control efficiency (WCE) of 84% and 82.3%, respectively. Nimje et al. (5) also reported that paraquat is the most effective herbicide for controlling weeds in potato crop. The treatments of paraquat and oxyfluorfen were closely followed by the treatment of farmers practice of hoeing and earthing up with WCE of 80.1%. The herbicidal treatment of fluchloralin (WCE 77.8%), pendimethalin (WCE of 72.1%), metribuzin (WCE of 67.8%) and thiobencarb (WCE of 66.5%) were also effective for controlling weeds and were statistically at par with the farmers practice of hoeing and weeding. Pre-emergence application of isoproturon was also effective on controlling the weeds with a WCE of 62%. Similar observations were also reported by Singh (6). Crop emergence was not adversely affected by different herbicides. The oxyfluorfen treated plots exhibited some phytotoxic effect but later on plants recovered their growth within a few days.

Differences among number of stems per hill were significant in different herbicidal treatments (Table 1). Paraquat at 0.75 kg/ha significantly increased this parameter compared with other herbicidal treatments. Weed free check recorded highest tuber yield. This was statistically at par with the tuber yields recorded by paraquat and oxyfluorfen. The next best treatment was the farmers' practice of hoeing and weeding which recorded a tuber yield of 180.2 q/ha. This was

statistically at par with fluchloralin (167.8 q/ha), pendimethalin (175.4 q/ha), metribuzin (164.2 q/ha) and thiobencarb (160.4 q/ha.) Isoproturon recorded a tuber yield of 159.2 q/ha. Unweeded control (weedy check) recorded significantly the lowest tuber yield of 137.4 q/ha. Similar observations were also reported by Nimje et al. (5) and Thakral et al. (7).

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