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Effect of Weed Management Practices in Potato (*Solanum tuberosum* L.)

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ABSTRACT

A field experiment was conducted during **rabi** seasons of 2002-03 and 2003-04 at College Farm, Gwalior to evaluate the performance of some weed management practices in potato. Results showed that herbicide prometryne 1.0 kg/ha PE was more effective to control the weeds. The next best treatments were pendimethalin 1.0 kg/ha PE and two hand weedings.

Key words : Mulching, hand weeding, chemical weed control

INTRODUCTION

Potato is an important food and vegetable crop of the world and produces more weight and calories per unit area as compared to all other food crops (Das, 1993). Presence of weeds throughout the growing period of all crops caused 62% reduction in tuber yield. Potato is major vegetable crop in India. However, the weeds prevalent in and around the crop hamper potato cultivation thereby resulting in substantial reduction in yield (Singh *et al.,* 1984). Manual weeding by traditional practice is quite effective but a costly, tedious, time consuming and also causes root injury (Khurana *et al.,* 1993).

Advantages of chemical weed control lie in its superior efficiency, economy and easiness. Chemicals like pendimethalin and alachlor as pre-emergence and paraquat as early emergence have been used for weed control in potato. But weeds generally emerge during later stage of crop growth even after application of aforesaid weedicides. Keeping these points in view, the field experiment was conducted to evaluate the performance of some weed management practices in potato.

MATERIALS AND METHODS

The experiment was conducted during **rabi** seasons of 2002-03 and 2003-04 at College Farm, Gwalior. There were 10 treatments taken in randomized block design with three replications. The experiment was sown on 23 and 30 October during the years 2002 and 2003, respectively. Tuber yield and dry matter of weeds were recorded. Herbicide paraquat was applied at 5% emergence of potato, while metribuzin, pendimethalin, prometryne and alachlor were sprayed at pre-emergence of crop and fluchloralin at pre-planting stage.

RESULTS AND DISCUSSION

The major weed flora of the experimental field was *Cyperus rotundus* and *Phalaris minor* among monocot weeds, while *Chenopodium album, Spergula arvensis, Melilotus indica, Anagallis arvensis, Asphodelus tenuifolius* and *Convolvulus arvensis* amongst dicot weeds. *Parthenium hysterophorus* was also observed during the study year 2003-04.

Effect on Weeds

It was observed that the population of *C. album* and *P. minor* varied significantly during both the years due to weed control treatments. The above weeds were effectively controlled with the application of pendimethalin 1.0 kg/ha, prometryne 1.0 kg/ha and metribuzin 0.5 kg/ha were next in order. In case of *S. arvensis* and *M. indica* these herbicides responded markedly in both the years. Minimum population of *S. arvensis* was observed in pendimethalin and prometryne closely followed by metribuzin. As regards *A. arvensis,* herbicide metribuzin and prometryne were found effective to control this weed followed by pendimethalin and fluchloralin. Almost similar results were observed also in case of *A. tenuifolius*. The population of *C. rotundus* was reduced markedly by the application of fluchloralin closely followed by one earthing and mulching at 20 DAS. Mulching 20 DAS, prometryne 1.0 kg/ha and fluchloralin 0.75 kg/ha controlled *C. arvensis* very effectively.

Dry matter of weeds and total weed population

Table 1. Number of weeds/m² species-wise of potato as influenced by weed control treatments

Treatments	*C. album*		*S. arvensis*		*M. indica*		*P. minor*		*A. arvensis*		*A. tenuifolius*		*C. rotundus*		*C. arvensis*	
	2002-03	2003-04	2002-03	2003-04	2002-03	2003-04	2002-03	2003-04	2002-03	2003-04	2002-03	2003-04	2002-03	2003-04	2002-03	2003-04
Paraquat 0.5 kg/ha POE	1.62	1.86	1.27	1.79	1.94	1.34	1.27	2.93	0.91	2.29	1.93	1.22	0.64	1.65	0.71	0.85
Mulching 20 DAS	1.78	1.99	1.91	1.81	1.44	1.66	1.26	2.68	0.71	1.84	1.70	0.71	0.67	1.49	0.98	0.75
Metribuzin 0.5 kg/ha PE	0.93	0.12	1.09	1.21	2.17	1.02	1.29	1.56	0.70	0.79	0.85	0.79	1.35	3.32	1.24	1.16
Pendimethalin 1.0 kg/ha PE	0.46	0.14	0.71	1.07	1.99	0.71	0.88	1.73	0.56	0.85	0.71	0.94	1.09	2.77	1.27	1.13
Prometryne 1.0 kg/ha PE	0.98	0.00	1.44	0.94	2.34	1.05	1.23	1.38	0.57	0.79	1.19	0.88	0.66	2.43	0.79	1.00
One earthing 30 DAS	2.19	1.57	2.30	1.14	2.64	1.22	1.44	2.10	1.11	1.84	1.81	1.23	1.12	1.47	1.97	1.41
Two hand weedings	1.86	1.53	2.86	2.48	2.52	2.22	1.71	2.41	1.20	2.56	1.56	1.27	0.96	1.67	1.61	0.94
Fluchloralin 0.75 kg/ha PPI	1.73	1.40	0.85	1.26	2.40	1.55	0.94	1.45	0.39	1.67	1.35	0.71	0.56	1.58	1.02	0.94
Alachlor 1.5 kg/ha PE	1.75	1.25	2.31	2.01	1.49	1.34	0.91	1.56	0.72	1.32	1.52	1.14	0.71	2.42	1.16	1.07
Unweeded control	2.09	2.18	2.77	3.94	2.87	2.52	1.56	3.69	1.17	3.57	2.12	1.70	1.04	3.19	1.50	1.52
LSD (P=0.05)	0.46	0.29	0.44	0.86	0.29	0.86	0.64	1.01	0.36	1.00	0.45	0.64	NS	1.09	NS	0.31

NS–Not Significant.

Table 2. Total weed population, weed biomass, weed control efficiency, tuber yield and economics as influenced by different weed control treatments

Treatments	Total weed population/m^2		Weed biomass (q/ha)		Tuber yield (q/ha)		Pooled over two years				
	2002-03	2003-04	2002-03	2003-04	2002-03	2003-04	WCE (%)	Gross returns (Rs./ha)	Net returns (Rs./ha)	Additional grain over control (Rs./ha)	B : C ratio
Paraquat 0.5 kg/ha POE	104.0	108.7	36.0	51.6	99.5	150.8	39.4	50080	18234	13012	1.57
Mulching 20 DAS	110.0	136.3	50.6	63.9	108.2	151.8	20.0	52000	20642	15420	1.66
Metribuzin 0.5 kg/ha PE	31.3	9.7	20.6	2.5	182.0	176.2	81.7	71640	36754	31532	2.05
Pendimethalin 1.0 kg/ha PE	19.3	12.7	20.8	1.8	161.4	200.6	81.8	72400	37851	32629	2.09
Prometryne 1.0 kg/ha PE	13.3	5.3	9.2	2.8	189.3	215.8	90.7	81000	46114	40892	2.32
One earthing 30 DAS	118.0	25.7	40.8	32.6	97.7	180.1	46.9	55560	23242	18020	1.72
Two hand weedings	199.0	25.3	26.1	9.5	144.1	161.0	72.8	61000	27782	22560	1.84
Fluchloralin 0.75 kg/ha PPI	174.0	223.3	60.9	83.1	86.9	93.3	-	36040	5222	-	1.17
Alachlor 1.5 kg/ha PE	80.0	23.3	25.2	4.7	133.5	147.8	76.4	56240	23874	18652	1.74
Unweeded control	87.3	32.7	28.4	5.9	118.6	179.9	93.1	59680	23542	22320	1.84
LSD (P=0.05)	40.2	14.1	21.0	9.9	20.4	44.5	-	-	-	-	-

were affected significantly by different treatments during both the years. The minimum dry matter production of weeds was found under the treatment prometryne 1.0 kg/ha closely followed by paraquat, pendimethalin and metribuzin. All these treatments were statistically similar among themselves and significantly more effective to rest of the treatments. The weed density was also lower under prometryne followed by pendimethalin and metribuzin. All these treatments were at par and significantly more effective to rest of the treatments.

Effect on Crop

On the pooled basis results showed that no phytotoxic effect of any herbicide was observed on the potato crop. The tuber yield was affected significantly due to different treatments. The yield of potato tuber was recorded highest (202.5 q/ha) under prometryne 1.0 kg/ha treatment. Pendimethalin 1.0 kg/ha (181.0 q/ha), metribuzin 0.5 kg/ha (179.1 q/ha) and two hand weedings (152.5 q/ha) were next in order. The lowest tuber yield (90.19 q/ha) was obtained in unweeded control which was 55.5, 50.2, 49.7 and 40.9% lower as compared to treatments prometryne, pendimethalin, metribuzin and two hand weedings, respectively.

Prometryne 1.0 kg/ha provided 91% weed control efficiency, recorded lowest weed biomass followed by pendimethalin (81.8%), metribuzin (81.7%) and two hand weedings (72.8%). However, different weed control treatments denoted varying values of weed control efficiency ranging from 21 to 91%. It was concluded that herbicide prometryne 1.0 kg/ha PE was found most effective to control the weeds resulting in higher yield of potato as well as higher net return and B : C ratio. The next best treatments were pendimethalin 1.0 kg/ha PE, metribuzin 0.5 kg/ha PE and two hand weedings.

REFERENCES

Das, F. C. 1993. *Vegetable Crops of India.* Kalyani Publishers, Ludhiana. pp. 58-78.

Khurana, S. C., K. K. Thakral and K. K. Bhatia, 1993. Effect of pendimethalin and isoproturon on weeds and tuber yield of potato. *Ind. Potato Assoc.* **20** : 255-257.

Singh, Govindra, V. M. Bhan, S. S. Tripathi and D. Singh, 1984. Comparative efficacy of herbicides in potato. *Ind. J. Weed Sci.* **16** : 1-5.