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Effect of Different Weed Management Practices on Growth and Yield of Potato (*Solanum tuberosum* L.) cv. Kufri Jyoti

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A B S T R A C T

The experiment was conducted to study the effect of different weed management practices on growth and yield of potato (*Solanum tuberosum* L.) cv. Kufri Jyoti at Crop Research Centre, SGRR (P.G.) College, Dehradun, Uttarakhand during the rabi season of the year 2017-18. The experimental field was laid out in Randomized Block Design with 3 replications of 8 treatments. The results indicated that days to 50 per cent emergence was significantly earliest (11.57) under Treatment T1 (S Metolachlor @ 0.12 kg/ha as Post-emergence) than other treatments, whereas plant population per meter2 was statistically non significant under the all treatments. The maximum plant height (39.40 cm and 41.60 cm) was observed during later stage of plant growth *i.e.*, 45 and 60 days after planting, respectively, under Treatment T3 (Metribuzin @ 0.4 kg/ha as Pre-emergence). The average weight of tubers per plant and tuber yield per plot (275.33g and 27.57 kg) were found maximum in treatment T5 (Prometryne @ 1.0 kg/ha as Pre-emergence). Thus, it can be concluded that the maximum yield and net return was recorded in T5 (Prometryne 1.0 kg/ha pre- emergence) over other treatments. Hence the treatment T5 (Prometryne 1.0 kg/ha pre- emergence) could be recommended for weed management in potato.

Introduction

Potato (*Solonum tuberosum* L.), an important food and vegetable crop of the world, produces more weight and calories per unit area as compared to all other food crops (Das, 1993). Potato tubers rich in dry matter, carbohydrate (starch) and potato tubers also provides sizable quantities of other nutrients *viz.*, protein, vitamins and minerals (Sati *et al.*, 2017). It ranks as the fourth major food crop after wheat, rice and maize, though the dry matter production of potato tubers per unit area exceeds that of wheat and maize.

Presence of weeds during the growing period of crop caused 62 per cent reduction in tuber yield

(Tomar *et al.*, 2008). Potato is found infested mainly with annual weeds like bathua, krishnaneel, senji *etc*., which emerged with sprouting tubers and cause severe competition during the early stage of plant growth. Weeds are supposed to be the fore most among the various factors responsible for making negative variation in crop yield and their control has always been one of the major problems before the cultivators. Weeds have been recognized as serious menace to crop production, In general, since they impose an important stress in realization of the genetic yield potential of any crop by sharing light, space, water and nutrients.

Weed management is a challenge for potato producers because of a scarcity of labor for hand weeding and limited options for registered herbicides (Bhullar *et al.,* 2015). Potato tuber yield losses go as high as 40-60 per cent or even more due to infestation of weeds (Tripathi *et al.,* 1989). Traditional manual weeding is quite effective but it is costly, tedious, time taking and also causes transmission of viral infection and root injury (Khurana *et al.,* 1993). Now-a- days labour has become a very costly input and its availability for agricultural propose is scare. Use of herbicides for controlling the weeds at pre-emergence as well as early post-emergence stage has been found to be of great importance in potato cultivation. Reddy *et al.,* (1995) and Kumar *et al.,* (1998) reported that application of herbicides as pre-emergence is quite effective than manual weeding in potato crop. Weed interference caused a significant reduction in tuber number plant-1 and tuber weight and consequently reduced the tuber yield by 43.5 per cent (Abouziena *et al.,* 2015). Therefore, the aim of the present study was to investigate the effect of different weed management practices on growth and yield of potato (*Solanum tuberosum* L.) cv. Kufri Jyoti.

Materials and Methods

The present experiment was carried out to study "The effect of different weed management practices on growth and yield of potato (*Solanum tuberosum* L.) cv. Kufri Jyoti" during the winter season of the year 2017-18 at Crop Research Centre, SGRR (P.G.) College, Dehradun, Uttarakhand. The experiment was laid out in Randomized Block Design with 3 replication and 8 treatments *viz.*, T1 (S-Metalachor @ 0.12 kg/ha Post-emergence), T2 (Mulching at 20 days after planting), T3 (Metribuzin @ 0.4 kg/ha Pre-emergence), T4 (Pendi-methalin @1.0 kg/ha Pre- emergence), T5 (Prometryne @ 1.0 kg/ha Pre-emergence), T6 (One earthing at 30 days after planting), T7 (Two hand weeding at 30 and 60 Days after planting) and T8 (Control *i.e.*, no weeding). Well-sprouted potato tubers (40- 60 g) were planted with 50 × 20 cm spacing. The data was subjected to analysis of variance (ANOVA) using method given by Panse and Sukhatme (1985).

The growth and yield parameters like, Days of emergence, Plant population at initial and harvest, Height of plant Number of haulms at initial stage, Number of haulms at initial stage (per m2), No. of tubers/plant, yield of tuber/plant, Yield of tuber per plot (kg), Yield of tubers per hectare, Soil moisture content and Starch content at harvest in tuber were recorded.

Results and Discussion

Based on the data as summarized in Table 2 and Table 3 revealed that difference among the various treatments with different weed management practices on growth and yield of potato (*Solanum tuberosum* L.) cv. Kufri Jyoti, were found significant to all characters except plant population of potato plant.

With respect to days of emergence, earlier emergence (11.57) was observed in T1, (S-Metalachlor) followed by T5 (Prometryne) than rest of the treatments. These differences in emergence of potato may be due to temperature variation at sowing depth as reported by Zaag-P-Vander *et al.*, (1989) and Jaiswal (2000). T3 (Metribuzin) produced significantly taller plants (41.60cm) than T8 (control). Higher number of tubers/plant (275.33), Tuber yield per plot (kg) (26.49), Tuber yield per plot (q/ha) (190.38) was recorded in T5

(prometryne) followed by T2 (Mulching). Increase in yield by prometryne due to weed control in potato has been reported by Molyavko (1986). Significantly higher tuber yield in T5 (Prometryne) may be attributed to more number of tubers and weight of tubers/plant in this treatment than rest of the treatments. Superiority of these characters in this treatment might have contributed to significant increase in yield. Differences in starch content in tubers after harvest of crop were not significant (Table 3). Rodriquez *et al.*, (1986) also reported that starch content was unaffected by weed management treatments. Based experimental result, it was observed that application of herbicides control the weed population during initial stages of plant growth *i.e.*, sprouting of tubers to earthing up. So that, very effective as compared to other conventional methods *viz.*, manual weeding and earthing up. On the other hand, pre-emergence application of Prometryne (1.0 kg/ha) and Metribuzin (0.5 kg/ha) gave statistically significant results as compared to other weed management practices.

Table.1 Treatments detail

S.No.	Symbol	Treatments
1.	T_1	S-Metalachor (0.12kg/ha Post-em.)
2.	T_2	Mulching (20 DAS)
3.	T_3	Metribuzin (0.4 kg/ha Pre-em.)
4.	T_4	Pendimethalin (1.0 kg/ha Pre-em.)
5.	T_5	Prometryne (1.0 kg/ha Pre-em.)
6.	T_6	One earthing (30 DAS)
7.	T_7	Hand weeding (30 and 60 DAS)
8.	T_8	Control

Table.2 Effect of different weed management practices on days to emergence percent and plant height, Plant population /m^2, No. of haulms at initial stage and maturity stage of potato cv. Kufri Jyoti

Treatments	Days to emergence	Plant height (cm)	Plant population /m^2	Number of haulms at initial stage (per m^2)	Number of haulms at maturity stage (per m^2)
T_1	11.57	38.95	27.53	27.53	30.33
T_2	13.23	40.01	26.1	26.67	30.33
T_3	12.9	41.60	26.77	26.67	31.43
T_4	13.57	39.63	28.77	28.33	32.43
T_5	11.9	37.43	28.77	28.33	31.43
T_6	14.23	35.50	27.43	27.43	30.10
T_7	13.9	37.83	28.1	28.10	30.33
T_8	13.55	30.60	28.1	29.10	32.77
SE(m)±	0.370	**1.74**	1.135	-	-
C.D. (5%)	1.099	**5.17**	NS	**NS**	**NS**

Table.3 Effect of different weed management practices on Tuber yield per plant (g), Tuber yield per plot (kg), Tuber yield per plot (q/ha), Starch content and Moisture content of potato cv. KufriJyoti

Treatments	Tuber yield per plant (g)	Tuber yield per plot (kg)	Tuber yield per plot (q/ha)	Starch content	Moisture content
T_1	164.67	14.50	100.70	12.95	29.69
T_2	142.33	15.44	109.30	15.55	29.90
T_3	267.00	26.49	183.19	14.91	31.74
T_4	256.33	23.39	162.46	14.13	29.09
T_5	275.33	27.57	190.38	15.01	31.30
T_6	147.00	13.87	98.80	14.80	30.59
T_7	202.00	20.81	145.22	13.07	30.68
T_8	101.33	12.26	88.05	13.70	29.71
SEm±	**26.11**	**1.03**	**6.88**	**1.34**	**1.11**
CD(0.05)	**78.23**	**3.76**	**20.45**	**NS**	**NS**

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