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Effect of Pre-Planting and Pre-Emergence herbicides on growth and yield of Rajmash *var.* PDR-14

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Abstract
A pot experiment was carried out to study the effect of pre–planting and pre–emergence herbicides on weed population, weed dry weight, yield attributes and yield of Rajmash under irrigated conditions of western U.P during the *Rabi.* Among the different weed control treatments applied, then the application of fluchloralin @ 1.0 kg *a.i*/ha and pendimethalin @ 1.0 kg *a.i*/ha reduced the population of *Anagallis arvensis*, *Melilotus alba* L., *Melilotus indica* L. and *Phalaris minor* significantly as weedy check and other herbicide treatments in comparison, there by resulting significant increase in weed control efficiency, growth and yield attributes *viz.* plant height, no. of branches/plant, dry matter accumulation, no. of pods/plant and seeds/pod, seed and straw yield of Rajmash. The N uptake by weeds was also significantly reduced, where as significant increase in N uptake was observed in Rajmash at various crop growth stages over weed check. Application of fluchloralin @ 1.0 kg *a.i*/ha or pendimethalin @ 1.0 kg *a.i*/ha used then increased the yield of Rajmash (1.03 to 1.04 t/ha) significantly over weedy check, besides realised at B: C. ratio of 2.10 to 2.15 during two cropping season.

Keywords: Weeds management, Rajmash

Introduction
Rajmash *(Phaseolus vulgaris* L.*)* is one of the most important pulse crops cultivated in hilly tracts of Jammu and Kashmir, Himachal Pradesh, Uttar Pradesh and parts of Maharashtra as a *kharif* season crop due to its specific adaption to a cool and long growing season (Tripathi *et al*. 1986) [5]. In north eastern plains of India, this has been introduced as non–traditional winter season crop. In spite of its popularity, its productivity in India is very low (300 kg/ha) as compared to the world average of 520 kg/ha (Ali and Kushwaha, 1987) [1].
Among the major constraints, initial heavy infestation weeds is one of the important factor, which hinders its overall growth and productivity (Malik and Malik, 1994) since initial growth rate of Rajmash is slow compared to weeds and the interspaces covered by weeds severely affected crop growth and yield. Although the yield losses due to weed depend on composition of weed flora, extent of infestation and the crop canopy decides yield loss but it has been estimated that weeds alone can reduce the yield to the tune of 20-60 per cent. Among the various weed management options herbicide use is not only efficient method but it is cost effective also. On the other hand, physical weed control measure *viz.* hand weeding is safe but labour intensive. The present study deals with the optimizing herbicide treatments and its appropriate combination of hand weeding for obtaining maximum yield and profit and reducing weeds population upto thresh hold level.

Materials and Methods
A field experiment was conducted at the research farm, Janta Vedic College. Baraut, Baghpat (U.P.) 20.6^0N and 77.15^0E longitude at an elevation of 236.6 m above the sea level during the *Rabi*. The region average annual of experiment site rainfall 651 mm extending over the period of mid July to October and few scattered showers during winter months from south-west monsoon. Whereas, the average minimum and maximum temperature vary from 5^0C to 45^0C. The soil of the experimental field was sandy loam in texture, slightly alkaline in reaction, low in organic carbon (0.35%) and available nitrogen (235 kg/ha) and was medium in available phosphorus (13.2 kg/ha) and potassium (260.2 kg/ha). Rajmash variety "PDR-14" was sown in rows 30 x 10cm apart on 25 October during both the years using 120 kg seed/ha. Recommended doses of 120 kg N, 60kg P_2O_5 and 50 kg K_20 were uniformly applied to all the treatments.

Full dose of P and K and half dose of N were applied as basal at the time of sowing and rest half of the N total as per treatment was applied before second irrigation 47 DAS. The experiment of 12 treatments comprising of weedy check, hand weeding at 30 DAS, weed free, fluchloralin @ 0.75 kg *a.i.*/ha, fluchloralin @ 1.0 kg *a.i.*/ha, fluchloralin @ 0.75 kg *a.i.*/ha with hand weeding at 30 DAS, pendimethalin @ 0.75 kg *a.i.*/ha, pendimethalin @ 1.0 kg *a.i.*/ha, pendimethalin @ 0.75 kg *a.i.*/ha with hand weeding at 30 DAS, oxyfluorfen @ 0.15 kg *a.i.*/ha, oxyfluorfen @ 0.20 kg *a.i.*/ha, oxyfluorfen @ 0.15 kg *a.i.*/ha with hand weeding at 30 DAS and were arranged in a randomized block design with three replications. Herbicide treatments were applied pre–planting and pre–emergence with the help of knapsack sprayer fitted with flat fan T-jet nozzle at a spray volume of 500 litres. In weed free plots, weeds were removed manually as and when required with the help of *khurpi.* Other standard agronomical package and practices were followed uniformly in both the years. Weed and crop dry matter (DM) productions were measured at mid season and final harvest at different yield and yield attributing panted measured at the time of harvest and adjusted to 14% moisture contents. For midseason sampling, weed and crop DM were measured from two using 0.25 m^2 quadrats/each plot. At 90 DAS leaf area was measured by taking 10 leaves randomly from each plot and measure leaf area index (LAI). the N uptake through weeds as well as Rajmash crop was measuring micro-kjeldan method (Jackon, 1973).

Results and Discussion

Population of weeds and dry weight of weeds in Rajmash

The weed flora observed in the experimental field was *Anagallis arvensis*, *Melilotus alba* L., *Melilotus indica* L. and *Phalaris minor*. Among the herbicides used, then the application of fluchloralin @ 1.0 kg *a.i.*/ha applied pre-planting provided effective weed control and improved weed control efficiency, which at par of pendimethalin @ 1.0 kg *a.i.*/ha applied pre-emergence as compared to weedy check treatment in Rajmash. The maximum reduction of weeds population was recorded in fluchloralin @ 1.0 kg *a.i.*/ha or pendimethalin @ 1.0 kg *a.i.*/ha treatment, which had 79.52% and 78.38% more used weed control efficiency over pendimethalin 0.75 kg/ha and 60.81% and 70.28% over 0.75 kg/ha with hand weeding at 30 days after sowing. Almost similar results were noticed for weed dry weight (g/m^2) in Rajmash crop. Among various different weed control treatments used, then the treatment of fluchloralin @ 1.00 kg *a.i.*/ha or pendimethalin @1.00 kg *a.i.*/ha caused 100 per cent reduction in weed dry weight and weed population at harvest, findings were reported by Mishra *et. al.* (1999) [2] and Prajapati *et al.* (2003) [4].

Plant growth and yield attributes

The weed control measures exhibited significant variation in respect of growth parameters. Fluchloralin @ 1.00 kg *a.i.*/ha (Table 2) produced taller plant closely followed by pendimethalin @ 1.00 kg *a.i.*/ha as compared to weedy check treatment respectively. The superiority of fluchloralin @ 1.00 kg *a.i.*/ha treatment at 90 DAS stage in term of shoot height might have accrued to increase and at par of pendimethalin @ 1.00 *a.i.*/ha. Their results were confirmed to Mishra *et al.* (1998) [3]. The efficacy of fluchloralin @ 1.0 kg/ha or pendimethalin @ 1.0 kg/ha use was also seen in other growth parameters *viz*. number of branches/plant (6.16 to 6.23) and leaf area index (1.06 to 1.07). The dry matter production which is the resultant of all these growth characters *viz*. plant height, number of branches/plant and leaf area index, the highest dry matter from fluchloralin 1.00 kg/ha and pendimethalin 1.0 kg/ha treatments. The effect of all these growth parameters utimathy reflected on various yield attributes also and number of pods/plant, 1000-seed weight, Harvest Index 65.6 to 66.4 %, 75.12 to 75.23 % and 75.47 to 75.93 %, higher over other weed management options. Maximum seeds yield was recorded with fluchloralin @ 1.00 kg *a.i.*/ha or pendimethalin @ 1.00 kg *a.i.*/ha (1.03 to 1.04 t/ha) as comparable to other treatments (Table 3).

Nitrogen uptake (kg/ha) by weeds at harvest

Application of fluchloralin @ 1.00 kg *a.i.*/ha used then accumulated lowest (0.00 kg N/ha) amount of nitrogen and at par of and pendimethalin @ 1.00 kg *a.i.*/ha (0.00 kg N/ha) during both years respectively (Table 4).

Nitrogen uptake (kg/ha) by Rajmash at harvest

Weed-management practices significantly affected the N uptake of Rajmash crop, the highest N uptake was recorded under the treatment of fluchloralin 1.00 kg/ha and pendimethalin 1.00 kg/ha (52.5n to 52.9 kg/ha), which was significant at par to weed free situation. This was apparently due to the lesser weed crop competition and thus better crop growth, yield and ultimates higher uptake by the crop. The remaining weed management option did not prove significance in terms of N uptake value were significantly inferior to 1.0 kg fluchloralin or pendimethalin application.

Economics

The application of fluchloralin @ 1.0 kg *a.i.*/ha was showed higher gross return, net return and B. C. ratio and at par of pendimethalin @ 1.0 kg *a.i.*/ha than other weed control treatments. The highest B. C. ratio of 2.10 to 2.15 was recorded with fluchloralin @ 1.00 kg *a.i.*/ha or pendimethalin @ 1.00 kg *a.i.*/ha. This show that Rajmash is more responsive towards the inputs use and under good management and it can give even higher returns (Table 2).

It may be concluded that the application fluchloralin @ 1.00 kg *a.i.*/ha and pendimethalin @ 1.00 kg *a.i.*/ha recording higher productivity and profitability of Rajmash.

Table 1: Effect of various treatments on weed population, dry weight of weeds and WCE (%) in Rajmash at 60 DAS

Treatments	Weed Population (no./m^2) in Rajmash	Dry weight of weeds (g/m^2) in Rajmash	WCE (%)
Weedy Check	20.01(4.53)	17.53 (4.25)	
Hand weeding at 30 DAS	13.22(3.70)	10.17(3.27)	24.58
Weed free	0.00(0.71)	0.00(0.71)	100.00
Fluchloralin (0.75 kg *a.i.*/ha)	7.69(2.86)	6.45(2.64)	63.20
Fluchloralin (1.00 kg *a.i.*/ha)	4.04(2.13)	3.59(2.02)	79.52
Fluchloralin (0.75 kg *a.i.*/ha) + HW 30 DAS	5.85(2.52)	4.57(2.25)	73.93
Pendimethalin (0.75 kg *a.i.*/ha)	7.48(2.82)	6.87(2.71)	60.81
Pendimethalin (1.00 kg *a.i.*/ha)	4.26(2.18)	3.79(2.07)	78.38
Pendimethalin (0.75 kg *a.i.*/ha) + HW 30 DAS	5.99(2.55)	5.01(2.35)	71.42

Oxyfluorfen (0.15 kg *a.i.*/ha)	8.01(2.92)	6.96(2.73)	60.29
Oxyfluorfen (0.20 kg *a.i.*/ha)	6.67(2.68)	5.51(2.45)	68.57
Oxyfluorfen (0.15 kg *a.i.*/ha) + HW 30 DAS	7.04(2.74)	5.59(2.48)	68.11
S em ±	0.10	0.11	1.23
CD (P=0.05)	0.22	0.25	4.27

Figures in parenthesis are transformed values subjected to (√x+0.5) transformation

Table 2: Growth and yield attributes of Rajmash at 90 DAS as influenced by various herbicides

Treatments	Plant height (cm)	No. of branches /plant	Dry matter accumulation /plant (g)	Leaf area index	No. of pods/plant	1000-seed weight (g)	Harvest index
Weedy Check	20.09	4.09	7.01	0.73	2.76	237.9	28.99
Hand weeding at 30 DAS	22.69	4.79	7.19	0.85	3.08	252.5	31.87
Weed free	27.35	6.48	9.99	1.08	5.70	323.7	39.85
Fluchloralin (0.75 kg *a.i.*/ha)	24.43	5.07	7.38	0.87	4.17	269.8	33.47
Fluchloralin (1.00 kg *a.i.*/ha)	26.73	6.23	9.96	1.07	5.53	316.7	38.41
Fluchloralin (0.75 kg *a.i.*/ha) + HW 30 DAS	25.05	5.50	8.62	0.98	4.91	297.5	36.47
Pendimethalin (0.75 kg *a.i.*/ha)	24.66	5.40	8.10	0.87	4.29	271.5	33.59
Pendimethalin (1.00 kg *a.i.*/ha)	26.65	6.16	9.96	1.06	5.51	316.2	38.18
Pendimethalin (0.75 kg *a.i.*/ha) + HW 30 DAS	25.17	5.68	8.64	0.96	4.88	297.1	36.38
Oxyfluorfen (0.15 kg *a.i.*/ha)	23.76	5.47	7.33	0.84	3.24	256.7	32.12
Oxyfluorfen (0.20 kg *a.i.*/ha)	25.04	5.49	8.33	0.94	4.78	279.1	35.11
Oxyfluorfen (0.15 kg *a.i.*/ha) + HW 30 DAS	24.16	5.41	8.36	0.92	4.53	273.8	33.88
S em ±	0.71	0.19	0.45	0.03	0.17	4.22	0.66
CD (P=0.05)	1.57	0.43	1.01	0.07	0.38	9.29	1.46

Table 3: Effect of different weed control treatments on yield and economics of Rajmash

Treatments	Stover yield (t/ha)	Yield (t/ha)	Cost of cultivation	Net Return (Rs/ha)	B: C ratio
Weedy Check	1.06	0.53	22095	4583	1.21
Hand weeding at 30 DAS	1.13	0.58	23145	5468	1.24
Weed free	1.59	1.06	26295	23985	1.91
Fluchloralin (0.75 kg *a.i.*/ha)	1.24	0.75	22695	13860	1.61
Fluchloralin (1.00 kg *a.i.*/ha)	1.57	1.04	22945	26435	2.15
Fluchloralin (0.75 kg *a.i.*/ha) + HW 30 DAS	1.47	0.86	23745	17693	1.63
Pendimethalin (0.75 kg *a.i.*/ha)	1.24	0.75	23085	13335	1.60
Pendimethalin (1.00 kg *a.i.*/ha)	1.57	1.03	23428	25772	2.10
Pendimethalin (0.75 kg *a.i.*/ha) + HW 30 DAS	1.47	0.86	24135	17010	1.70
Oxyfluorfen (0.15 kg *a.i.*/ha)	1.15	0.60	23140	6440	1.28
Oxyfluorfen (0.20 kg *a.i.*/ha)	1.47	0.82	23195	15740	1.68
Oxyfluorfen (0.15 kg *a.i.*/ha) + HW 30 DAS	1.28	0.76	24190	12635	1.52
S Em±	0.04	0.03	-	-	-
CD (P=0.05)	0.09	0.09	-	-	-

References

1. Ali M, Kushwaha BL. Cultivation of *rabi*-rajmash in plain. Indian Farming. 1987; 31(5):20-23.
2. Mishra JS, Singh VP, Bhan VM. Studies on nitrogen economy in Rajmash (*Phaseolus vulgaris*) through weed control. Indian Journal of Weed Science. 1999; 31(3-4):199-203.
3. Mishra PJ, Sharma SN, Satyanandan K. Effect of herbicides on weed growth and yield of Rajmash (*Phaseolus vulgaris* L.) World Weeds, 1998; 5(1-2):143-146.
4. Prajapati MP, Patel LR, Patel BM. Effects of integrated weed management and nitrogen level on weeds and productivity of Rajmash (*Phaseolus vulgaris* L.) under north Gujarat condition. Legume Research. 2003; 26(2)79-84.
5. Tripathi DP, Chandra S, Asthana AN. Technology for growing rajmash in plains. Indian Farming, 1986; 36(9):12-15.