Consequences Of Integrate Weed Management Practices On Various Weed AttributesIn Field Pea (*Pisum Sativum L*).

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Abstract:
A field experiment was conducted at the Crop Research Centre, School of Agriculture, Uttaranchal University, Dehradun, Uttarakhand to observe 'Discover the Effectiveness of Integrated Weed managing Practices on Growth and Yield of Field Pea *(Pisum sativum* L.)' during the Rabi season of 2021-22. The experimental designused for the purpose was Randomised Block Design with 7 treatments and 3 replications. The treatments were as,Isoproturon (PoE) @ 1kg a.i./ha + 1 hand weeding, Isoproturon (PoE) @1kg a.i. /ha, Atrazine (PE) @1kg a.i. /ha,Atrazine (PE) + 1 hand-weeding @1kg a.i. /ha, pendimethalin (post-emergence) @ 1kg a.i. /ha, pendimethalin (PE) + 1 hand-weeding @1kg a.i. /ha, Control. Out of the above treatments, Pendimethalin (PE) + 1 hand-weeding was most effective in controlling the weeds

Keywords: Isoproturon, Pendimethalin, Atrazine, weed biomass, weed density, weed control efficiency, hand weeding.

INTRODUCTION

Pulses are one of the cheapest and most essential sources of protein in the human diet. It contributes significantlyto soil health by contributing a large amount of organic material and biological nitrogen fixation. It releases roughly 30 kg of nitrogen per hectare into the soil, which is beneficial to subsequent crops **(Anonymous, 2006).** Pea is the world's third important pulse crop, trailing only dry bean and chickpea, and India's third most popular Rabi pulse, trailing only chickpea and lentil. India is rank fourth in terms of area (10.53%) and fifth in terms ofoutput (6.96%). The field pea is farmed on 25 million acres around the world. Field peas are farmed over 9.45 lakh hectares of land. The production in 2016-17 was roughly 8.02 lakh tonnes, with a productivity of 845 kg/ha. **(Directorate of Pulses Development, Department of Agriculture and Farmers Welfare, 2016-17).**

Uttar Pradesh produces the most field peas. Moreover, half of India's pea crop comes from this region. Aside fromthat, Uttar Pradesh, Bihar, Maharashtra & Madhya Pradesh are the leading pea-producing states. Pea cultivation covers 552000 hectares in India, yielding 5562000 tonnes and a yield of 100761 kg/ha **(FAO, 2019**). In Uttarakhand, field peas are grown on 0.13 million hectares, yielding 0.93 million tonnes and 300 kg per hectare, respectively. Some of the pea-growing areas in Uttarakhand are Champavat, Punda, Padampuri, Someshwar, Navgarh, Udham Singh Nagar, and Haridwar **(NHB 2017-18).**

For pea growers, weeds are a major problem. The field pea contains numerous weeds such as *Chenopodium album*, *Cyperus rotundus*, *Parthenium hysterophorus*, and *Anagallis arvensis* **(Chaudhary *et al.*, 2009), (Bharat *et al.*, 2006)** observed that weeds compete strongly during the winter season, leading to a drastic reduction in yield depending on density. And density (40 %) happens until then. Weed species are present in pea grains. **(Lemerle *et al.*, 2006)** found that low crop density affected pea production more than optimal plant populations. Weeds cause 70-80% yield loss at low crop density (10 plants/m^2) compared to high crop density (30 saplings/m^2).**(Munakamwe *et al.*, 2014),** herbicide-sprayed peas produced a 19% higher seed yield (508g/m^2) compared to non-sprayed plants.

Weeds are a major issue in Field Pea, if not controlled timely can cause yield loss up-to 80%. Weeds must be controlled in Field Pea before the significant period of weed control. Hence, the study had been undertaken to find out an efficient way to control weeds in field Pea.

Materials and methods

A field test had been performed during the Rabi season of 2021-22 in Uttaranchal University, Premnagar,Dehradun, and Uttarakhand (30.33 º N Latitude and 77.95 º E Longitude) India. The maximum and minimum temperatures of the place are 27.65ºC and 13.8ºC respectively. The soil of the experimental site contained sand 53.40 % silt 25.40% and clay 21.30%. The soil texture was Sandy clay loam having pH almost neutral which is 7.4 and organic carbon 1.30%. The available Nitrogen 302.5 kg/ha, available P 13.14 kg/ha and offered K was 232.6 kg/ha. The design randomised block design was selected for this experimental purpose using 7 treatments and 3 replications. The sowing had been

done on 26th November and the harvesting had been done on 18th of March. Seed rate was 75 kg/ha and the recommended dose of fertilizer that is 20 kg/ha of N, 60 kg/ha of P and 40kg/ha of K. The application of pre-emergence herbicide was done on 25th November. The post-emergence herbicide application was done at 45 days. In treatments of herbicide + 1 hand-weeding was done at 45 DAS. Thecrop variety used was Arkel.

Results and Discussion

Weed vegetation of the experimental ground was identified, collected, and classified as grassy and broad leaf. Out of total weed species *Cynodon dactylon* and *Phalaris minor* (among grassy) and *Chenopodium album* and *Fumaria parviflora* (among broad leaf) were dominant with some minor weeds (Table 1).

In case of total weed density, treatments of pendimethalin + 1 hand-weeding and pendimethalin @ 1kg a.i. /ha were statistically at par to each-other. The best weed control had been observed in plots with the treatment Pendimethalin + 1 hand-weeding and the lowest weed control had been observed in T_7 which was Control. The consequences were in accordance with (**Buttar et al, 2008)**. The total weed density was recorded randomly from selectedarea of 50cm x 50cm from each-plot.

The total weed dried up matter had been observed once at 30, 60, 90 DAS and at harvesting in terms of gm/m^2. The maximum total weed dried up matter was experimental in Control and the lowest was in the treatment of Pendimethalin+ 1 hand-weeding. The best control of total weed dry matter was found in Pendimethalin+ 1 hand-weeding followed by the treatment of Pendimethalin @ 1kg a.i. /ha and Atrazine + 1 hand-weeding. The treatments of Pendimethalin @ 1kg a.i. /ha as well as Atrazine + 1 hand-weeding are statistically at par to one-another. **(Buttaret al., 2008)**

Out of all the herbicide (solely) treated plots and the plots treated with herbicide as well as hand weeding, the treatment of Isoproturon alone was least effective to the weeds and also the herbicide toxicity caused by it was the highest in those plots. This has been confirmed by **(Leoci & Ruberti, 2020).**

In accordance with various weed management techniques, pertinent statistics on weed control effectiveness were noted at 30, 60, 90 DAS and at yield the weed control efficiency (%) was observes to be maximum in the treatment of Pendimethalin + 1 hand-weeding followed by Atrazine + 1 hand-weeding. The result is in accordance with the confirmation of (**Rana, 2002).**

All the weed management treatments affected plant height significantly at all the period of examination. Among herbicidal treatments, plant height was significantly the highest under the sequential application Pendimethalin + 1 hand-weeding at 30, 60, 90 DAS and at yield correspondingly.

Table 1: Weed flora of the experimental field during Rabi season 2021-22

SN.	Weeds species	Common name	Local name	Family
1.	*Chenopodium album L.* (Broad leaved weeds)	Lambsquarter	Bathua	Amaranthaceae
2.	*Fumaria parviflora* (Broad leaved weeds)	Fine leaf fumitory	Gajri	Papaveraceae
3.	*Phalaris minor* (Grassy weeds)	Little seed canary	Gehu ka mama	Poaceae
4.	*Cyanodon dactlyon* (Grassy weeds)	Bermuda grass	Doob grass	Poaceae
5.	*Vicia sativa L* (Grassy weeds)	Common vetch	Chatri	Fabaceae
6.	*Anagallis arvensis* (Broad leaved weeds)	Scarlet pimpernel	Krishananeel	Primulaceae

Table 2: Result of weed managing practices on total weed density at different stages.

Treatments	Total weed density			
	30 DAS	60 DAS	90 DAS	At harvest
T_1 (Isoproturon @ 1 kg ha^{-1} + 1 HW, PoE)	4.24	5.27	3.49	6.77
T_2 (Isoproturon @ 1 kg ha^{-1}, PoE)	3.53	4.59	3.20	6.41
T_3 (Atrazine @ 1 kg ha^{-1}, PE)	6.00	4.13	3.50	7.07
T_4 (Atrazine @ 1 kg ha^{-1} + 1 HW, PE)	5.21	5.74	3.73	6.78
T_5 (Pendimethalin @ 1 kg ha^{-1}, PoE)	3.35	5.57	3.00	5.88
T_6 (Pendimethalin @ 1 kg ha^{-1} + 1 HW, PE)	2.10	2.90	1.90	2.20
T_7 (Control)	6.92	8.20	8.86	11.8
SEm±	0.16	0.33	0.13	0.27
CD (5 %)	0.52	1.18	0.41	0.86

Table 3: Result of weed managing practices on total weed dry matter on at different stages.

Treatments	Total weed dry matter			
	30 DAS	60 DAS	90 DAS	At harvest
T_1 (Isoproturon @ 1 kg ha^{-1} + 1 HW, PoE)	2.47	2.53	2.44	2.76
T_2 (Isoproturon @ 1 kg ha^{-1}, PoE)	2.34	2.53	2.52	2.76
T_3 (Atrazine @ 1 kg ha^{-1}, PE)	2.43	2.72	2.47	2.55
T_4 (Atrazine @ 1 kg ha^{-1} + 1 HW, PE)	2.63	2.63	2.43	2.49
T_5 (Pendimethalin @ 1 kg ha^{-1}, PoE)	2.32	2.48	2.02	2.15
T_6 (Pendimethalin @ 1 kg ha^{-1} + 1 HW, PE)	1.90	2.10	1.60	1.80
T_7 (Control)	3.12	3.28	3.08	3.06
SEm±	0.07	0.06	0.03	0.03
CD (5 %)	0.23	0.19	0.11	0.09

Table 4: Result of weed managing practices on total weed control effectiveness.

Treatments	Weed control effectiveness At harvest
T_1 (Isoproturon @ 1 kg ha^{-1} + 1 HW, PoE)	20.4
T_2 (Isoproturon @ 1 kg ha^{-1}, PoE)	33.8
T_3 (Atrazine @ 1 kg ha^{-1}, PE)	33.9
T_4 (Atrazine @ 1 kg ha^{-1} + 1 HW, PE)	21.3
T_5 (Pendimethalin @ 1 kg ha^{-1}, PoE)	37.3
T_6 (Pendimethalin @ 1 kg ha^{-1} + 1 HW, PE)	63.5
T_7 (Control)	0.00
SEm±	2.04
CD (5 %)	6.36

Table 5: Result of weed managing practices plant height at different stages.

Treatments	Plant Height (cm)			
	30 DAS	60 DAS	90 DAS	At harvest
T_1 (Isoproturon @ 1 kg ha^{-1} + 1 HW, PoE)	7.0	8.0	13.3	20.0
T_2 (Isoproturon @ 1 kg ha^{-1}, PoE)	14.0	17.0	19.1	29.3
T_3 (Atrazine @ 1 kg ha^{-1}, PE)	7.0	8.0	11.2	19.0
T_4 (Atrazine @ 1 kg ha^{-1} + 1 HW, PE)	7.3	8.5	10.5	21.3
T_5 (Pendimethalin @ 1 kg ha^{-1}, PoE)	8.0	11.4	12.4	19.0
T_6 (Pendimethalin @ 1 kg ha^{-1} + 1 HW, PE)	19.0	21.0	23.0	31.3
T_7 (Control)	5.3	6.6	8.6	11.6
SEm±	0.48	0.37	0.83	1.43
CD (5 %)	1.50	1.17	2.59	4.45

CONCLUSION:

The results of the experiment prove that when agronomic and chemical treatments are combined, the best weed control is gained. Pendimethalin + 1 hand-weeding produced the best results. Therefore, combining chemical and cultural approaches to manage weeds produces the best results. Other herbicides, such as Atrazine and Isoproturon, were also highly successful in controlling weeds, but they also affected crops because they made them harmful effects. More legumes are affected than cereal crops.

CONFLICT OF INTEREST

There is no conflict of interest among authors for this manuscript.

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