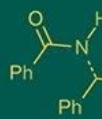


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Assessment of weed dynamics under different sowing dates and weed management practices on the irrigated field pea (*Pisum sativum* L.)

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Abstract

The present investigation was conducted at DKS College of Agriculture and Research Station, Bhatapara, Chhattisgarh to study the combine effect of date of sowing and weed management practices on weed dynamics in field pea during *rabi* season 2023-24. Fifteen treatment combinations comprising in Split Plot Design of three different sowing dates *viz.*, (D₁: 01 November, D₂: 20 November and D₃: 10 December) and five weed management practices *viz.*, (W₁: Weedy check, W₂: Weed-free, W₃: Two hand weeding at 20 and 40 DAS, W₄: Metribuzin 250 g a.i. ha⁻¹ as PoE and W₅: Imazethapyr + Imazamox (pre-mix) 70 g a.i. ha⁻¹ as PoE) were replicated thrice. The study reveals that the sowing date 20 November (D₂) and through 2 hand weeding at 20 and 40 DAS (W₃) were effectively reduced weed density and weed dry matter at 20, 40, 60 and 80 DAS of grasses, sedges and broad-leaved weeds. The sowing date 20 November (D₂) and two hand weeding at 20 and 40 DAS (W₃) had higher weed control efficiency (%) with lower weed index (%) were observed. *Anagallis arvensis*, broad-leaved weed was recorded highest weed dominance (%) of treatment under sowing date 10 December (D₃) and weedy check (W₁).

Keywords: Pea (*Pisum sativum* L.), sowing date, weed, herbicide

Introduction

Pulses are 2nd important cultivated crop after cereals. Variety of pulse crops grown in India and the entire world. In India, Field pea (*Pisum sativum* L.) is the 3rd most important *rabi* pulse after chickpea and lentil. It belongs to the family Fabaceae and subfamily Papilionoideae. Field pea is a good source of protein and primarily used for human consumption and also used as livestock feed. It contains 15-35% protein, 20-50% starch, 4-10% sugar, 2-4% minerals and 0.6-1.5% fat (Makasheva, 1983) [5]. In India, the cultivated area of field pea is about 0.76 million ha with an annual production of about 1.04 million tonnes and estimated yield of field pea is 13.18 q ha⁻¹ [Anonymous. 2021. (a)] [1]. In Chhattisgarh, the field pea is mostly grown in *rabi* season. Cultivated area of field pea in Chhattisgarh is 13690 ha with production of 5354 metric ton.

There are many constraints that are responsible for losses of field pea yield but the biggest threat is weed competition. In India, agriculture fields are generally infested by broad-leaved and grassy weeds in wide spectrum which competing with the crop plants for light, nutrients, water and alleopathic effect of harboring harmful pests (Dittmar and Boyd 2015) [2]. The critical period is up to 60 DAS for crop weed competition in pea. Weed competition reduces the quantity of pods and seeds pod⁻¹, which causes a significant production loss of up to 65.8% under unweeded conditions (Mishra, 2006) [7]. There are some herbicides available *viz.*, Metribuzin, Imazethapyr + Imazamox (pre-mix) etc and also manual hand weeding are able to check the emergence and growth of grasses and broad-leaved weeds of pea.

It is imperative to find out optimum date of sowing and effective weed management practices for better growth and yield of field pea. The present investigation was carried out to evaluate the Effect of date of sowing and weed management practices on the performance of irrigated field pea.

Materials and Methods

A field experiment entitled the effect of date of sowing and weed management practices on the performance of irrigated field pea (*Pisum sativum* L.) was conducted at the Instructional Farm, DKS College of Agriculture and Research Station in Bhatapara, Chhattishgarh, during *Rabi* season of 2023–24. The experimental field was neutral in pH and clayey texture soil. The range of mean maximum and minimum temperatures 24.8 to 38.9 °C and 10.1 to 23.6 °C during the crop growth and development period was respectively. The range of the relative humidity 63.7-90.3%, bright sunshine 1.8 to 9.2 hrs day⁻¹, wind speed 0.1 to 4.5 km hr⁻¹ and daily evaporation 13.8 to 47.3 mm was respectively.

The experiment conducted in a Split Plot Design with 15 treatment combinations comprising of three different sowing

dates viz., (D₁: 01 November, D₂: 20 November and D₃: 10 December) and five weed management practices viz., (W₁: Weedy check, W₂: Weed-free, W₃: Two hand weeding at 20 and 40 DAS, W₄: Metribuzin 250 g a.i. ha⁻¹ as PoE and W₅: Imazethapyr + Imazamox (pre-mix) 70 g a.i. ha⁻¹ as PoE) were replicated thrice. Weed identification, relative density, weed density, dry matter accumulations, yield attributes, productivity, cost of cultivation, gross returns, net returns and B: C ratio were recorded or computed after the harvested of the crop. The data obtained on various observations for each treatment were subject to 'Analysis of variance' as recommended by R. Rangaswamy (2005) [9]. Weed index, weed control efficiency and weed dominance were worked out using the following formulas:

$$a) \text{ WI (\%)} = \frac{\text{Grain yield from weed free plot} - \text{Grain yield from treated plot}}{\text{Grain yield from weed free plot}} \times 100$$

$$b) \text{ WCE (\%)} = \frac{\text{Weed dry weight in weedy check plot} - \text{Weed dry weight in treated plot}}{\text{Weed dry weight in weedy check plot}} \times 100$$

$$c) \text{ Weed dominance (\%)} = \frac{\text{Absolute density of individual species}}{\text{No. of quadrats in which the species occurred}} \times 100$$

Result and Discussion

Weed identification

Each kind of weed has an own characteristic and it was identified at different growth stages viz. 20, 40, 60 and 80 DAS. The experiment field was heavily infested with different weed flora. The predominant grasses were *Echinochloa colona* and *Cynodon dactylon*, sedge was

Cyperus rotundus (L.) Whereas, the *Anagallis arvensis* was the pre dominant broad leaved weed followed by *Trifolium repens*, *Convolvulus arvensis*, *Parthenium hysterophorus* and *Euphorbia hirta*. It was discovered that the majority of the weeds seen in the experimental field resembled those described by Punia *et al.* (2017) [8] and Kumar *et al.* (2023) [4]. The recorded data was presented in Table 1.

Table 1: Details of existing dominating weeds and their relative weed density (%) on experimental field.

S. No.	Scientific name	Common name	Family	Relative weed density (%)
1.	<i>Echinochloa colona</i>	Jungali sawan	Poaceae	13.05
2.	<i>Cynodon dactylon</i>	Bermuda grass (Doob)	Graminae	7.07
3.	<i>Cyperus rotundus</i>	Nut grass (motha)	Cyperaceae	5.63
4.	<i>Anagallis arvensis</i>	Krishna neel	Primulaceae	47.43
5.	<i>Trifolium repens</i>	White clover	Fabaceae	10.19
6.	<i>Convolvulus arvensis</i>	Hirankhuri	Convolvulaceae	7.74
7.	<i>Parthenium hysterophorus</i>	Gajar ghas	Asteraceae	5.58
8.	<i>Euphorbia hirta</i>	Asthma plant (Dudhi)	Euphorbiaceae	3.30

Weed density (No. m⁻²)

The results revealed that the different date of sowing and weed management practices exerted a significant influence on weed density at 20, 40, 60 and 80 DAS. The minimum weed density was recorded under 20 November (D₂) and two hand weeding at 20 and 40 DAS (W₃) and sowing date 10 December (D₃) and weedy check (W₁) were recorded maximum weed density. However, all the weed management practices were significantly superior to weedy check. These findings are in line with those reported by Rana *et al.* (2015) [10], Jilani *et al.* (2016) [3] and Kumar *et al.* (2023) [4]. The recorded data was presented in Table 2.

Weed dry matter accumulation (g m⁻²)

The study assessed on different growth stages at 20, 40, 60 and 80 DAS and recorded that the weed dry matter effectively reduced under 20 November (D₂) and two hand

weeding at 20 and 40 DAS (W₃) and recorded maximum under 10 December (D₃) sowing date and weedy check (W₁). However, all the weed management treatments significantly reduced the weed dry matter accumulation compared to weedy check. These results are similar to findings of Mathukia *et al.* (2015) [6], Punia *et al.* (2017) [8] and Kumar *et al.* (2023) [4]. The recorded data was presented in Table 3.

Weed index (%)

The weed index was influenced by different date of sowing and weed management practices. The lowest weed index with highest seed yield was recorded under sowing date 01 November; D₁ (19.63%) and two hand weeding at 20 and 40 DAS; W₃ (11.17%) Similar findings have been reported by Verma *et al.* (2022) [11] and Kumar *et al.* (2023) [4]. The recorded data was presented in Table 4.

Table 2: Weed density (No. m⁻²) of grasses, sedges and broad-leaved weeds under different sowing dates and weed management practices at different growth stages in field pea.

Treatments	Grasses				Sedges				Broad-leaved weeds			
	20 DAS	40 DAS	60 DAS	80 DAS	20 DAS	40 DAS	60 DAS	80 DAS	20 DAS	40 DAS	60 DAS	80 DAS
Date of sowing												
D ₁ = 01 November	2.36 (5.07)	3.57 (12.27)	4.06 (16.00)	3.73 (13.40)	1.76 (2.60)	1.94 (3.27)	2.50 (5.73)	2.37 (5.13)	4.53 (20.00)	6.81 (45.87)	7.57 (56.87)	6.85 (46.47)
D ₂ = 20 November	2.29 (4.73)	3.39 (11.00)	3.75 (13.53)	3.54 (12.07)	1.70 (2.40)	1.87 (3.00)	2.37 (5.13)	2.24 (4.53)	4.47 (19.47)	6.45 (41.07)	7.05 (49.20)	6.26 (38.67)
D ₃ = 10 December	2.50 (5.73)	3.88 (14.53)	4.62 (20.80)	4.02 (15.67)	1.83 (2.87)	2.09 (3.87)	2.59 (6.20)	2.51 (5.80)	4.70 (21.60)	7.24 (51.87)	8.53 (72.33)	7.08 (49.67)
S.Em±	0.84	1.23	1.15	1.00	1.02	0.81	0.79	0.82	1.11	1.61	1.66	1.41
C.D. 5%	NS	NS	1.92	1.57	NS	1.05	1.01	1.10	NS	NS	3.07	2.52
Weed management												
W ₁ = Weedy check	3.34 (10.67)	5.08 (25.33)	5.51 (29.89)	4.88 (23.33)	2.30 (4.78)	2.88 (7.78)	3.21 (9.78)	3.06 (8.89)	6.59 (42.89)	9.65 (92.67)	10.49 (109.44)	9.11 (82.56)
W ₂ = Weed free	0.71 (0.00)	0.71 (0.00)	0.71 (0.00)	0.71 (0.00)	0.71 (0.00)	0.71 (0.00)	0.71 (0.00)	0.71 (0.00)	0.71 (0.00)	0.71 (0.00)	0.71 (0.00)	0.71 (0.00)
W ₃ = Two hand weeding at 20 and 40 DAS	0.71 (0.00)	0.71 (0.00)	3.10 (9.11)	2.86 (7.67)	0.71 (0.00)	0.71 (0.00)	2.17 (4.22)	2.07 (3.78)	0.71 (0.00)	0.71 (0.00)	4.60 (20.67)	4.33 (18.22)
W ₄ = Metribuzin 250 g a.i. ha ⁻¹ as PoE	2.88 (7.78)	4.55 (20.22)	5.03 (24.78)	4.50 (19.78)	2.20 (4.33)	2.44 (5.44)	2.95 (8.22)	2.84 (7.56)	5.45 (29.22)	8.92 (79.11)	9.79 (95.33)	8.41 (70.22)
W ₅ = Imazethapyr + Imazemox (pre-mix) 70 g a.i. ha ⁻¹ as PoE	2.82 (7.44)	4.24 (17.44)	4.54 (20.11)	4.28 (17.78)	2.12 (4.00)	2.04 (3.67)	2.95 (8.22)	2.46 (5.56)	5.49 (29.67)	7.75 (59.56)	8.51 (71.89)	7.36 (53.67)
S.Em±	0.85	1.34	1.25	1.06	1.01	0.84	0.89	0.84	1.38	1.63	1.83	1.55
C.D. 5%	1.07	2.06	1.90	1.52	NS	1.06	1.17	1.06	2.14	2.61	2.96	2.45
Interaction												
S.Em±	0.94	1.65	1.53	1.26	1.18	0.93	1.01	0.93	1.71	2.06	2.33	1.94
C.D. 5%	NS	NS	2.43	1.91	NS	NS	1.41	1.25	NS	NS	3.85	3.17

Table 3: Weed dry matter (g m⁻²) of grasses, sedges and broad-leaved weeds under different sowing dates and weed management practices at different growth stages in field pea.

Treatments	Grasses				Sedges				Broad-leaved weeds			
	20 DAS	40 DAS	60 DAS	80 DAS	20 DAS	40 DAS	60 DAS	80 DAS	20 DAS	40 DAS	60 DAS	80 DAS
Date of sowing												
D ₁ = 01 November	0.86 (0.23)	1.13 (0.77)	2.18 (4.25)	2.01 (3.56)	0.86 (0.24)	1.02 (0.54)	1.18 (0.90)	1.11 (0.74)	1.57 (1.97)	2.29 (4.74)	4.02 (15.64)	3.75 (13.53)
D ₂ = 20 November	0.84 (0.20)	0.96 (0.42)	2.04 (3.65)	1.89 (3.09)	0.84 (0.21)	1.00 (0.51)	1.12 (0.76)	1.08 (0.66)	1.52 (1.81)	1.83 (2.84)	3.63 (12.69)	3.41 (11.15)
D ₃ = 10 December	0.90 (0.31)	1.23 (1.02)	2.29 (4.75)	2.19 (4.28)	0.88 (0.27)	1.10 (0.72)	1.24 (1.04)	1.16 (0.84)	1.65 (2.24)	2.94 (8.14)	4.40 (18.83)	3.97 (15.28)
S.Em±	0.72	0.73	0.82	0.82	0.71	0.72	0.73	0.75	0.77	0.84	0.99	1.06
C.D. 5%	NS	NS	1.08	1.07	NS	NS	0.79	NS	NS	NS	1.55	1.72
Weed management												
W ₁ = Weedy check	1.00 (0.51)	1.48 (1.69)	3.21 (9.80)	2.95 (8.18)	1.06 (0.63)	1.48 (1.70)	1.53 (1.85)	1.37 (1.38)	2.35 (5.01)	4.31 (18.08)	6.30 (39.25)	5.73 (32.36)
W ₂ = Weed free	0.71 (0.00)	0.71 (0.00)	0.71 (0.00)	0.71 (0.00)	0.71 (0.00)	0.71 (0.00)	0.71 (0.00)	0.71 (0.00)	0.71 (0.00)	0.71 (0.00)	0.71 (0.00)	0.71 (0.00)
W ₃ = Two hand weeding at 20 and 40 DAS	0.71 (0.00)	0.71 (0.00)	1.24 (1.03)	1.22 (0.99)	0.71 (0.00)	0.71 (0.00)	1.10 (0.71)	1.05 (0.60)	0.71 (0.00)	0.71 (0.00)	3.12 (9.23)	2.98 (8.40)
W ₄ = Metribuzin 250 g a.i. ha ⁻¹ as PoE	0.97 (0.43)	1.31 (1.20)	2.51 (5.80)	2.33 (4.93)	0.92 (0.35)	1.11 (0.73)	1.25 (1.07)	1.24 (1.03)	1.78 (2.66)	2.31 (4.81)	4.31 (18.08)	3.97 (15.29)
W ₅ = Imazethapyr + Imazemox (pre-mix) 70 g a.i. ha ⁻¹ as PoE	0.89 (0.30)	1.13 (0.79)	2.22 (4.44)	2.15 (4.11)	0.85 (0.21)	1.01 (0.51)	1.17 (0.88)	1.11 (0.73)	1.69 (2.34)	1.95 (3.31)	3.54 (12.05)	3.32 (10.56)
S.Em±	0.73	0.73	0.83	0.84	0.72	0.73	0.73	0.73	0.80	0.88	1.15	1.14
C.D. 5%	0.76	0.78	1.02	1.05	0.75	0.76	0.79	0.78	0.96	1.13	1.71	1.69
Interaction												
S.Em±	0.74	0.75	0.91	0.93	0.73	0.74	0.75	0.75	0.87	0.98	1.39	1.38
C.D. 5%	NS	NS	1.20	1.25	NS	NS	0.84	NS	NS	NS	2.17	2.14

Weed control efficiency (%)

The result showed that the weed control efficiency also affected by different date of sowing and weed management practices. The highest WCE recorded under 20 November; D₂ (62.91%) at 60 DAS, two hand weeding at 20 and 40

DAS; W₃ (82.67%). The decreased dry matter of weeds is the reason for the increased weed control effectiveness. These outcomes are consistent with findings of Verma *et al.* (2022) ^[11] and Kumar *et al.* (2023) ^[4]. The recorded data was presented in Table 4.

Table 4: Weed index (%) and weed control efficiency (%) under different sowing dates and weed management practices at different growth stages in field pea

Treatments	Weed Index (%)	Weed Control Efficiency (%)
Date of sowing		
D ₁ = 01 November	19.63	60.59
D ₂ = 20 November	26.17	62.91
D ₃ = 10 December	27.60	59.71
Weed management		
W ₁ = Weedy check	52.84	0.00
W ₂ = Weed free	0.00	100.00
W ₃ = Two hand weeding at 20 and 40 DAS	11.17	82.67
W ₄ = Metribuzin 250 g a.i. ha ⁻¹ as PoE	34.87	53.08
W ₅ = Imazethapyr + Imazemox (pre-mix) 70 g a.i. ha ⁻¹ as PoE	23.47	69.60

Table 5: Weed dominance (%) under different sowing dates and weed management practices at different growth stages in field pea

Treatments	Weed dominance (%)					
	<i>Anagallis arvensis</i>	<i>Echinochloa colona</i>	<i>Trifolium repens</i>	<i>Convolvulus arvensis</i>	<i>Cyperus rotundus</i>	<i>Cynodon dactylon</i>
Date of sowing						
D ₁ = 01 November	37.79	9.56	6.89	4.18	3.49	5.14
D ₂ = 20 November	24.29	7.32	6.50	6.57	5.19	4.52
D ₃ = 10 December	41.87	11.73	8.94	6.22	3.66	5.83
Weed management						
W ₁ = Weedy check	60.15	21.53	17.06	14.91	11.03	11.47
W ₂ = Weed free	0.00	0.00	0.00	0.00	0.00	0.00
W ₃ = Two hand weeding at 20 and 40 DAS	31.73	4.44	2.33	2.40	0.47	2.04
W ₄ = Metribuzin 250 g a.i. ha ⁻¹ as PoE	43.82	12.85	11.05	5.27	4.56	7.98
W ₅ = Imazethapyr + Imazemox (pre-mix) 70 g a.i. ha ⁻¹ as PoE	37.56	8.87	6.79	5.70	4.51	4.33

Weed dominance (%)

It is evident from the data that crop sown on 20 November (D₂) and two hand weeding at 20 and 40 DAS (W₃) were recorded the lowest weed dominance of major no. of weed species and maximum on late sowing and weedy check. *Anagallis arvensis* had the highest dominance all over the field in *rabi* season. These findings are similar with the findings of Punia *et al.* (2017)^[8] and Kumar *et al.* (2023)^[4]. The recorded data was presented in Table 5.

Conclusion

From the present investigation it is concluded that the sowing date 20 November (D₂) and weed free (W₂) were found very effective to reduce the weed density and weed dry matter accumulation. Therefore two hand weeding at 20 and 40 DAS (W₃) followed by is recommended for pea weed management and less chemical use. The sowing date 20 November (D₂) and two hand weeding at 20 and 40 DAS (W₃) had higher weed control efficiency (%) with lower weed index (%) while weedy check (W₁) had 0% control efficiency with higher weed index. The highest weed dominance (%) of *Anagallis arvensis* was recorded treatment under sowing date 10 December (D₃) and weedy check (W₁).

References

- Anonymous. Area, production and yield of field pea in India. FAO; c2021. Available from: <https://www.fao.org/faostat/en/#data/QCL>.
- Dittmar PJ, Boys NS, Kanissery R. Weed management in bean and pea (bush, pole, lima bean, English pea, and southern pea). HS188, UF/IFAS Extension, University of Florida; c2015.
- Jilani TA, Waseem K, Jilani Md S. Effect of weed management techniques for better growth and yield of

pea (*Pisum sativum* L.). Pak J Agric Sci. 2016;53(4):901-909.

- Kumar R, Kumar V, Prasad SK, Verma SK, Singh SP. Yield attributes and weed management practices on field pea (*Pisum sativum* L.) in Indo-Gangetic plain of Varanasi. Pharma. Innov. J. 2023;12(3):2530-2533.
- Makasheva RKH. The pea. New Delhi: Oxonion Press Pvt. Ltd.; c1983. p. 267.
- Mathukia RK, Gadhiya PV, Panara DM. Weed management in field pea (*Pisum sativum* L.). J Crop Weed. 2015;11:177-180.
- Mishra JS. Efficacy of post emergence herbicides against wild oat in field pea. Indian J Weed Sci. 2006;38:140-142.
- Punia R, Punia SS, Sangwan M, Thakral SK. Efficiency of imazethapyr applied alone and its mixture with other herbicides in green gram and their residual effect on mustard. Indian J Weed Sci. 2017;49(2):151-155.
- Rangaswamy R. A textbook of agricultural statistics. New Age International (P) Limited; c2005. p. 391.
- Rana SC, Pandita VK, Chhokar RS, Sirohi S. Effect of pre and post emergence herbicides on weeds and seed yield of garden pea. Legume Res. 2015;38(4):484-487.
- Verma H, Mirjha PR, Chandravanshi R, Manikpuri K, Singh T. Weed management in field pea (*Pisum sativum* L.) under vertisols condition of Chhattisgarh. Int J Res Agron. 2022;6(1):15-17.