



International Journal of Agriculture Extension and Social Development

ISSN Print: 2618-0723
ISSN Online: 2618-0731
NAAS Rating (2026): 5.04
IJAESD 2026; 9(10): 155-160
www.extensionjournal.com
Received: 21-08-2026
Accepted: 22-09-2026
Published: 06-10-2026

Priyanka Bora

Subject Matter Specialist,
Krishi Vigyan Kendra,
Udalguri, Assam, India

Anjan Sarmah

Ph.D. Scholar, Department of
Agronomy, AAU, Jorhat,
Assam, India

Priyanka Dutta

Subject Matter Specialist,
Krishi Vigyan Kendra,
Sivasagar, Assam, India

Khagen Kurmi

Rtd. Professor, Department of
Agronomy, AAU, Jorhat,
Assam, India

Residual effects of different establishment methods and weed management practices in rice on growth and yield of succeeding relay field pea (*Pisum sativum* L.) in Assam

Priyanka Bora¹, Anjan Sarmah², Priyanka Dutta³, Khagen Kurmi⁴

DOI: <https://www.doi.org/10.33545/26180723.2026.v9.i10c.4372>

ABSTRACT

A field experiment entitled “Residual effects of different establishment methods and weed management practices in rice on growth and yield of succeeding relay field pea (*Pisum sativum* L.)” was carried out in the farmer’s field at Hongshobil, Gossaigaon, Kokrajhar, Assam during the year 2023-24 and 2024-25. The experiment consisted of 18 treatment combinations with 3 crop establishment methods viz., M_1 : Conventional transplanting, M_2 : Direct seeding by drum seeder, M_3 : Direct seeding with 50% reduced tillage and 6 weed management practices viz., W_1 : Pretilachlor 750 g/ha PE, W_2 : Pretilachlor 750 g/ha PE f.b. paddy weeder at 30 DAS/DAT, W_3 : Pyrazosulfuron-ethyl 25 g/ha PE f.b. bispyribac-sodium 25 g/ha at 30 DAS/DAT, W_4 : Paddy weeder at 20 and 40 DAS/DAT, W_5 : Weedy check, W_6 : Weed free check. The experiment was laid out in a split plot design with rice establishment methods assigned in the main plots and weed management practices in sub-plots with three replications. The result revealed that rice establishment methods had a significant residual effect on growth and yield of relay field pea. Direct seeding by drum seeder (M_2) recorded the highest number of branches per plant (8.03 and 8.39), pods per plant (9.21 and 9.76), seed yield (8.76, 8.84 q/ha) and stover yield (10.04, 10.18 q/ha) during 2023-24 and 2024-25, respectively and was statistically at par with conventional transplanting (M_1). In contrast, the residual effects of weed management practices and their interactions with rice establishment methods were non-significant for growth and yield parameters of relay field pea in both the years. The findings indicate that direct seeding of rice using drum seeder can provide a favourable carry-over effect on the performance of relay field pea.

Keywords: Rice establishment methods, Weed management practices, Relay field pea, Residual effect

Introduction

India remains a major force in global rice production and trade, with its rice sector playing a pivotal role in global food security, while rice forms the foundation of Assam’s food and agricultural economy. In India, rice is cultivated on 47.82 million ha yielding 137.83 million tonnes and an average productivity of 2.9 tonnes per ha during financial year 2023-24 (Anonymous, 2024b) [1]. Moreover, being the global leader as regards of export, India exported 163.59 lakh tonnes which accounts to 45.92 percent share in world export of rice during 2023-24 (Anonymous, 2024a) [2]. In Assam, rice is the major cereal food crop occupying an area of 23.07 lakh hectares which is approximately 83 percent of net sown area (27.44 lakh hectares) of the state, with a production of 60.44 lakh tones and productivity of 2.65 tonnes per hectare during the year 2022-23 (Anonymous, 2025) [3]. The predominance of rice in the cropping systems of Assam necessitates the adoption of efficient rice-based cropping system for enhancing resource-use efficiency and farm productivity.

Among establishment methods of rice, conventional transplanting is the most common. This method is labour, water and energy intensive which requires puddling and transplanting operations. Repeated puddling may alter soil physical properties which form hard pan affecting the establishment and growth of succeeding crops. Moreover, increasing water scarcity, labour wages and the need to reduce production costs have encouraged the adoption of direct seeded rice (DSR) (Kaur et al., 2017) [4]. It offers certain advantages like saving irrigation water, labour, energy, time, better growth of succeeding crops, reduces emission of greenhouse-gases, etc (Kumar et al., 2018) [5]. Thus, rice establishment methods may influence not only rice productivity but also the growing environment and performance of the succeeding crop.

Weed management is another critical component of rice production, particularly under DSR, where weeds emerge simultaneously with the crop and can cause substantial yield losses if not effectively controlled. Therefore, the risk of yield losses is greater in DSR than transplanted rice. DSR faces significant challenges from diverse weed flora, causing yield losses of 50-90% if not managed effectively (Kumar et al., 2025) [6]. Hence, the direct-seeding of rice faces severe challenges from weeds, and effective weed management practices are essential for growing of DSR (Manjhi et al., 2025) [7]. However, differences in weed management practices may also influence the succeeding crop through changes in weed seed banks, soil conditions, crop

Corresponding Author:

Priyanka Bora

Subject Matter Specialist,
Krishi Vigyan Kendra,
Udalguri, Assam, India

residues and possible herbicide carry-over effects. Therefore, assessment of their residual effects on the succeeding crop is important for developing suitable rice-based cropping systems.

Relay cropping in which succeeding crop is established in the standing preceding crop before its harvest, provides an opportunity to intensify rice-based systems and utilize residual moisture and available growing period efficiently (Sarmah *et al.*, 2024) [8]. Inclusion of pulse crops in rice-based systems can further enhance system productivity and diversification while contributing to soil fertility through biological nitrogen fixation. Field pea (*Pisum sativum* L.) is a promising winter pulse crop that can be grown successfully under suitable agro-climatic conditions. Relay field pea after rice can utilize residual soil moisture and reduce the time and resources required for separate land preparation, making it a potentially suitable component of rice-based cropping systems in Assam. (Sarma *et al.*, 2017) [9].

Understanding the residual effects of different establishment methods and weed management practices is essential for optimizing the growth and yield of succeeding relay field pea under the agro-ecological conditions of Assam the present study was undertaken.

Materials and methods

A two-year field experiment was conducted during 2023–24 and 2024–25 in a farmer's field at Hongshobil village, P.O. Gossaigaon, District Kokrajhar, Assam, representing the Lower Brahmaputra Valley Zone of Assam (26°40' N latitude, 90°02' E longitude and 51.57 m above mean sea level), to evaluate the residual effects of rice crop establishment and weed management practices on the growth and yield of succeeding relay field pea. The experiment was laid out in a split-plot design with three replications, comprising three rice crop establishment methods in the main plots and six weed management practices in the sub-plots, resulting in 18 treatment combinations and 54 plots. Each plot measured 4 m × 3 m (12 m²), with a net experimental area of 648 m² and a gross experimental area of 880 m². The rice establishment methods were M₁: conventional transplanting, M₂: direct seeding using a drum seeder, and M₃: direct seeding with 50% reduced tillage. The weed management practices were W₁: pretilachlor at 750 g ha⁻¹ as pre-emergence (PE), W₂: pretilachlor at 750 g ha⁻¹ as PE followed by paddy weeder at 30 DAS/DAT, W₃: pyrazo-

sulfuron-ethyl at 25 g ha⁻¹ as PE followed by bispyribac-sodium at 25 g ha⁻¹ at 30 DAS/DAT, W₄: paddy weeder at 20 and 40 DAS/DAT, W₅: weedy check, and W₆: weed-free check. Winter rice variety 'Numoli' was followed by relay field pea variety 'Aman', which was established by broadcasting seed at 75 kg ha⁻¹ at 15 days after flowering of winter rice. No additional fertilizer, herbicide, weeding or other crop management practices were applied to the succeeding field pea crop, allowing the observed response to represent the residual effects of the preceding rice treatments. Growth parameters, yield attributes, seed yield and stover yield of relay field pea were recorded using standard procedures, and the data were subjected to statistical analysis appropriate for a split-plot design to determine the significance of treatment effects.

Results and discussion

Growth parameters

Crop establishment methods significantly influenced the growth parameters of relay field pea, whereas the effect of weed management practices and their interaction was non-significant during both years of experimentation.

The growth parameters of relay field pea were significantly influenced by rice crop establishment methods, whereas the differences were more pronounced at later growth stages. Conventional transplanting (M₁) recorded the highest plant height at 30 DAS, possibly due to greater initial crop canopy and suppression of weeds by the standing rice crop, as field pea was sown before rice harvest; however, at 60 DAS, direct seeding by drum seeder (M₂) recorded significantly higher plant height and remained statistically at par with M₁ in both years. Direct seeding by drum seeder (M₂) also recorded the highest number of branches plant⁻¹ (8.03 and 8.39), dry matter accumulation and crop growth rate (CGR) during both years. The superior growth under M₂ may be attributed to reduced crop-weed competition, better utilization of residual soil moisture and nutrients, favourable soil conditions and greater vegetative growth, as reflected by increased plant height and branching, which enhanced dry matter production and CGR. Similar findings have been reported by Choudhary *et al.* (2023) [10], Bharali *et al.* (2019) [11] and Kumar *et al.* (2023) [10, 11, 12].

Table 1. Residual effect of crop establishment methods and weed management practices in rice on plant height of relay field pea

Treatments	Plant height (cm)							
	2023-24				2024-25			
	30 DAS	60 DAS	90 DAS	120 DAS	30 DAS	60 DAS	90 DAS	120 DAS
Main plot : Methods of crop establishment (M)								
M ₁ : Conventional transplanting	28.04	42.44	72.63	97.38	28.87	43.79	73.22	97.48
M ₂ : Direct seeding by drum seeder	26.79	45.02	75.94	101.39	26.92	45.17	74.57	102.07
M ₃ : Direct seeding with 50% reduced tillage	23.79	37.62	67.62	94.52	24.23	39.73	68.63	95.80
SEm (±)	0.77	1.29	2.60	2.46	0.79	1.07	2.29	2.65
CD (<i>p</i> = 0.05)	3.03	5.05	NS	NS	3.11	4.21	NS	NS
Sub plot: Weed management practices (W)								
W ₁ : Pretilachlor 750 g/ha PE	25.94	39.36	69.63	95.72	26.39	40.58	69.94	96.89
W ₂ : Pretilachlor 750 g/ha PE <i>f.b.</i> paddy weeder at 30 DAS/DAT	25.98	40.06	70.44	96.67	26.65	40.24	71.21	96.24
W ₃ : Pyrazosulfuron-ethyl 25 g/ha PE <i>f.b.</i> bispyribac-sodium 25 g/ha at 30 DAS/DAT	26.13	42.40	73.12	97.51	26.76	44.18	73.03	98.24
W ₄ : Paddy weeder at 20 and 40 DAS/DAT	23.56	38.92	69.19	94.68	23.69	40.14	70.80	97.04
W ₅ : Weedy check	28.48	44.96	75.24	101.97	28.54	47.87	74.50	101.78
W ₆ : Weed free check	27.14	44.47	74.75	100.02	27.76	44.37	73.37	100.49
SEm (±)	1.08	2.62	2.98	4.76	1.13	2.66	2.68	4.75
CD (<i>p</i> = 0.05)	NS	NS	NS	NS	NS	NS	NS	NS
Interaction (M × W)	NS	NS	NS	NS	NS	NS	NS	NS

DAS: Days after sowing, DAT: Days after transplanting, PE: Pre-emergence, NS: Non-significant

(continued on next page)

Table 2. Residual effect of crop establishment methods and weed management practices in rice on number of branches of relay field pea

Treatments	No. of branches/plant	
	2023-24	2024-25
Main plot : Methods of crop establishment (M)		
M ₁ :Conventional transplanting	7.60	8.01
M ₂ :Direct seeding by drum seeder	8.03	8.39
M ₃ : Direct seeding with 50% reduced tillage	7.33	7.65
SEm (±)	0.13	0.14
CD (<i>p</i> = 0.05)	0.49	0.54
Sub plot: Weed management practices (W)		
W ₁ : Pretilachlor 750 g/ha PE	7.42	7.78
W ₂ : Pretilachlor 750 g/ha PE <i>f.b.</i> paddy weeder at 30 DAS/DAT	7.73	8.24
W ₃ : Pyrazosulfuron-ethyl 25 g/ha PE <i>f.b.</i> bispyribac-sodium 25 g/ha at 30 DAS/DAT	8.07	8.34
W ₄ : Paddy weeder at 20 and 40 DAS/DAT	7.49	7.82
W ₅ : Weedy check	7.08	7.42
W ₆ : Weed free check	8.13	8.52
SEm (±)	0.28	0.31
CD (<i>p</i> = 0.05)	NS	NS
Interaction (M x W)	NS	NS

DAS: Days after sowing, DAT: Days after transplanting, PE: Pre-emergence, NS: Non-significant

Table 3. Residual effect of crop establishment methods and weed management practices in rice on dry matter accumulation of relay field pea

Treatments	Dry matter accumulation (g/plant)							
	2023-24				2024-25			
	30 DAS	60 DAS	90 DAS	120 DAS	30 DAS	60 DAS	90 DAS	120 DAS
Main plot : Methods of crop establishment (M)								
M ₁ :Conventional transplanting	4.56	9.03	15.73	21.67	4.83	9.32	16.53	22.10
M ₂ :Direct seeding by drum seeder	4.29	9.63	17.65	23.93	4.54	9.68	18.26	24.26
M ₃ : Direct seeding with 50% reduced tillage	4.02	8.61	14.64	19.43	4.11	8.80	15.27	20.10
SEm (±)	0.10	0.17	0.37	1.01	0.14	0.14	0.34	0.82
CD (<i>p</i> = 0.05)	NS	0.68	1.44	NS	NS	0.54	1.33	NS
Sub plot: Weed management practices (W)								
W ₁ : Pretilachlor 750 g/ha PE	4.18	8.94	15.59	21.09	4.33	9.02	16.40	21.73
W ₂ : Pretilachlor 750 g/ha PE <i>f.b.</i> paddy weeder at 30 DAS/DAT	4.23	9.01	16.27	21.89	4.47	9.26	16.92	22.36
W ₃ : Pyrazosulfuron-ethyl 25 g/ha PE <i>f.b.</i> bispyribac-sodium 25 g/ha at 30 DAS/DAT	4.57	9.46	16.89	22.80	4.77	9.63	17.39	23.27
W ₄ : Paddy weeder at 20 and 40 DAS/DAT	4.24	9.02	15.38	20.94	4.36	9.11	16.44	21.76
W ₅ : Weedy check	3.83	8.42	14.65	19.89	4.13	8.80	15.13	20.19
W ₆ : Weed free check	4.69	9.68	17.25	23.44	4.89	9.78	17.85	23.61
SEm (±)	0.23	0.28	0.63	0.83	0.19	0.25	0.60	0.79
CD (<i>p</i> = 0.05)	NS	NS	NS	NS	NS	NS	NS	NS
Interaction (M x W)	NS	NS	NS	NS	NS	NS	NS	NS

DAS: Days after sowing, DAT: Days after transplanting, PE: Pre-emergence, NS: Non-significant

Table 4. Residual effect of crop establishment method and weed management practices in rice on crop growth rate of relay field pea

Treatments	Crop growth rate (g/m ² /day)							
	2023-24				2024-25			
	0-30 DAS	30-60 DAS	60-90 DAS	90 -120 DAS	0-30 DAS	30-60 DAS	60 -90 DAS	90 -120 DAS
Main plot : Methods of crop establishment (M)								
M ₁ :Conventional transplanting	5.09	5.28	7.45	6.47	5.17	5.31	8.01	6.12
M ₂ :Direct seeding by drum seeder	4.76	5.44	9.08	6.98	5.04	5.36	9.53	6.61
M ₃ : Direct seeding with 50% reduced tillage	4.45	5.22	6.71	5.33	4.79	5.24	7.19	5.31
SEm (±)	0.12	0.17	0.22	0.33	0.15	0.15	0.30	0.27

(continued on next page)

Treatments	Crop growth rate (g/m ² /day)							
	2023-24				2024-25			
	0-30 DAS	30-60 DAS	60-90 DAS	90-120 DAS	0-30 DAS	30-60 DAS	60-90 DAS	90-120 DAS
CD ($p = 0.05$)	NS	NS	0.88	NS	NS	NS	1.16	NS
Sub plot: Weed management practices (W)								
W ₁ : Pretilachlor 750 g/ha PE	4.64	5.28	7.39	6.12	4.82	5.21	8.20	6.04
W ₂ : Pretilachlor 750 g/ha PE <i>f.b.</i> paddy weeder at 30 DAS/DAT	4.70	5.30	8.08	6.24	4.97	5.32	8.51	5.94
W ₃ : Pyrazosulfuron-ethyl 25 g/ha PE <i>f.b.</i> bispyribac-sodium 25 g/ha at 30 DAS/DAT	5.08	5.40	8.26	6.57	5.10	5.40	8.63	6.41
W ₄ : Paddy weeder at 20 and 40 DAS/DAT	4.71	5.30	7.07	5.91	4.85	5.27	8.14	5.78
W ₅ : Weedy check	4.26	5.10	7.25	5.82	4.59	5.19	7.03	5.63
W ₆ : Weed free check	5.21	5.52	8.42	6.88	5.13	5.44	8.97	6.29
SEm ($\pm$)	0.25	0.23	0.50	0.42	0.21	0.27	0.54	0.40
CD ($p = 0.05$)	NS	NS	NS	NS	NS	NS	NS	NS
Interaction (M x W)	NS	NS	NS	NS	NS	NS	NS	NS

DAS: Days after sowing, DAT: Days after transplanting, PE: Pre-emergence, NS: Non-significant

Yield and yield attributes

Crop establishment methods significantly influenced the number of pods plant⁻¹ and seed and stover yields of relay field pea, whereas number of seeds pod⁻¹ and pod length were not significantly affected during either year of experimentation. Direct seeding by drum seeder (M₂) recorded the highest number of pods plant⁻¹ (9.21 and 9.67) during 2023–24 and 2024–25, respectively, and remained statistically at par with conventional transplanting (M₁). The higher pod production under M₂ may be associated with its superior vegetative growth, particularly greater branching and dry matter accumulation, which provided more reproductive sites and enhanced assimilate availability for pod formation and development (Rahangdale *et al.*, 2025, Chudhury *et al.*, 2018 and Rao *et al.*, 2022) [13, 14, 15]. In contrast, number of seeds pod⁻¹ and pod length remained statistically comparable among the crop establishment methods. Direct seeding by drum seeder (M₂) also produced significantly higher seed yield (8.76 and 8.84 q ha⁻¹) and stover yield (10.04 and 10.18 q ha⁻¹) in 2023–24 and 2024–25, respectively, with pooled seed and stover yields of 8.80 and 10.11 q ha⁻¹, respectively, and was statistically at par with conventional transplanting (M₁). The higher seed yield under M₂ was pri-

marily associated with the greater number of pods plant⁻¹ and better crop growth, which likely enhanced biomass production and assimilate partitioning towards reproductive sinks (Kumar *et al.*, 2022 and Samant *et al.*, 2023) [16, 17]. Weed management practices did not exert a significant effect on any of the yield attributes or seed and stover yields in either year. Nevertheless, the weed-free check (W₆) generally recorded numerically higher values for seeds pod⁻¹, seed yield and stover yield, followed by pyrazosulfuron-ethyl 25 g ha⁻¹ as PE followed by bispyribac-sodium 25 g ha⁻¹ at 30 DAS/DAT (W₃). The interaction between rice crop establishment methods and weed management practices was non-significant for all yield attributes and yield parameters in both years.

Biological yield and harvest index

Biological yield of relay field pea was significantly influenced by rice crop establishment methods during both years of experimentation, with direct seeding by drum seeder (M₂) recording the highest biological yield of 18.81 and 19.02 q ha⁻¹ in 2023–24 and 2024–25, respectively. The higher biological yield under M₂ was consistent with its higher seed and stover

Table 5. Residual effect of crop establishment method and weed management practices in rice on yield attributing characters of relay field pea

Treatments	No. of pods/plant		No. seeds/pod		Pod length (cm)	
	2023-24	2024-25	2023-24	2024-25	2023-24	2024-25
Main plot : Methods of crop establishment (M)						
M ₁ : Conventional transplanting	8.74	9.07	5.21	5.20	7.99	8.04
M ₂ : Direct seeding by drum seeder	9.21	9.67	5.33	5.39	8.18	8.29
M ₃ : Direct seeding with 50% reduced tillage	7.96	8.50	5.13	5.16	7.72	7.75
SEm ($\pm$)	0.21	0.22	0.17	0.16	0.19	0.18
CD ($p = 0.05$)	0.81	0.87	NS	NS	NS	NS
Sub plot: Weed management practices (W)						
W ₁ : Pretilachlor 750 g/ha PE	8.50	8.92	5.04	5.09	7.79	7.90
W ₂ : Pretilachlor 750 g/ha PE <i>f.b.</i> paddy weeder at 30 DAS/DAT	8.89	9.13	5.21	5.20	7.97	8.05
W ₃ : Pyrazosulfuron-ethyl 25 g/ha PE <i>f.b.</i> bispyribac-sodium 25 g/ha at 30 DAS/DAT	8.95	9.39	5.42	5.49	8.17	8.22
W ₄ : Paddy weeder at 20 and 40 DAS/DAT	8.32	8.80	5.02	4.99	7.78	7.80
W ₅ : Weedy check	8.05	8.67	4.83	4.91	7.52	7.56
W ₆ : Weed free check	9.10	9.57	5.79	5.81	8.56	8.62
SEm ($\pm$)	0.27	0.22	0.22	0.22	0.24	0.23

(continued on next page)

Treatments	No. of pods/plant		No. seeds/pod		Pod length (cm)	
	2023-24	2024-25	2023-24	2024-25	2023-24	2024-25
CD ($p = 0.05$)	NS	NS	NS	NS	NS	NS
Interaction (M x W)	NS	NS	NS	NS	NS	NS

DAS: Days after sowing, DAT: Days after transplanting, PE: Pre-emergence, NS: Non-significant

Table 6. Residual effect of crop establishment methods and weed management practices in rice on seed and stover yield of relay field pea

Treatments	Seed yield (q/ha)			Stover yield (q/ha)		
	2023-24	2024-25	Pooled	2023-24	2024-25	Pooled
Main plot : Methods of crop establishment (M)						
M ₁ : Conventional transplanting	8.19	8.39	8.27	9.64	9.84	9.74
M ₂ : Direct seeding by drum seeder	8.76	8.84	8.80	10.04	10.18	10.11
M ₃ : Direct seeding with 50% reduced tillage	7.77	7.88	7.83	9.27	9.47	9.37
SEm ($\pm$)	0.15	0.13	0.11	0.14	0.11	0.08
CD ($p = 0.05$)	0.48	0.53	0.41	0.55	0.45	0.30
Sub plot: Weed management practices (W)						
W ₁ : Pretilachlor 750 g/ha PE	8.09	8.16	8.13	9.58	9.72	9.65
W ₂ : Pretilachlor 750 g/ha PE <i>f.b.</i> paddy weeder at 30 DAS/DAT	8.25	8.45	8.35	9.71	9.81	9.76
W ₃ : Pyrazosulfuron-ethyl 25 g/ha PE <i>f.b.</i> bispyribac-sodium 25 g/ha at 30 DAS/DAT	8.51	8.66	8.58	9.78	10.05	9.92
W ₄ : Paddy weeder at 20 and 40 DAS/DAT	8.03	8.04	8.04	9.55	9.68	9.62
W ₅ : Weedy check	7.92	7.99	7.95	9.46	9.62	9.54
W ₆ : Weed free check	8.56	8.92	8.74	9.81	10.10	9.95
SEm ($\pm$)	0.32	0.27	0.25	0.25	0.21	0.19
CD ($p = 0.05$)	NS	NS	NS	NS	NS	NS
Interaction (M x W)	NS	NS	NS	NS	NS	NS

DAS: Days after sowing, DAT: Days after transplanting, PE: Pre-emergence, NS: Non-significant

Table 7. Residual effect of crop establishment methods and weed management practices in rice on biological yield and harvest index of relay field pea

Treatments	Biological yield (q/ha)		Harvest index (%)	
	2023-24	2024-25	2023-24	2024-25
Main plot : Methods of crop establishment (M)				
M ₁ : Conventional transplanting	17.78	18.24	45.82	46.02
M ₂ : Direct seeding by drum seeder	18.81	19.02	46.57	46.47
M ₃ : Direct seeding with 50% reduced tillage	17.04	17.35	45.47	45.31
SEm ($\pm$)	0.20	0.16	0.49	0.53
CD ($p = 0.05$)	0.80	0.63	NS	NS
Sub plot: Weed management practices (W)				
W ₁ : Pretilachlor 750 g/ha PE	17.67	17.88	45.67	45.45
W ₂ : Pretilachlor 750 g/ha PE <i>f.b.</i> paddy weeder at 30 DAS/DAT	17.95	18.26	45.94	46.25
W ₃ : Pyrazosulfuron-ethyl 25 g/ha PE <i>f.b.</i> bispyribac-sodium 25 g/ha at 30 DAS/DAT	18.29	18.71	46.58	46.35
W ₄ : Paddy weeder at 20 and 40 DAS/DAT	17.59	17.73	45.52	45.30
W ₅ : Weedy check	17.38	17.61	45.40	45.29
W ₆ : Weed free check	18.36	19.02	46.61	46.94
SEm ($\pm$)	0.41	0.37	1.21	0.91
CD ($p = 0.05$)	NS	NS	NS	NS
Interaction (M x W)	NS	NS	NS	NS

DAS: Days after sowing, DAT: Days after transplanting, PE: Pre-emergence, NS: Non-significant

yields, reflecting greater overall biomass production. In contrast, weed management practices did not significantly affect biological yield in either year, although the weed-free check (W₆) recorded the highest numerical values. Harvest index was not significantly influenced by rice crop establishment methods, weed management practices, or their interaction during either year, indicating that the proportion of total biomass partitioned into seed yield remained relatively stable across the treatments.

Conclusion

The study revealed that the establishment method adopted in the preceding rice crop had a significant residual effect on the growth and yield performance of succeeding relay pea. Among the establishment methods, direct seeding of rice using drum seeder (M₂) showed a favourable residual effect, resulting in improved growth and yield of

pea, whereas, the weed management practices had no significant residual effect on field pea performance. However, treatment combination of direct seeding of rice using drum seeder (M_2) and pyrazo-sulfuron-ethyl 25 g ha^{-1} as PE followed by bispyribac-sodium 25 g ha^{-1} at 30 DAS/DAT (W_3) recorded higher yield of the succeeding pea crop therefore, this combination may be considered a suitable approach for enhancing productivity of relay field pea under the conditions of present study

References

1. Anonymous. Agricultural statistics at a glance 2023. Government of India. 2024b.
2. Anonymous. A brief report on export of rice by India. Directorate General of Commercial Intelligence & Statistics. 2024a.
3. Anonymous. Statistical handbook of Assam-2024, Government of Assam. 2025.
4. Kaur J, Singh A. Direct seeded rice: Prospects, problems, constraints and researchable issues in India. *Current Agriculture Research Journal*. 2017;5(1):13-32.
5. Kumar P, Kumar S, Mouriya AK, Kumar V. Productivity and economics of direct seeded rice. *International Journal of Science, Environment and Technology*. 2018;7(6):2033-2039.
6. Kumar G, Kumar A, Karan N, Sarma HH, Bora SS, Saud RK, Chauhan MK, Rafique NT, Medhi K, Konwar MJ, Bharali P. Evaluation of weed management practices and their impact on weed dynamics under different rice establishment techniques in early Ahu season. *International Journal of Agriculture Sciences*. 2025;17(2):13417-13420.
7. Manjhi RP, Kumari M, Pandey SK. Efficacy of integrated weed management (IWM) practices on the weed dynamics, production and productivity of direct-seeded rice. *Plant Science Today*. 2025;10(14):3-7.
8. Sarmah A, Barman B, Hafiz A, Sharma MS, Das BK, Ojah I, Khound A. An economic analysis of rice-based cropping sequence at NICRA adopted village in Darrang district of Assam. *International Journal of Research in Agronomy*. 2024;7(6):149-153.
9. Sarma D, Saikia P, Sarma MK, Neog P, Borah P, Chettri P, Hazarika M, Bhattacharjee M, Kakati N. Crop intensification through relay cropping in rice fallows of Assam. *Indian Journal of Dryland Agricultural Research & Development*. 2017;32(1):75-77.
10. Choudhary AK, Nandan R, Kumar R. Effect of sowing methods and weed management practices on growth and yield of field pea (*Pisum sativum* L.) under eastern Indo-Gangetic Plains. *Legume Research*. 2023;46(5):635-640.
11. Bharali P, Thakuria K. Crop establishment methods and nitrogen management in organically grown scented rice (*Oryza sativa*)-vegetable pea (*Pisum sativum*) relay cropping system. *International Journal of Agriculture Sciences*. 2019;11(1):7728-7731.
12. Kumar R, Singh SP. Effect of weed management practices and planting methods on growth and yield attributes of rice (*Oryza sativa* L.). *Oryza*. 2023;60(1):44-50.
13. Rahangdale MT, Ghodeswar P, Choudhary AS, Satankar N. Effect of Integrated Nutrient Management on growth, yield and quality of Cowpea. *Journal of Emerging Technologies and Innovative Research*. 2025;12(2):145-149.
14. Choudhary AK, Kumar S, Sandhu JS. Physiological and molecular basis of yield enhancement in pulses: Current status and future directions. *Frontiers in Plant Science*. 2018;9:1873.
15. Rao AU, Kumar KM, Visalakashmi V, Rao SG, Satyanarayana NH. Promising rice establishment methods and N management for rice-greengram system. *Ecology Environment and Conservation*. 2022;28:117-121.
16. Kumar R, Singh AK, Meena RK, Yadav RS. Physiological determinants of productivity in field pea (*Pisum sativum* L.) under different agronomic practices. *Legume Research*. 2022;45(10):1234-1240.
17. Samant TK, Garnayak LM, Paikaray RK, Mishra KN, Panda RK, Swain SK. Direct and residual effect of nutrient management and rice establishment methods on productivity, profitability, nutrient uptake and resource use efficiency in rice (*Oryza sativa* L.)-groundnut (*Arachis hypogaea* L.) cropping system. *Legume Research*. 2023;46(3):339-345.

How to cite this article: Bora P, Sarmah A, Dutta P, Kurmi K. Residual effects of different establishment methods and weed management practices in rice on growth and yield of succeeding relay field pea (*Pisum sativum* L.) in Assam. *International Journal of Agriculture Extension and Social Development*. 2026;9(10):155-160. doi: <https://www.doi.org/10.33545/2618072.3.2026.v9.i10c.4372>