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RESEARCH NOTE

Farmer perception and on-farm assessment of pretilachlor + florpyrauxifen-benzyl efficacy in managing weeds in direct wet-seeded rice

A. Nivetha

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ABSTRACT

Weed infestation is a major constraint in direct wet-seeded rice (*Oryza sativa* L.) (WSR), particularly during the early stage of rice growth. The present study was undertaken to understand the farmer perception and assess the on-farm efficacy of early post-emergence herbicide application (EPoE) of pretilachlor + florpyrauxifen-benzyl to manage early season weeds in direct wet-seeded rice. The study was conducted during the *Kharif* season of 2023 in farmers' fields in Alappuzha and Kottayam districts, Kerala, India. A survey of 110 farmers and 60 dealers was carried out using a structured questionnaire to evaluate the awareness, adoption, satisfaction and market perception on weed management in WSR, by index-based analysis. The dominant weed flora in the study area was: grasses, *Echinochloa colona* (L.) Link and *Echinochloa crus-galli* (L.) P. Beauv.; sedge, *Cyperus difformis* L., and broad-leaved weed, *Monochoria vaginalis* (Burm. f.) C. Presl.. The pretilachlor + florpyrauxifen-benzyl 620+20/ha (pre-mix) applied at 8–10 days after sowing (DAS), when weeds at the 2–3 leaf stage, was observed to provide effective early season control of dominant grass weeds and moderate control of sedges and broad-leaved weeds. Survey results indicated moderate awareness and adoption levels of improved weed management options among farmers, largely influenced by labour scarcity and the need for timely weed control in WSR. Dealer perception reflected increasing interest in pre-emergence weed management options, emphasizing the need for their field demonstrations and technical guidance. The study concludes that pretilachlor + florpyrauxifen-benzyl EPoE can play a significant role in managing early emerging weeds in WSR and improved extension support is essential to enhance farmer adoption of improved weed management options under Kerala conditions.

Keywords: Adoption Index, Direct wet-seeded, Farmer Perception, Pretilachlor + florpyrauxifen-benzyl, Herbicide, Weed Flora, Weed management

Direct-seeded rice (*Oryza sativa* L.) is gaining importance in India due to labour scarcity, rising cultivation costs and the need for timely crop establishment (Yaduraj *et al.* 2021). However, weed infestation remains a major constraint in direct-seeded rice systems, particularly during early crop growth stages when the crop is highly vulnerable to competition (Rao *et al.* 2017, Yaduraj *et al.* 2021, Shekhawat *et al.* 2022). The absence of standing water during establishment favours the emergence of diverse weed flora, including grass weeds, sedges and broad-leaved weeds, leading to significant yield losses if not managed effectively (Rao *et al.* 2007).

Early season weed control is critical for the successful adoption of direct-seeded rice (Dass *et al.* 2017). Pre-emergence herbicides are widely recommended for suppressing weeds during the initial stages of crop establishment and reducing dependence on manual weeding, which is often constrained by labour unavailability. Several pre-emergence herbicides have been reported to be effective against dominant weed species in rice ecosystems; however, their performance and acceptance vary across regions due to differences in weed flora, cropping practices and farmer awareness.

In Kerala, the information on the field-level performance of early post-emergence herbicide application in direct wet-seeded rice and farmer perception on it is limited. Most of the emphasis was on experimental evaluations at research stations, while evidence from farmer fields and perception-based assessments remains scarce. This gap restricts the identification of location-specific weed management options and their adoption strategies. Thus, a study was undertaken to generate region-specific insights that can support improved weed management and promote informed adoption of early post-emergence herbicide in direct-seeded rice systems.

Department of Agri Business Management, School of Business, MIT WPU, Pune, Maharashtra 411038, India

* Corresponding author email: nivethashanthi96@gmail.com

The objective of this on-farm study in farmers' fields was to understand farmers' perception and assess field-level performance of pretilachlor + florpyrauxifen-benzyl EPoE for early-season weed management in direct wet-seeded rice in Kerala.

The study was conducted during the kharif season from June to October 2025 in two major rice-growing districts of Kerala, namely Alappuzha and Kottayam. A total of 110 WSR farmers were selected from the two districts (52 from Alappuzha and 58 from Kottayam) based on their willingness to participate in the study. In addition, 60 agricultural input dealers operating in the study area were surveyed during the same period, from June to October 2025, to assess market-level perceptions.

The assessment focused on the on-farm performance of early post-emergence application of Pretilachlor + florpyrauxifen-benzyl (pre-mix), which was approved for weed management in WSR. The herbicide was applied by 110 participating direct-seeded rice farmers at the label-recommended dose of 620+20/ha (pre-mix) within 8–10 days after sowing in their respective fields across selected villages of Alappuzha and Kottayam districts of Kerala. The on-farm performance assessment was based on field observations from these 110 farmer fields. Observations were made during early crop establishment to identify dominant weed flora and to assess perceived weed suppression.

Field observations were carried out using a structured visual assessment method in the direct wet-seeded rice fields of participating farmers. Each field was visited during the early crop establishment stage (within 20–30 days after sowing). Weed species present were identified visually, and dominant weeds were recorded based on their frequency of occurrence across fields. Weed flora were grouped into grasses, sedges, and broad-leaved weeds.

Frequency of occurrence of weed species was determined based on their presence across the observed farmer fields. For each weed species, the number of fields in which the species was observed during early crop establishment (20–30 days after sowing) was recorded. Frequency of occurrence was expressed qualitatively as high, moderate, or low based on the proportion of fields in which the weed species occurred. Weed species present in more than 50% of the observed fields were classified as having high frequency of occurrence, those present in 25–50% of fields were classified as moderate, and those occurring in less than 25% of fields were classified as low.

The efficacy of the early post-emergence herbicide was assessed qualitatively through visual estimation of weed suppression in comparison with untreated patches or adjacent fields managed under farmers' usual practices. Weed control effectiveness was categorized as good, moderate, or low based on the overall reduction in weed density and vigour observed during field visits.

Dominant grass weeds, sedges and broad-leaved weeds were identified based on their frequency of occurrence. Perceived weed suppression was categorized qualitatively based on visual assessment during the early growth stages of the crop as: good (>70% weed suppression), moderate (40–70% weed suppression), and low (<40% weed suppression), relative to untreated or conventionally managed fields.

A structured questionnaire was used to collect data from farmers on awareness, adoption, and satisfaction related to the use of early post-emergence herbicide in direct wet-seeded rice. Dealer surveys were conducted using a structured questionnaire to understand perceptions regarding demand trends, farmer enquiries and market potential. Responses were recorded using a five-point Likert scale, where 1 = very low, 2 = low, 3 = moderate, 4 = high, and 5 = very high

Farmer awareness and adoption regarding the use of the early post-emergence herbicide: pretilachlor + florpyrauxifen-benzyl (pre-mix) were assessed using structured questionnaire responses. The percentage of farmers aware of or adopting the herbicide was calculated by dividing the number of farmers responding positively by the total number of respondents (n = 110) and multiplying by 100. Awareness Index and Adoption Index were computed by expressing the obtained percentage scores as index values, where the percentage value directly represented the index score.

Farmer satisfaction and dealer perception were assessed using a five-point Likert scale, where 1 = very low, 2 = low, 3 = moderate, 4 = high, and 5 = very high. Mean score for each parameter was calculated as the average of individual respondent scores.

Satisfaction Index (SI, %) was calculated using the formula: SI (%) = (Obtained score / Maximum possible score) × 100 where the maximum possible score was calculated as 5 × 110 (five being the highest Likert score and 110 being the total number of farmers).

Similarly, dealer perception index (DPI, %) was calculated as: DPI (%) = (Obtained score / Maximum possible score) × 100 where the maximum possible score was 5 × 60 (five being the highest Likert score and 60 being the total number of dealers surveyed). Awareness, adoption, satisfaction and dealer perception indices were computed to interpret the survey data. The indices were calculated using standard formulae by expressing the obtained scores as a percentage of the maximum possible score. Descriptive analysis was employed to summarize the results.

The weed flora observed in direct wet-seeded rice fields of the study area included grass weeds: *Echinochloa colona*, *Echinochloa crus-galli*, *Leptochloa chinensis* and *Ischaemum rugosum*; sedges: *Cyperus difformis* and *Fimbristylis miliacea*; and broad-leaved weeds: *Monochoria vaginalis* and *Ludwigia parviflora*. Among these, *Echinochloa colona*, *E. crus-galli*, *Cyperus difformis* and *Monochoria vaginalis* were the predominant weed species during the early crop growth stage (**Table 1**). Grass weeds were the most prevalent group during early crop establishment, which is typical of direct-seeded rice systems under tropical conditions. Field observations indicated that early post-emergence application of the label-recommended dose of pretilachlor + florpyrauxifen-benzyl 620 + 20/ha (pre-mix), 8–10 days after sowing (DAS), resulted in effective early-season suppression of dominant grass weeds resulted in effective early season control of dominant grass weeds with moderate control efficacy on sedges and broad-leaved weeds.

The survey indicated that awareness and adoption indices were of a moderate level of familiarity and use of early post-emergence herbicides in wet direct-seeded rice cultivation (**Table 2**). Labour scarcity and challenges associated with timely manual weeding were identified as major factors influencing adoption. Farmers practicing wet direct-seeded rice increasingly perceived early post-emergence herbicides as a viable option to manage early weed pressure and reduce dependence on manual labour.

Farmer satisfaction index values indicated higher satisfaction regarding usage of application and labour-saving benefits of the early post-emergence herbicide, while comparatively lower satisfaction was reported with respect to cost effectiveness (**Table 2**). Thus, while farmers recognize the operational advantages of pre-emergence weed management, the economic considerations are influencing adoption decisions.

Mean score was calculated based on a five-point Likert scale (1 = very low, 2 = low, 3 = moderate, 4 = high, 5 = very high). Percentage and index values were calculated as (mean score / 5) × 100. For awareness and adoption, percentage represents the proportion of farmers responding positively, and the corresponding index value expresses the standardized score.

Dealer perception index results indicated increasing farmer enquiry and interest in pre-emergence weed management options for wet direct-seeded rice (**Table 2**). Dealers emphasized the need for field demonstrations and technical guidance to enhance farmer confidence and promote appropriate use of herbicides. The overall field observations and survey findings highlight the importance of early post-emergence herbicides as a component of early weed management in wet direct-seeded rice systems under Kerala conditions.

Conclusion

The on-farm assessment indicated that the pretilachlor + florpyrauxifen-benzyl 620+20/ha (pre-mix) applied at 8–10 days after sowing (DAS) has the potential for early-season weeds management in direct wet-seeded rice in Kerala, as it effectively managed dominant grass weeds, while survey-based indices reflected moderate awareness and adoption among farmers. Higher satisfaction of the farmers due to labour-saving benefits highlights the relevance of weed management with early post-

Table 1. The dominant weeds observed in farmers direct wet-seeded rice fields and their early-season control by tested herbicide

Weed group	Weed species	Visually assessed dominance of weed	Visually assessed early-season weed control
Grass	*Echinochloa colona*	High	Good
Grass	*Echinochloa crus-galli*	High	Good
Sedge	*Cyperus difformis*	Moderate	Moderate
Broad-leaved weed	*Monochoria vaginalis*	Moderate	Moderate

Table 2. Farmer awareness, adoption, satisfaction and dealer perception indices regarding the early post-emergence application of pretilachlor + florpyrauxifen-benzyl (pre-mix) in direct wet-seeded rice

Category	Parameter	n	Mean core	Percentage (%) and index value (%)
Farmer awareness & adoption	Awareness	110	3.5	70.9
	Adoption	110	2.9	58.2
Farmer satisfaction	Ease of application	110	4.1	82.0
	Weed suppression	110	3.8	76.0
	Labour saving	110	4.3	86.0
	Cost effectiveness	110	3.4	68.0
	Overall satisfaction	110	3.9	78.0
Dealer perception	Farmer enquiry	60	4.0	80.0
	Demand trend	60	3.8	76.0
	Repeat purchase potential	60	3.9	78.0
	Need for demonstrations	60	4.4	88.0

emergence application of herbicides to address labour constraints in direct wet-seeded rice system. Dealer perception further indicated increasing interest of the farmers to use early post-emergent herbicides and the need for location specific demonstrations and technical guidance on proper use of herbicides in WSR, by the scientists and agriculture department staff, to enhance farmer confidence.

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