

## **Evaluation of Florpyrauxifen-Benzyl Herbicides for Control on Common Weeds in Transplanted Rice**

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### **Abstract**

The research to test the effectiveness of the herbicide Florpyrauxifen-Benzylin in controlling weeds in rice was carried out in Sragen, Central Java. March to August 2021. The herbicides tested are: T1) Florpyrauxifen-Benzyl 400 ml/ha, T2) Florpyrauxifen-Benzyl 600 ml/ha, T3) Florpyrauxifen-Benzyl 800 ml/ha, T4) Florpyrauxifen-Benzyl 1000ml/ha, T5) Aryloxyphenoxy propionate 800 ml/ha, T6) Penoxsulam 800 ml/ha, T7) Natrium Byspiribac 300 ml/ha T8) Metsulfuron Methyl, T9) Hand Weeding and T10) Untreated. The herbicides were applied with the help of a knapsack sprayer by using a T-jet nozzle. The calibration of the knapsack sprayer was done by spraying on a non-experimental area. The volume of water used for spray was 300 L per ha. The results showed that the application of florpyrauxifen-benzyl in various doses did not show toxicity to rice plants. application of florpyrauxifen-benzyl starting at a dose of 600 ml/ha had the same effectiveness in controlling weeds as companion herbicides. At the end of the study, *E. crus-galli* and *L. chinensis* still seemed to dominate all plots in all herbicide applications.

**Keywords:** Florpyrauxifen-Benzyl, herbicides, weeds, transplanted rice



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### **INTRODUCTION**

Herbicides are widely used by farmers around the world because they are an effective weed control tactic, require less labor, and reduce operating costs. In weed control there is a tendency for farmers to use herbicides continuously without paying attention to the selection of the right type and dose. one of the impacts of herbicide use is weed persistence to herbicide and evolution (Somerville, 2018). Kniss (2018) reported that the development of weed resistance due to herbicides was recorded at around five cases per year from 1990 to 2015. Heap (2020) reports that there are 92 species of herbicide resistance spread across 70 countries. Weed management practices to prevent the occurrence of herbicide resistance can be done by alternately giving herbicides with different active ingredients

Florpyrauxifen benzyl (trademark as Rinskor) is a broad-spectrum herbicide for controlling grass, broadleaf, and sedge weeds in rice (Corteva Agriscience., 2019). According to the HRAC O/WSSA including group 4. The second member of the synthetic auxin chemotype, arylpicolinate. Arylpicolinate exhibits new and different characteristics in terms of usage rates, spectrum, weed symptoms, environmental fate, and molecular interactions compared to other auxin chemotypes (Byron et al., 2019). Florpyrauxifen-benzyl (Rinskor™ Active) is an herbicide currently being developed to control rice weeds (Epp et al. 2016). As a new herbicide, testing should be carried out for the herbicide used as an alternative to herbicide selection.

The purpose of this study was to evaluate the dose of the herbicide Florpyrauxifen-Benzylin which had the same or greater level of control with comparison herbicides.

## MATERIAL AND METHODS

The treatments were arranged in a completely randomized block design in Sragen, Central Java. march to August 2021. The herbicides tested are: T1) Florpyrauxifen-Benzyl 400 ml/ha, T2) Florpyrauxifen-Benzyl 600 ml/ha, T3) Florpyrauxifen-Benzyl 800 ml/ha, T4) Florpyrauxifen-Benzyl 1000ml/ha, T5) Aryloxyphenoxy propionate 800 ml/ha, T6) Penoxsulam 800 ml/ha, T7) Natrium Byspiribac 300 ml/ha, T8) Metsulfuron Methyl, T9) Hand Weeding and T10) Untreated. The herbicides were applied with the help of a knapsack sprayer by using a T-jet nozzle. The calibration of the knapsack sprayer was done by spraying on a non-experimental area. The volume of water used for spray was 300 L per ha., Target pest: a common weed of rice. The research parameters are (1) phytotoxicity (visual) of rice at 3, 7, 14, dan 28 Day After Application (DAA) herbicide). Visible phytotoxicity on rice seedling by 0-10 scale. 0 = no visible phytotoxicity, 1 = very light spots, 2 = very light lesions, 3 = very visible foliar phytotoxicity, 4 = leaf yellowing or whiting, 5 = leaf burning or blight, 6 = > 25% foliar injury, 7 = > 50% foliar injury, 8 = > 90% foliar injury, 9= severely seedling damage but not dead, 10 = totally dead (2) Weed control per species (% visual biomass reduction vs control) at 14, 42, dan 56 DAA, use formula Abbot. Abbot Formula % Control =  $(\frac{N_{UT} - N_T}{N_{UT}}) \times 100 \%$   $N_{UT}$  = Number of weeds in Untreated plot,  $N_T$  = Number of weeds in Treated plot. (3) Some Dominant Ratio at 56 DAA.

## RESULTS AND DISCUSSION

The results showed that the weeds growing in the untreated plots were *E. crus-galli*, *L.chinensis*, a weed belonging to the Poaceae family (grasses), *F. miliace*, *C.iria*, *C. difformis* were plant species that belonging to the family *Cyperaceae* and *S. zeylanica*, *M vaginalis*, *Ludwigia Sp.* is a broadleaf species. Important weeds and their distribution in the south and south Asia, their presence can reduce yields.

### Phytotoxicity in rice

Application of herbicide Florpyrauxifen-Benzyl did not show phytotoxicity until the highest dose. Bispiripac herbicide application showed low phytotoxicity, 1 = very light spots, 2 = very light lesions at 3 DAA to 7 DAA. And gradually normal at 14 DAA. Other comparison herbicide applications did not show herbicide phytotoxicity in rice

### Weed control

The application of Florpyrauxifen-Benzyl 400 ml/ha has not been able to control *E. crus-galli*, with a control percentage of 77% to 90%. while at higher doses at 14 DAA and 26 DAA, the percentage of control was above 90% and decreased at the age of 42 to 56 DAA. The percentage of control of Florpyrauxifen-Benzyl 600 ml/ha, 800 ml/ha, and 1000 ml/ha were above 90%. The application of a comparison herbicide was effective in controlling *E. crus-galii* with a control percentage above 90% (fig. 1a)

*L. chinensis* was known to be present at 28 DAA. in all treatment plots. Application of Florpyrauxifen-Benzyl doses of 400 ml/ha, 28 DAA, 42 DAA, and 56 DAA. provide percent control 82%, 90% and 86 percent. The application of comparison herbicides and hand weeding was effective in controlling *L. chonensis* up to 42 DAA, at 56 DAA with the percentage of weed control above 90% (fig. 1b). The application of Florpyrauxifen-Benzyl at a dose of 400 ml/ha has not been able to effectively control *E. crus-galli* and *L. chinensis* which are grass weeds.

Figures 1c and 1d. shows the percentage of weed control of the sedges group. *F. miliacea* began to be identified at 28 DAA while *C. iria* at 42 DAA. Application of Florpyrauxifen-Benzyl was effective in

controlling *F. millicea*, and *C. difformis* starting at a dose of 400 ml/ha. Application of aryloxyphenoxy propionate 800 ml/ha gave a comparable Herbicide control percentage to control 80% to 85%.

The application of the herbicide Florpyrauxifen-Benzyl at various doses showed that the percentage of weed control was below 90% as well as the comparison herbicide, 5 controls of all tested herbicides gave control levels of *Ludwigia Sp* and *Spenochlea sp* weeds above 90 percent (fig2 and fig2b). Florpyrauxifen-Benzyl and other herbicides tested were effective in controlling weeds *Spenochlea sp* and *M. vaginalis* (fig. 2c and 2d) the percentage of weeds tested were above 90 persen.

Florpyrauxifen-Benzyl (Rinskor™ active) can be a new alternative for weed control and different from other synthetic auxin herbicides. Rinskor is a post-emergence herbicide in rice plants. Florpyrauxifen-benzyl is a new active ingredient from the aryloxyphenoxy herbicide family (Epp et al. 2016). The synthetic auxin, florpyrauxifen-benzyl showed activity in grasses and broadleaf weeds in rice (Miller and Norsworthy 2018). Therefore, florpyrauxifen-benzyl is a new management option for controlling ALS, ACCase, PSII, and synthetic auxin-resistant broadleaf weed and grass species (Epp et al. 2016).

Bispyribac-sodium is a broad-spectrum post-emergence herbicide, mainly controlling *Echinochloa crus-galli*; Applications carried out at the fourth leaf stage to tiller stage showed good plant compatibility with direct seed rice. The mode of action of bispyribac-sodium consists in inhibiting the biosynthesis of branched amino acids. This compound presents a good eco-toxicological profile; very suitable for application to rice. Bispyribac sodium inhibits the plant enzyme acetolactate synthase (ALS) which in turn inhibits the production of the amino acids valine, leucine, and isoleucine in plants (Tranel & Wright 2002)

### **Dominant summed Ratio (SDR) Weeds**

Table 1 shows that *E. crus-galli* and *L. chinensis* were the two dominant weeds in all treatment plots of weed application. However, the application of florpyrauxifen-benzyl and comparison herbicides showed control percentages above 90 percent (Figure 1 and Figure 2). *E. crus-galli* and *L. chinensis* were effectively controlled manually even though during vegetative growth they had almost the same morphology as rice plants.

The use of herbicides to control *E. crus-galli* and *L. chinensis* is widely practiced, in the early stages of herbicides it can control weeds but at later stages, there are still *E. crus-galli* and *L. chinensis* even though the population is below the threshold.

### **CONCLUSION**

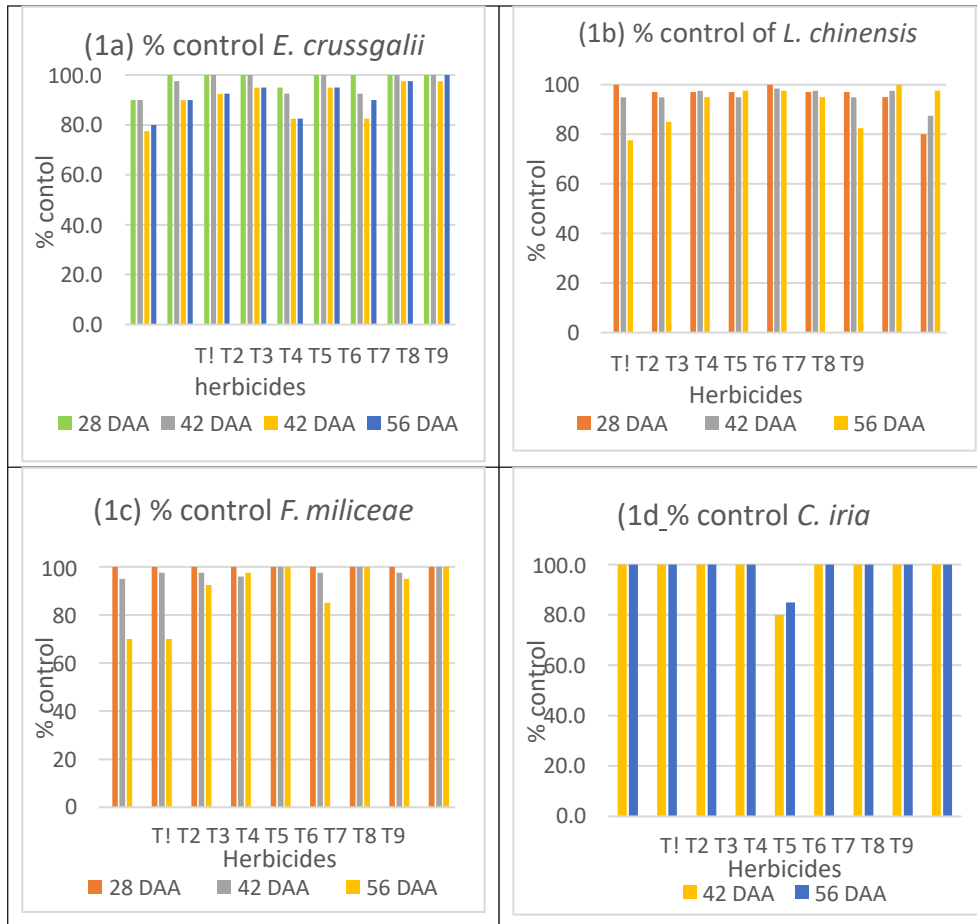
The results showed that the application of florpyrauxifen-benzyl in various doses did not show toxicity to rice. Application of florpyrauxifen-benzyl starting at a dose of 600 ml/ha has the same effectiveness as a companion herbicide. At the end of the study (56 DAA) *E. crus-galli* and *L. chinensis* dominated all experimental plots.

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**REFERENCE**

- Corteva Agriscience (2019). Rinskor Collects the 2018 AGROW Award for the Best New Crop Protection. <https://www.proquest.com/docview/2226445221/70BF98CC832B4EA5PQ/2?accountid=207111>. Accessed: Mart. 5, 2021
- Heap IM (2019) International survey of herbicide resistant weeds. <http://www.weedscience.org/in.asp>. Accessed: Agust. 5, 2021
- Miller MR, Norsworthy JK (2018) Florpyrauxifen-benzyl weed control spectrum and tank-mix compatibility with other herbicides commonly used in rice. *Weed Technology* 32:319-32
- Montgomery GB, Bond JA, Golden BR, Gore J, Edwards HM, Eubank TW, Walker TW (2015) Utilization of saflufenacil in a Clearfield® rice (*Oryza sativa*) system. *Weed Technol* 29:255-262
- Somerville, Gayle J; Powles, Stephen B; Walsh, Michael J; Renton, Michael (2018) Modeling the Impact of Harvest Weed Seed Control on Herbicide-Resistance Evolution. *Weed Science; Lawrence* 66, 395-403
- Tranel, P. J., and Wright, T. R. 2002. Resistance of weeds to ALS-inhibiting herbicides: What have we learned? *Weed Science*, 50: 700-712.

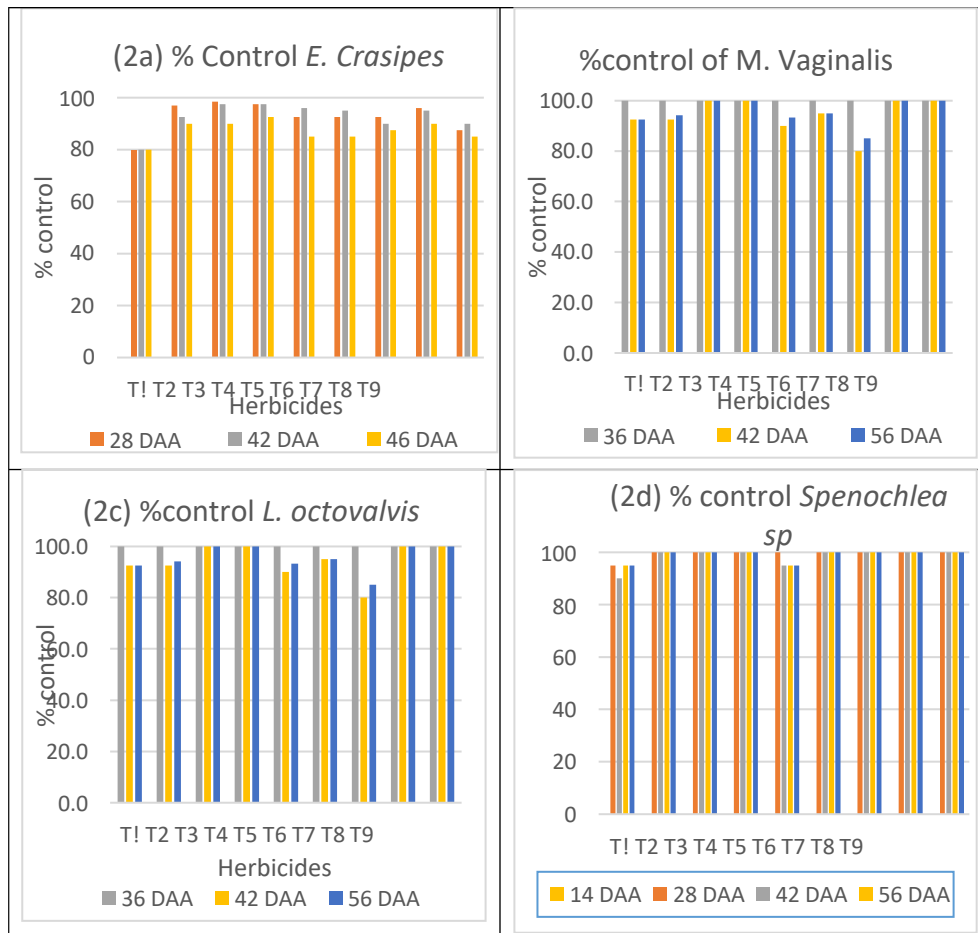


Note : T1) Florpyrauxifen-Benzyl 400 ml/ha, T2) Florpyrauxifen-Benzyl 600 ml/ha, T3) Florpyrauxifen-Benzyl 800 ml/ha, T4) Florpyrauxifen-Benzyl 1000ml/ha, T5) aryloxyphenoxy propionate 800 ml/ha, T6) Penoxsulam 800 ml/ha, T7) Natrium Byspiribac 300 ml/ha T8) Metsulfuron Methyl, T9) Hand Weeding

Figure 1. Percentage control of *E. Crusgalii*, *L. chinensis*, *F. molliacea* and *C. iria* due to various herbicide applications.

Note: :

T1)



Florpyrauxifen-Benzyl 400 ml/ha, T2) Florpyrauxifen-Benzyl 600 ml/ha, T3) Florpyrauxifen-Benzyl 800 ml/ha, T4) Florpyrauxifen-Benzyl 1000ml/ha, T5) aryloxyphenoxy propionate 800 ml/ha, T6) Penoxsulam 800 ml/ha, T7) Natrium Byspiribac 300 ml/ha T8) Metsulfuron Methyl, T9) Hand Weeding

Figure 2. Percentage of control of *E. gracipes*, *M vaginalis*, *L. octovalvis* and *Spenochlea sp*. due to various herbicide applications.

Table 1. Dominant summed Ratio (SDR) Weeds

Tret	Treatment	Some Ratio Dominance (%)							
		1)	2)	3)	4)	5)	6)	7)	8)
T1	Florpyrauxifen-Benzylr 400 ml/ha	35, 4	30,4	8,3	0	4,7	12,2	5	4
T2	Florpyrauxifen-Benzyl 600 ml/ha	30, 8	30	2,5	0	22, 4	14,3	0	0
T3	Florpyrauxifen-Benzyl 8000 ml/ha	54, 2	30,4	15, 4	0	0	0	0	0
T4	Florpyrauxifen-Benzyl 1000 ml/ha	52, 2	42,2	5,6	0	13, 4	0	0	0
T5	aryloxyphenoxy propionate 800 ml/ha	25, 7	27,3	5,6	0	13, 6	13,4	5,2	9,2
T6	Penoxsulam 750 ml/ha	25, 6	35,9	15, 2	0	13, 1	10,2	0	0
T7	Natrium Byspiribac 300 ml/ha	28, 3	37,6	0	4,2	12, 1	17,8	0	
T8	Metsulfuron Methyl 700 ml/ha	32, 4	30,6	0	14,3	11, 6	11,1	0	0
T9	Hand Weeding	46, 7	53,3	0	0	0	0	0	
T10	UNTREATED	15, 4	18,3	7,2	6,5	15, 1	22,2	10,1	5,2

Note : 1) *E.cruss-galli*, 2) *L.chinensis*, 3), *F. miliace*, 4) *C.iria*, 5). *Ludwigia Sp.* 6) *E. crasspes.* 7) *S. zeylanica* 8) *M aginalis*