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Evaluation of metamifop for grass weeds control in direct seeded rice

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ABSTRACT

Field experiment was conducted to evaluate the bio-efficacy of Metamifop 10 EC and its phytotoxicity and residues in direct seeded rice. The treatments comprised of different weed management practices *viz.*, metamifop 10 EC at 50, 75, 100 and 125 g a.i ha^{-1} at 2-3 leaf stage of weeds; metamifop 10 EC at 50, 75, 100, 125 and 200 g a.i ha-1 at 5-6 leaf stage; Pre-emergence application of pretilachlor S at 0.45 kg a.i ha-1 as pre emergence with one hand weeding on 30 - 35 DAS ; cyhalofop butyl 10 EC at 100 g ai ha^{-1} as post emergence herbicide at 15 DAS: weed free check and unweeded control. The common weeds of the experimental field consisted of grasses, sedges and broad leaved weeds (BLW). Application of metamifop 10 EC at 125 g ai ha^{-1} sprayed at 2-3 leaf stage was comparable with pretilachlor S at 0.45 kg a.i ha^{-1} as pre emergence with one hand weeding on 30 - 35 DAS in the control of grasses at 30 and 60 DAS. Metamifop 10 EC at 125 g a.i ha^{-1} at 2-3 leaf stage and metamifop 10 EC at 200 g a.i ha-1 at 5-6 leaf stage was better in controlling grass weeds than pretilachlor S at 0.45 kg a.i ha^{-1} as pre emergence with one hand weeding on 30-35 DAS at 30 DAS. For direct seeded low land rice post-emergence application of metamifop 10 EC at 2-3 leaf stage was found to be effective in controlling grass weeds than application of metamifop 10 EC at 5-6 leaf stage. Metamifop 10 EC at 125 g a.i ha^{-1} at 2-3 leaf stage was found to be best in controlling grass weeds.

Key words: Direct seeded, rice, Metamifop 10 EC

Rice is the staple food for more than half of the world's population. In Asia, more than 80% of the people live on rice, and their primary food security is entirely dependent on the volume of rice produced in this part of the world. However, increase in rice production is now lagging behind population growth. Overall, the total global rice production is declining gradually even with the extensive use of the high yielding modern varieties and hybrids. India is having the rice growing area of 42.63 million ha with a production of 85.72 million tonnes and a productivity of 2,011 kg ha-1. In Tamil Nadu, rice is cultivated in an area of 1.93 million ha with a production of 6.61 million tonnes and a productivity of 3,423 kg ha-1 (Department of Agriculture and Cooperation, 2008). Direct seeding is practiced in areas of uncertain distribution of rainfall or inadequate availability of irrigation facilities. Direct seeded rice is gaining momentum in India due to high demand of labour during peak season of transplanting and availability of water for short periods. Weeds are the major biotic constraints that compete with rice for moisture, nutrients, and light. The competition is more severe in direct seeded rice, as crop and weeds emerge simultaneously. As a result, crop suffers, starting from early period of growth. This in turn reduces the rice yield. The yield loss due to weeds varies from 40 to 100 per cent in direct seeded rice (Choubey *et al.*, 2001). Of the spectrum of weeds found in the wet seeded rice fields, grasses cause the highest yield reduction followed by sedges and broad leaved weeds.

Any delay in weeding will lead to increased dry matter production in weeds which has a negative correlation with yield. Yield losses, as high as 46% caused by weeds, have been reported in direct seeded rice. Though manual weeding is considered to be the best, the undependable labour availability and escalating wages in many cases have given impetus to the development and use of new chemicals for weed control. Thus, nowadays chemical weed control in direct seeded rice has gained importance because of the intensity of weed problems, coupled with the lack of

labour for weeding and its high cost. Herbicides are considered to be an alternative supplement to hand weeding (Rajendrakumar, 2003).

MATERIALS AND METHODS

Field experiment was conducted during kharif season of 2008 at Tamil Nadu Agricultural University; Coimbatore to evaluate Metamifop for weed control efficacy and productivity of direct seeded rice. The experimental field was situated in the North Western Agro- climatic Zone of Tamil Nadu at 110 North latitude, 77' East longitude and at an altitude of 426.7 m above MSL. The normal weather conditions prevailed at the experimental location is briefed here under. A mean annual rainfall of 640 mm was received in 43 rainy days (mean of 25 years).

The mean maximum and minimum temperature were 31.5 0C and 27.2 0C respectively. The relative humidity was 95 per cent. The bright sun shine hour per day was 7.4 with a solar radiation of 400 cal.cm-2 d-1. During the cropping period, the crop received a rainfall of 406.9 mm in 23 rainy days. The mean maximum and minimum temperature were 31.1 0C and 21.70C respectively. The soil of the experimental field was deep clay loam, moderately drained and taxonomically falls under verticustochrep (belonging to Noyyal series). The initial soil status was low in available nitrogen, medium in available phosphorus and high in available potassium.

The common weeds of the experimental field consisted of grasses, sedges and broad leaved weeds (BLW). The major grass weed was *Echinochloa crus-gulli* (L.) and the major sedge was *Cyperus rotundus* (L). Among the broad leaved weeds *Eclipta alba* (L.), *Ammania baccifera* (L.) and *Ludwigia parviflora* (L.) were the dominant species. The treatment details were Metamifop 10 EC at 50 g a.i ha-1 as POE at 2-3 leaf stage (T1), Metamifop 10 EC at 75 g a.i ha-1 as POE at 2-3 leaf stage (T2), Metamifop 10 EC at 100 g a.i ha-1 as POE at 2-3 leaf stage (T3), Metamifop 10 EC at 125 g a.i ha-1 as POE at 2-3 leaf stage (T4), Metamifop 10 EC at 50 g a.i ha-1 as POE at 5-6 leaf stage (T5), Metamifop 10 EC at 75 g a.i ha-1 as POE at 5-6 leaf stage (T6), Metamifop 10 EC at 100 g a.i ha-1 as POE at 5-6 leaf stage (T7), Metamifop 10 EC at 125 g a.i ha-1 as POE at 5-6 leaf stage (T8), Metamifop 10 EC at 200 g a.i ha-1 as POE at 5-6 leaf stage (T9), Pre-emergence Pretilachlor S at 0.45 kg a.i ha-1 as PE + HW on 30 - 35 DAS (T10), Cyhalofop butyl 10 EC at 100 g a.i ha-1 as POE at 15 DAS (T11), Weed free check (Four hand weeding) (T12), Unweeded control (T13). Relative density (RD) of group wise weeds was worked out by using the formula given below and expressed as percentage.

$$\textbf{Relative density (\%)} = \frac{\text{Absolute density of a given species (No.m}^{-2})}{\text{Total absolute density of all species (No.m}^{-2})} \times 100$$

Weed control efficiency (WCE) was computed by adopting the formula suggested by Mani *et al* (1973).

$$\textbf{WCE (\%)} = \frac{\text{wpc - wpt}}{\text{wpc}} \times 100$$

Where,

wpc = Weed population in the control plot
wpt = Weed population in the treated plot
(PE- Pre emergence; POE- Post emergence)

RESULTS AND DISCUSSION

Metamifop 10 EC at 125 g ai ha-1 (T4) treatment was effective in controlling grassy weeds. It was on comparable with application of pretilachlor S at 0.45 kg a.i ha-1 as pre emergence with one hand weeding on 30-35 DAS (T10) at 30 and 60 DAS respectively (Table 1). Application of metamifop applied as post emergence at 90-200 g a.i. ha-1 gave excellent control of major grass weeds including *Echinochloa* sp., *Leptochloa chinensis*, *Digitaria* sp. and *Eleusine indica* in paddy and direct sown rice as reported by Kim *et al*. (2003). Unweeded control registered the highest grass weed density at all stages of observation *viz*., 30, 60 and 90 DAS respectively. Relative density of grasses was lower with the application of metamifop 10 EC at 125 g a.i ha-1 (T4) at 30, 60 and 90 DAS respectively. It could be due to the higher efficacy of metamifop over the grass weeds at early stage of the weeds. Metamifop 10 EC at 125 g a.i ha-1 (T4) recorded higher Weed Control Efficiency compared to other treatments.

Table 1. Relative density and grass weed control efficiency

Treatments	Relative density of grasses (%)			Grass weed control efficiency (%)		
	30 DAS	60 DAS	90 DAS	30 DAS	60 DAS	90 DAS
T_1- Metamifop 10 EC at 50 g a.i ha^{-1} as POE	11.0	18.9	13.2	69.7	64.8	65.0
T_2- Metamifop 10 EC at 75 g a.i ha^{-1} as POE	10.2	20.5	15.3	73.4	66.6	68.7
T_3- Metamifop 10 EC at 100 g a.i ha^{-1} as POE	8.2	16.8	11.9	78.8	72.0	72.7
T_4- Metamifop 10 EC at 125 g a.i ha^{-1} as POE	5.3	14.8	10.4	84.6	75.2	75.6
T5- Metamifop 10 EC at 50 g a.i ha^{-1} as POE	22.2	23.6	20.1	16.3	54.6	54.9
T_6- Metamifop 10 EC at 75 g a.i ha^{-1} as POE	21.6	22.2	14.7	16.4	58.2	58.1
T_7- Metamifop 10 EC at 100 g a.i ha^{-1} as POE	22.5	20.3	13.5	21.7	65.5	66.1
T_8- Metamifop 10 EC at 125 g a.i ha^{-1} as POE	23.7	18.8	14.5	23.2	68.6	70.7
T_9- Metamifop 10 EC at 200 g a.i ha^{-1} as POE	19.6	14.8	12.1	25.1	73.8	74.0
T_{10}- Pretilachlor S at 0.45 kg ha^{-1} as PE + HWon 30 to 35 DAS	56.5	23.6	13.8	61.1	80.8	85.7
T_{11}- Cyhalofopbutyl 10EC at 100 g a.i ha^{-1} as POE	28.7	36.3	31.7	14.9	19.6	9.1
T_{12}- Weed free check	100.0	100.0	100.0	93.1	91.8	88.1
T_{13}- Unweeded control	24.0	39.8	33.9	0.0	0.0	0.0

CONCLUSION

It could be concluded that direct seeded low land rice post emergence application of Metamifop 10 EC at 2-3 leaf stages was found to be effective in controlling grass weeds than application of Metamifop 10 EC at 5-6 leaf stage. Meta 10EC at 125gm active ingredient per ha was found to be best in controlling grass weeds.

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