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**Weed Control in Broadcast Rice: Effectiveness of fenoxaprop-p-ethyl and 2,4-D Mixture**

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**Abstract**

*Weed control in broadcast rice was experimented in split-split plot design. Two herbicides spraying at 10 days and 20 days after seeding were main plots. Irrigating 3,6 and 9 days after herbicide treatments were sub plots and 3 rates of fenoxaprop-p-ethyl and 2,4-D mixture 3+100,6+200 and 9+300 g(a.i./a.e.)/rai were sub sub plots. Hand weeding and non weeding treatments were also included as the control treatments. The results indicated that the use of herbicides at 10 days after seeding significantly controlled broadleaf weeds and sedge compared to the 20 days treatment. Irrigation at 3 and 6 days after herbicide spraying showed better effect in weed control than at 9 days after herbicide spraying. Fenoxaprop-p-ethyl and 2,4-D mixture at 6+200 (a.i./a.e.)/rai and 9+300 (a.i./a.e.)/rai were more effective than the rate at 3+100 (a.i./a.e.)/rai. The phytotoxicity was found in the cases of fenoxaprop-p-ethyl and 2,4-D mixture at 3+100 (a.i./a.e.)/rai and 6+200 (a.i./a.e.)/rai which caused slight phytotoxicity whereas 9+300 (a.i./a.e.)/rai resulted in moderate phytotoxicity. The maximum phytotoxicity severity was found at 14 days after application. After 35 days of application the phytotoxicity seemed to have no obvious results. The results indicated that herbicides spraying at 10 days after seeding got higher yield than the case of 20 days treatment. Irrigation at 3,6 and 9 days after spraying and the three rates of herbicides showed no significant effect on yield and yield components when compared to those from hand weeding but highly significant difference when compared to those from non weeding method.*

**Introduction**

Broadcast rice is one of the methods of growing rice which is widely practiced by Thai farmers. Under this method, germinated rice seeds are sown directly into paddy field. In Thailand the broadcast area is about 6.88 thousand hectares. Weeds cause the reduction in both quantity and quality of rice yield. Several kinds of weeds which emerge as the same time of rice can compete which rice resulted in growth and yield reduction (Prasan *et al.*, 1986). Under broadcast rice field, hand weed or other are rather difficult due to high rice population density, labour shortage and also high labour cost. Therefore under such condition farmers have to use both pre and post-emergence herbicides. The succession of herbicide application can be achieved when weeds are controlled rapidly and no plant toxicity is found. Using of two different types of herbicide can reduce the application rate of both herbicides and also resulting in low residual effect to the soil, more efficiency in weed control which is due to the synergism of both chemical. Pornchai *et al.*, (1997) reported that mixture of quizalofop-p-tefuryl and formesafen gave high efficiency in controlling both grasser and broadleaf weeds compared to

when using only one type of each chemical. However, the reports concerned with using of mixture of two different types of herbicide under broadcast rice field are not found.

## Materials and Methods

Weed control in Broadcast Rice was experiment at Chiang Mai University and designed in split-split plot. Three replication and 4x4 m of sub fields for 12 kg/rai of rice seed. Main plot of experiment are two herbicides spraying times as 10 days after sowing and 20 days after sowing. Sub plot of experiment are Irrigation times as irrigation 3 days after herbicides treatment, irrigation 6 days after herbicides treatment and irrigation 9 days after herbicides treatment. Sub-Sub Plot of experiment are rate of active ingredient per rai as rate of fenoxaprop-p-ethyl and 2,4-D mixture 3+100 g (a.i./a.e.)/rai, rate of fenoxaprop-p-ethyl and 2,4-D mixture 6+200 g (a.i./a.e.)/rai, rate of fenoxaprop-p-ethyl and 2,4-D mixture 9+300 g (a.i./a.e.)/rai, hand weeding treatment and non weeding treatment

12 kg/rai of rice seed were soaked at 24 hr then incubate 48 hr. After rice seed were germinated sow in 4x4 m of field then spray with fenoxaprop-p-ethyl and 2,4-D mixture at 10 and 20 days after sowing. The spraying volume is 80L/rai irrigation of 3, 6 and 9 days after herbicides treatment at 5-10 cm of water deep until 15 days before harvesting. Rate of 3 kg./rai 16-20-0 fertilizing at 20-30 days after sowing and rate of 20 kg./rai 21-0-0 fertilizing at 60 days after sowing.

Data recording efficiency of herbicides to control weed at 7-35 days after application by visual method control rating 0-100 (0-20=No control, 21-40= Slightly control, 41-60= Moderately control, 61-80= Good control and 81-100= Completely control). Phytotoxicity rating at 7-35 days after application by visual method at 0-100 (0-20= Normal, 21-40= Slightly toxic, 41-60= Moderately toxic, 61-80= Severely toxic and 81-100= Completely Killed)

## Result and Discussion

The results indicated that the use of herbicides at 10 days after seeding significantly controlled broadleaf weeds and sedge compare to the 20 days treatment (table 1). The dry weight of both weed at 10 days after application showed less than that of 20 days after application (table 2). From yield analysis results was found that herbicides spraying at 10 days after seeding showed higher yield than that of 20 days treatment (table 4).

Irrigation at 3 and 6 days after herbicide spraying showed effectively in weed control than at 9 days after herbicide spraying and dry weight of weed at 3 and 6 days after spraying showed less than of 9 days after spraying (table 1). Besides, Irrigation at 3 and 6 days after herbicide spraying showed phytotoxicity than at 9 days after herbicide spraying (table 3).

Fenoxaprop-p-ethyl and 2,4-D mixture at 6+200 (a.i./a.e.)/rai and 9+300 (a.i./a.e.)/rai were more effective than the rate of 3+100 (a.i./a.e.)/rai and dry weight of Fenoxaprop-p-ethyl and 2,4-D mixture at 6+200 (a.i./a.e.)/rai and 9+300 (a.i./a.e.)/rai were showed less than the rate of 3+100 (a.i./a.e.)/rai. The phytotoxicity were found by fenoxaprop-p-ethyl and 2,4-D mixture at 9+300 (a.i./a.e.)/rai showed phytotoxicity than at 3+100 (a.i./a.e.)/rai and 6+200 (a.i./a.e.)/rai. Effect on yield was found that all of fenoxaprop-p-ethyl and 2,4-D mixture rate showed higher than control comparison.

**Table 1 Efficacy of herbicides on weed control in rice**

Timing (DAS)	Irrigation (DAA)	broadleaf 14 DAA			sedge 14 DAA		
		Rate (g ai,ae/rai)					
		3+100	6+200	9+300	3+100	6+200	9+300
10	3	86.00	89.33	92.00	81.00	83.33	87.33
	6	85.33	83.33	89.33	80.00	82.67	83.33
	9	72.67	76.67	80.00	79.33	78.33	81.00
20	3	70.33	74.33	82.67	74.00	75.67	79.00
	6	68.67	67.00	66.00	71.67	74.67	78.33
	9	66.00	69.33	70.33	67.00	71.00	72.67

Control Rating: 0-20= No control, 21-40= Slightly control, 41-60= Moderately control, 61-80= Good control, 81-100= Completely control, DAA= Days after application, DAS= Day after sowing

**Table 2 Dry weight of weed at 30 days after application**

Timing (DAS)	Irrigation (DAA)	broadleaf				sedge			
		Rate (g ai,ae/rai)							
		3+100	6+200	9+300	NW	3+100	6+200	9+300	NW
10	3	5.22	6.46	4.51	38.64	8.21	6.78	3.62	20.92
	6	8.45	7.24	5.73	42.38	8.14	5.65	4.53	23.35
	9	10.22	9.38	7.73	47.13	12.34	12.71	9.28	23.23
20	3	11.48	9.86	8.62	39.71	13.66	10.77	8.59	28.61
	6	10.90	11.08	8.62	39.71	12.63	11.78	9.91	32.18
	9	12.81	7.25	8.36	51.95	12.67	9.79	7.07	29.10

NW: Non Weeding, DAA= Days after application, DAS= Day after sowing

**Table 3 Effect of herbicides on phytotoxicity of rice**

Timing (DAS)	Irrigation (DAA)	21 DAA		
		Rate (g ai,ae/rai)		
		3+100	6+200	9+300
10	3	25.67	33.33	50.00
	6	15.67	31.67	50.00
	9	15.00	20.00	35.00

Phytotoxicity Rating: 0-20= Normal, 21-40= Slightly toxic, 41-60= Moderately toxic, 61-80= Severely toxic, 81-100= Completely Killed, DAA= Days after application, DAS= Day after sowing

**Table 4 Effect of herbicides on yield of rice**

Timing (DAS)	Irrigation (DAA)	Rate (g ai,ae/rai)				
		3+100	6+200	9+300	HW	NW
10	3	608.84	603.06	595.37	642.46	362.08
	6	698.36	667.36	619.79	653.24	345.95
	9	704.36	695.07	687.94	501.53	320.31
20	3	550.61	532.86	600.59	606.48	278.02
	6	620.29	443.40	654.01	579.41	351.02
	9	670.13	656.13	692.59	450.25	300.48

NW: Non Weeding HW: Hand Weeding, DAA= Days after application, DAS= Day after sowing

### Conclusion

Application of herbicides at 10 days after seeding significantly controlled broadleaf weeds and sedge compare to the 20 days treatment. The dry weight of both weed at 10 days after application showed less than that of 20 days after application. From yield analysis results was found that herbicides spraying at 10 days after seeding showed higher yield than that of 20 days treatment. Irrigation at 3 and 6 days after herbicide spraying showed effectively in weed control than at 9 days after herbicide spraying. Fenoxaprop-p-ethyl and 2,4-D mixture at 9+300 (a.i./a.e.)/rai were more effective than the rate of 3+100 (a.i./a.e.)/rai and 6+200 (a.i./a.e.)/rai. The phytotoxicity were found by fenoxaprop-p-ethyl and 2,4-D mixture at 3+100 (a.i./a.e.)/rai and 6+200 (a.i./a.e.)/rai which caused slightly phytotoxic whereas 9+300 (a.i./a.e.)/rai resulted moderately phytotoxic. The maximum phytotoxicity severity was found at 14 days after application and after 35 days of application the phytotoxicity seemed no obvious results.

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