

**EFFECT OF WEED CONTROL TREATMENTS ON
TRANSPLANTED RICE (*Oryza sativa* L.)**

(Received: 20.3.2002)

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ABSTRACT

Two field experiments were conducted at El-Serw Agricultural Research Station during 1999 and 2000 summer seasons to study the effect of some promising herbicides *i.e.*, Fentracamide at 150 g/fed, Fluthiamide at 100g/fed and Oxadiargyl at 90g/fed as compared with the recommended herbicides Benthio carb at 2L/fed., and Butachlor at 1.5L/fed on weeds and transplanted rice (*Oryza sativa* L.). The results showed that the predominant grassy weeds were *Echinochloa crus-galli* (L.) P.Beauv. and *Echinochloa colonum* (L.) Link and the sedge *Cyperus difformis*(L.) in the two seasons. Fentracamide, Fluthiamide and Oxadiargyl caused significant reduction in the percentage of grassy weeds by 98.1-100, 94.2-95.6 and 96.2-100%, respectively and sedge weed by 99.5-100, 98.4-100 and 99.3-100%, respectively and reflected an increase in rice grain yield. Yield in the three treatments ranged from 2.142-2.293, 2.268 - 2.495 and 2.31-2.56 t/fed, respectively in both seasons. Meanwhile, Benthio carb, Butachlor and hand weeding twice gave significant reduction percentage of grassy weeds by 95.8-100, 53.6-61.5 and 77.7-79.4%, respectively and sedge weed by 99.5-99.6, 98.2-100 and 97.3-98.5%, respectively and gave significant increase in rice grain yield. Yield with the respective previous treatments ranged from 3.109-3.293, 2.436-2.68 and 2.688-2.856 t/fed, respectively in both seasons. These herbicides were equal in controlling weeds and increase rice productivity. The three promising herbicides (Fentracamide, Fluthiamide and Oxadiargyl) can replace the recommended herbicides (Benthio carb, Butachlor).

Key words: *benthiocarb, butachlor, fentracamide, fluthiamide oxadiargyl herbicides, transplanted rice.*

1. INTRODUCTION

Rice (*Oryza sativa* L.) is one of the most important cereal crops and is the principal food for more than half of the world population ; it is considered as a favourable source of carbohydrates. In Egypt, rice is considered the 2nd export crop after cotton and also as one of the most important cereal crops after wheat. It occupies annually about 1.5 million feddans with an approximate production of 5.8 million metric tons. Also, there was a gradual increase in the national average of grain yield from 2.14 t/fed in 1976 to 3.74 t/fed in 1999. In general, weed compete with rice and cause serious reduction in the yield which ranged from 20 to 55% (Nandal and Singh,1994, Srinivasan and Choudhury, 1994 and Ibrahim *et al.*, 1995). Therefore, weed control treatments *i.e.*, hand weeding or herbicides can significantly increase the yield of rice. Weeds in rice are controlled by the herbicides Benthiocarb, Butachlor and Oxadiazon(Bali *et al.*, 1994, Singh and Singh, 1994 and Ibrahim *et al.*, 1995).

The present investigation was carried out to study the effect of some promising herbicides on weeds and transplanted rice.

2.MATERIALS AND METHODS

Two field experiments were carried out at El-Serw Agricultural Research Station, Damietta Governorate, Egypt, during 1999 and 2000 summer seasons, to study the effect of some promising herbicides on weeds and transplanted rice. Rice cultivar Giza 178 was used. The preceding winter crop was berseem in the two seasons. Plot area was 10.5 m². Seedlings of 35 day-old were transplanted in puddle soil at 20 X 20 cm spacing using 4-5 seedlings/hill. Transplanting was done on June 12th 1999 and June 9th 2000. The experiments were laid out in a randomized complete block design with 4 replicates.

2.1. Weed control treatments were as follow

2.1.1.Untreated (control).

2.1.2.Hand weeding twice *i.e.*, at 20 and 30 days after transplanting rice (DATR).

- 2.1.3. Benthocarb (Saturn 50% EC) applied at 2 L/fed at 7-10 DATR.
- 2.1.4. Butachlor (Pensite 60% EC) applied at 1.5 L/fed at 4-7 DATR.
- 2.1.5. Oxadiargyl (Topstar 80% WG) applied at 90 g/fed (immediately) during transplanting rice.
- 2.1.6. Fluthiamide (Drago 60%WP) applied at 100g/fed at 4-5 DATR.
- 2.1.7. Fentracamide(YRC 50%WP) applied at 150g/fed at 2-5 DATR.

Herbicide efficiency was assessed after hand pulling of weeds from 1 m² of each plot after 30 days from applications by sorting out weeds into species and measuring their fresh weight (g/ m²).

Rice plants were harvested during the last week of September in the two seasons. Samples of 5 plants from the inner area of every plot were taken at random to estimate the following characters:

- | | |
|------------------------------|--------------------------------------|
| 1-Plant height (cm). | 2-Number of panicles/ m ² |
| 3- Panicle length(cm). | 4-Number of grains/panicle |
| 5- Grain weight/panicle (g). | 6-1000 grain weight (g). |
| 7-Harvest index. | 8- Grain and straw yield(t/fed). |

All data were statistically analyzed according to Snedecor and Chochran (1982) and means were compared by L.S.D. test at 5% level of probability to verify the significance of differences between means.

3.RESULTS AND DISCUSSION

3.1.Effect of weed control treatments

3.1.1. On weeds

In this study, the predominant weed species were *Echinochloa crus-galli*(L.)P.Beauv. and *Echinochloa colonum*(L.)Link as grassy weeds and *Cyperus difformis* L. as a sedge in both seasons.

Results in Table(1) show that the fresh weight of grassy and sedge weeds was significantly decreased with all weed control treatments as compared with untreated (control) in both seasons. Fentracamide at 150 g/ fed, Fluthiamide at 100 g/fed, Oxadiargyl at 90 g/fed, Benthocarb at 2 L/fed, Butachlor at 1.5 L/fed and hand weeding twice caused a significant reduction in fresh weight of grassy weeds by 100, 95.6, 100, 100, 53.6 and 79.4%, respectively in the 1st season and 98.1, 94.2, 96.2, 95.8, 61.5 and 77.7 %, respectively in the 2nd season as compared with untreated (control). Fresh weight of the

sedge weed was significantly decreased with the respective previous treatments by 100, 100, 100, 99.6, 100 and 98.5% in the 1st season and 99.5, 98.4, 99.3, 99.5, 98.2 and 97.3% in the 2nd season as compared with the control treatment. The previous reduction trend was also observed regarding the fresh weight of total weeds, viz. by 100, 99.1, 100, 99.7, 91.0 and 94.8%, respectively in the 1st season and 99.1, 97.3, 98.5, 98.5, 88.8 and 92.3%, respectively in the 2nd season as compared with the control treatment. This result suggests that herbicides are highly effective in controlling grassy and sedge weeds at low dose rates. These results are in agreement with those reported by Mishra and Singh (1989), Chela and Gill (1990), Gogoi and Gogoi (1993), Gogoi and Kalita (1993), Bali *et al.* (1994), Bhattacharya *et al.* (1997), Couderchet *et al.* (1998) and Ramteke *et al.* (1998).

Table(1): Effect of herbicides on fresh weight of grassy, sedge and total weeds in transplanted rice.

Treatments	Rate /Fed.	1999 season			2000 season		
		Fresh weight (g/m ²)			Fresh weight (g/m ²)		
		Grassy	Sedge	Total	Grassy	Sedge	Total
Oxadiargyl	90 g	0	0	0	10	5	15
Fluthiamide	100 g	11	0	11	15	12	27
Fentracamide	150 g	0	0	0	5	4	9
Benthiocarb	2 L	0	4	4	11	4	15
Butachlor	1.5 L	115	0	115	100	13	113
Hand Weeding	twice	51	16	67	58	20	78
Untreated Control	--	248	1034	1282	260	748	1008
LSD 5%	--	32.7	64.6	224.6	28.6	42.3	49.7

3.1.2. On transplanted rice yield and its components

Results in Table(2) show that the means of plant height (cm), panicle length(cm), number of panicles/ m², 1000 grains weight (g), grain and straw yield (t/fed) and harvest index were increased significantly with all weed control treatments as compared with the control in both seasons. Meanwhile, increments of number and weight of grains/ panicle did not reach significant values. The highest number of panicles/m² and harvest index were obtained by hand weeding twice in both seasons. The highest 1000 grain weight, grain and straw yield were obtained by Benthiocarb at the rate of 2 L/fed, while Oxadiargyl at the rate of 90 g/fed caused an increase in panicle length (cm) and plant height in both seasons. The grain yield/fed of the treatments with Benthiocarb, hand weeding twice, Butachlor, Oxadiargyl, Bluthiamide and Fentrac amide was

Table (2): Effect of weed control treatments on means of plant height (pl.h.), panicle length (pan.l.), No. of panicle/m²(No.pan./m²), 1000 grain weight (1000gr.wt.), No. of grains/panicle (No. gr./pan.), grain weight/ panicle(gr.wt./pan.), grain yield (t/fed.), straw yield(t/fed.) and harvest index (har. ind.)during 1999 and 2000 seasons.

Year	Treatments	Rate / Fed.	Pl. h.	Pan.L.	No.of Pan. /m ²	1000 gr.wt.	No.of gr./pan.	Gr.Wt. / pan.	Grain yield t/fed.	straw yield t/fed.	Har Ind.
1999	Oxadiargyl	90 g	88.0	19.5	305.0	15.38	117.0	1.81	2.310	3.548	0.394
	Fluthiamide	100 g	86.5	18.6	350.0	13.05	118.0	1.54	2.268	3.492	0.394
	Fentracamide	150 g	85.4	18.3	290.0	14.58	120.0	1.75	2.142	3.224	0.399
	Benthiocarb	2 L	87.2	19.4	382.0	16.03	121.0	1.94	3.109	4.664	0.400
	Butachlor	1.5 L	80.9	18.6	322.0	15.65	115.0	1.80	2.436	3.752	0.394
	Hand Weeding	twice	80.0	18.2	412.0	13.98	118.0	1.65	2.856	4.255	0.402
	Untreated Control		78.7	17.0	122.0	14.91	116.0	1.73	0.882	1.437	0.380
	LSD 5%		3.4	1.4	51.2	1.50	NS	NS	0.315	0.180	0.011
2000	Oxadiargyl	90 g	90.7	20.4	356.0	15.08	122.0	1.84	2.560	3.890	0.396
	Fluthiamide	100 g	87.8	19.7	360.0	16.01	119.0	1.62	2.495	3.618	0.408
	Fentracamide	150 g	88.2	19.8	315.0	14.58	120.0	1.75	2.293	3.340	0.407
	Benthiocarb	2 L	90.0	20.1	390.0	16.18	123.0	1.99	3.293	4.686	0.413
	Butachlor	1.5 L	82.2	18.9	374.0	14.96	119.0	1.78	2.680	3.915	0.406
	Hand Weeding	twice	81.6	19.3	394.0	15.38	117.0	1.80	2.688	3.718	0.420
	Untreated Control		80.9	17.5	130.0	13.61	118.0	1.90	1.037	1.542	0.402
	LSD 5%		2.0	1.4	26.0	0.80	NS	NS	1.900	0.500	0.004

3.109, 2.856, 2.436, 2.31, 2.268 and 2.142 tons, respectively in the 1st season and 3.293, 2.688, 2.68, 2.56, 2.495 and 2.293 tons, respectively in the 2nd season. The increase of rice grain yield due to weed control treatments over the untreated one may be attributed to the increase in number of panicles/m², weight of grains/panicle and panicle length. Also, the effect of weed control treatments on weed emergence which resulted in proper utilization of resources by the rice crop due to the reduction in crop-weed competition in terms of dry matter accumulation.

These results are in agreement with those obtained by Verma *et al.*, (1987), Mishra and Singh (1989), Deka and Sarma (1993), Gogoi and Gogoi (1993), Gogoi and Kalita (1993), Bali *et al.*, (1994), Nandal and Singh (1994), Singh and Singh (1994), Bhattacharya *et al.*, (1997), Couderchet *et al.*, (1998) and Ramteke *et al.*, (1998).

It can be concluded that Oxadiargyl, Fluthiamide and Fentracamide provided broad spectrum control of grassy and sedge weeds. The respective previous treatments reduced fresh weight of grassy weeds by 96.2-100, 94.2-95.6 and 98.1-100%, respectively and of the sedge weed by 99.3-100, 98.4-100 and 99.5-100%, respectively and reflected increase in rice grain yield by 1.428-1.523, 1.386-1.458 and 1.256-1.260 t/fed, respectively in both seasons. Meanwhile, Benthio carb, Butachlor and hand weeding twice caused significant reduction in percentage of grassy weeds by 95.8-100, 53.6-61.5 and 77.7-79.4%, respectively and of the sedge weed by 99.5-99.6, 98.2-100 and 97.3-98.5%, respectively and significant increase in rice grain yield by 2.227-2.256, 1.554-1.643 and 1.651-1.974 t/fed, respectively in both seasons. These herbicides were equal in efficiency in controlling weeds and in increasing rice productivity *via* effective weed control. The three promising herbicides (Fentracamide, Fluthiamide and Oxadiargyl) can replace the recommended herbicides (Benthio carb, Butachlor).

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تأثير بعض معاملات مكافحة الحشائش على محصول الارز الشتل

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ملخص

أجريت تجربتان حقليتان بمحطة البحوث الزراعية بالسرو - محافظة دمياط فى الموسمين الصيفيين لعامى ١٩٩٩ و ٢٠٠٠ لدراسة تأثير بعض مبيدات الحشائش الواعدة (المختارة) مثل اوكساديارجيل بمعدل ٩٠ جم/فدان - فنتراكاميد بمعدل ١٥٠ جم/فدان - فلوثياميد بمعدل ١٠٠ جم/فدان مقارنة بالمبيدات الموصى بها مثل بنتثيوكارب بمعدل ٢ لتر/فدان - بيتاكلور بمعدل ١,٥ لتر/فدان على الحشائش ومحصول الارز الشتل (جيزة ١٧٨). أوضحت النتائج ان المبيدات اوكساديارجيل وفنتراكاميد وفلوثياميد اعطت كفاءة ابادية عالية لمقاومة الحشائش ضيقة الأوراق (الدنيبة - نجيل نمر) بمقدار (٩٦,٢ - ١٠٠)، (٩٨,١ - ١٠٠)، (٩٤,٢ - ٩٥,٦) %، على التوالي والسعد (العجيرة) بمقدار (٩٩,٣ - ١٠٠)، (٩٩,٥ - ١٠٠)، (٩٨,٤ - ١٠٠) %، على التوالي خلال الموسمين الزراعيين. اما محصول الارز فقد تراوح بين (٢,٣١ - ٢,٥٦)، (٢,١٤٢ - ٢,٢٩٣ - ٢,٢٦٨ - ٢,٤٩٥) طن على التوالي خلال الموسمين الزراعيين. كما أوضحت النتائج أيضا أن مبيدات بنتثيوكارب والنقاوة اليدوية مرتين وبيتاكلور اعطت كفاءة ابادية عالية لمقاومة الحشائش ضيقة الأوراق بمقدار (٩٥,٨ - ١٠٠)، (٧٧,٧ - ٧٩,٤)، (٥٣,٦ - ٦١,٥) %، على التوالي ولمقاومة السعد بمقدار (٩٩,٦ - ٩٩,٥)، (٩٧,٣ - ٩٨,٥)، (٩٨,٢ - ١٠٠) %، على التوالي خلال الموسمين. اما محصول الارز، وقد اعطى معدل زيادة مقارنة بالقطع غير المعاملة وترجع هذه الزيادة فى المحصول الى زيادة عدد السنابل وطول السنبله وعدد الحبوب فى السنبله ووزن الف حبة وان محصول الارز قد تراوح بين (٣,٢٩٣ - ٣,١٠٩)، (٢,٦٨٨ - ٢,٨٥٦)، (٢,٦٨ - ٢,٤٣٦) طن، على التوالي فى كلا الموسمين. والخلاصة ان مبيدات اوكساديارجيل وفنتراكاميد وفلوثياميد تفوق بعض الموصى بها ويمكن أن تحل محل مبيدات بنتثيوكارب وبيتاكلور الموصى بها حاليا.