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Evaluation of the efficacy of Pyanchor EC (Piribenzoxim) and Solito 320 EC (Pretilachlor) as post-emergence weed control chemicals in lowland rice production

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ABSTRACT: Two post-emergence herbicides (*Pyanchor EC* having *piribenzoxim* as its active ingredient and *Solito 320EC*, having *pretilachlor* as its active ingredient) were evaluated for efficacy on weeds in lowland rice at different rates. The experiment was conducted in 2005 and 2006 using Randomized Complete Block Design at the experimental field of National Cereals Research Institute, Badeggi located at Lat 09° 45' N; Long 06° 7' E, ALT 50.57 MSL. The variety of rice used was FARO 52 (WITA 4). None of the herbicides/ rates has any Phytotoxicity effect on rice. The herbicides controlled weeds better than the untreated control. As post-emergence herbicide in lowland rice, either *Pyanchor EC* or *Solito 320EC* is recommended to be used at 1.5l/ha. The low rate of application and the small quantity of water needed per hectare (200 litres) provide advantages of reduced cost of input into weed management and enhanced productivity in lowland rice.

Introduction

Uncontrolled weeds can cause appreciable yield reduction in crops, which ranges between 28 - 100% in maize and rice (1). Weeds often compete with crops for nutrients, water, light and space. The yield loss arising from weed competition can be as high as 75% in planted rice in Nigeria (2). Weeds are therefore real constraints to rice production (3).

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To combat weeds, hand weeding became the most common method used by the peasant farmers. The use of hand weeding or hoe weeding in the control of Weeds by most Smallholder farmers in developing countries is known to be time-consuming and labour intensive. It can take more than 50% of the farmer's labour input into crop production (4). It has been stated that progress would be made in the development of weed management technologies for smallholder farmers if research addresses the difficult problem of finding alternative to hand weeding (5) hence, the calls for herbicide usage for fast and more effective weed control measure. In the time past, herbicides have been stated to be of high price and not within the reach of the peasant farmers. Integrated weed management option with the use of low external input was then advocated. This involved the use of various combinations of weed control measures such as cultural, mechanical, biological, preventive and chemical at an economic level that is also environment-friendly to manage weeds below economic threshold.

Many of the recommended herbicides in rice production are to be used between 4 - 8l/ha (6). In order to reduce the cost of herbicides, agro-chemical Companies have started to formulate new herbicides with lower rate of application in line with low cost technology development. The effectiveness of these herbicides has to be determined.

The objective of this trial is to evaluate the bio-efficacy of the newly developed Pyanchor EC (having piribenzoxim as its active ingredient) and Solito 320EC (having pretilachlor as its active ingredient) herbicides as weed control chemical in lowland rice.

Materials and Methods

A Randomized Complete Block Design experiment with three replicates was carried out in 2005 and 2006 at the experimental field of National Cereals Research Institute, Badeggi located at Lat 09° 45' N; Long 06° 7' E, ALT 50.57 MSL. Two Test post-emergence herbicides (*Pyanchor EC having piribenzoxim as its active ingredient and Solito 320EC, having pretilachlor as its active ingredients*) were evaluated at 1 and 1.5l/ha each respectively. Check chemical (Orizoplus having Propanil and 2, 4-D Amine as active ingredients) was included among the treatment at 5l/ha as well as Weedy check and 2 hand weeding at 21 and 42 Days After Transplanting (DAT). The variety of rice used was FARO 52 (WITA 4).

Transplanting of 21 days old seedling of rice at 2 seedlings/hill was done on 23 August 2005 and 7 September 2006 after land puddling at a spacing of 20cm x 20cm on a plot size of 6m x 5m. The herbicides were applied at 7 days after transplanting of rice. Pyanchor EC and Solito 320EC were applied with 200l/ha of water while Orizoplus was applied with 300l/ha of water as indicated in the chemical labels.

Data Collected include: Prevalent weed species before land preparation; Phytotoxicity, weed cover score; weed control rating and grain yield. The obtained data were subjected to analysis of variance using IRRISTAT analytical Software and where F-ratio was significant; means were separated using Least Significant Difference.

Results and Discussion

Weed Occurrence Status

The prevalent weeds at the experimental site in Badeggi in 2005/2006 before land preparation are listed in Table 1. Grasses, broadleaves weeds and sedges occurred at the site at different levels. Among the grasses, *Echinochloa Stagina* Beauv occurred at high level while *Imperata Cylindrica* var.africa C.E. Hubbard occurred at low level. Among the broadleaved weeds, *Ipomea aquatica* Forsk occurred at moderate level. Within the sedge group, *Fimbrostylis difforalis* Gaudent occurred at low level compared to others that occurred at moderate level. There was no change in weed status in both years.

Table 1: Weed occurrence status at the trial site in Badeggi before land preparation in 2005/2006.

Weed species	Status of occurrence
Grasses	
<i>Cynodon dactylon</i> (Linn) pers	++
<i>Leersia hexandra</i> (Sw)	++
<i>Echinochloa stagnina</i> Beauv	+++
<i>Imperata cylindrica</i> var africana C.E. Hubbard	+
Broadleaves	
<i>Aeschynomene indica</i> L	+
<i>Ipomea aquatica</i> Forsk	++
<i>Nymphaea lotus</i> Linn	+
<i>Eichhornia natans</i> (P. Beauv) Solms-laub	+
Sedge	
<i>Cyperus haspan</i> L	++
<i>Klinga pumila</i> Michx	++
<i>Fimbrostylis difforalis</i> Gaudet	+
<i>Cyperus difformis</i> L	++
<i>Cyperus esculentus</i> Linn	++

+ = low

++ = moderate

+++ = high

Phytotoxicity on rice.

None of the herbicides/ rates has any Phytotoxicity effect on rice. (Table 2). This indicates that the herbicides have no injurious effect on rice and thus can be safely used on rice field. The herbicides are therefore selective in action.

Weed cover score

The weed cover score indicated significant difference among the herbicide treated plots. Within the herbicide treated plots, weed cover score showed that Solito 320EC at 1l/ha had significantly more weed cover than the other herbicide treated plots (Table 2). The weedy check had the highest significant weed cover value in each respective year.

Weed control rating

There was significant difference in the weed control rating among the herbicide treated plots in 2006. However, all the herbicide treated plots controlled weeds better than the weedy check and the 2 hand weeding treatment (Table 2). Pyanchor EC at 1 and 1.5l/ha and Solito 320EC at 1.5l/ha controlled weeds significantly better than the Orizoplus at 5l/ha and Solito 320 EC at 1l/ha. Pyanchor EC at 1.5l/ha and Solito 320EC at 1.5l/ha controlled weeds better than other treatments.

Grain yield

Lowest grain yield of rice was obtained in the weedy check in both years. Among the herbicide treated plots, Solito 320EC at 1l/ha gave the lowest yield in both years. In 2005, the highest grain yield (4100.0kg/ha) was obtained in the Pyanchor EC treated plot at 1.5l/ha followed closely with Solito 320EC applied at also 1.5l/ha (3700.0kg/ha). In 2006, Solito 320EC applied at 1.5l/ha gave the highest yield of 3166.7 kg/ha followed by Pyanchor EC at 1.5l/ha that gave 2822.2 kg/ha.

Table 2: Effect of Pyanchor EC (*piribenzoxim*) and Solito 320EC (*pretilachlor*) on rice phytotoxicity, weed cover score and weed control rating in Badeggi in 2005 and 2006.

Treatment	Phytotoxicity rating on rice						Weed cover score			Weed control rating		
	2005						2005			2006		
	Days after application						Days after application					
	7	14	28	7	14	28	28	28	28	28	28	28
1. Weedy check	0	0	0	0	0	0	6.9 ^a	8.0 ^a	0.0 ^d			
2. 2 hand weeding		0	0	0	0	0	0	0.9 ^{bc}	2.7 ^b			6.7 ^c
3. Orizopius @ 5l/ha	0	0	0	0	0	0	1.8 ^{bc}	1.3 ^c				8.0 ^b
4. Pyanchor @ 1l/ha	0	0	0	0	0	0	0.9 ^{bc}	1.3 ^c				8.7 ^a
5. Pyanchor @ 1.5l/ha	0	0	0	0	0	0	0.7 ^c	1.0 ^c				9.0 ^a
6. Solito @ 1l/ha	0	0	0	0	0	0	2.0 ^b	2.3 ^b	8.0 ^b			
7. Solito @ 1.5l/ha	0	0	0	0	0	0	1.5 ^{bc}	1.0 ^c				9.0 ^a
SE±	0	0	0	0	0	0	5.6	0.3	0.2			
CV%	0	0	0	0	0	0	37.9	18.3	4.6			

Weed Control Rating Scale: 0 – 10 where 0 = no weed control and 10 = complete weed kill

Weed Cover Score Scale: 0 – 10 where 0 = no weed and 10 = full weed cover

Phytotoxicity Rating Scale: 0 – 10 where 0 = no toxicity and 10 = total crop kill

Table 3: Effect of Pyanchor EC (*Piribenzoxim*) and Solito 320EC (*Pretilachlor*) on rice grain yield in Badeggi in 2005 and 2006.

Treatment	l	Grain yield (kg/ha)	
		2005	2006
1. Weedy check	700 ^c	1744.5 ^b	
2. 2 hand weeding		3200 ^a	1955.5 ^{ab}
3. Orizoplus @ 5l/ha	3500 ^a		2566.7 ^{ab}
4. Pyanchor @ 1l/ha	3500 ^a		2411.1 ^{ab}
5. Pyanchor @1.5l/ha	4100 ^a		2822.2 ^{ab}
6. POW 1 @ 1l/ha	2900 ^b		1844.4 ^{ab}
7. POW 1 @ 1.5l/a		3700 ^a	3166.7 ^a

SE±	1100	451.8	
CV%	24.7	33.2	

Conclusion

The result of the weed control as indicated in the weed cover score, weed control rating, the grain yield coupled with non-toxicity of the herbicides on rice and the high performance in comparison to the check herbicide (Orizoplus) pointed to a conclusion that as post-emergence herbicide in lowland rice, either Pyanchor EC or Solito 320EC is recommended to be used at 1.5l/ha. The low rate of application and the small quantity of water needed per hectare (200 litres) provide advantages of reduced cost of input into weed management and enhanced productivity in lowland rice.

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