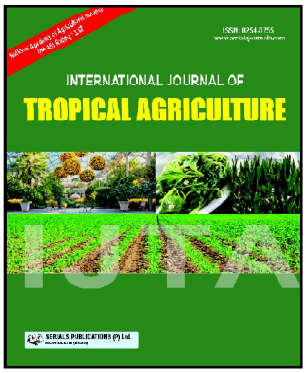

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Bio-efficacy of Bispyribac acid 40 % SC against weed flora in Rice (*Oryza sativa L*)

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Abstract: The experiment was conducted at Instructional Farm of Uttar Banga Krishi Viswavidyalaya, Pundibari, Cooch Behar, West Bengal, India to study the bio-efficacy of bispyribac acid 40 % EC against weed flora in Rice (*Oryza sativa*) during 2014-15 to 2015-16. Weed flora in the experimental field were predominantly consisted of *Echinochloa colona, Echinochola crusgalli, Cyperus difformis, Cyperus iria, Monochoria vaginalis* and *Ludwigia parviflora,* etc. The result from the experimental trial revealed that the weeds flora in rice were controlled effectively by applying Bispyribac acid 40 % SC at dosages ranges from @ 17.5 to 52.5 g a.i./ha, which were statistically superior to the standard checks Bispyribac sodium 10% SC@ 20 g a.i./ha and Azimsulfuron sodium 10% SC @ 35 g a.i./ha. Significant increase in grain yield and straw yield was obtained by application of Bispyribac acid 40 % SC at the tested dosages ranges from @ 17.5 to 52.5 g a.i./ha in comparison to the untreated control & standard check. Among the treatments T_3 (Bispyribac acid 40 % SC@ 52.5 g a.i./ha) improved grain yield of 30.61 and 27.07 % over untreated control during both the years.

Key words: Bio-efficacy, Bispyribac acid, Rice and Weed.

INTRODUCTION

Rice (*Oryza sativa L.*) is staple food crop for more than half of the world population. In India, it is the staple food for 65 per cent of the total population. India has the largest area (44.46 m ha) among rice growing countries and stands second in production (95.98 mt) with a productivity of 2130 kg ha^{-1}. The total rice area in India has been stabilized around 43 m ha. Therefore

the productivity should reach 3.2 t ha^{-1} from the present level of 2.05 t ha^{-1} to meet the projected target of 140 mt of rice by 2025 AD (Subbaiah, 2006). Among the production constraints weed infestation has been recognized as major one and yield reduction due to crop weed competition has been reported to be 28 to 45 per cent (Singh *et al.,* 2003).

The rice and weeds compete for the same pool of resources and among the different weed species, grassy weeds pose greater competition for nutrients followed by sedges and broad leaf weeds, respectively, (Raju and Reddy, 1986). Rice production is facing serious constraints including a declining growth rate in yield, depletion of natural resources, labour shortage, gender-based conflicts, institutional limitations and environmental pollution. Weed infestation in transplanted rice not only results in yield reduction but quality of produce is also impaired. Manual weeding is very effective but it is tedious, time consuming and expensive in large scale cultivation. Continuous rains in rainy season and unavailability of man power make manual weeding difficult. In such situation, chemical weed control is a better option as herbicides can check weed growth from the beginning of crop growth. Pre-emergence herbicides such as butachlor, pretilachlor, Pyrazosulfuron ethyl, Bensulfuron methyl, Bensulfuron methyl + pretilachlor are being used frequently for the effective management of weeds in transplanted rice, but the window of their application is very narrow (1-5 DAT). The need of post emergence herbicides is often realized by the growers to combat weeds emerging during later stages of crop.

Keeping these in view, a field experiment was carried out to evaluate the Bio-efficacy of Bispyribac acid 40 % SC against weed flora in Rice (*Oryza sativa L*) which will ensure an economic rice production.

MATERIAL AND METHODS

This research was conducted at Instructional Farm of Uttar Banga Krishi Viswavidyalaya, Pundibari, Cooch Behar, West Bengal, India. The farm is situated at $26^0$19'86" N latitude and $89^0$23'53" E longitude at an elevation of 43 meters above mean sea level. The soil at the experimental site was sandy loam in texture and acidic in nature having pH of 5.50. The initial organic carbon 0.82%, available nitrogen 161.25 kg ha^{-1}, available phosphorus 23.10 kg ha^{-1} and available potash 107.20 kg ha^{-1}. The experiment was laid out in Randomized block design with seven treatments and replicated thrice. Treatments comprises T_1=Bispyribac acid 40% SC @ 17.5 g ai/ha, T_2= Bispyribac acid 40% SC @ 35 g ai/ha T_3= Bispyribac acid 40% SC @ 52.5 g ai/ha T_4= Bispyribac acid 40% SC @ 20 g ai/ha T_5= Azimsulfuron sodium 10% SC @35.0g ai/ha T_6= Untreated control and T_7= Bispyribac acid 40% SC@70gai/ha.

All the recommended improved package of practices was followed in this experiment including the plant protection measures. Full doses of Phosphorus through Single Super Phosphate and Potash through Muriate of Potash each @ 30 kg ha^{-1} was applied as basal. Recommended dose of Nitrogen @ 60 kg ha^{-1} through Urea was applied in 4 splits at basal, 25, 45 and 65 DAT. The test herbicide Bispyribac acid 40% SC at dosages of 43.75, 87.50 and 131.25 g a.i ha^{-1} and the standard check (Market sample) Bispyribac acid 40% SC @ 200 g a.i. ha^{-1} and Azimsulfuron 50 % DF @ 70 g a.i. ha^{-1} were sprayed at 29.09.2014 and 07.08.2015 as post emergence treatment respectively, with a spray volume of 300 l ha^{-1} by knapsack sprayer fitted with flat fan deflector nozzle.

Observations on species wise weed count (per sq. m area) was recorded at initial (before herbicide application) followed by 30 and 60 days after application (DAA) of tested herbicides from each plots using 1 X 1 m^2 quadrate in marked area. The weed samples were sun dried for four days and then transferred to hot air oven for drying at 60^0 C. Weeds dry weight of each sample was recorded in g/m^2 at

60 DAA. After harvesting of paddy crop, the field was left undisturbed and the sowing okra was done keeping the original lay out plan of the experiment intact. No further application of any insecticide, fungicide or herbicide was done in any form. The crop was observed regularly to record any ill effect on the crop growth and development, if any, due to the application of Bispyribac acid 40% SC in previous paddy crop. Residue sample of grain, husk, straw and chopped soil has been collected after harvesting of rice and sent to the sponsoring agency for analysis.

Weed control efficiency (WCE) was calculated on the basis of data recorded at 30 & 60 DAA of the tested herbicide in rice as per the formula given below:

$$\text{Weed Control Efficiency (\%)} = \frac{\text{WDC - WDT}}{\text{WDC}} \times 100$$

Where,

WDC = Weed dry weight in untreated control plot (gm^{-2})

WDT = Weed dry weight in treated plot (gm^{-2})

The crop was harvested at maturity and yield was recorded in kg/plot and converted to t/ha. The data were analyzed following Analysis of Variance (ANOVA) technique and mean differences were adjusted by the Multiple Comparison test (Gomez and Gomez, 1984).

RESULTS AND DISCUSSIONS

Weed density

Data presented in table 1 showed that initial weed density was uniform in all the plots as the difference was statistically non-significant. However, observations on weed density after 30 & 60 days of application of herbicides clearly indicate that herbicidal treatment was better than weedy check condition in reduction of the weed density (table 2 & 3).

Among all the treatments, Bispyribac acid 40 % SC @ 52.5 g a.i./ha (T_3) recorded lowest total weed population of grassy and broad leaf weeds which was closely followed by Bispyribac acid 40 % Sc @ 35 g a.i./ha though on par with its lower doses ie. Bispyribac acid 40 % SC @ 20 & 17.5 g a.i./ha at 30 DAA and 30 DAA as well as with the Azimsulfuron sodium 10 % SC @ 35 g a.i./ha during both the years of experimentation.

Weed dry weight

Species wise dry weight of weeds was recorded at 60 days after application of herbicides and represented in Table 4. Among the treatments, Bispyribac acid 40 % SC @ 52.5 g a.i./ha (T_3) recorded significantly lowest dry weight of the grassy and broad leaf weeds in 2014-15 and 2015-16 respectively than Azimsulfuron sodium 10 % SC @ 35 g a.i./ha (T_5) and untreated control (T_6). Bispyribac acid 40 % SC @ 52.5 g a.i./ha was showed lowest dry weight of both grassy and broad leaf weeds among herbicidal treatments which were on par with its lower doses during both the years of experimentation. Hasanuzzaman *et al.,* 2008 reported that all herbicidal treatments reduced weed population significantly compared with weedy check. Hence, the dry weight of weeds increased with the age of the crop in the control plot and it is mainly due to the fact that with the age of the crop the number as well as the size of individual weed species increased which gave more dry weight (Yadav *et al.,* 2008).

Weed control Efficiency

The results of mean weed control efficiency (WCE) of grassy and broad leaf weeds are presented in Table 5 and it was revealed that all the herbicidal treatments gives effective control of grassy weeds ranged from 42.59 % to 62.66% and 35.23% to 56.26% at 60 DAA during 2014-15 and 2015-16 respectively. Among the herbicidal treatments Bispyribac acid 40 % SC @

Table 1
Weed density (per m² area) at initial stage (before herbicide application) in transplanted rice

	2014-15						*2015-16*					
	Grassy weeds and sedge			*Broad leaf weeds*			*Grassy weeds and sedge*			*Broad leaf weeds*		
Treatments	*Echinocloa crusgalli*	*Echinocloa colonum*	*Panicum ripens*	*Cyperus irria*	*Monocoria vaginalis*	*Luduigia purviflora*	*Echinicloa crusgalli*	*Echinicloa colonum*	*Panicum ripens*	*Cyperus irria*	*Monocoria vaginalis*	*Luduigia purviflora*
T_1	6.67	4.00	3.00	2.00	2.67	4.33	6.33	4.67	4.67	3.00	3.67	3.33
T_2	5.33	4.00	3.33	4.33	3.00	3.00	5.00	5.67	5.33	5.00	3.33	3.67
T_3	6.67	6.67	3.67	4.67	2.33	4.67	7.67	8.00	5.33	5.67	3.00	3.67
T_4	4.00	4.67	3.33	3.67	3.33	2.67	4.67	5.00	3.00	4.00	3.33	3.00
T_5	5.67	6.33	3.33	5.33	3.00	3.33	6.00	6.67	5.67	6.00	3.67	4.33
T_6	5.33	4.00	3.00	3.67	4.00	2.00	5.67	4.33	5.00	5.00	4.67	3.33
S.Em(±)	1.50	1.65	0.86	1.86	0.85	0.86	1.14	0.79	0.62	1.40	0.66	0.96
CD (P = 0.005)	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

T_1 = Bispyribac acid 40% SC @ 17.5 g a.i./ha; T_2 = Bispyribac acid 40% SC @ 35.0 g a.i./ha; T_3 = Bispyribac acid 40% SC @ 52.5 g a.i./ha; T_4 = Bispyribac sodium 10% SC @ 20 g a.i./ha; T_5 = Azimsulfuron sodium 10% SC@35.0 g a.i./ha and T_6 = Untreated control

Table 2
Weed density (per m² area) at 30 days after application of herbicidal treatments in transplanted rice

	2014-15						*2015-16*					
	Grassy weeds and sedge			*Broad leaf weeds*			*Grassy weeds and sedge*			*Broad leaf weeds*		
Treatments	*Echinocloa crusgalli*	*Echinocloa colonum*	*Panicum ripens*	*Cyperus irria*	*Monocoria vaginalis*	*Luduigia purviflora*	*Echinicloa crusgalli*	*Echinicloa colonum*	*Panicum ripens*	*Cyperus irria*	*Monocoria vaginalis*	*Luduigia purviflora*
T_1	2.33	1.67	1.33	0.67	1.00	1.67	3.00	2.00	1.67	1.33	1.33	1.67
T_2	1.67	1.33	1.33	1.67	1.33	1.00	2.00	1.67	2.00	2.00	1.00	1.33
T_3	2.33	2.00	1.00	1.00	0.67	1.33	2.33	2.67	2.33	2.33	1.00	1.00
T_4	1.67	1.67	1.33	1.33	1.00	1.00	1.67	1.33	1.00	1.33	0.67	1.00
T_5	2.00	3.00	1.67	2.33	1.33	1.67	2.67	3.33	2.33	3.00	1.67	2.00
T_6	4.33	4.67	3.67	4.33	3.33	2.33	3.67	4.00	2.67	3.67	2.33	1.67
S.Em(±)	0.71	0.68	0.42	0.80	0.53	0.64	0.57	0.59	0.42	1.10	0.38	0.61
CD (P = 0.005)	NS	2.17	1.33	NS	NS	NS	NS	NS	NS	NS	NS	NS

T_1 = Bispyribac acid 40% SC @ 17.5 g a.i./ha; T_2 = Bispyribac acid 40% SC @ 35.0 g a.i./ha; T_3 = Bispyribac acid 40% SC @ 52.5 g a.i./ha; T_4 = Bispyribac sodium 10% SC @ 20 g a.i./ha; T_5 = Azimsulfuron sodium 10% SC@35.0 g a.i./ha and T_6 = Untreated control

Table 3
Weed density (per m² area) at 60 days after application of herbicidal treatments in transplanted rice

	2014-15						*2015-16*					
	Grassy weeds and sedge			*Broad leaf weeds*			*Grassy weeds and sedge*			*Broad leaf weeds*		
Treatments	*Echinocloa crusgalli*	*Echinocloa colonum*	*Panicum ripens*	*Cyperus irria*	*Monocoria vaginalis*	*Luduigia purviflora*	*Echinicloa crusgalli*	*Echinicloa colonum*	*Panicum ripens*	*Cyperus irria*	*Monocoria vaginalis*	*Luduigia purviflora*
T_1	2.33	2.33	2.67	1.33	1.67	2.33	3.33	3.67	2.67	2.33	2.67	3.00
T_2	1.67	2.33	2.33	2.67	2.33	1.67	3.00	3.33	3.33	3.67	3.00	3.00
T_3	2.00	2.33	2.00	2.00	1.33	2.00	3.33	4.00	3.67	3.00	2.33	3.33
T_4	1.67	2.33	2.33	2.33	1.67	1.67	3.67	3.33	3.00	4.00	2.67	2.67
T_5	2.00	4.00	3.00	2.33	2.67	2.67	4.00	5.00	4.00	3.33	3.33	4.00
T_6	4.67	5.00	5.00	5.33	4.67	3.33	6.00	6.00	5.00	5.33	5.33	4.33
S.Em(±)	0.75	0.63	0.88	0.56	0.42	0.47	0.68	0.66	0.47	0.89	0.44	0.55
CD (P = 0.005)	NS	2.01	NS	1.80	1.33	NS	NS	NS	NS	NS	1.41	NS

T_1 = Bispyribac acid 40% SC @ 17.5 g a.i./ha; T_2 = Bispyribac acid 40% SC @ 35.0 g a.i./ha; T_3 = Bispyribac acid 40% SC @ 52.5 g a.i./ha; T_4 = Bispyribac sodium 10% SC @ 20 g a.i./ha; T_5 = Azimsulfuron sodium 10% SC@35.0 g a.i./ha and T_6 = Untreated control

Table 4
Dry weight of weed (per m² area) at 60 days after application of herbicidal treatments in transplanted rice

	2014-15						*2015-16*					
	Grassy weeds and sedge			*Broad leaf weeds*			*Grassy weeds and sedge*			*Broad leaf weeds*		
Treatments	*Echinocloa crusgalli*	*Echinocloa colonum*	*Panicum ripens*	*Cyperus irria*	*Monocoria vaginalis*	*Luduigia purviflora*	*Echinicloa crusgalli*	*Echinicloa colonum*	*Panicum ripens*	*Cyperus irria*	*Monocoria vaginalis*	*Luduigia purviflora*
T_1	1.48	1.44	1.19	1.44	2.22	1.60	2.91	1.50	1.26	2.29	2.92	1.90
T_2	1.36	1.43	1.17	1.38	1.74	1.53	2.44	1.49	1.23	1.65	2.28	1.84
T_3	1.35	1.37	0.98	1.07	1.73	1.53	2.41	1.47	1.08	1.47	1.85	1.57
T_4	1.90	1.45	1.44	1.77	2.94	2.21	3.13	1.51	1.43	2.32	3.26	1.94
T_5	1.64	1.99	1.51	1.53	3.44	2.53	3.31	2.24	1.54	2.06	3.17	2.36
T_6	3.78	3.00	2.48	3.54	5.87	3.51	5.10	2.83	2.63	3.38	5.77	3.36
S.Em(±)	0.59	0.22	0.17	0.60	0.66	0.42	0.46	0.27	0.18	0.55	0.53	0.17
CD (P = 0.005)	NS	0.71	0.54	NS	2.13	1.33	1.48	0.85	0.57	NS	1.69	0.55

T_1 = Bispyribac acid 40% SC @ 17.5 g a.i./ha; T_2 = Bispyribac acid 40% SC @ 35.0 g a.i./ha; T_3 = Bispyribac acid 40% SC @ 52.5 g a.i./ha; T_4 = Bispyribac sodium 10% SC @ 20 g a.i./ha; T_5 = Azimsulfuron sodium 10% SC@35.0 g a.i./ha and T_6 = Untreated control

Table 5

Weed controt efficiency of Bispyribac acid 40% SC on transplanted rice during 2014-15 and 2015-16 at 60 days after application

	2014-15						*2015-16*					
	Grassy weeds and sedge			*Broad leaf weeds*			*Grassy weeds and sedge*			*Broad leaf weeds*		
Treatments	*Echinocloa crusgalli*	*Echinocloa colonum*	*Panicum ripens*	*Cyperus irria*	*Monocoria vaginalis*	*Luduigia purviflora*	*Echinicloa crusgalli*	*Echinicloa colonum*	*Panicum ripens*	*Cyperus irria*	*Monocoria vaginalis*	*Luduigia purviflora*
T_1	60.90	52.05	52.08	59.19	62.18	54.32	43.04	47.06	52.16	32.22	49.39	43.50
T_2	64.08	52.39	52.89	60.89	70.30	56.32	52.19	47.41	53.30	51.33	60.49	45.08
T_3	64.34	54.38	60.40	69.84	70.58	56.41	52.78	48.24	59.01	56.55	67.88	53.13
T_4	49.60	51.83	42.01	49.95	49.97	36.94	38.73	46.71	45.69	31.33	43.44	42.30
T_5	56.58	33.85	39.33	56.64	41.34	27.83	35.08	20.94	41.50	39.01	45.06	29.79
T_6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

T_1 = Bispyribac acid 40% SC @ 17.5 g a.i./ha; T_2 = Bispyribac acid 40% SC @ 35.0 g a.i./ha; T_3 = Bispyribac acid 40% SC @ 52.5 g a.i./ha; T_4 = Bispyribac sodium 10% SC @ 20 g a.i./ha; T_5 = Azimsulfuron sodium 10% SC@35.0 g a.i./ha and T_6 = Untreated control

52.5 g a.i./ha (T_3) showed highest degree of weed control efficiency with disregard to the species and year followed by Bispyribac acid 40 % SC @ 35 g a.i./ha (T_2) and Bispyribac acid 40 % SC @ 17.5 g a.i./ha (T_1). It was observed that Bispyribac acid 40 % SC is more efficient in controlling *Monocoria vaginalis* followed by *Cyperus irria* and *Panicum ripens* in all the doses than the other weed flora found in the experiment.

Yield attributes and yields of rice

The highest grain yield of 4.90 and 4.95 t ha^{-1} was obtained in the plot receiving Bispyribac acid 40 % SC @ 52.5 g a.i./ha (T_3) during both the years of experimentation. The highest grain yield of rice was mainly due to minimum crop-weed competition throughout the crop growth period, thus enabling the crop for maximum utilization of nutrients, moisture, light and space which influenced by yield components Among herbicides treatment, significant increase in grain yield was obtained with the application of Bispyribac acid 40 % SC @ 52.5 g a.i./ha (T_3) followed by Bispyribac acid 40 % SC @ 35 g a.i./ha (T_2) and Bispyribac acid 40 % SC @ 17.5 g a.i./ha (T_1) which were on par to each other and statistically superior in comparison to Azimsulfuron sodium 10 % SC @ 35 g a.i./ha (T_5) (Table 6).

Economics

Economic analysis revealed that Bispyribac acid 40 % SC @ 52.5 g a.i./ha (T_3) fetched highest net return (Rs. 42153.75 & 42123.75/ha) and benefit cost ratio (1.07 & 1.02) during both the years of experimentation followed by Bispyribac acid 40% SC @ 35.0 g a.i./ha (T_2) and Bispyribac acid 40% SC @ 17.5 g a.i./ha might be due to higher weed control efficiency, higher yield and lower cost of the chemicals. Among the herbicides treatment, Bispyribac sodium 10% SC@20.0 g a.i./ha recoded lower net return (Rs. 33730 & 33900/ha) and benefit cost ratio (0.82 & 0.79) might be due to lesser weed control efficiency and higher price of the chemical.

CONCLUSION

The result from the experimental trial revealed that the weeds flora in rice were controlled effectively by applying Bispyribac acid 40 % SC at dosages ranges from @ 17.5 to 52.5 g a.i./ha, which were statistically superior to the standard checks Bispyribac sodium

Table 6
Yield and yield attributes of transplanted rice, as affected by Bispyribac acid 40% SC

Treatments	*Panicle length (cm)*		*No. of panicle/m^{-2}*		*Grain yield kg ha^{-1}*		*Straw yield kg ha^{-1}*	
	2015	*2016*	*2015*	*2016*	*2015*	*2016*	*2015*	*2016*
T_1	23.42	23.32	345.17	340.53	4.70	4.69	6.25	6.81
T_2	24.70	24.59	335.80	332.36	4.79	4.72	6.53	6.88
T_3	25.47	25.71	372.00	374.73	4.90	4.95	6.54	7.04
T_4	24.77	25.03	344.63	338.15	4.47	4.49	6.21	7.02
T_5	23.77	23.92	320.74	330.64	4.40	4.63	6.48	6.86
T_6	21.85	21.91	208.00	224.61	3.40	3.61	6.15	6.49
S.Em(±)	0.20	0.17	23.89	14.32	0.10	0.10	0.10	0.17
CD (P = 0.005)	0.65	0.55	7.48	32.32	0.32	0.24	NA	NA

T_1 = Bispyribac acid 40% SC @ 17.5 g a.i./ha; T_2 = Bispyribac acid 40% SC @ 35.0 g a.i./ha
T_3 = Bispyribac acid 40% SC @ 52.5 g a.i./ha; T_4 = Bispyribac sodium 10% SC @ 20 g a.i./ha;
T_5 = Azimsulfuron sodium 10% SC@35.0 g a.i./ha and T_6 = Untreated control

10% SC@ 20 g a.i./ha and Azimsulfuron sodium 10% SC @ 35 g a.i./ha. Significant increase in grain yield and straw yield was obtained by application of Bispyribac acid 40 % SC at the tested dosages ranges from @ 17.5 to 52.5 g a.i./ha in comparison to the untreated control & standard check.

Economic analysis revealed that Bispyribac acid 40 % SC @ 52.5 g a.i./ha (T_3) fetched highest net return and benefit cost ratio during both the years of experimentation.

Table 7
Economic analysis of rice cultivation

Treatments	*Common cost of cultivation (Rs. / ha)*		*Cost of treatments (Rs. / ha)*		*Total cost*		*Gross return (Rs. / ha)*		*Net return (Rs. / ha)*		*Benefit: Cost (Rs. / ha) ratio*	
	2014-15	*2015-16*	*14-15*	*15-16*	*14-15*	*15-16*	*14-15*	*15-16*	*14-15*	*15-16*	*14-15*	*15-16*
T_1	38870	40600	218.75	218.75	39088.75	40818.75	78300	79280	39211.25	38461.25	1.00	0.94
T_2	38870	40600	437.50	437.50	39307.5	41037.5	80120	79840	40812.5	38802.5	1.04	0.95
T_3	38870	40600	656.25	656.25	39526.25	41256.25	81680	83380	42153.75	42123.75	1.07	1.02
T_4	38870	40600	2400.00	2400.00	41270	43000	75000	76900	33730	33900	0.82	0.79
T_5	38870	40600	560.00	560.00	39430	41160	74560	78540	35130	37380	0.89	0.91
T_6	38870	40600	0	0	38870	40600	59900	63520	21030	22920	0.54	0.56

T_1=Bispyribac acid 40% SC @ 17.5 g a.i./ha; T_2=Bispyribac acid 40% SC @ 35.0 g a.i./ha; $T_{3=}$ Bispyribac acid 40% SC @ 52.5 g a.i./ha;
T_4= Bispyribac sodium 10% SC @ 20 g a.i./ha; T_5 =Azimsulfuron sodium 10% SC@35.0 g a.i./ha and T_6=Untreated control
Price of Bispyribac sodium 40 % SC is Rs. 5000/L, Azimsulfuron sodium 10% SC@ = Rs. 8000/L and Bispyribac sodium 10% SC = Rs. 12000/L

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REFERENCES

Gomez, K.A. and A.A. Gomez, (1984), Statistical Procedures for Agriculture Research. Int. Rice Res. Inst. Jhon Wiley and Sons. New York, pp: 139-240.

Hasanuzzaman, M., M.O. Islam and M.S. Bapari, (2008), Efficacy of different herbicides over manual weeding in controlling weeds in transplanted rice. *Aus. J. Crop Sci.,* 2(1): 18-24.

Raju, R.A. and Reddy, M.N., (1986), Protecting the world's rice crop. Agric. Int. Dev. Bull., 8: 17-18 (C.F. Agribusiness World Wide Jan-Feb. 1986).

Singh, G., Singh, V.P., Singh, M., And Singh S.P., (2003), Effect of Anilofos and Triclopyr on grassy and non grassy weeds in transplanted rice. *Ind. J. Weed Sci.,* 35: 30-32.

Subbaiah, S.V., (2006), Several options being tapped. The Hindu survey of Indian Agriculture, PP. 50-54.

Yadav D B, Singh S and Yadav A. (2008), Evaluation of Azimsulfuron and metsulfuron methyl alone and in combination for weed control in transplanted rice. *Indian Journal of Weed Science* 40(1/2): 14-18.