



Effect of Herbicides Combinations for Control of Weed Complex Density and Yield Attributes in Direct Seeded Rice (*Oryza sativa*)

V.B. Nevse, Y. R. Govekar* and S. P. Gosavi

Department of Plant Pathology, Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli-415712

*Corresponding Author E-mail: govekaryr@gmail.com

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ABSTRACT

*The field experiment was conducted during kharif season of the year 2013-2014 on red lateritic soil of the Education-cum-experimental Farm, Department of Agronomy, College of Agriculture, Dapoli, Ratnagiri (M.S.) to study Effect of herbicides combinations for control of complex weed flora in direct seeded Rice (*Oryza sativa*). There have 10 treatments combination, Bispyribac-Na @ 25g/ha, Pendimethalin fb bispyribac-Na @ 1000 fb 25 g/ha, Oxadiargyl fb bispyribac-Na @ 100/25 g/ha, Pyrazosulfuron fb bispyribac -Na @ 20/25 g/ha, Pendimethalin fb bispyribac-Na fb manual weeding @ 1000 fb 25 g/ha, Pendimethalin fb manual weeding (Pendistar) @ 1000g/ha, Bispyribac -Na + (chlormuron + metsulfuron) @ 20+4g/ha, Three mechanical weedings (cono / rotary weeder), Weed free check (HW at 20,40, and 60 DAS) and Weedy check. The present study revealed that as compared to weedy check all the weed control measures significantly reduced the weed density of monocots at 60 DAS during individual years and in pooled results. Application of pendimethalin fb manual weeding remained at par with weed free check and Pendimethalin fb Bispyribac-Na fb manual weeding and recording significantly lowest weed density of monocots over all other treatments during the year and various weed control measures tried significantly influenced the yield attributes viz. plant height and weight of filled grains per panicle over weedy check. Weed free check (three hand weeding) recorded significantly higher plant height over other treatments except Pendimethalin fb Bispyribac-Na fb manual weeding, Pendimethalin fb manual weeding, Three mechanical weeding and Pendimethalin fb Bispyribac-Na which were at par with weed free check. In respect of filled grains per panicle pre-emergence application of pendimethalin fb manual weeding significantly showed higher response over Bispyribac-Na, Oxadiargyl fb Bispyribac-Na and weedy check and remain at par with rest of the treatments in 2013 & 2014.*

Key words: Direct seeded Rice, Different herbicides, weed density, yield attributing characters and chemical composition.

INTRODUCTION

It is estimated that weeds cause 10 to 20 % losses in crop production in developed, developing and under -developed countries

respectively (yaduraju & Moorthy 2002). Herbicides flowed by intercultures operation play an important role in integrated weed management in rice.

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In early season weed competition significantly reduces rice grain yield and pre-emergence herbicides application are widely used. But most weeds seed germinate over long time and pre-emergence herbicides having short residual life so that used combinations of herbicides and approach integrated weed managements.

MATERIALS AND METHODS

The field experiment was conducted during *kharif* season of the year 2013-2014 on red lateritic soil of the Education-cum-experimental Farm, Department of Agronomy, College of Agriculture, Dapoli, Ratnagiri (M.S.) to study Effect of herbicides combinations for control of complex weed flora in direct seeded Rice (*Oryza sativa*). There have 10 treatments combination with RBD designed. The different treatments included weed control measure such as hand

weeding at 20 40 and 60 DAS, Weedy check, and different herbicides Bispyribac-Na 25g/ha 20 DAS (3-4 leaf stage), Pendimethalin fb bispyribac-Na 1000 fb 25 0-2 fb 25, Oxadiargyl fb bispyribac-Na 100/25 0-2 fb. 25, Pyrazosulfuron fb bispyribac –Na 20/25 0-3 fb. 25 Pendimethalin fb bispyribac-Na fb manual weeding 1000 fb 25 0-2 fb. 20 DAS (3-4 leaf stage) fb 45d. Pendimethalin fb manual weeding (Pendistar) 1000 0-2 fb. 25-30d Bispyribac -Na + (chlorimuron + metsulfuron) 20+4 20 DAS Three mechanical weedings (cono / rotary weeder) 20, 40, 60 DAS Weed free check (HW at 20, 40, and 60 DAS) Weedy check. The experimental data were subjected to analysis of variance (ANOVA) and treatment means were compared, significant differences were tested at $p=0.05$ using split plot design(SPD) as given by Panse and Sukhatme (1985) using computer design.

RESULTS AND DISCUSSION

Composition of weed flora:-

Sr.No.	Year	Grasses & sedges	Broad leaved weeds
1.	2013	<i>Cyperus iria</i> , <i>Isachne globossa</i> , <i>Ischaemum rugosum</i> , <i>Echinochloa colona</i> , <i>Coix lacryma-jobi</i>	<i>Ludwigia octovalvis</i> , <i>Mimosa pudica</i> , <i>Ageratum conyzoides</i> , <i>Alternanthera sessilis</i> , <i>Smithia sensitiva</i> .
2.	2014	<i>Cyperus iria</i> , <i>Isachne globossa</i> , <i>Ischaemum rugosum</i> , <i>Echinochloa colona</i>	<i>Ludwigia octovalvis</i> , <i>Mimosa pudica</i> , <i>Ageratum conyzoides</i> , <i>Alternanthera sessilis</i> , <i>Smithia sensitiva</i> .

I) Effect of herbicide combinations on weed density-

As compared to weedy check all the weed control measures significantly reduced the weed density of monocots at 60 DAS during individual years and in pooled results. Application of pendimethalin fb manual weeding remained at par with weed free check and Pendimethalin fb Bispyribac-Nafb manual weeding and recording significantly lowest weed density of monocots over all other treatments during the year 2013, 2014 and in pooled results. While, during 2012 Pendimethalin fb manual weeding showed the lowest weed density over rest of the weed control measures tried except weed free check, Bispyribac-Na, Pendimethalin fb Bispyribac-

Na, Pyrazosulfuron fb Bispyribac-Na and Bispyribac-Na + (chlorimuron + metsulfuron) which were at par with each other. Weed density of BLWS at 60 DAS was not significantly influenced due to different weed control measures during all the years of experimentation and in pooled result except during 2014. Where in weed free check recorded significantly lowest weed density of BLWS except pendimethalin fb manual weeding. The weed free check exhibiting highest weed control efficiency followed by pendimethalin fb manual weeding and Pendimethalin fb Bispyribac-Nafb manual weeding. At 90 DAS weed free check (3HW) reduce significantly the density of monocots over all other weed control measures tried,

except use of pendimethalin fb manual weeding and Pendimethalin fb Bispribac-Na fb manual weeding during 1st year and in pooled results while, Pendimethalin fb manual weeding during 2nd year. However, during 3rd year use of Pendimethalin fb Bispribac-Na fb manual weeding recorded significantly lowest weed density of monocots over all

other weed control measures, except weed free check and Pendimethalin fb manual weeding. The similar results were obtained by Simarjeet kaur and Surjeet Singh 2015 who reported lower weed density in pendimethline treatment as compared to other herbicides treatments such as butachlor, thiobencarb and oxadiargyl.

Table 1: Effects of herbicide combinations on weed density at 60 DAS (No. 0.25 m²) (Three year pooled mean)

Treatments	Grasses & Sedges				Broad leaved weeds				Total				Weed control efficiency			
	2012	2013	2014	Pooled	2012	2013	2014	Pooled	2012	2013	2014	Pooled	2012	2013	2014	Pooled
T1: Bispribac-Na	33.00 (5.68)	29.00 (5.16)	44.33 (6.64)	35.44 (5.83)	0.00 (0.71)	0.00 (0.71)	15.00 (3.93)	5.00 (1.78)	33.00	29.00	59.33	40.44	52.86	41.2	58.41	52.73
T2: Pendimethalin fb Bispribac-Na	53.00 (6.56)	21.33 (4.32)	23.33 (4.88)	32.56 (5.26)	1.67 (1.26)	3.00 (1.68)	11.00 (3.38)	5.22 (2.10)	54.67	24.33	34.33	37.78	21.90	50.7	75.94	55.84
T3: Oxadiargyl fb Bispribac-Na	26.33 (4.64)	23.33 (4.41)	17.00 (4.13)	22.22 (4.39)	1.00 (1.10)	0.00 (0.71)	14.67 (3.89)	5.22 (1.90)	27.33	23.33	31.67	27.44	60.96	52.7	77.80	67.93
T4: Pyrazosulfuron fb Bispribac-Na	33.00 (5.68)	34.67 (5.88)	32.33 (5.70)	33.33 (5.75)	0.00 (0.71)	0.00 (0.71)	15.00 (3.91)	5.00 (1.78)	33.00	34.67	47.33	38.33	52.86	29.7	66.83	55.20
T5: Pendimethalin fb Bispribac-Na fb manual weeding	57.00 (4.43)	2.67 (1.74)	15.67 (4.00)	15.11 (3.39)	4.00 (1.63)	1.00 (1.17)	9.33 (3.13)	4.78 (1.98)	31.00	3.67	25.00	19.89	55.71	92.6	82.48	76.75
T6: Pendimethalin fb manual weeding	6.67 (2.60)	0.67 (1.00)	16.00 (4.05)	7.78 (2.55)	3.00 (1.50)	3.33 (1.79)	6.67 (2.67)	4.33 (1.99)	9.67	4.00	22.67	12.11	86.19	91.9	84.11	85.85
T7: Bispribac-Na + (chlormuron+metsulfuron)	55.00 (7.41)	26.00 (5.02)	45.67 (6.78)	42.22 (6.40)	7.33 (2.04)	0.0 (0.71)	13.67 (3.76)	8.78 (2.33)	62.33	26.00	59.34	51	10.96	47.3	58.41	40.39
T8: Three mechanical weedings (cono / rotary weeder)	21.33 (4.45)	12.00 (2.88)	28.67 (5.37)	20.67 (4.23)	15.00 (3.59)	3.67 (1.85)	11.00 (3.37)	9.89 (2.94)	6.33	15.67	39.67	30.56	48.10	68.2	72.19	64.28
T9: Weed free check (HW at 20,40, & 60DAS)	7.67 (2.85)	3.00 (1.86)	16.00 (4.03)	8.89 (2.91)	0.67 (1.00)	0.0 (0.71)	5.33 (2.39)	2.00 (1.37)	8.34	3.00	21.33	10.89	88.08	93.9	85.05	87.27
T10: Weedy check	57.33 (7.45)	47.67 (6.71)	116.00 (10.78)	73.67 (8.32)	12.67 (2.53)	1.67 (1.39)	26.67 (5.26)	11.89 (2.87)	70.00	49.34	142.67	85.56	-	-	-	-
S.Em ±	- (0.79)	- (0.67)	- (0.58)	- (0.66)	- (1.31)	- (0.50)	- (0.20)	- (0.50)	-	-	-	-	-	-	-	-
C.D. at 5%	- (2.20)	- (1.86)	- (0.78)	- (1.32)	- (N.S.)	- (N.S.)	- (0.55)	- (1.00)	-	-	-	-	-	-	-	-

Figures in parentheses indicate square root transformations $\sqrt{x + 0.5}$.

Table 2: Effects of herbicide combinations on weed density at 90 DAS (No. 0.25 m²) (Three year pooled mean)

Treatments	Grasses & Sedges				Broad leaved weeds				Total				Weed control efficiency			
	2012	2013	2014	Pooled	2012	2013	2014	Pooled	2012	2013	2014	Pooled	2012	2013	2014	Pooled
T1: Bispribac-Na	26.00 (5.04)	46.67 (6.81)	42.33 (6.50)	38.33 (6.12)	0.00 (0.71)	0.00 (0.71)	15.67 (4.02)	5.22 (1.81)	26.0	46.67	58.00	43.55	16.13	71.5	56.39	60.17
T2: Pendimethalin fb Bispribac-Na	17.33 (4.09)	19.33 (4.22)	22.67 (4.81)	19.78 (4.37)	3.00 (1.50)	3.67 (1.81)	11.67 (3.51)	6.11 (2.27)	20.33	23.00	34.34	25.89	34.42	85.9	74.18	76.32
T3: Oxadiargyl fb Bispribac-Na	17.67 (3.87)	26.00 (4.76)	18.33 (4.32)	20.67 (4.32)	2.67 (0.89)	0.33 (0.88)	15.00 (3.94)	6.00 (1.90)	20.34	26.33	33.33	26.67	34.39	83.9	74.94	75.61
T4: Pyrazosulfuron fb Bispribac-Na	23.33 (4.74)	76.33 (8.73)	27.67 (5.28)	42.44 (6.25)	0.00 (0.71)	0.67 (1.00)	15.33 (3.95)	5.33 (1.89)	27.33	77.00	43.00	47.77	11.84	53.0	67.67	56.31
T5: Pendimethalin fb Bispribac-Na fb manual weeding	1.00 (1.17)	32.33 (5.32)	15.67 (4.00)	16.33 (3.50)	8.67 (2.98)	4.00 (2.02)	12.00 (3.53)	8.22 (2.84)	9.67	36.33	27.67	24.55	68.81	77.8	79.20	77.55

T6: Pendimethalin fb manual weeding	3.00 (1.71)	5.33 (2.06)	17.67 (4.26)	8.67 (2.68)	7.33 (2.65)	6.67 (2.58)	7.67 (2.83)	7.22 (2.69)	10.33	12.00	25.34	15.89	66.68	92.7	80.95	85.47
T7: Bispipyribac-Na + (chlorimuron+metsulfuron)	19.00 (4.32)	39.33 (6.26)	39.67 (6.30)	32.67 (5.63)	0.00 (0.71)	1.00 (1.10)	15.00 (3.94)	5.33 (1.91)	19.00	40.33	54.67	38.00	38.71	75.4	58.89	65.24
T8: Three mechanical weedings (cono / rotary weeder)	12.67 (3.15)	30.00 (5.31)	20.67 (4.68)	21.11 (4.35)	5.67 (2.24)	3.67 (1.55)	10.00 (3.24)	6.44 (2.34)	18.34	33.67	30.67	27.55	40.84	79.5	76.94	74.80
T9: Weed free check (HW at 20,40, & 60DAS)	0.67 (1.00)	3.00 (1.82)	18.00 (4.10)	7.22 (2.30)	1.00 (1.10)	1.00 (1.10)	9.00 (3.08)	3.67 (1.76)	1.67	4.00	27.00	10.89	94.61	97.5	79.70	90.04
T10: Weedy check	21.00 (4.56)	156.67 (12.03)	105.67 (10.29)	94.44 (8.96)	10.00 (2.81)	7.33 (2.17)	27.33 (5.27)	14.89 (3.42)	31.00	164.0-	133.00	109.33	-	-	-	
S.Em ±	- (0.53)	- (0.81)	- (0.22)	- (0.76)	- (0.76)	- (0.81)	- (0.14)	- (0.43)	-	-	-	-	-	-	-	
C.D. at 5%	- (1.46)	- (2.25)	- (0.62)	- (1.51)	- (2.11)	- (N.S.)	- (0.40)	- (0.85)	-	-	-	-	-	-	-	

Figures in parentheses indicate square root transformations $\sqrt{x + 0.5}$.

Table 3: Effects of herbicide combinations on yield attributes of rice (Three year pooled mean)

Treatments	Height (cm)				Number of tillers/m				No of Panicles /m			
	(2012)	(2013)	(2014)	Pooled	(2012)	(2013)	(2014)	Pooled	(2012)	(2013)	(2014)	Pooled
T1: Bispipyribac-Na	52.40	65.67	83.30	67.12	37.33	96.00	62.00	65.11	19.33	80.67	53.33	51.11
T2: Pendimethalin fb Bispipyribac-Na	57.00	71.50	89.67	72.72	31.00	64.00	61.67	52.22	17.00	43.33	53.33	37.89
T3: Oxadiargyl fb Bispipyribac-Na	59.67	63.53	88.20	70.47	50.00	72.67	64.00	62.22	42.67	60.00	55.33	52.67
T4: Pyrazosulfuron fb Bispipyribac-Na	51.40	66.95	86.83	68.39	47.00	56.00	63.00	55.33	40.33	49.33	53.33	47.67
T5: Pendimethalin fb Bispipyribac-Na fb manual weeding	63.67	72.63	91.33	75.65	48.33	62.67	66.00	59.11	43.67	52.67	57.67	51.33
T6: Pendimethalin fb manual weeding	59.67	69.70	93.20	74.19	60.67	87.33	69.00	72.33	52.67	70.67	61.67	61.67
T7: Bispipyribac-Na + (chlorimuron+metsulfuron)	49.53	76.13	83.33	69.73	35.33	60.00	60.67	52.00	22.67	54.00	52.00	42.89
T8: Three mechanical weedings (cono / rotary weeder)	55.67	71.53	89.50	72.56	36.67	76.00	62.00	58.22	31.67	60.67	51.33	47.89
T9: Weed free check (HW at 20,40, & 60DAS)	60.80	76.43	91.03	76.76	51.67	80.00	68.00	66.56	45.67	54.67	60.00	53.44
T10: Weedy check	54.60	61.19	79.30	65.03	32.00	66.00	56.00	51.33	23.67	52.00	47.67	41.11
S.Em ±	0.72	0.72	0.36	2.54	2.45	2.09	0.29	6.53	2.27	2.25	0.28	6.24
C.D. at 5%	N.S.	N.S.	1.01	5.06	N.S.	N.S.	0.80	N.S.	6.30	N.S.	0.80	N.S.

Table 4: Effects of herbicide combinations on yield attributes of rice (Three year pooled mean)

Treatments	Panicle Length (cm)				Weight of filled Grain /panicles			
	(2012)	(2013)	(2014)	Pooled	(2012)	(2013)	(2014)	Pooled
T1: Bispipyribac-Na	18.40	19.30	19.27	18.99	1.03	2.97	1.98	1.99
T2: Pendimethalin fb Bispipyribac-Na	18.07	21.49	20.17	19.91	1.47	3.70	2.52	2.56
T3: Oxadiargyl fb Bispipyribac-Na	19.67	20.29	20.26	20.07	2.01	4.18	2.40	2.86
T4: Pyrazosulfuron fb Bispipyribac-Na	18.47	19.29	18.43	18.73	2.11	2.64	2.00	2.25
T5: Pendimethalin fb Bispipyribac-Na fb manual weeding	19.27	19.57	31.37	20.07	2.01	3.38	3.19	2.86
T6: Pendimethalin fb manual weeding	19.87	20.47	21.54	20.62	2.25	3.35	3.08	2.89
T7: Bispipyribac-Na + (chlorimuron+metsulfuron)	18.93	21.43	19.03	19.80	2.09	3.17	2.48	2.58
T8: Three mechanical weedings (cono / rotary weeder)	18.20	20.67	20.42	19.76	1.52	3.52	2.48	2.51
T9: Weed free check (HW at 20,40, & 60DAS)	19.33	20.40	20.70	20.14	2.22	3.68	2.63	2.84
T10: Weedy check	19.47	18.68	16.80	18.32	2.04	2.23	1.88	2.05
S.Em ±	0.38	0.27	0.12	0.63	0.41	0.32	0.16	0.25
C.D. at 5%	N.S.	N.S.	0.33	N.S.	N.S.	0.88	0.45	0.51

II) Effect of herbicide combinations on yield attributes

The pooled data revealed that various weed control measures tried significantly influenced the yield attributes viz. plant height and weight of filled grains per panicle over weedy check. Weed free check (three hand weeding) recorded significantly higher plant height over other treatments except Pendimethalin fb Bispyribac-Na fb manual weeding, Pendimethalin fb manual weeding. Three mechanical weeding and Pendimethalin fb Bispyribac-Na which were at par with weed free check. In respect of filled grains per panicle pre-emergence application of pendimethalin fb manual weeding significantly showed higher response over Bispyribac-Na, Oxadiargyl fb Bispyribac-Na and weedy check and remain at par with rest of the treatments. From the different herbicides under trial, pendimethalin fb manual weeding, recorded highest weed control efficiency (85.85 & 85.47%) at 60 and 90 DAS respectively, followed by pendimethalin fb Bispyribac-Na fb manual weeding. The total weed growth of monocots and BLWs was conspicuously suppressed by the application of Pendimethalin fb manual weeding exhibiting the WCE of 83.94 and 94.29 percent at 60 and 90 DAS respectively. The same results are in conformity with the Simerjit kaur and Surjeet singh 2015 who reported that pendimethalin treatment recorded significantly higher yield attributes as compared to other treatments in a direct seeded rice. Similar results were also obtained by Singh et al. (2009) that under dry seeding, higher yield attributes was recorded with preemergence application of pendimethalin 1.50 kg/ha. The difference in yield attributes might be due to differences in application mode and efficacy of herbicides against weed species.

From the above data it is concluded that application of pendimethalin (PE) fb manual

weeding was the most effective and economical treatment followed by weed free check (HW at 20, 40, and 60 DAS) to control weeds effectively in direct seeded drilled rice during *kharif* season and thus obtain higher productivity and profit.

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