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Comparative efficacy of pre and post emergence herbicides on growth and yield of paddy in Kodagu region

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Abstract
Weeds are one of the important factors that impose a great threat to crop yield. In order to attenuate weed infestation in paddy, the efficacy of various chemicals like Butachlor, Bensulfuron methyl + Pretilachlor and Oxadiargyl as pre emergence herbicides, Penoxsulum, Bispyribac sodium, 2,4 D and Ethoxysulfuron as post emergent application and its combinations were tested during the *Kharif* season of 2016 at Agricultural and Horticulture Research Station, Ponnmapet, Virajpet taluk, Kodagu district of Karnataka. Result revealed that application of oxadiargyl 80 % WP @ 100 g a.i. ha^{-1} at 3 DAT followed by Penoxsulum @ 22.5 g a.i. ha^{-1} at 20 DAT found effective in controlling sedges, grassy and broad leaf weeds as well as recorded higher growth parameters like plant height (104.54 cm), number of tillers (21.43), number of leaf (20.05), leaf area (344.65 cm^2/hill), leaf area index (1.72), total dry matter (65.13g /hill) as a resulted obtained highest grain (4068 kg/ha) and straw yield (5298 kg/ha) compared to other herbicidal treatments.

Keywords: Pre and post emergence herbicides, growth parameters in paddy, Kodagu region

Introduction
In India, rice (paddy) is the staple food for more millions of people and plays a vital role in the economy. It is generally grown by transplanting in puddle soils. Weeds are regarded as one of the major limiting factors of crop production. Weeds share light, nutrient and water with the crop and interfere with paddy growth and production in many ways. The effective control of weeds at the initial stage can improve the productivity of a crop. Mubeen *et al.* (2014) [4] observed that conducted application of Penoxsulam followed by hand-hoeing at 30 days after seeding (DAS) reduced weed density as low as 6 and 28 plants m^{-2} at 35 DAP and at harvest, respectively. In addition, paddy yield attributes including the number of tillers, grain weight, leaf area index, and leaf area duration was higher, while grain yield in this treatment was 70 per cent higher compared to untreated control. Ganai *et al.* (2014) [2] tested different herbicides at Srinagar during the *Kharif* season of 2008, 2009 and 2010. The maximum grain yield, yield attributes and weed control efficiency was recorded with the application of penoxulam @ 22.5 g a.i. ha^{-1} (8 days after sowing). The maximum reduction in grain yield over weed free treatment was recorded in weedy check (48.5 %) and the least reduction in penoxulam @ 22.5 g/ha (2.4 %). Application of penoxulam @ 22.5 g ha^{-1} being at par with weed free treatment proved superior to the other weed-management practices for grain yield and yield attributes. The present study was undertaken to study the comparative efficacy of pre and post emergence herbicides on growth and yield parameters of paddy in the Kodagu region.

Material and Methods
A field experiment was conducted during *Kharif* 2016 at the Agricultural and Horticultural Research Station, Ponnampet (12^0 06' N, 74^0 83' E, altitude 867 m), Virjarpet taluk, Kodagu district comes under the agro climatic zone 9 (hilly zone) of Karnataka. The soil of the experimental site was acidic in reaction (pH 6.28) with normal slat load (EC 0.123 d Sm^{-1}) and the organic carbon content was medium (0.56 %). The status with respect to available nitrogen (313.60 kg ha^{-1}) and phosphorous (40.5 kg ha^{-1}) was medium and low with respect to available potassium (120 kg ha^{-1}). The total normal annual rainfall of the station was 2573.3 mm. The major portion of rain was received during June to September months. The experiment having three replications was laid out in a Randomized Complete Block Design (RCBD) with a net plot size of 3.2 m X 2.6 m. Tunga (IET 13901) was used as experimental material. Three days after transplanting, butachlor (5 % G) 30 kg ha^{-1} at 3 DAT and bensulfuron methyl 0.6 % G @

60 g a.i. ha^{-1} + pretilachlor 6 % G @ 600 g a.i. ha^{-1} was applied by mixing with sand @ 75 kg ha^{-1} and broadcasted. Oxadiargyl (80 % WP) 100 g a.i. ha^{-1} at 3 DAT is sprayed with the help of knapsack sprayer as pre emergence herbicide. Penoxsulum 240 SC @ 22.5 g a.i. ha^{-1}, bispyribac sodium 10 SL @ 20 g a.i. ha^{-1}, 2,4 D (80 % WP) at 2.5 kg ha^{-1} were sprayed as post emergent application at twenty days after transplanting with the help of hand operated knapsack sprayer and ethoxysulfuron 15 WG @ 18.75 g a.i. ha^{-1} applied as post emergence were compared with weedy check in which no weeds were eradicated as well as with manual hand weeding. The quantity of water used in knapsack spray was 500 liters per ha. The sowing of cultivar Tunga (IET -13901) done with a spacing of 20 cm X 10 cm and fertilized with recommended doses of nitrogen, phosphorous and potassium (75:75:90 kg ha^{-1}). Data on growth parameter *viz.*, Plant height, Tillers, No of green leaves, LAI, Total dry matter were recorded at 30, 60, 90 and at harvest. Weed population and weed dry weight are subjected to $\sqrt{x+0.5}$ transformations, by using Fischer method of ANOVA the data was analyzed statistically for the test of significance. The level of significance of F test was 5 per cent. (Gomez and Gomez, 1984) [3].

Table 1: Influence of weed management practices on Plant height (cm), Number of tillers hill^{-1}, Number of green leaves hill^{-1}, Leaf area (cm^2 hill^{-1}), LAI and Total dry matter (g hill^{-1}) in transplanted paddy

Treatment	Plant height	Tillers	No of green leaves	Leaf area	LAI	Total dry matter
T_1:Butachlor 5 % G @ 30 kg ha^{-1} at 3 DAT	92.26	13.36	6.93	203.56	1.02	54.74
T_2:Oxadiargyl 80 % WP @ 100 g a.i. ha^{-1} at 3 DAT	92.52	13.59	7.67	211.48	1.06	55.07
T_3:Ethoxysulfuron 15 % G @ 18.75 g a.i. ha^{-1} at 20 DAT	93.50	15.45	9.61	225.03	1.13	55.43
T_4:Bispyribac-Na 10 % SL @ 20 g a.i. ha^{-1} at 20 DAT	93.68	15.67	10.04	232.61	1.16	55.84
T_5:Penoxsulum 240 SC @ 22.5 g a.i. ha^{-1} at 20 DAT	94.65	16.31	10.71	240.05	1.20	57.16
T_6:Butachlor @ 30 kg ha^{-1} at 3 DAT fb ethoxysulfuron 18.75 g a.i. ha^{-1} at 20 DAT	97.96	17.96	15.66	278.74	1.39	57.49
T_7:Butachlor @ 30 kg ha^{-1} at 3 DAT fb bispyribac-Na @ 20 g a.i. ha^{-1} at 20 DAT	98.50	17.17	16.52	292.67	1.46	58.32
T_8:Butachlor @ 30 kg ha^{-1} at 3 DAT fb penoxsulum @ 22.5 g a.i. ha^{-1}at 20 DAT	99.34	18.62	17.32	303.18	1.52	60.74
T_9: Oxadiargyl @ 100 g a.i. ha^{-1} at 3 DAT fb ethoxysulfuron @ 18.75 g a.i. ha^{-1} at 20 DAT	101.88	19.50	19.29	329.05	1.65	62.45
T_{10}:Oxadiargyl 100 g a.i. ha^{-1} at 3 DAT fb bispyribac-Na @ 20 g a.i. ha^{-1} at 20 DAT	102.09	19.92	19.90	337.18	1.69	63.26
T_{11}:Oxadiargyl @ 100 g a.i. ha^{-1} at 3 DAT fb penoxsulum @ 22.5 g a.i. ha^{-1} at 20 DAT	104.54	21.43	20.05	344.65	1.72	65.13
T_{12}:Bensulfuron methyl 0.6 G @ 60 g a.i. ha^{-1} + pretilachlor 6 % G @ 600 g a.i. ha^{-1} at 3 DAT	101.30	19.39	18.84	322.46	1.61	61.08
T_{13}: Butachlor 30 kg ha^{-1} fb 2,4 D (80 % WP) at 2.5 kg ha^{-1} at 3 weeks after planting.	96.83	17.15	13.96	265.02	1.33	57.84
T_{14}: Hand weeding at 20 and 40 DAT	106.11	21.63	22.01	363.57	1.82	67.51
T_{15}: Unweeded check	86.68	10.06	3.54	171.84	0.86	35.89
S.Em. ±	2.854	0.57	0.952	15.87	0.11	1.75
CD at 5 %	8.267	1.64	2.758	45.98	0.32	5.07

Note: DAT: days after transplanting; a.i.: active ingredient

Result and Discussion

Weed competition with the crop as observed in unweeded control which reduced the growth of paddy crop by lowering growth components *viz.*, plant height, number of tillers, number of leaves, leaf area, leaf area index and dry weight of plant. These results are corroborate with the findings of Rao *et al.* (2008) [6], Deepthi, (2010) [1] in transplanted paddy. Use of herbicides and hand weeding improved the growth components significantly as compared to weedy check which results, less weed density, ample space, light and nutrients for root growth, optimum expansion of leaves, tillers and dry weight of plant in paddy. Grain yield of paddy differed significantly due to different weed management practices. Significantly higher grain yield (4068 kg ha^{-1}) was recorded with oxadiargyl @ 100 g a.i. ha^{-1} at 3 DAT fb penoxsulum @ 22.5 g a.i. ha^{-1} at 20 DAT and oxadiargyl @ 100 g a.i. ha^{-1} at 3 DAT fb bispyribac-Na 10 % SL @ 20 g a.i. ha^{-1} 20 DAT (3907 kg ha) compared to control. The per cent increase in yield of these treatments ranges from 5 to 43 per cent over other herbicide combination. The lowest yield (1821 kg ha^{-1}) was noticed in unweeded control.

The increase in paddy yield is mainly due to application of new herbicide molecule in combination of post and pre-emergence herbicide which reduced weed growth and was responsible for better growth attributes such as more green leaves, number of tillers and higher leaf area and total dry matter. Higher yield components were the consequence of lower weed competition and it resulted in better utilization of nutrients, moisture, light and space by the crop. All these factors attributed to the yield increase. The total dry matter production is a result of cumulative and complementary effect of plant height, number of tillers and number of green leaves. This increased dry matter production was attributed to the increased plant height, number of leaves, tillers and panicles per plant and better translocation of photosynthates from leaves to panicle. This was a consequence of effective weed control, which reduced the competition and increased the availability of resources. Similar results were reported by Prasuna and Rammohan (2015) [5].

Conclusion

It was conclude that application of oxadiargyl 80 % WP @ 100 g a.i. ha^{-1} at 3 DAT fb penoxsulum @ 22.5 g a.i. ha $^{-1}$ at 20 DAT followed by oxadiargyl @ 100 g a.i. ha^{-1} at 3 DAT fb bispyribac-Na 10 % SL @ 20 g a.i. ha^{-1} at 20 DAT were found effective for controlling sedges, grasses and broadleaved weeds as well as improving growth parameters which resulted in increased paddy yield in labour scare area like Kodagu region of Karnataka.

Reference

1. Deepthi KY, Subramanyam D. Performance of pre- and post-emergence herbicides on weed flora and yield of transplanted paddy (*Oryza sativa*). Indian J Weed Sci. 2010; 42(3):229-231.
2. Ganai AM, Ashaq H, Anwar TM. Bio-efficacy of different herbicides in direct seeded paddy (*Oryza sativa*) under temperate Kashmir valley conditions. Indian J Agron. 2014; 59(1):86-90.
3. Gomez KA, Gomez AK. Statistical procedures for Agricultural Research. (2nd Ed.). John Wiley and Sons, New York, 1984, 105-114.

4. Mubeen K, Nadeem MA, Tanveer A, Jhala AJ. Effects of seeding time and weed control methods in direct seeded paddy (*Oryza sativa* L.). The J Anim. Pl. Sci. 2014; 24(2):534-542.
5. Prasuna JG, Rammohan J. Effect of weed management practices on growth and yield attributes of aerobic paddy. J Crop Weed. 2015; 11(1):229-231.
6. Rao AS, Ratnam M, Reddy TY. Weed management in direct seeded semi dry paddy. Indian J Weed Sci. 2008; 40(4):153-156.