Effect of Hherbicidal wWeed mManagement on Yyield Aattributes and Yyield of Kkodo (*Paspalum scrobiculatum* L.)

ABSTRACT

The present experiment was carried out at the Instructional cum Research Farm, Indira Gandhi Krishi Vishwavidyalaya, Raipur, Chhattisgarh during *kKharif* seasons 2021 and 2022. The field experiment was laid out with Indira Kodo 1 variety as test crop in Randomized block design (RBD) with 10 treatment and 3 replications. Results of the experiment revealed that, different weed management practices affected all the yield attributes and yield *viz*., Nnumber of eEar hHead, lLength of eEar hHead (cm), nNumber of sSeeds eEar hHead, Eear hHead wWeight (g), Ttest wWeight (g), Hharvest iIndex (%) and were significantly higher under Pyrazosulfuron ethyl 10 % 20 g/ha (PE) *fb* Chlorimuron ethyl 10 % + Metsulfuron methyl 10 % 4 g/ha (PoE) which was followed by Hand weeding twice at 20 and 40 DAS. All the yield attributes and seed yield were equally highest in both the *kharif* seasons *i.e*. seed and straw yield of kodo (Mean *viz*., 2044 and 4073 kg ha^{-1}) were also found maximum under the treatment Pyrazosulfuron ethyl 10 % 20 g/ha (PE) *fb* Chlorimuron ethyl 10 % + Metsulfuron methyl 10 % 4 g/ha (PoE) which was significantly highest in comparison to the different weed managements treatments.

Key words: Kodo, Chemicals, Yield

INTRODUCTION

Millets are highly nutritious, non-glutinous and non-acid forming foods. Millets are of two types: major millets and minor millets. Major millets are maize, bajra, sorghum, and minor millets are Kkodo, Kkutki, Rragi. Kodo millet (*Paspalum scorbiculatum* L.) is also known as ditch millet. It is grown only in India. The species was domesticated in India some 3000 years ago. The crop is hardy and drought-resistant, and is capable of growing in marginal soils. Kodo is monocot and the seeds are very small and ellipsoidal, being approximately 1.5 mm in width and 2 mm in length; they vary in colour from

being light brown to a dark grey. Kodo millet has a shallow root system which may be ideal for intercropping. The grain is enclosed in hard, corneous, persistent husks (FAO, 1995).

In view of nutrient composition, the grains are now considered as nutrition cereals. Kodo millet contains 66.6g of carbohydrates and 353 kcal per 100g of grain, comparable to other millets. It also contains 1.4% fat and 2.6% minerals. The iron content in Kkodo millet ranges from 25.86ppm to 39.60ppm (Chandel *et al.*, 2014). Among the millets, it has the least amount of phosphorous content. Hegde and Chandra (2005) reported that Kkodo millet had good DPPH quenching capability as it required only 18.5µl for 50% quenching as compared to 0.946µmol/ml of Vitamin C and 0.348 µmol/ml Vitamin E to achieve the same (50% DPPH quenching). Kodo millet flour has a gelatinization temperature range of 13°C (76.6-90°C), which has less resistant to gelatinization (Shinoj *et al.*, 2006) and can be incorporated for baking of bread and cakes, extrusion of cereal-based products, gravy, soup, heat set gel, porridge.

The factors responsible for low yields of Kkodo millet are severe infestation by weeds due to slow initial growth of crops coupled with frequent rains in the rainy season inflict huge yield losses up to an extent of 37 % (Yaduraju, 2006). The yield reduction in Kodo millet would be 55-61 percent, if weeds are not controlled in time (Lekhana *et al.*, 2021). To obtain a profitable yield of Kodo millet, weeds must be controlled. The infestation of weeds is increasing day by day in the Kodo millet growing areas of the state year after year. So to widen the weed control spectrum, it is imperative to use herbicides and their combinations having a different mode of action (Walia *et al.*, 2006). Since Kodo millet is a long-duration crop as compared to other small millets and hence provides great scope for weed control during the early growth stages of the crop. As vegetative growth of the crop is more, pre, as well as post-emergent herbicides, also play a major role in effective control of the weeds. Therefore, present experiment was carried out to find out the appropriate herbicide molecule and hand weeding, weed-free check, and unweeded check are different treatments imposed.

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MATERIALS AND METHODS

The experimental site was located at the Instructional cum Research Farm, College of Agriculture, I.G.K.V. Raipur (C.G.). The experiment was conducted in randomized block design with three replications. The treatments were *viz* T_1**:** Pyrazosulfuron ethyl 10% 20 g/ha (PE), T_2: Chlorimuron ethyl 10% + Metsulfuron methyl 10 % 4 g/ha (PoE), T_3: Metsulfuron methyl 20% 4 g/ha (PoE), T_4: Carfentrazone ethyl 40% 12.5 g / ha. (PoE), T_5: Pyrazosulfuron ethyl 10% 20 g/ha (PE) *fb* Chlorimuron ethyl 10% + Metsulfuronmethyl 10% 4 g/ha (PoE), T_6: Pyrazosulfuron ethyl 10% 20 g/ha (PE) *fb* Metsulfuron methyl 20% 4 g/ha (PoE), T7: Pyrazosulfuron ethyl 10% 20 g/ha (PE) *fb* Carfentrazone 40% 12.5 g/ha. (PoE), T_8**:** Hand weeding twice at 20 and 40 DAS, T_9**:** Green manuring up to 40 DAS and T_{10}**:** Control.

RESULTS AND DISCUSSION

The result of the experiment revealed that, all the yield attributes *viz*., number of ear head, length of ear head (cm), number of seeds ear head, ear head weight (g), test weight (g), grain yield, straw yield and harvest index (%) were significantly higher under (T_5) Pyrazosulfuron ethyl 10 % 20 g/ha (PE) *fb* Chlorimuron ethyl 10 % + Metsulfuron methyl 10 % 4 g/ha (PoE) which was followed by (T_8) hand weeding twice 20 and 40 DAS, (T_{10}) control was recorded lowest during both the years and in mean data. Application of metsulfuron methyl + chlorimuron-ethyl @ 4 g ha^{-1} at 7 DAS followed by hand weeding at 40 DAS resulted in significantly higher yield (2034 kg ha^{-1}) compared to other treatments (Gopinath and Kundu, 2008). Metsulfuron methyl @ 8 g ha^{-1} and metsulfuron methyl + chlorimuron ethyl @ 8 ha^{-1} not only provided higher yield among the treatments but their effectiveness for suppressing mixed flora of weeds was statistically comparable to weed-free condition and two hand weeding treatments (Singh *et al.,* 2012). Higher grain yield was attributed to better control of weeds, lower weed index and higher weed control efficiency throughout the crop growth period, which resulted in better availability of growth factors like light, space, nutrients and moisture to the crop resulting in better crop growth and yield. Similar results were also reported by s (Dhanapal *et al.*, 2015).

Table 1: Number of Eear hHead pPlant^{-1},^{1} length, Length of eEar hHead Ppplant^{-1} (cm), eEar hHead wWeight pPlant^{-1} (g) and number of seeds per ear hHead of kKodo as iInfluenced by dDifferent wWeed mManagement pPractices

	Treatments	Number of eEar Hhead pPlant^{-1}(No.)			Length of Eear hHead Ppplant^{-1} (cm)			Ear Hhead wWeight Ppplant^{-1} (g)			Number of seeds per ear head (No.)		
		2021	2022	Mean	2021	2022	Mean	2021	2022	Mean	2021	2022	Mean
T_1	Pyrazosulfuron ethyl 10% 20 g/ha (PE)	4	5	4	7.11	7.33	1.60	1.50	1.87	1.69	104	119	111
T_2	Chlorimuron ethyl 10% + Metsulfuron methyl 10 % 4 g/ha (PoE)	4	5	4	8.66	8.91	1.58	1.60	1.98	1.79	122	135	128
T_3	Metsulfuron methyl 20 % 4 g/ha (PoE)	5	4	4	8.44	8.81	1.57	1.58	1.94	1.76	120	134	127
T_4	Carfentrazone ethyl 40 % 12.5 g / ha. PoE	5	4	4	8.00	8.52	1.73	1.57	1.90	1.73	119	132	125
T_5	Pyrazosulfuron ethyl 10 % 20 g/ha (PE) *fb* Chlorimuron ethyl 10 % + Metsulfuron methyl 10 % 4 g/ha (PoE)	6	6	6	8.89	9.14	1.67	1.73	2.19	1.96	128	140	134
T_6	Pyrazosulfuron ethyl 10 % 20 g/ha (PE) *fb* Metsulfuron methyl 20% 4 g/ha (PoE)	5	5	5	8.77	9.02	1.65	1.67	1.96	1.81	125	137	131
T_7	Pyrazosulfuron ethyl 10 % 20 g/ha (PE) *fb* Carfentrazone 40% 12.5 g / ha. (PoE)	5	6	5	8.76	8.99	1.70	1.65	1.94	1.79	124	136	130
T_8	Hand weeding twice 20 and 40 DAS	5	6	5	8.88	9.09	1.53	1.70	2.02	1.86	127	139	134
T_9	Green manuring up to 40 DAS	5	4	4	7.33	7.57	1.28	1.53	1.89	1.71	115	129	122
T_{10}	Control	4	4	4	7.00	7.14	**0.11**	1.28	1.69	1.48	88	98	93
	SEm±	**0.32**	**0.35**	**0.34**	**0.35**	**0.40**	**0.33**	**0.11**	**0.08**	**0.10**	**4.02**	**3.90**	**3.96**
	CD (P=0.05)	**0.95**	**1.05**	**1.00**	**1.03**	**1.18**	**1.50**	**0.33**	**0.25**	**0.29**	**11.96**	**11.6**	**11.78**

Table 2: Seed Yyield, sStraw yYield (kg ha^{-1}), hHarvest iIndex (%) and tTest wWeight of kKodo as iInfluenced by dDifferent wWeed mManagement pPractices

	Treatments	Seed Yyield (kg ha^{-1})			Straw Yyield (kg ha^{-1})			Harvest iIndex (%)			Test Wweight (g)		
		2021	2022	Mean	2021	2022	Mean	2021	2022	Mean	2021	2022	Mean
T_1	Pyrazosulfuron ethyl 10% 20 g/ha (PE)	1543	1560	1551	3290	3312	3301	31.92	32.01	31.97	4.10	4.41	4.26
T_2	Chlorimuron ethyl 10% + Metsulfuron methyl 10 % 4 g/ha (PoE)	1651	1675	1663	3732	3781	3757	30.67	30.69	30.68	4.73	5.03	4.88
T_3	Metsulfuron methyl 20 % 4 g/ha (PoE)	1610	1635	1622	3679	3732	3705	30.44	30.46	30.45	4.67	4.94	4.81
T_4	Carfentrazone ethyl 40 % 12.5 g / ha. PoE	1571	1592	1582	3673	3718	3696	29.96	29.98	29.97	4.55	4.82	4.69
T_5	Pyrazosulfuron ethyl 10 % 20 g/ha (PE) *fb* Chlorimuron ethyl 10 % + Metsulfuron methyl 10 % 4 g/ha (PoE)	2022	2065	2044	4037	4108	4073	33.37	33.45	33.41	5.03	5.31	5.17
T_6	Pyrazosulfuron ethyl 10 % 20 g/ha (PE) *fb* Metsulfuron methyl 20% 4 g/ha (PoE)	1846	1875	1860	3968	4022	3995	31.75	31.80	31.77	4.80	5.08	4.94
T_7	Pyrazosulfuron ethyl 10 % 20 g/ha (PE) *fb* Carfentrazone 40% 12.5 g / ha. (PoE)	1662	1688	1675	3873	3921	3897	30.02	30.09	30.06	4.77	5.02	4.89
T_8	Hand weeding twice 20 and 40 DAS	2003	2033	2018	4000	4063	4032	33.36	33.35	33.36	4.90	5.29	5.09
T_9	Green manuring up to 40 DAS	1557	1575	1566	3376	3413	3394	31.56	31.57	31.56	4.35	4.58	4.47
T_{10}	Control	461	469	465	1102	1110	1106	29.48	29.68	29.58	3.70	4.06	3.88
	SEm±	**11.18**	**11.85**	**11.52**	**17.49**	**17.09**	**17.29**	**4.26**	**5.52**	**4.26**	**0.24**	**0.23**	**0.24**
	CD (P=0.05)	**33.21**	**35.21**	**34.21**	**51.97**	**50.77**	**51.37**	**12.67**	**16.39**	**12.67**	**0.70**	**0.69**	**0.70**

CONCLUSION

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