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Influence of Herbicides and Varieties on Growth,Yield and Quality of Paddy(*Oryzasativa*L.)

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ABSTRACT

Present investigation entitled "Influence of herbicides and varieties on growth, yield and quality of Paddy (*Oryza sativa* L.)" has been proposed to execute the field trial at the research farm, Department of Agronomy, AKS University Satna (M.P.). during the *kharif* season of 2020-21. The study consisted of four herbicides H0 – Control, H1 - Butachlor @1kg/ha at 3 DAT, H2 - Pyrazosulfuron ethyl 10% WP @ 150g/ha on 3-4 DAT, H3 - Bispyribac sodium @ 50g/ha, with three variety V1- IR-64, V2 - JR-206, V3 - JR-81. The field experiment was laid out in Randomized Block Design with a factorial concept with three replications. The results revealed that the herbicides, use of H1 (Butachlor @ 1 kg/ha) brought significant improvement in control of weed. It may be concluded that paddy variety (IR-64) brought significantly superior crop growth, yield and quality. Application of herbicide, Butachlor @1kg/ha and variety IR-64 (H1V1) demonstrated a more practical approach in reducing the impact of weeds and promoting improved crop growth with plant height (91.62 cm), number of tillers per plant (15.95), Grain yield (5169 kg/ha). Hence it could be concluded that the application of Butachlor @ 1 kg/ha with IR–64 variety highest could be applicable for Butachlor @ 1 kg/ha are most suitable herbicide for obtaining high rice grain yield and yield profitable strategies.

Keywords – Rice,herbicides, Randomized, nutrition, Butachlor

Introduction

Rice (*Oryza sativa* L.) is the staple food of more than 60 per cent of the World's population, and its cultivation secures a livelihood for more than two billion people. It is the second largest producing cereal crop in the World. It belongs to the family Poaceae and has chromosome number 2n=24; its origin is South East Asia. It is the most critical grain about human nutrition and caloric intake, providing more than one-fifth of the calories consumed worldwide by humans. It contains a low percentage of calcium. The byproducts of rice milling are used for a variety of purposes. Rice bran is used as cattle and poultry feed, and rice hulls can manufacture insulation material, cement, cardboard and litter in poultry

keeping.In India, Rice is grown in an area of 46.38 million hectares with a production of 130.29 million tonnes and an average productivity of 28.09 kg/ha. In Madhya Pradesh, rice is cultivated in an area of 17 lakh hectares with a production of 1710000 tonnes from 2020 to 21.In India, the use of herbicides to control weeds has grown significantly. It looks to be a fast, simple, cost-effective method for controlling weeds in paddy fields[1]. In contrast to other highland grains, paddy rarely receives sufficient weed control from a single dose of a specific herbicide. So, according to[2], both pre- and post-emergence herbicides, when used correctly, were quite successful at controlling weeds in rice fields.Butachlor is a selective herbicide of the acetanilide class. It is used as a pre-emergent herbicide. It is extensively used in India as granules in rice as a post-emergency herbicide. Its have had a minor impact on the chlorophyll content of rice leaves. Pyrazosulfuron Ethyl herbicide is a chemical group of Sulfonylurea. Its mode of action is a pre-emergent, systemic and broad-spectrum herbicide. Bispyribac sodium is a broad–spectrum post-emergent herbicide. That effectively controls primary grasses, sedges and broad-leaf weeds in rice crops.Highyielding varieties developed at the International Rice Research Institute (IRRI) in the 1966s and 1970s. The developed indica cultivar IR64 that IRRI created in the Philippines was available. In addition to its high yield, early maturity and disease resistance, Several beneficial genes have been added to IR64 through backcross breeding. JR 81 JNKVV, Jabalpur JR-81 recommended for flaking purposes. Best sensory qualities attributes of flaked rice. It shows the importance of the herbicide and variety in enhancing the production and productivity of rice. JR 206 (IET 26079) JNKVV, Jabalpur, JR-206, is a paddy breeder seed. It adopted villages under the Farmer First Programme (FFP). Suitable for rainfed and irrigated ecologies, average yield 55.0-60.0 q/ha, long bold grains, maturity 120-122 days, resistant to bunt and blast.

Materials and Methods

The present investigation entitled “influence of herbicides and varieties on growth, yield, and quality in paddy (*Oryza sativa* L.)” was carried out at the research plot, Department of Agronomy, AKS University Satna (M.P.).The field experiment was conducted during the *Kharif* season of 2020- 2021.

Herbicide and their application

Weed management was done as per different weed management treatments. The herbicides were sprayed using a knapsack sprayer with a flat fan nozzle with their respective doses at appropriate stages. The spray volume of the herbicide was calculated on a test-run basis. For this, a known quantity of water was filled in a tank of the knapsack sprayer and then sprayed over a marked area of 100 m^2. After the spray, the remaining water in the spray

tank was measured and deducted from the initial volume of water in the spray tank. Thus, the spray volume of herbicide was calculated and used for the application of herbicide. The spray volume used for spraying herbicides was 600 L ha-1 for pre- and post-emergence herbicides.

Herbicide Procurement

Common name	Trade name	Formulation	Nameofchemical group	Timeofapplication
Bispyribac Sodium	Nominee gold	10%EC	Pyrimidinyl (thiobenzoat)	*Postemergence*
Pyrazosulfuron ethyl	Saathi	10 %WP	Sulfonylurea	*Preemergence,*
Butachlor	Machette	50%EC	Tertiarycarb oxamide	*Postemergence*

Experimental design and statistical analyses

The experiment was laid out in a randomized complete block design with three replications. The data were analysis using Fisher's analysis of variance approach and treatment means were compared using the least significant difference (LSD) test at $p \leq 0.05$. Using Microsoft Excel, regression and correlation studies were performed to determine the link between various variables.

Result

The result shows (Table 1) that the plant height, number of tillers/plant, test weight, number of grain/panicle, grain yield (kg/ha), straw yield (kg/ha) was influenced significantly due to different herbicides and varieties.

Table 1 Effect of herbicides and verities on growth, yield and quality of paddy.

Treatment	Plant height (cm)	Number of tillers/plant	Test weight (g)	Protein content (%)	Grain yield(kg/ha)	Straw yield (kg/ha)
Herbicides (H)						
H_0	71.23	8.55	22.45	7.22	2871	8347
H_1	89.54	14.48	25.07	8.06	5056	8949
H_2	79.07	10.9	23.54	7.47	3975	8604

H_3	82.65	11.7	23.45	7.74	4546	8680
SEm±	0.02	0.007	0.04	0.004	0.004	0.002
C.D	0.05	0.021	0.01	0.012	0.012	0.006
Varieties (V)						
V_1	80.13	11.16	23.86	7.66	4136	8688
V_2	80.88	11.60	23.93	7.61	4123	8601
V_3	80.55	11.46	23.83	7.62	4077	8647
SEm±	0.01	0.006	0.003	0.004	0.003	0.002
C.D	0.03	0.019	0.009	0.010	0.01	0.005
Interaction effect of Herbicides and varieties (H×V)						
H_0V_1	72.46	8.82	22.84	7.29	3054	8416
H_1V_1	91.62	15.95	25.23	8.22	5169	9046
H_2V_1	76.84	10.57	23.21	7.38	3865	8654
H_3V_1	79.61	11.05	24.18	7.66	4456	8635
H_0V_2	69.54	8.32	22.11	7.16	2744	8254
H_1V_2	87.64	12.86	24.95	7.92	4962	8836
H_2V_2	81.68	11.26	23.87	7.56	4116	8597
H_3V_2	84.65	12.2	24.77	7.83	4668	8716
H_0V_3	71.68	8.46	22.39	7.20	2815	8371
H_1V_3	89.36	14.64	25.03	8.05	5036	8964
H_2V_3	78.68	10.88	23.53	7.47	3945	8562
H_3V_3	83.68	11.86	24.39	7.74	4513	8689
SEm±	0.03	0.013	0.006	0.007	0.007	0.004
C.D	0.09	0.037	0.017	0.021	0.020	0.011

HerbicideH_0-Control, **H_1**- Butachlor@1kg/haat3DAT, **H_2** - Pyrazosulfuronethyl10%WP@150g/haon3-4 DAT, **H_3**-Bispyribacsodium@50g/ha.

VarietiesV_1 =IR-64, **V_2**=JR-206, **V_3**=JR-81.

Plant height (cm)

Plant height is the major factor which responsible for growth and development of the plant. Among the herbicides plant height found significant in H_1 (Butachlor@1kg/haat3DAT) 89.54 (cm), followed by H_3 (Bispyribacsodium@50g/ha) 82.65cm. While the minimum value was obtained in H_0 (control) 71.23cm. Whereas the variety V_2 (JR-206) found highest plant

height i.e. 80.88 cm and the minimum plant height recorded in V_1 (IR-64) 80.13 cm.While in the interaction between herbicide and variety found significant results. Among the different treatment combination H_1V_1 (Butachlor @1kg/ha at 3 DAT + JR-64) found highest plant height 91.62 cm, followed by H_1V_3 Butachlor @1kg/ha at 3 DAT + JR-81 i.e. 89.36 cm. while the lowest value obtained in H_0V_2 (Control + JR-206) i.e. 69.54 cm.

Number of tiller/plant

Effect of different herbicides and varieties found significant for number of tiller/plant. Among the herbicide number of tillers/plant found significant in H_1 (Butachlor@1kg/haat3DAT) 14.48. followed by H_3 (Bispyribacsodium@50g/ha)10.9. While the minimum number of tillers/plant was obtained in H_0 (control) 8.53. Whereas the variety V_2 (JR-206) found highest number of tillers/plant i.e. 11.60 and the minimum number of tillers/plant recorded in V_1 (IR-64) 11.16. While in the interaction between herbicides and variety found significant results. Among the different treatment combination H_1V_1 (Butachlor @1kg/ha at 3 DAT + JR-64) found highest number of tillers/plant 15.95, followed by H_1V_3Butachlor @1kg/ha at 3 DAT + JR-81 i.e. 14.64. While the lowest value obtained in H_0V_2 (Control + JR-206) i.e. 8.32.

Test weight

Effect of different herbicides and varieties found significant for test weight (g).Among the herbicide test weight found significant in H_1 (Butachlor@1kg/haat3DAT,) 25.07g, followed by H_3 (Bispyribacsodium@50g/ha) 23.54g. While the minimum test weightwas obtained in H_0 (control) 22.45g. Whereas the variety V_2 (JR-206) found highest test weight i.e. 123.93g and the minimum test weight recorded in V_3 (JR-81) 23.83G. While in the interaction between herbicides and varieties found significant results. Among the different treatment combination H_1V_1 (Butachlor @1kg/ha at 3 DAT + JR-64) found highest test weight 25.23g, followed by H_1V_3 Butachlor @1kg/ha at 3 DAT + JR-81 i.e. 25.03g. While the lowest test weight obtained in H_0V_2 (Control + JR-206) i.e. 22.11g.

Protein content (%)

Effect of different herbicides and varieties found significant for protein content (%) Among the herbicideprotein content (%) found significant in H_1 (Butachlor@1kg/haat3DAT) 8.06%, followed by H_3 (Bispyribacsodium@50g/ha) 7.74%. While the minimum protein content (%) was obtained in H_0 (control) 7.22%. Whereas the variety V_1 (IR-64) found highest protein content (%) i.e. 7.64 and the minimum protein content (%) recorded in V_2 (JR-206) 7.61%. While in the interaction between herbicides and varieties found significant

results. Among the different treatment combination H_1V_1 (Butachlor @1kg/ha at 3 DAT + JR-64) found highest protein content (%) 8.22, followed by H_1V_3 Butachlor @1kg/ha at 3 DAT + JR-81 i.e. 8.05. While the lowest protein content (%) obtained in H_0V_2 (Control + JR-206) i.e. 132.12.

Grain yield (kg/ha)

Effect of different herbicides and varieties found significant for grain yield (kg/ha) Among the herbicidegrain yield (kg/ha) found significant in H_1(Butachlor@1kg/haat3DAT) 5056kg/ha, followed by H_3 (Bispyribacsodium@50g/ha) 4546 kg/ha. While the minimum grain yield (kg/ha)was obtained in H_0 (control) 2871 kg/ha. Whereas the variety V_1 (IR-64) found highest grain yield (kg/ha) i.e. 4136 kg/ha and the minimum grain yield (kg/ha) recorded in V_3 (JR-81) 4077 kg/ha. While in the interaction between herbicides and varieties found significant results. Among the different treatment combination H_1V_1 (Butachlor @1kg/ha at 3 DAT + JR-64) found highest grain yield (kg/ha) 5169 kg/ha, followed by H_1V_3 Butachlor @1kg/ha at 3 DAT + JR-81 i.e. 5036v. While the lowest grain yield obtained in H_0V_2 (Control + JR-206) i.e. 2744 kg/ha.

Straw yield (kg/ha)

Effect of different herbicides and varieties found significant for straw yield (kg/ha). Among the herbicidestraw yield (kg/ha) found significant in H_1 (Butachlor@1kg/haat3DAT) 8949kg/ha, followed by H_3 (Bispyribacsodium@50g/ha) 8680 kg/ha. While the minimum straw yield was obtained in H_0 (control) 8347 kg/ha. Whereas the variety V_1 (IR-64) found highest straw yield (kg/ha) i.e. 8688 kg/ha and the minimum straw yield (kg/ha) recorded in V_3 (JR-81) 8647 kg/ha. While in the interaction between herbicides and varieties found significant results. Among the different treatment combination H_1V_1 (Butachlor @1kg/ha at 3 DAT + JR-64) found highest straw yield (kg/ha) 9046 kg/ha, followed by H_1V_3 Butachlor @1kg/ha at 3 DAT + JR-81 i.e. 8964kg/ha. While the lowest straw yield obtained in H_0V_2 (Control + JR-206) i.e. 8254 kg/ha.

Discussion

This may be because a weed-free environment was established from the beginning to the end of the harvest, resulting in less weed competition and minimal weed-induced nutrient removal. This may have increased the capacity for nutrient uptake and improved the size of the source and sink, all of which increased the yield attributes.[3]has reported similar findings[4]. It could be because there was less competition from weeds in terms of dry matter, which might have produced an overall conducive environment for rice growth and

development. This would have increased the amount of light, moisture, nutrients, and space available to rice plants, assisting in the production of sound grains. pandemon-1. These outcomes are consistent with what[5][6][7][8] and[9]The excellent eradication of weeds may be the cause of this rise in straw output. This is brought on by an increase in the plant's height and number of shoots per unit area as well as the buildup of dry materials. Similar results were also documented[6][10].

Summary and Conclusion

This study shows that the sequential application of Butachlor@1kg/ha and variety IR-64 found highest productivity and profitability with healthy plant growth by suppressing the weed growth. The integration of herbicides and varieties with Butachlor @1kg/ha at 3 DAT + JR-64 may be another option, which besides giving acceptably better yield and weed control and profitability.

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