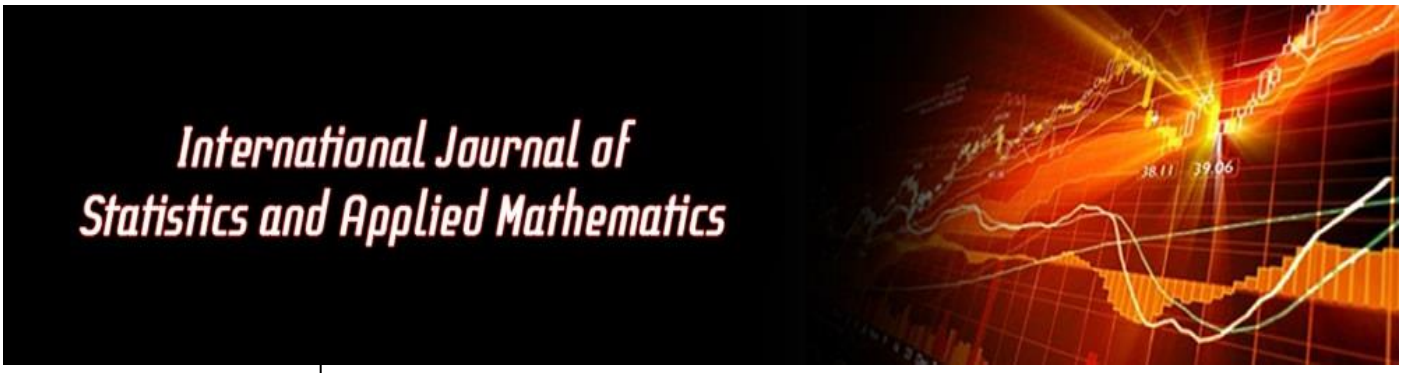

ISSN: 2456-1452
Maths 2023; SP-8(5): 92-94

https://www.mathsjournal.com
Received: 15-07-2023
Accepted: 16-08-2023

Shailesh K Singh
Krishi Vigyan Kendra, Barabanki, A.N.D. University of Agriculture &Technology, Kumarganj, Ayodhya, Uttar Pradesh, India

SK Tomar
Krishi Vigyan Kendra, Gorakhpur, Uttar Pradesh, India

M Kumar
Krishi Vigyan Kendra, Gorakhpur, Uttar Pradesh, India

TS Tomar
J.V. College Baraut, Baghpat, Uttar Pradesh, India

Corresponding Author:
Shailesh K Singh
Krishi Vigyan Kendra, Barabanki, A.N.D. University of Agriculture &Technology, Kumarganj, Ayodhya, Uttar Pradesh, India

Weed management in puddled direct seeded drum seeder sown rice (*Oryza sativa*) with herbicides

Shailesh K Singh, SK Tomar, M Kumar and TS Tomar

Abstract
An on farm trial was conducted during kharif 2018 and 2019 to find out the most promising herbicide combination in puddled direct seeded rice (DSR) sown with drum seeder using sprouted seed. All the doses of herbicides significantly reduced the dry matter production of weeds. The highest grain yield (53.2 q/ha) was obtained with application of pyrazosulfuron @200 g fb application of bispyribac sodium @ 250 ml/ha at 30 days after sowing (DAS). This treatment was significantly superior to other herbicidal treatments. On an average weed population of 955/m^2 was recorded in weedy check plot. Highest weed control efficiency and lowest weed population and weed dry weight was recorded with application of Pyrazosulfuron 10 WP @ 250 g /ha at puddling fb by bispyribac sodium 10 SC at 30 DAS closely followed by pyrazosulfuron @200 g at puddling fb bispyribac sodium @ 250 ml/ha at 30 DAS and pyrazosulfuron @200 g/ha at 3 DAS fb bispyribac sodium @ 250 ml/ha at 30 DAS. Unchecked weed growth reduced the crop yield by 72.1 percent when compared with Pyrazosulfuron 10 WP @ 200 g/ha at puddling fb by bispyribac sodium 10 SC at 30 DAS. This treatment was found most economical too. The second most economical treatment was pyrazosulfuron @200 g at 3 DAS fb bispyribac sodium @ 250 m l/ha at 30 DAS.

Keywords: Pyrazosulfuron, bispyribac, pyrazosulfuron

Introduction
In India rice occupies nearly 43.8 million ha area with production of 177.6 million tonne and productivity of 4057 kg/ha. (FAOSTAT 2021) [2]. Rice is the most important staple food in Asia where more than 90% of the world rice is grown. In India mostly rice is grown increal-cereal system where labour availability during rice transplanting and increasing cost of rice transplanting manually is going out of reach of small and marginal farmers. It was also reported by farmers and several scientist that manually transplanting of rice by hired labour transplant fever no of plants / unit area and deep transplanting in puddled field was also a factor in low yield of rice in transplanted field. A shift in weed populations with changing cultivation practices is thus a predictable consequence of intensification (Mortimer 1990) [5]. Direct-seeding has replaced transplanting in Asia, the annual grasses *Echinochloa colona* and *Leptochloa chinensis* have succeeded the previously dominant *Monochoria vaginalis* and *Ludwigia hyssopifolia* (Ho and Itoh 1991) [4]. Farmers now prefer direct seeding of rice whether it is dry DSR or wet seeding in puddled field through drum seeder or broadcast. Scientist are advocating for DSR in (Dry or wet) for reducing the cost of cultivation, improve the soil physical and biological condition with increase in yield. Wet seeded rice currently gaining pace in India whereas in Malaysia, Thailand, Vietnam, Philippines and Sri Lanka it grown due to shortage of labour (Weerakoon *et al*. 2011) [9]. Of the several reasons for low productivity of puddled seeded rice, inadequate weed control is to be considered as the major one. Yield reduction of DSR due to infestation of weeds ranges 78.5-94.8% (Vaishya and Tomar, 2000; Gopinath *et al*. 2012) [6, 3].

Materials and Methods: A farmers participatory on farm trial was conducted during kharif season of 2018 and 2019 under irrigated condition of 10 farmers field of district Barabanki. It was laid out in randomized block design with 9 treatments (Table-1).

Farmers were treated as replication. The soil was loam to silty loam in texture with pH 8.1 and available N, P and K 222-256, 12.4- 14.4 and 270- 285 kg/ha respectively was ranged. The organic carbon content from 0.2 - 0.36. Sprouted seeds of rice variety NDR 2065 @ 20 kg/ha were used for sowing through drum seeder in puddled field when no standing water in the field. Sowing was completed between 10th June to 20th June during both the years at all ten locations. Herbicide and seed of NDR 2065 was provided by KVK Barabanki. Nitrogen, phosphorus and potash were given @ 150:60:40 kg/ha with zinc sulphate @ 25 kg/ha. The crop was irrigated as per need. Herbicides were applied as per treatment. Weed flora, weed density and weed dry weight were recorded at 60th day stage of the crop in each plot using quadrant of 100 X 100 cm. Weed were counted species wise and removed for recording their biomass. Weed samples were sun dried and later on dried at 70 ^{0}C until constant weight was attained. Yield and yield contributing characters were also recorded during the course of investigation. Weed control efficiency was calculated using weed dry weight data. Data on weeds were subjected to square root transformation ($\sqrt{X+1}$) before statistical analysis.

Results and Discussion

Weeds

In puddled seeded rice, weed flora of unweeded check plots consisted of monocot (39%), sedges (46%) and dicot (15%). The prominent weeds of on farm trial at all 10 location were *Echinochloa colonum* (L), *Echinochloa crus-galli* L., *Leptochloa chinensis* (L.) Nees, *Diplachne fusca*, *Dactyloctenium aegyptium*, *Cyperus species*, *Paspalum distichum Eleusine indica* (L.) Gaertn, *Eragrostis japonica* (Thumb.) Trin. *Eragrostis pilosa* (L.) Beauv. *Fimbristylis* spp., *Celosia argentea*, *Eclypta alba* and *Cynodon dactylon* (L.).

All the herbicides used at varying rates reduced the weed density per unit area than weed check. Among the herbicides application of Pyrazosulfuron 10 WP @ 250 g/at puddling fb by bispyribac sodium 10 SC at 30 DAS provided significantly lowest weed density compared with rest of the herbicides. The data of weed dry weight (Table-1) showed that all herbicides significantly reduced the weed dry weight compared with un weeded check. Among the herbicides and their dose Pyrazosulfuron 10 WP @ 250 g/at puddling fb by bispyribac sodium 10 SC at 30 DAS was found most promising in reducing the weed dry weight and showed higher weed control efficiency compared with rest of the herbicides. Singh *et al*. (2018) also reported considerable reduction in weed dry weight due to application of herbicides. Similarly Pyrazosulfuron 10 WP @ 200 g/ha at puddling fb by bispyribac sodium 10 SC at 30 DAS @ 250 ml/ha and Pyrazosulfuron 10 WP @ 200 g/ha at 3 DAS fb bispyribac sodium 10 SC at 30 DAS @ 250 ml/ ha being at par recorded significantly lower weed population and, dry weight and weed control efficiency than rest of the herbicidal treatments. Application of penoxulam + cyhalofop butyl fb bispyribac sodium 10 SC at 30 DAS @ 250 ml/ ha recorded least effective in reduction the weed population and weed dry weight and weed control efficiency (82.24%). This could be attributed to the fact that herbicide with different dose, time and mode of action when applied in proper combination effectively control the weeds. The highest weed control efficiency of 95.5% was recorded with Pyrazosulfuron 10 WP @ 250 g/ha at puddling fb by bispyribac sodium 10 SC at 30 DAS followed by Pyrazosulfuron 10 WP @ 200 g/at puddling fb by bispyribac sodium 10 SC at 30 DAS (92.71%) and Pyrazosulfuron 10 WP @ 200 g/3 DAS fb by bispyribac sodium 10 SC at 30 DAS (92.71%) (91.46%). The differential behavior of herbicide could be attributed to their differential reaction to weed species.

Crop

Considerable variation in grain yield and yield attributes due to various treatments were noted. All the herbicidal treatments significantly enhanced the the grain yield compared with un weeded check plot. The average data indicated that the application of Pyrazosulfuron 10 WP @ 200 g/at puddling fb by bispyribac sodium 10 SC at 30 DAS recorded the highest grain yield which was significantly superior to rest of the herbicides. Application of Pyrazosulfuron 10 WP @ 200 g/3DAS fb by bispyribac sodium 10 SC at 30 DAS at par with Pyrazosulfuron 10 WP @ 150 g/at puddling fb by bispyribac sodium 10 SC at 30 DAS recorded higher grain yield than the treatment recorded highest WCE ie Pyrazosulfuron 10 WP @ 250 g / at puddling fb by bispyribac sodium 10 SC at 30 DAS. It might be due to some adverse effect of higher dose of Pyrozosuphuron at puddling which reflect in to less fertile tillers and no of grain and grain yield though it gave higher yield and yield attribues than Butachlore 50 EC fb bispyribac sodium 10 SC, Penoxsulam 1.02% + cyhalofop-butyl 5.1% fb bispyribac sodium 10 SC and Triafamone 20% + Ethoxisulfuron 10% WG fb bispyribac sodium 10 SC. This may be due to the effectiveness of the chemicals in controlling the weeds, as is evident from higher weed control efficiency, higher number of fertile tillers, Panicle length, no of filled grains /panicle and test weight. Singh *et al*. (2018) emphasized the need for adoption of proper dose of herbicides and time of application for weed control in puddled direct seeded rice sown with drum seeder using sprouted seeds for higher grain yield during rainy season.

Economics

Applicatin of Pyrazosulfuron 10 WP @ 200 g/at puddling fb by bispyribac sodium 10 SC at 30 DAS provided the highest net income of Rs. 1.44/rupee investment followed by Pyrazosulfuron 10 WP @ 200 g/3 DAS fb by bispyribac sodium 10 SC at 30 DAS (1.35), Pyrazosulfuron 10 WP @ 150 g at at puddling fb bispyribac sodium 10 SC (1.27) and Pyrazosulfuron 10 WP 250 g/ha fb bispyribac sodium 10 SC (1.26) (Table 2)

Based on the study conducted for two years it may be concluded that weeds in puddled direct seeded rice in irrigated condition may be effectively controlled through application of Pyrazosulfuron 10 WP @ 200 g/at puddling fb by bispyribac sodium 10 SC at 30 DAS with highest net return.

Table 1: Effect of herbicides on yield and yield contributing characters and economics of puddled DSR sown with drum seeder using sprouted seeds

Teatment	Dose	Time of application (DAS)	Weed population (/m2)			Weed dry weight (g/m2)			Weed control efficiency (%)
			2018	2019	Mean	2018	2019	Mean	
Butachlore 50 EC fb bispyribac sodium 10 SC	3.0 litre + 250 m/ha	6 & 30	10 (99)	11.44 (130)	10.7 (114)	85.43	97.32	91.37	85.39
Pretilachlore 50 EC +fb bispyribac sodium 10 SC	1.5 litre +250 ml/ha	4 & 30	9.43 (88)	10.63 (112)	10 (100)	76.23	89.74	82.98	88.07
Pyrozosulphuron 10 WP +fb bispyribac sodium 10 SC	150 g +250 ml/ha	At puddling & 30	8.18 (66)	9.11 (82)	8.66 (740	53.66	62.97	58.31	90.67
Pyrozosulphuron 10 WP +fb bispyribac sodium 10 SC	200 g +250 ml/ha	At puddling & 30	6.92 (48)	7.61 (57)	7.26 (52)	35.43	55.32	45.37	92.71
Pyrozosulphuron 10 WP +fb bispyribac sodium 10 SC	250 g/+250 ml/ha	At puddling & 30	5.47 (29)	5.83 (33)	5.65 (31)	26.32	29.84	28.08	95.5
Pyrozosulphuron 10 WP +fb bispyribac sodium 10 SC	200 g/ha +250 ml/ha	3 & 30	7.87 (62)	7.61 (57)	7.74 (39.5)	49.13	57.63	53.38	91.46
Penoxsulam 1.02% + cyhalofop-butyl 5.1% fb bispyribac sodium 10 SC	2000 g/ha +250 ml/ha	15 & 30	12.92 (166)	13.52 (182)	13.22 (174)	126.23	120.56	123.39	80.24
Triafamone 20% + Ethoxisulfuron 10% WG fb bispyribac sodium 10 SC	225 ml/ha +250 ml/ha	15 &30	13.52 (182)	12.80 (163)	13.17 (172.5)	114.52	108.3	111.41	82.17
Unweeded check			30.51 (930)	31.32 (980)	955	619.23	630.63	624.93	
CD (P=0.05)			1.2	1.31		4.42	5.39		

Table 2: Effect of herbicides on yield and yield contributing characters and economics of puddled DSR sown with drum seeder using sprouted seeds (mean of two years)

Teatment	Dose	Time of application (DAS)	Panicles (/m^2)	Length of panicle (Cm)	Field grains/panicle (no.)	Test weight (g)	Grain yield (q/ha)	Net income/Re investment (Rs/)
Butachlore 50 EC fb bispyribac sodium 10 SC	3.0 litre + 250 m/ha	6 & 30	339	20.5	131	20.8	42.6	0.72
Pretilachlore 50 EC fb bispyribac sodium 10 SC	1.5 litre +250 ml/ha	4 & 30	348	21	144	22.2	46.2	1.2
Pyrozosulphuron 10 WP fb bispyribac sodium 10 SC	150g +250 ml/ha	At puddling & 30	370	23.9	146	23.4	49.4	1.27
Pyrozosulphuron 10 WP fb bispyribac sodium 10 SC	200 g +250 ml/ha	At puddling & 30	410	24.6	163	24.3	53.3	1.44
Pyrozosulphuron 10 WP fb bispyribac sodium 10 SC	250g/+250 ml/ha	At puddling & 30	366	23.4	139	23.6	46.4	1.26
Pyrozosulphuron 10 WP fb bispyribac sodium 10 SC	200 g/ha +250 ml/ha	3 & 30	375	22.6	149	23.8	50.1	1.35
Penoxsulam 1.02% + cyhalofop-butyl 5.1% fb bispyribac sodium 10 SC	2000 g/ha +250 ml/ha	15 & 30	311	20.7	128	22.4	42.9	0.85
Triafamone 20% + Ethoxisulfuron 10% WG fb bispyribac sodium 10 SC	225 ml/ha +250 ml/ha	15 &30	286	20.1	130	22.7	41.7	0.63
Unweeded check			123	0.8	112	19.6	30.9	0.33
CD (p=0.05)			23	0.8	7.2	0.6	3.1	

References

1. Chauhan BS, Opeña J. Effect of tillage systems and herbicides on weed emergence, weed growth, and grain yield in dry-seeded rice systems. Field Crops Res 2012;137:56-69.
2. FAOSTAT Food and Agriculture Data. Food and Agriculture Organization of the United Nations, Rome; c2021.
3. Gopinath KA, Mina BL, Singh KP, Nataraja KC. Integrated weed management in direct seeded rainfed rice (*Oryza sativa*). Indian Journal of Agronomy. 2012;57(3):245-249.
4. Ho NK, Itoh K. Changes in weed flora and their distribution in the Muda area. 8th MADA/TARC, Quarterly Meeting, 3 November 1991, Alor Setar, Malaysia; c1991.
5. Mortimer AM. The biology of weeds, In: Weed Control Handbook: Principles. (Eds. Hance RJ, Holly K.). 8th Edition. Blackwell Scientific Publications, Oxford; c1990. p. 1-42.
6. Vaishya RD, Tomar SK. Weed control in puddled seeded rice (*Oryza sativa*) with herbicides. Indian Journal of Agronomy. 2000;45(2):334-337.
7. Singh AK, Tomar SK, Singh DP. Bio- efficacy of herbicides and their mixture on weeds and yield of rice (*Oryza sativa*) under rice-wheat cropping system. Indian Journal of Agronomy. 2018;63(2):204-208.
8. Singh VP, Singh SP, Dhyani VC, Banga A, Kumar K, Satawali, *et al*. Weed management in direct-seeded rice. Indian Journal of Weed Science. 2016;48(3):233-246.
9. Weerakoon WM, Mutunayake MM, Bandara C, Rao AN, Bhandari DC, Ladha JK, *et al*. Direct-seeded rice culture in Sri Lanka: lessons from farmers. Field Crops Research. 2011 Feb 28;121(1):53-63.