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Research Article

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Effect of Forchlorfenuron on Yield and Economics of Transplanted Rice

Vikash Singh*, Kamal Kishore Agrawal, Amit Kumar Jha and Muni Pratap Sahu

Department of Agronomy, College of Agriculture

Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur, Madhya Pradesh -482004

*Corresponding Author E-mail: vikashsingh5695@gmail.com

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ABSTRACT

The field experiment was carried out at Krishi Nagar Farm, Department of Agronomy, Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur (M.P.) during kharif 2018 on effect of forchlorfenuron on yield and economics of transplanted rice. Eight forchlorfenuron treatments comprised different doses of forchlorfenuron were applied at panicle initiation (PI) stage through foliar spray @ 520, 1040, 1560, 2080, 2600, 3120, 3640 g ha^{-1} and untreated control plot (No foliar spray).The experiment was laid out in randomized block design with thrice replication. The experimental results revealed that maximum grain yield (4745 kg ha^{-1}), straw yield (7290 kg ha^{-1}), gross monetary returns (97621 Rs. ha^{-1}) and net monetary returns (52300 Rs. ha^{-1}) were recorded under application of forchlorfenuron @ 3640 g ha^{-1} as compared to rest of the treatments.

Keywords: *Rice, Yield, Economics and Forchlorfenuron.*

INTRODUCTION

Rice (*Oryza sativa* L.) plant belonging to the family of *Poaceae* (*Gramineae*). It is the most important staple food in Asia, providing average 32% of total calorie uptake (Kumhar et al., 2016a, Kumhar et al., 2016b & Kumhar et al., 2018). Rice production has pivotal role in our national economy. There is always a growing demand for rice in India due to burgeoning population (*Kewat* et al., 2002). Globally rice is grown in over 160 mha producing about 478 MT of grains annually (Anonymous, 2016). In India rice grown nearly 43.19 mha area with the production of 109.70 MT and triggering productivity of 2550 kg ha^{-1}. (Anonymous, 2017).

The role of plant growth regulators (promoters, retardants and inhibitors) in various physiological and biological processes in plants is well known which enables a rapid change in phenotype of the plant. Plant growth regulators play a vital roles in coordination of many growth and behavioral processes in rice, which regulate the amount, type and direction of plant growth (Rajendra & Jones Jonathan 2009; Anjum et al., 2011). Similarly, Choi et al., (2010) stated that application of PGR increased paddy yield. Whereas, Reddy et al., (2009) reported that application of NAA increased yield components and yieldof rice.

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In the recent time, new molecules size CPPU {N-(2-chloro-4-pyridinyl)-N-phenylurea} from cytokines category is being evaluated for number of field crops and fruit crops (Singh, 2019). CPPU (forchlorfenuron) is a synthetic cytokinin-active phenylurea with a physiologic activity and It induces callus formation, promotes shoot regeneration, provokes seed germination, promotes fruit expansion, retards leaf senescence, etc. Forchlorfenuron and its derivatives are also known as cytokinin oxidase/ dehydrogenase inhibitors (Kopecny et al., 2010). Looking to feat as above the present study was under takes.

MATERIALS AND METHODS

The field experiment was conducted during *Kharif* season 2018 at Krishi Nagar Farm, Department of Agronomy, JNKVV Jabalpur, Madhya Pradesh. Eight forchlorfenuron treatments comprised of different doses were applied at PI stage through foliar spray @ 520, 1040, 1560, 2080, 2600, 3120, 3640 g ha^{-1} and untreated control plot (No foliar spray). The experiment was laid out in randomized block design with thrice replication. The soil of the experimental area was sandy clay loam in texture, neutral in soil reaction (pH 6.7), medium in organic carbon content (0.60 %), normal in electrical conductivity (0.30 dS m^{-1}), medium in available N (281.43 kg ha^{-1}), available P (20.35 kg ha^{-1}) and medium in available K (272.12 kg ha^{-1}).The total rainfall received was 1092.10 mm in 45 rainy days.

The rice variety '*Kranti'* was transplanted in the experimental field. Seedlings of rice were raised in nursery on 18 June 2018 and 30 days old seedling transplanted in main field manually on 18 July 2018 after its thorough puddling and leveling. Healthy seedling (two seedling $hill^{-1}$) was transplanted at the planting geometry of 20 cm x 20 cm in all the plots and recommended nutrient dose of 120:60:40 N, P_20_5, K_20 kg ha^{-1} were applied uniformly through urea, single super phosphate and muriate of potash, respectively. Out of this, half of N and entire dose of P_20_5 and K_20 were applied at the time of transplanting and the remaining quantity of N was applied in two equal splits, one at tillering and another at panicle initiation (PI) stage. Two hand weeding at 20 and 40 DAT were done to keep the field free from weed infestation. A package and practices were adopted as recommended by JNKVV, Jabalpur.

RESULTS AND DISCUSSION

Effect of forchlorfenuron on yield of rice

The data of *kharif* season 2018 pertaining to yield (kg ha^{-1}) and economics (Rs. ha^{-1}) as influenced by different doses of forchlorfenuron treatments is presented in Table 1.

Application of different doses of forchlorfenuron treatments brought marked increase in the grain and straw yield of rice over control plots during the year of experimentation. Significant increase in grain yield was noted as compared to control. Among the forchlorfenuron treatments, highest grain yield was recorded under application of forchlorfenuron @ 3640 g ha^{-1} (4745 kg ha^{-1}) and it was at par with forchlorfenuron @ 3120 g ha^{-1} (4553 kg ha^{-1}). Forchlorfenuron spray had also significant effect on straw yield of rice. The highest straw yield was obtained under treatments with application of forchlorfenuron @ 3640 g ha^{-1} (7290 kg ha^{-1}) which was at par with forchlorfenuron @ 3120 g ha^{-1} (7140 kg ha^{-1}). Gurmani et al. (2006) reported an increased paddy yield with application of plant growth regulator, while comparing different plant growth regulators (ABA, BA and CCC) and their effects on yield and yield attributing characters. The finding is also similar with Pandey et al. (2001), whom reported that IAA @ 50 ppm produced significantly maximum grain yield $hill^{-1}$, 1000-grain weight and yield kg ha^{-1}.

Effect of forchlorfenuron on economics of rice

Data given in Table 1 indicated that effectiveness of any production system is ultimately evaluated on the basis of its economics. Economic analysis is the basic consideration in determining that which treatment gives the highest return. All

forchlorfenuron treatments gave higher net benefit over control. Economic analysis promised that maximum net return of (Rs. 52300 ha^{-1}) and gross monetary return (Rs. 97621ha^{-1}) were obtained from application of forchlorfenuron @ 3640 g ha^{-1}. The lowest gross monetary return (Rs. 64822 ha^{-1}), net return (Rs. 32241 ha^{-1}) and B:C ration (1.99) was observed with untreated control plot. Tiwari et al. (2011) revealed that the application of GA_3 45 g + Urea 10 g + Boric acid 2 g + $ZnSO_4$ 2 g + K_2PO_4 2 g ha^{-1} gave the best effects as compared to all other treatments, combinations for most of the characters and used as substitute of GA_3, to achieve higher seed yield of rice with maximum economic return.

Table 1. Effect of different doses of forchlorfenuronon grain, straw yield and economics of rice

Treatments	Grain yield (kg ha^{-1})	Straw yield (kg $ha^{-1)}$	Cost of cultivation (Rs. ha^{-1})	Gross return (Rs. ha^{-1})	Net return (Rs. ha^{-1})	B:C ratio
T_1 - Untreated control	3080	5460	32581	64822	32241	1.99
T_2 - Forchlorfenuron 520 g ha^{-1}at PI stage	3590	6083	34401	74987	40586	2.18
T_3 - Forchlorfenuron 1040 gha^{-1} at PI stage	3631	6140	36221	75846	39625	2.09
T_4- Forchlorfenuron 1560 gha^{-1} at PI stage	3909	6241	38041	80883	42842	2.13
T_5 - Forchlorfenuron 2080 g ha^{-1} at PI stage	4040	6293	39861	83287	43426	2.09
T_6 - Forchlorfenuron 2600 gha^{-1} at PI stage	4343	6743	41681	89488	47807	2.15
T_7 - Forchlorfenuron 3120 gha^{-1} at PI stage	4553	7140	43501	93955	50454	2.16
T_8- Forchlorfenuron 3640 gha^{-1} at PI stage	4745	7290	45321	97621	52300	2.15
SEm±	90	79	--	--	--	--
CD(P=0.05)	274	240	--	--	--	--

CONCLUSION

On the basis of findings of present investigation, it can be concluded that application of forchlorfenuron @ 3640 g ha^{-1} found more remunerative followed by forchlorfenuron @ 3120 g ha^{-1} as both received higher values of NMR (Rs 52300 and 50454 ha^{-1}) and higher B:C ratio (2.18) under forchlorfenuron applied @ 520 g ha^{-1}. B:C ratio may be due to higher cost of forchlorfenuron in higher dose.

REFERENCES

Anjum, S.A., Wang, L.C., Farooq, M., Hussain, M., Xue, L.L., & Zou, C.M. (2011). Brassinolide application improves the drought tolerance in maize through modulation of enzymatic antioxidants and leaf gas exchange. *JournalAgron Crop Science 197*, 177–185

Anonymous. (2016). Rice Yearbook. United States Department of Agriculture Economic Research Service, *Washington DC.*

Anonymous. (2017). Directorate of Economics and Statistics, Department of Agriculture and Co-operation, Govt. of India, New Delhi. 86-88.

Choi, J.H., Abe, N., Tanaka, H., Fushimi, K., Nishina, Y., Morita, A., Kiriiwa, Y., Motohashi, R., Hashizume, D., Koshino, H., & Kawagishi, H. (2010). Plant-growth regulator, imidazole-4-carboxamide, produced by the fairy ring forming fungus Lepistasordida. *JournalAgric Food Chemestry, 58*(18), 9956-9959.

Gurmani, A.R., Banno, A., & Saleem, M. (2006). Effect of growth regulator on growth, yield and ion accumulation of rice. *Pak. Journal Bot. 38*(5), 1415-1424.

Kewat, M.L., Agrawal, S.B., Agrawal, K.K., & Sharma, R.S. (2002). Effect of Divergent Plant Spacings and Age of Seedlings on Yield and Economics of

Hybrid Rice (*Oryza sativa*).*Indian Journal of Agronomy*, *47*(3).

Kopecny, D., Briozzo, P., Popelkova, H., Sebela, M., Koncitíkova, R., Spichal, L., Nisler, J., Madzak, C., Frebort, I., Laloue, M.,& Houba- Herin, N. (2010). Phenyl-and benzylureacytokinins as competitive inhibitors of cytokinin oxidase/dehydrogenase: a structural study. *Biochimie 92*, 1052–62

Kumhar, B.L., Ameta, H.K., & Rewar, S.K. (2016b). Direct seeded rice is a reduce input of rice production in India- A Review. *Journal Progressive Agri*. *7*(1), 17-19.

Kumhar, B.L., Chavan, V.G., & Tilekar, R.N. (2016a). Economic analysis, drymatter accumulation and uptake of NPK of different rice establishment methods different varieties. *Res. JournalAgril. Sciences 7*(3), 617-621.

Kumhar, B.L., Chavan, V.G., Agrawal, K.K., Jha, A.K., & Kumar, V. (2018). Study of different rice establishment methods on growth and yield of different varieties. *Bhartiya Krishi Anushandhan Patrika*, *33*(4), 283-286.

Pandey, A.K., Tripathi, R.S., & Yadav, R.S. (2001). Effect of certain growth regulators on growth, yield and quality of rice (*Oryza sativa* L.). *Indian Journal Agric. Research 35*(2), 118-120.

Rajendra B and Jones Jonathan DG 2009. Role of plant hormones in plant defence responses. *Plant MolBiol* 69, 473–488

Reddy, N.M., Keshavulu, K., Durga, K.K., Ankaiah, R., & Adrana, K. (2009). Effect of nutrientsalternate to GA3 on yield and quality in hybrid rice seed production. *Journal Research Crops*., *10*(3), 718-722.

Singh, V. (2019). Growth and yield of transplanted rice as influenced by Forchlorfenuron (0.12% EC w/w). M.Sc (Agri.) Thesis,Jawaharlal Nehru Krishi VishwaVidyalaya, Jabalpur.

Tiwari, D.K., Pandey, P., Giri, S.P., & Dwivedi, J.L. (2011). Effect of GA3 and Other Plant Growth Regulators on Hybrid Rice Seed Production. *Asian journal of plantsciences*, *10* (2), 133-139.