

## EFFECT ON PRODUCTION AND PROFITABILITY OF HYBRID RICE (*ORYZA SATIVA* L.) THROUGH NUTRIENT MANAGEMENT PRACTICES

Kishan Singh, D.K. Gupta\*, V.K. Singh, A.K. Paliwal and N. Chouksey

Raj Mohini Devi College of Agriculture and Research Station, Ambikapur (C.G.), India

Email: gupta\_dinesh11@yahoo.co.in

Received-03.01.2020, Revised-25.01.2020

**Abstract:** The field experiment was conducted at Research-cum-instructional farm of Raj Mohini Devi College of Agriculture and Research Station, Ajirma, Ambikapur, Chhattisgarh during *kharif* 2018 to study the effect of “Effect on production and profitability of hybrid rice (*Oryza sativa* L.) through nutrient management practices”. The experiment was laid out with 02 hybrid rice varieties as main plot (V<sub>1</sub>: IRH-103, V<sub>2</sub>: IRH-111.) and 05 nutrient management practices as sub plot T<sub>1</sub>- 100% RDF (Standard check), T<sub>2</sub>- 75% RDF through inorganic and organic {Topdressing of (Vermicompost @2q/ha+ DAP@ 25kg/ha) at 25-30 DAT and remaining NPK through inorganic}, T<sub>3</sub>- 100% RDF through inorganic and organic {Topdressing of (vermicompost @2q/ha+ DAP@ 25 kg/ha) at 25-30 DAT and remaining NPK through inorganic}, T<sub>4</sub>- 150% RDF through inorganic and organic {Topdressing of (Vermicompost @2q/ha+ DAP@ 25 kg/ha) at 25-30 DAT and remaining NPK through inorganic}, T<sub>5</sub>- 150% RDF in split plot design with four replications. The result revealed that hybrid rice variety IRH-103 on significantly higher grain yield (67.98q/ha), HI% (48.26 %) and test weight (24.21g) comprised to IRH-111. Among the nutrient management practices were significantly higher grain yield (65.11 q/ha), HI% (44.23 %) and test weight (24.46 g) on 150% RDF through inorganic and organic {Topdressing of (Vermicompost @2q/ha+ DAP@ 25 kg/ha) at 25-30 DAT and remaining NPK through inorganic} and statistically at par with 150% RDF through inorganic. In case of monetary higher gross return (184697.76₹/ha), net return (138771.78₹/ha) and B: C ratio (3.02) were also observed in hybrid rice variety IRH-103 than IRH-111 and nutrient management practices application of 150% RDF through inorganic and organic {Topdressing of (Vermicompost @2q/ha+ DAP@ 25 kg/ha) at 25-30 DAT and remaining NPK through inorganic} recorded significantly higher gross return (177034.36₹/ha), net return (129526.86₹/ha) and B: C ratio (2.73) and which was on par with 150% RDF through inorganic.

**Keywords:** Hybrid, Nutrient, Management practices, Rice

### INTRODUCTION

Rice (*Oryza sativa* L.) is one of the major important cereal food grain crops of India in terms of area, production and consumer demand. India is the 2<sup>nd</sup> largest producer and consumer of rice in the world. Rice occupies the largest cropped area of 43.90 million ha with annual production of 104.8 metric tonnes and productivity of 2.39 t ha<sup>-1</sup> (Economic Survey India, 2016). Chhattisgarh is an important rice growing state in eastern part of India. In Chhattisgarh state rice occupies major area of 3.74 million ha out of 5.9 million ha area with productivity of 22.12 q/ha. (Anonymous, 2018). In Chhattisgarh first hybrid variety Indira Sona developed by IGKV in 2006. The current new approaches such as new plant type, hybrid rice and molecular biotechnology techniques only hybrid rice seems to be better and viable approach because it gives the minimum 10-15% yield advantage to the best cultivated variety.

### MATERIALS AND METHODS

The field experiment was conducted during *kharif* 2018 at Research-cum-instructional farm of Raj Mohini Devi College of Agriculture and Research Station, Ajirma, Ambikapur, Chhattisgarh. Geographically, Ambikapur is situated in the north of Chhattisgarh. The climate of Surguja region is of sub-

humid with hot and dry summer and cold winter. The average annual rainfall is about 1356 mm. The soil of experimental field was “*Inceptisols*”, slightly acidic (5.7) in nature and medium in fertility status having low N, medium P<sub>2</sub>O<sub>5</sub> and high K<sub>2</sub>O. The experiment was laid out in split plot design with four replications with 02 hybrid rice varieties as main plot (V<sub>1</sub>: IRH-103, V<sub>2</sub>: IRH-111.) and 05 nutrient management practices as sub plot (T<sub>1</sub>- 100% RDF (Standard check), T<sub>2</sub>- 75% RDF through inorganic and organic {Topdressing of (Vermicompost @2q/ha+DAP@ 25kg/ha) at 25-30 DAT and remaining NPK through inorganic}, T<sub>3</sub>- 100% RDF through inorganic and organic {Topdressing of (vermicompost @2q/ha+ DAP@ 25 kg/ha) at 25-30 DAT and remaining NPK through inorganic}, T<sub>4</sub>- 150% RDF through inorganic and organic {Topdressing of (Vermicompost @2q/ha+ DAP@ 25 kg/ha) at 25-30 DAT and remaining NPK through inorganic}, T<sub>5</sub>- 150% RDF through inorganic).

### RESULTS AND DISCUSSION

Yield attributes as well as grain yield of hybrid rice variety was significantly influenced by integrated nutrient management sources (Table 1). The data concluded to the grain yield of hybrid rice variety IRH-103 was recorded significantly the highest grain yield (67.98 q ha<sup>-1</sup>) and this was 11% higher grain yield as compare to IRH-111 (54.88 q ha<sup>-1</sup>).

\*Corresponding Author

A critical perusal of data revealed that the highest grain yield of 65.11 q ha<sup>-1</sup> was achieved with application of 150% recommended dose of fertilizer through organic and inorganic, which remained statistically at par with 150% RDF through inorganic (63.17 q ha<sup>-1</sup> which was 6% higher than 100% RDF through inorganic) . Next in order of grain yield

performance was 100% recommended dose of fertilizer through organic and inorganic (60.29 q ha<sup>-1</sup>) followed by 100% RDF through inorganic-standard check (59.48 q ha<sup>-1</sup>) and 75% RDF through inorganic and organic sources of nutrient (59.12 q ha<sup>-1</sup>).

**Table 1.** Effect of nutrient management practices and hybrid rice varieties on Bundle weight (q ha<sup>-1</sup>), grain yield (q ha<sup>-1</sup>) and straw yield (q ha<sup>-1</sup>).

Treatment	Bundle weight (q ha <sup>-1</sup> )	Grain yield (q ha <sup>-1</sup> )	Straw yield (q ha <sup>-1</sup> )
<b>Main plot-Variety (2)</b>			
V1- IRH-103	141.73	67.98	73.75
V2-IRH-111	140.73	54.88	86.25
<b>SE(m)</b>	<b>2.77</b>	<b>0.96</b>	<b>1.96</b>
<b>C.D.5%</b>	<b>N.S.</b>	<b>4.28</b>	<b>8.78</b>
<b>Sub plot-Nutrient management practices (5)</b>			
T <sub>1</sub> - 100% RDF (Standard check)	139.17	59.48	79.69
T <sub>2</sub> - 75% RDF through inorganic and organic (Topdressing of {Vermicompost @2q/ha+ DAP@ 25kg/ha} at 25-30 DAT and remaining NPK through inorganic)	137.40	59.12	78.28
T <sub>3</sub> - 100% RDF through inorganic and organic (Topdressing of {vermicompost @2q/ha+ DAP@ 25 kg/ha} at 25-30 DAT and remaining NPK through inorganic)	139.27	60.29	78.98
T <sub>4</sub> - 150% RDF through inorganic and organic (Topdressing of {Vermicompost @2q/ha+ DAP@ 25 kg/ha} at 25-30 DAT and remaining NPK through inorganic)	146.93	65.11	82.82
T <sub>5</sub> - 150% RDF through inorganic	143.40	63.17	80.23
<b>SE(m)</b>	<b>2.80</b>	<b>0.97</b>	<b>1.00</b>
<b>C.D.5%</b>	<b>8.44</b>	<b>2.83</b>	<b>3.03</b>

Hybrid rice variety with nutrient management practices also influenced the grain yield with application of 150% RDF through inorganic and organic with variety IRH-103 resulted in significantly higher grain yield (72.08 q ha<sup>-1</sup>) than other combinations. However, the lowest grain yield (52.71 q ha<sup>-1</sup>) was associated with application of 100 % RDF through inorganic (T<sub>1</sub>) and 75 % RDF through inorganic and organic (T<sub>2</sub>) with variety IRH-111(53.13 q ha<sup>-1</sup>) .

Better performance of combined use of organic manures with chemical fertilizers might be due to synergistic effect of inorganic fertilizer and organic manures, as well as the slow release of nutrients throughout the crop growth, thus helping to form more photosynthesis and translocation the same from source to sink and also the immediate release of N and improved soil physical properties due to application of organic manures and inorganic fertilizer enhanced the crop growth and in turn yield

attributes of rice. This was evidenced by Banik *et al.*, (2006) and Mondal *et al.*, (2003).

In case of monetary among the different hybrid rice variety IRH-103 also recorded (table 2) significantly higher net return and B: C ratio (Rs. 184698, 138772 ha<sup>-1</sup> and 3.02) over the IRH-111(Rs. 153456, 107530 ha<sup>-1</sup> and 2.34). Treatments fertilized with either inorganic or organic along with 75, 100 or 150% RDF, significantly influenced the gross return, net return and B:C ratio. The application of 150% RDF through inorganic and organic recorded significantly higher gross return, net return and B:C ratio (Rs. 177034, 129527 ha<sup>-1</sup> and 2.73 respectively) being at par with 150% RDF through inorganic (Rs.173760, 126833 ha<sup>-1</sup>and 2.70). The lowest gross return, net return and B:C ratio (Rs.163443,118529 ha<sup>-1</sup>and 2.63) were obtained with 75% RDF through inorganic and organic. The combination between hybrid rice variety and nutrient management practices on net return and B:C ratio were observed in non-significantly influenced.

**Table 2.** Effect of hybrid rice varieties and nutrient management practices on cost of cultivation, gross return, net return and B: C ratio.

Treatment	Cost of cultivation (Rsha <sup>-1</sup> )	Gross return (Rsha <sup>-1</sup> )	Net return (Rsha <sup>-1</sup> )	B:C
<b>Main plot-variety (2)</b>				
V1- IRH-103	45925.98	184697.76	138771.78	3.02
V2-IRH-111	45925.98	153456.35	107530.39	2.34
<b>SE(m)</b>		<b>2707.59</b>	<b>2707.61</b>	<b>0.06</b>
<b>C.D.5%</b>		<b>12104.55</b>	<b>12104.63</b>	<b>0.26</b>
<b>Sub plot-Integrated nutrient management (5)</b>				
T <sub>1</sub> - 100% RDF (Standard check)	44500	164635.38	120135.38	2.70
T <sub>2</sub> - 75% RDF through inorganic and organic (Topdressing of {Vermicompost @2q/ha+ DAP@ 25kg/ha} at 25-30 DAT and remaining NPK through inorganic)	44913.99	163442.56	118528.61	2.63
T <sub>3</sub> - 100% RDF through inorganic and organic (Topdressing of {vermicompost @2q/ha+ DAP@ 25 kg/ha} at 25-30 DAT and remaining NPK through inorganic)	45781	166512.90	120731.90	2.64
T <sub>4</sub> - 150% RDF through inorganic and organic (Topdressing of {Vermicompost @2q/ha+ DAP@ 25 kg/ha} at 25-30 DAT and remaining NPK through inorganic)	47507.5	177034.36	129526.86	2.73
T <sub>5</sub> - 150% RDF through inorganic	46927.4	173760.08	126832.68	2.70
<b>SE(m)</b>		<b>2213.70</b>	<b>2213.69</b>	<b>0.03</b>
<b>C.D.5%</b>		<b>6463.07</b>	<b>6463.05</b>	<b>0.09</b>

## REFERENCES

- Anonymous** (2018). *Chhattisgarh main vibhinna faslon ke antargat khestrafal awam utpadakta , krishi darshika*, IGKV, Raipur:4.
- Banik, P., Ghosal, P.K., Sasmal, T.K., Bhattacharya, S., Sarkar, B.K. and Bagchi, D. K.** (2006). Effect of organic and inorganic nutrients for soil quality conservation and yield of rainfed low land rice in sub-tropical plateau region. *Journal of Agronomy and Crop Science*. Vol.192(5): 31–43.
- Economic, Survey** (2016). Economic survey, Government of India Ministry of Finance. Department of Economic Affairs. Economic Division. 09 January 2016. Oxford University Press. New Delhi.
- Mondal, S.S., Sitamgshu, S., Aruoghosh, Das, J.** (2003). Response of summer rice (*Oryza sativa* L.) to different organic and inorganic sources of nutrients. *Crop Research*. Vol.25:219-222.

