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# Integrated Nutrient and Weed Management Practices on Quality Parameters in Aromatic Rice

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**A B S T R A C T**

An experiment was carried out in crop research centre farm of Dr. Rajendra Prasad Central Agricultural University, Pusa during *kharif* seasons of 2016 and 2017 to study the effect of integrated nutrient and weed management practices on quality parameters of aromatic rice. The two factors comprised of Main-plot: Integrated nutrient management i.e. Control, 50% RDN through inorganic source + 50% RDN through vermicompost, 75% RDN through inorganic source + 25% RDN through vermicompost and 100% RDF (120 kg N-60 kg P -40 kg K/ha) through inorganic source and Sub-plot: Integrated weed management- Pretilachlor 1.5 kga.i. /ha (P.E.) + Bispyribac sodium 20 g/ha at 20 DAT, Pretilachlor 1.5 kga.i./ha (P.E.) + 1 HW at 20 DAT, Weed free (2 HW at 20 and 40 DAT) and Weedy check. The experiment was laid out in a split plot design with three replications and individual plot size of 16 $m^2$. In Integrated nutrient management the different physical quality of grain of aromatic rice were improved effectively by application with 50% RDN through inorganic source + 50% RDN through vermicompostthan75% RDN through inorganic source + 25% RDN through vermicompost. In Integrated weed management the physical quality of grain were improved by application with weed free (2 HW at 20 and 40 DAT) than Pretilachlor 1.5 kg/ha (P.E.) + 1 HW at 20 DAT in both the years. The interaction effect between integrated nutrient and weed management treatment was not found significant under above mentioned quality parameters.

## Introduction

Rice is one of the most important food grains produced and consumed all over the world. Aromatic rice contributes a small portion but an important subgroup of rice production. India has a rich diversity of aromatic rice and among them, the long grained superfine aromatic rice are the unique gift of nature to our country. Because of their unique aroma quality (due to 2-acetyl-1-pyrroline compound), superfine grains and exceptionally good cooking qualities, is nature's gift to Indian subcontinent. Therefore, demand for aromatic rice is growing rapidly in the international market. The steady increase in production and the growing demand for Basmati rice in the international market made

India an important rice exporting country of the world (Rani, 2013). In recent years, both the acreage and productivity of rice is declining. Because a number of factors are responsible for low productivity of rice the various organic-inorganic combination provide balance between the yield and quality of aromatic rice. Therefore to meet the high quality food of the growing population, the rice production has to be enhanced with good integrated management practices to maintain the quality and sustainability in aromatic crop production. There was no significant difference in quality of rice with conjunctive application of RDF and organic manure or RDF alone (Chaudhary *et al.,* 2011). Weed infestation is considered as an important one. Weeds offer a severe competition to the crop for natural resources which leads to deterioration of quality of rice. The organic manures are expected to improve the quality of rice grain.

Keeping these in mind, an experiment was conducted in Crop Research Centre of Dr. Rajendra Prasad Central Agricultural University, Pusa, Samastipur, Bihar to study the effect of integrated nutrient and weed management practices for high quality aromatic rice.

## Materials and Methods

A field experiment was conducted during the *kharif* seasons of 2016 and 2017 at the Crop Research Centre of Dr. Rajendra Prasad Central Agricultural University, Pusa, Samastipur, Bihar. The soil was calcareous (sandy-loam). The experiment was laid out in split plot design, which was replicated thrice. The two factors comprised of Main-plot: Integrated nutrient management i.e. $N_0$ - Control $N_1$ -50% RDN through inorganic source + 50% RDN through vermicompost, $N_2$-75% RDN through inorganic source + 25% RDN through vermicompost and $N_3$-100% RDF (120 kg N-60 kg P - 40 kg K /ha) through inorganic source and Sub-plot: Integrated weed management-$W_1$ – Pretilachlor 1.5 kg a.i. /ha (P.E.) + Bispyribac sodium 20 g/ha at 20 DAT, $W_2$ – Pretilachlor 1.5 kg a.i./ha (P.E.) + 1 HW at 20 DAT, $W_3$ - Weed free (2 HW at 20 & 40 DAT) and $W_4$ - Weedy check.The gross plot size under each treatment was 16 $m^2$ and the net plot size was 9.6 $m^2$. "*Rajendra bhagawati"* variety was taken as a test crop. The recommended dose of fertilizers was 120-60-40 kg N: P: K/ha. However, the nitrogen was applied as per treatment. The half of nitrogen from inorganic source and full dose of nitrogen from organic source, phosphorus and potassium were applied as basal and remaining dose of nitrogen from inorganic fertilizer was applied in two equal splits at active tillering and panicle initiation stages, respectively. For hulling quality evaluation of rice, 100 g paddy was dehulled in a dehuller machine. The husk as well as brown rice was weighed and the percent yield of brown rice and hulls was calculated for hulling percentage of rice, resulting brown rice was milled using a TM-05 Type stake grain testing mill using a 36 mesh abrasive cylinder for about 2 min at 800-1000 rpm to obtain about 10 % milling (by weight). Head rice recovery was obtained from the milled rice. Whole grain of the milled rice were separated from the brocken rice using a kwis grant sizer (4/inch) Average kernel length, breadth and length to breadth (L:B) ratio before and after cooking was determined by closely placing the 10 randomly selected grains on a graph paper which had 10 divisions in 1 cm.

## Results and Discussion

The quality parameters of rice was not significantly influenced by integrated nutrient and weed management practices as well as interaction effect among the above treatments during both the years of study (Table 1).

Among integrated nutrient management practices the hulling percentage (74.83 and 74.93%) milling percentage (70.17 and 70.77%) and head rice recovery (64.99 and 65.35%), Before cooked length of kernel (7.58 and 7.83 mm), breadth of kernel (1.83 and 1.87 mm) and length and breadth ratio (4.18 and 4.36 mm) and after cooked length of kernel (8.67 and 9.02 mm), breadth of kernel (1.98 and 2.05 mm) and length and breadth ratio (4.53 and 4.54 mm)were found in 50% RDN through inorganic + 50% RDN through vermicompost thanthan75% RDN through inorganic source + 25% RDN through vermicompost and 100% RDN through inorganic source in both the years, respectively (Table 1).

This might be due to the organic manure improves organic matter status of soil which is most important component of soil. Organic carbon helps to increase microbial and enzymatic activities of soil which ultimately improve the availability of macro and micro nutrients of soil which ultimately help to improve quality parameters of rice.

This result is in close conformity with the findings of Zaidi *et al.,* (2016). Organic manures were improving milling and cooking quality and enhance head rice recovery of rice (Prakash *et al.,* 2002). The increase in head rice recovery may be due to increase in kernel length by superimposition of organic sources and application of chemical fertilizers with organic manures increased hulling percentage of rice. Similar findings are in agreement with Saquib *et al.,* 2017.

The integrated nutrient management treatments were unable to produce significant variation for length and breadth of kernel in local aromatic rice. The influence of different treatments comprising organic, inorganic alone and their combinations on L/B ratio before and after cooking was not significant. These results are in line with the observations made by Saha *et al.,* (2007) and Chaudhary *et al.,* (2011). Among Integrated weed management the physical quality of rice grain such as hulling (74.62 and 74.72%) milling (69.99 and 70.60%) and head rice recovery (65.18 and 65.52%), Before cooked length of kernel (7.43 and 7.66mm), breadth of kernel (1.83 and 1.86 mm) and length and breadth ratio (4.09 and 4.32 mm) and after cooked length of kernel (8.51 and 8.82 mm), breadth of kernel (1.97 and 2.05 mm) and length and breadth ratio (4.50 and 4.51 mm)were improved by application with weed free (2 HW at 20 and 40 DAT) than Pretilachlor 1.5 kga.i/ha (P.E.) + 1 HW at 20 DAT and Pretilachlor 1.5 kga.i/ha (P.E.) + Bispyribac-sodium (PO.E) 20 ga.i./ha at 20 DAT in both the years, respectively (Table 1). This might be due to all the weed control methods were effective in decreasing the total weed density and dry weight over control and improving the rice yield and quality. Higher weed suppression and increase in rice yield was resulted by hand weeding twice than by the other weed control practices. Similar observation has also been found by Akbar *et al.,* 2011 and Kumar*et al.,* 2017. Based on two years of experimentation, may be concluded that quality parameters of aromatic rice were not significantly affected by different integrated nutrient and weed management practices. Among integrated nutrient management practice quality parameters were numerically higher with the application of 50% RDN through inorganic source + 50% RDN through vermicompost *fb* 75% RDN through inorganic source + 25% RDN through vermicompost whereas, in integrated weed management practices quality parameters were numerically highest with weed free (2 HW at 20 and 40 DAT) and in weed control method, highest quality parameters of aromatic rice value was recorded Pretilachlor 1.5 kg a.i /ha (P.E.) + 1 HW at 20 DAT.

**Table.1 Effect of integrated nutrient and weed management on different quality parameters of aromatic rice**

| Treatment | Hulling (%) | | Milling (%) | | Head rice recovery (%) | | Kernel length before cooking (mm) | | Kernel breadth before cooking (mm) | | Shape index before cooking | | Kernel length after cooking (mm) | | Kernel breadth after cooking (mm) | | Shape index after cooking | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2016 | 2017 | 2016 | 2017 | 2016 | 2017 | 2016 | 2017 | 2016 | 2017 | 2016 | 2017 | 2016 | 2017 | 2016 | 2017 | 2016 | 2017 |
| **Integrated nutrient management** | | | | | | | | | | | | | | | | | | |
| **Control** | 73.71 | 73.76 | 69.11 | 69.74 | 59.34 | 60.66 | 7.06 | 7.26 | 1.77 | 1.76 | 3.99 | 4.15 | 8.12 | 8.46 | 1.89 | 1.96 | 4.34 | 4.34 |
| **50% RDN through inorganic source + 50% RDN through vermicompost** | 74.83 | 74.93 | 70.17 | 70.77 | 64.99 | 65.35 | 7.58 | 7.83 | 1.83 | 1.87 | 4.18 | 4.36 | 8.67 | 9.02 | 1.98 | 2.05 | 4.53 | 4.54 |
| **75% RDN through inorganic source + 25% RDN through vermicompost** | 74.66 | 74.70 | 69.98 | 70.61 | 63.83 | 63.84 | 7.43 | 7.66 | 1.82 | 1.84 | 4.08 | 4.25 | 8.50 | 8.82 | 1.95 | 2.03 | 4.43 | 4.42 |
| **100% RDF (120 kg N-60 kg P - 40 kg K /ha) through inorganic source** | 74.45 | 74.55 | 69.82 | 70.44 | 62.27 | 62.75 | 7.35 | 7.58 | 1.81 | 1.81 | 4.07 | 4.21 | 8.40 | 8.75 | 1.92 | 2.00 | 4.39 | 4.40 |
| **LSD=(0.05)** | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| **Integrated weed management** | | | | | | | | | | | | | | | | | | |
| **Pretilachlor 1.5 kg a.i. /ha (P.E.) + Bispyribac sodium 20 g/ha at 20 DAT** | 74.40 | 74.48 | 69.76 | 70.40 | 62.22 | 63.22 | 7.35 | 7.57 | 1.80 | 1.80 | 4.08 | 4.21 | 8.38 | 8.73 | 1.91 | 1.99 | 4.40 | 4.40 |
| **Pretilachlor 1.5 kg/ha (P.E.) + 1 HW at 20 DAT** | 74.56 | 74.66 | 69.90 | 70.53 | 63.01 | 64.12 | 7.39 | 7.60 | 1.81 | 1.83 | 4.08 | 4.23 | 8.47 | 8.82 | 1.94 | 2.02 | 4.42 | 4.43 |
| **weed free (2 HW at 20 & 40 DAT)** | 74.62 | 74.72 | 69.99 | 70.60 | 65.18 | 65.52 | 7.43 | 7.66 | 1.83 | 1.86 | 4.09 | 4.32 | 8.51 | 8.82 | 1.97 | 2.05 | 4.50 | 4.51 |
| **Weedy check** | 74.05 | 74.09 | 69.42 | 70.03 | 60.01 | 59.75 | 7.24 | 7.48 | 1.79 | 1.78 | 4.06 | 4.20 | 8.33 | 8.69 | 1.90 | 1.99 | 4.39 | 4.39 |
| **LSD=(0.05)** | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| **Intraction** | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |

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