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Response of organic farming on quality evaluation of rice (*Oryza sativa* L.)

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Abstract
The present investigation entitled "Response of organic farming on quality evaluation of rice (*Oryza sativa* L.)" was carried out during *kharif* season on randomized block design with four replications in sarjoo- 52 variety. Five treatments of organic farming were taken namely T_1 (In situ decomposition of rice straw and pressmud @ 5.0 t/ha with PSM and *Azotobacter*), T_2 (In situ decomposition of rice straw and FYM @ 5.0 t/ha with PSM and *Azospirillium*), T_3 (In situ decomposition of rice straw with pressmud @ 10.0 t/ha and PSM), T_4 (In situ decomposition of rice straw with FYM @ 10.0 t/ha and PSM), T_5 (In situ decomposition of rice straw with poultry manure @ 5.0 t/ha and PSM).
Maximum and minimum test weight of rice variety was noticed in treatment T_5 (29.00g) and treatment T_3 (25.00g). Highest L: B ratio was recorded in treatment T_5 (3.00) while minimum L: B ratio was noticed in treatment T_3. Maximum starch iodine blue value was recorded in treatment T_5 (70.73%) while minimum starch iodine blue value was recorded in treatment T_4 (70.60%). The protein content was observed maximum in T_5 (8.85%) and minimum protein content was noticed in T_3 treatment (7.73%). The amylose content was noticed highest in T_5 treatment (22.90%) and minimum content was reported in T_3 treatment (20.47%). The total mineral content of rice grain was observed maximum in T_5 treatment (1.40%) while minimum content was recorded in T_3 treatment. The protein profiling of rice grain quality indicates the prominent bands showed in the T_5, T_4 and T_3 treatment while light band showed in T_1 and T_2 treatments.

Keywords: organic farming, rice, protein, amylose, total mineral, protein profiling

Introduction
Rice is the staple food of more than 60 per cent of world's population. About 90 per cent of all rice grown in the world is produced and consumed in the Asian region. In India, rice is the most important and extensively grown food crop, occupying about 44.8 million hectare of land. Organic farming refers to a particular farming system that uses organic manure, limited range of naturally derived chemicals. Organic farming uses no growth regulators, artificial additives; biosides are synthetic chemical sprays (Beharrell and Macfie, 1991) [2]. Overall goal of organic farming is to use agricultural methods that have the smallest impact of the environment and provide the largest benefits to the people (David Suzuki Foundation, 2002) [3]. The National organic board of USA defines organic farming as an ecological production management system that promotes and enhances biodiversity, biological cycles and soil biological activities. The focus is on ecological compatible production system and process, not on the product itself or the specific inputs (GOI, 2001) [6]. Balance fertilization through organic soruces collectively improves the grain quality and soil health. Keeping in view the immense role of organic farming in rice crop, the present investigation entitled "Response of organic farming on quality evaluation of rice (*Oryza sativa* L.) were under taken.

Materials and Methods
The experiment was conducted at Agronomy experiment farm of Narendra Deva University of Agriculture and Technology, Narendra Nagar (Kumarganj), Faizabad (U.P.) in randomized block design having four replications. The experiment comprised of five treatments *viz*., T_1 (In situ decomposition of rice straw and Pressmud @ 5.0 t/ha with PSM and *Azotobator*), T_2 (In situ decomposition of rice straw and FYM @ 5.0 t/ha with PSM and *Azospirillium*), T_3 (In situ decomposition of rice straw with Pressmud @ 10.0 t/ha and PSM), T_4 (In situ decomposition of rice straw with FYM @ 10.0 t/ha and PSM)and T_5 (In situ decomposition of rice straw with Poultry manure @ 5.0 t/ha and PSM). Rice crop (sarjoo -52) was sown at proper moisture. The test weight was measured by electronic balance and L:B ratio was determined on the basis of average length and width of rice seed, Starch iodine blue value was

estimated by the method of Mc Gready *et al.* (1950) [13], protein content in grain was determined by the Lowry's method (1951) [12], Amylose content method has been recommended by Juliano (1979) [9], Total mineral content was estimated by the method as described by Hart and Fisher (1971) [7] and protein profiling was done by method given by Laemmli (1970) [11].

Results and Discussion

The data regarding test weight was ranged from 25.00-29.00g. Maximum test weight in rice variety was recorded in T_5 treatment (29.00g) followed by T_2 (27.75g), T_1 treatment (26.75g) and T_4 (26.00g). Minimum test weight was noticed in the treatment T_3 (25.00g). The increasing test weight of seeds in various treatments may be due to the role of N, P and K which showed beneficial effect on test weight as reported by Sharma *et al.* (2004) [14]. Careful examination of the data revealed that the L:B ratio of rice varied from (2.63-3.00). Maximum L:B ratio in rice variety was recorded in T_5 treatment (3.00) followed by treatment T_1 (2.88), treatment T_2 (2.85) and treatment T_4 (2.78). Minimum L:B ratio was noticed in treatment T_3 (2.63). Organic manures poultry manure, PSM, rice straw. Which significantly influence L:B ratio Sharma (2004) [14]. It is obvious from the data that the starch iodine blue value content ranged from 70.60-70.73%. Maximum starch iodine blue value in rice variety was recorded in T_5 treatment (70.73%) followed by T_2 (70.70%) T_3 treatment (70.63%) and T_1 (70.61%). Minimum starch iodine blue value content was noticed in the treatment T_4 (70.60%). Jian *et al.* (2005) [8] also observed relationship between application of nitrogen fertilizers with grain protein content and starch viscosity in rice. The peak visiocity, hot viscocity and final viscocity of grain starch decreased significantly with increasing amount of N applied. It is obvious from the data that the protein content ranged from 7.73-8.85%. Maximum protein content in rice variety was recorded in treatment T_5 (8.85%) followed by treatment T_2 (8.43%), treatment T_1 (8.10%) and treatment T_4 (8.03%). Minimum protein content was noticed in the treatment T_3 (7.73%). This might be due to better supplied of nitrogen from the organic materials. It also supplied other nutrient like P, k, Z_n, organic matter etc. which influence the qualitative and quantitative trait plant and plant produce. Nitrogen is the main constituent of amino acid biosynthesis and helped in the formation of protein. Nitrogen may be used as a starting material for the biosynthesis of amino acid. Azospirillium and Azotobacter gross association studied to data exhibit only small and variable N2 fixing activity provide important nitrogen for protein synthesis in cereal crop such as, maize, wheat, rice (Fredriksson *et al*, 1998) [5]. Application of organic farming also influence the protein content because phosphorus is an essential constituent of majority of enzymes required in activation of amino acids and protein synthesis as

Table 1: Test weight, L: B ratio and starch iodine blue value in rice as influenced by various treatments of organic materials

Treatments	Test weight (g)	L:B ratio	Starch iodine blue value (%)
T_1	26.75	2.88	70.61
T_2	27.75	2.85	70.70
T_3	25.00	2.63	70.63
T_4	26.00	2.78	70.60
T_5	29.00	3.00	70.73
CD at 5%	1.892	0.257	0.128

It is obvious from the data that the amylose content ranged from 20.47-22.90 per cent. Maximum Amylose content in rice variety was recorded in T_5 treatment (22.90%) followed by T_2 treatment (22.23%), T_1 treatment (22.05%) and T_4 (21.80%). Minimum amylose content was noticed in the treatment T_3 (20.47%). The variety Sarjoo-52 contains intermediate amylose content and does not become hard upon cooking as suggested by Singh *et al.* (2006) [15].

Table 2: Protein, amylose and total mineral content in rice as influenced by various treatments of organic materials

Treatments	Protein (%)	Amylose (%)	Total mineral content (%)
T_1	8.10	22.05	1.35
T_2	8.43	22.23	1.38
T_3	7.73	20.47	1.25
T_4	8.03	21.80	1.33
T_5	8.85	22.90	1.40
CD at 5%	0.515	0.457	0.125

It is obvious from the data that the total mineral content ranged from 1.25-1.40 per cent. Maximum mineral content in rice variety was recorded in T_5 treatments (1.40%) followed by T_2 treatment (1.38%), treatment T_1 (1.35%) and T_4 (1.33%). Minimum mineral content was noticed in the treatment T_3 (1.25%). All micro and macro minerals which, participate in the formation of protoplasm, protein and nucleic acid. Sulphur helps in protein synthesis and in chlorophyll synthesis. The mineral content was depend upon the absorption of nutrient from the soil. Mineral also encourage vegetative growth and formation of well-developed root system which efficiently absorb minerals from the soil as given by Kanwar (1978) [10]. The banding pattern of protein were observed in Fig. 1 and results revealed that more prominent bands were showed in the treatments T_5, T_4 and treatment T_3. Light bands showed in treatment T_1 and treatment T_2, but no specific and distinct band was found which might the responsible for the protein quality as influence by various treatments of the organic farming. Asghar *et al.* (2004) [1] have studied inter and intra-specific variation through SDS-PAGE of total seed protein in rice germplasm. They have observed a considerable variation in protein banding pattern. The occurrence of inter-specific variation was higher than that of intra-specific variation. Dongsub *et al.* (2004) [4] have conducted experiments to increase specific free amino acid lysine in the rice. They have obtain most significant amino acids increase in the resistant lines was lysine and tryptophan. Total protein was resolved by SDS. PAGE showed few differences in the protein profiles of the control and mutant lines.

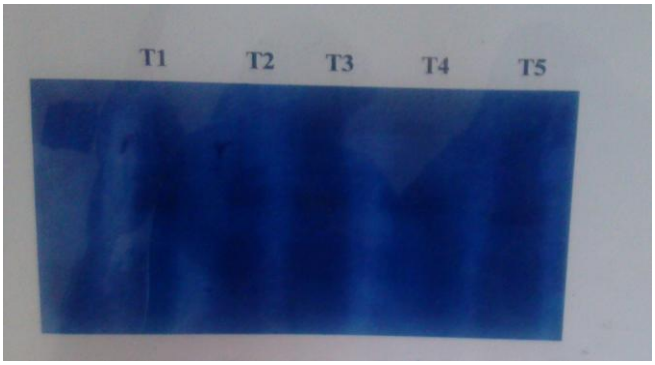

Fig 1: Protein profiling

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