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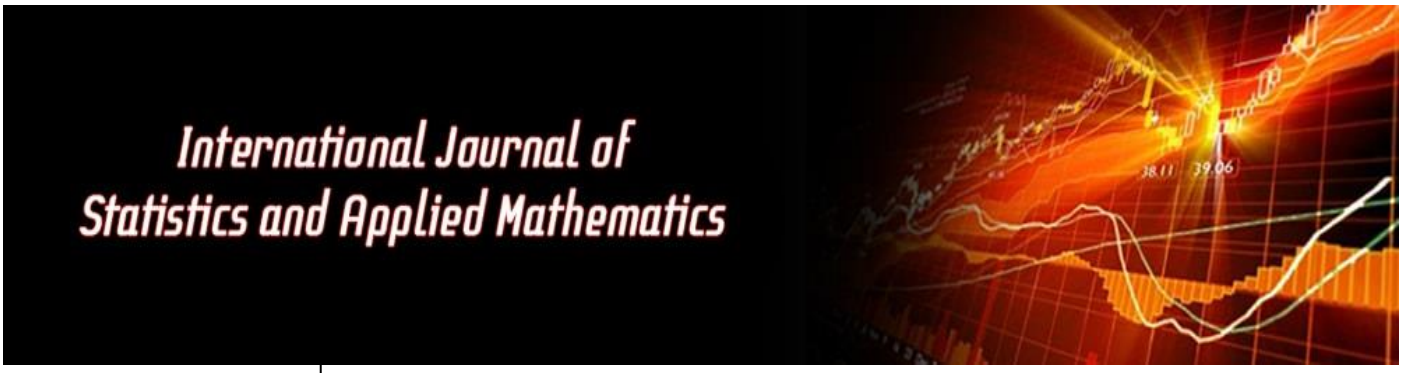

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To assess the adoption level of basmati rice growers regarding basmati rice production technology in western Uttar Pradesh

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Abstract
Basmati rice (*Oryza sativa*) of the western Uttar Pradesh comprises of four regions i.e. Bareilly, Moradabad, Meerut and Saharanpur, out of which two regions namely Meerut and Saharanpur were selected purposively. The study aimed to assess the knowledge level of basmati rice growers regarding cultivation practices and the adoption of new technologies. The results showed that most respondents had medium-level knowledge about improved varieties, recommended seed rates, nursery field preparation, nursery raising methods, irrigation management, and transplanting methods. The majority of respondents had high knowledge about organic manure, nitrogen phosphorus, and potash, as well as micronutrient application. However, most respondents were low in knowledge about bio-fertilizers and weed management practices. Most respondents were also knowledgeable about the appropriate time for weed management, major diseases, insect-pest control, harvesting management practices, and threshing practices. The study found that most respondents had medium-level knowledge about the control of major insect-pest, harvesting management practices, and threshing practices. However, there was a lack of knowledge about the appropriate time for threshing, which could lead to grain damage and slow down profits. In terms of weed management practices, most respondents had medium-level knowledge about the appropriate time for weed management, while only 8.33 percent were knowledgeable about the appropriate time for harvesting. Most respondents were also knowledgeable about the control of major insect-pest, but only 6.67 percent were knowledgeable about the control of major insect-pest. In conclusion, the study highlights the importance of improving knowledge levels among basmati rice growers to promote the adoption of new technologies and practices. By addressing these gaps, the study can help improve the economic yield, quality, and quantity of basmati rice crops.

Keywords: Adoption, basmati rice, inputs, production, productivity

Introduction
Rice is a crucial food crop for over half of the world's population and is cultivated by small farmers in less than one hectare. It is also a wage commodity for workers in cash crop or non-agricultural sectors. Rice is of special importance for nutrition in Asia, Latin America, the Caribbean, and Africa, making it a strategic commodity in many countries. Basmati rice, cultivated in the north-western part of the Indo-Gangetic plains of the Indian subcontinent, is highly valued due to its unique grain size, aroma, cooking qualities, sweet taste, and soft texture. The area of basmati rice in India is 21.34 lakh hectares, with production of 87.73 lakh tonnes and 12.60 lakh tonnes in Uttar Pradesh. Basmati rice is cultivated in a flat region, no higher than 700 meters altitude, and is cultivated by hand with traditional methods. India's success as a major rice exporter is attributed to research efforts, farm management practices, liberalization of trade policy, and the efforts of the All India Rice Exporters Association and Agricultural Processed Food Products Export Development Authority. Basmati rice, known for its fragrance and texture, is a nutritious and healthy food with low fat content and excellent carbohydrates.
It is easy to digest and contains vitamins and minerals like vitamin B and iron, which are vital for the proper functioning of the body systems. Brown rice is rich in dietary fiber and is considered more nutritious than white basmati rice. India is one of the world's largest producers of white rice, accounting for 20% of all world rice production.

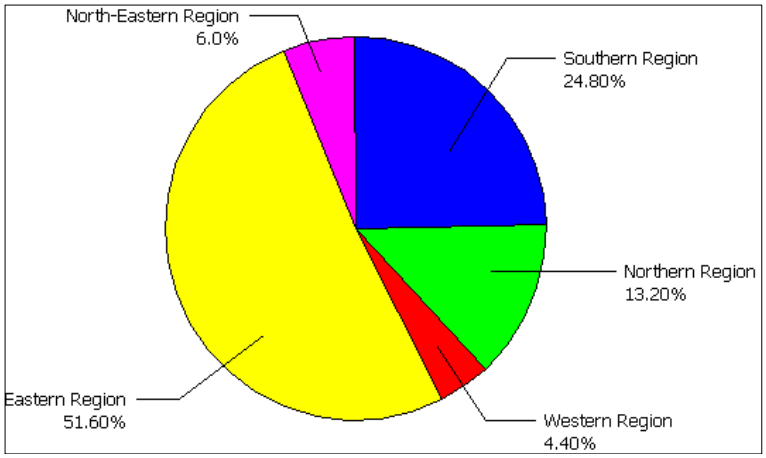

Fig 1: Region-wise Percentage share of rice production kin India during 1999-2000

The Himalayan agro-climate plays a significant role in the existence of this unique rice line. Basmati rice is cultivated between latitudes 300 N to 33 °N and longitudes 75 °E to 77 °E, and requires specific soil and climatic conditions. The suitable soil for basmati rice production is clay, grown in puddle fields in high temperature and humidity conditions but with low temperatures during the ripening period. Basmati rice production in India may surge to around 20 million tonnes in FY 2014-15 due to higher returns and the new high-yielding basmati rice variety PUSA 1509. According to the USDA, India's basmati rice production is expected to reach around 8 million tonnes in 2013-14, up around 13% from the previous year. Experts believe that the increase could be much higher due to increasing domestic prices and export demand for basmati rice, encouraging farmers to grow more. Basmati rice prices in India increased by about 24% to 27% from around Rs.3,300 to Rs. 3,400 per quintal in October 2013.

Materials and Methods

The study aimed to measure the knowledge level of basmati rice farmers in Gangoh block, Saharanpur district, and Anoopshar block, Bulandshahr district, western Uttar Pradesh, in 2013-2014, as well as their adoption of enhanced agricultural practices. The survey included 180 respondents from five communities, with 18 from each community. Age, education level, caste, family size, institutional membership, land holding size, farm asset ownership, transportation facility, irrigation facility, socioeconomic status, annual income, communication sources, field management practices, and barriers to adopting improved cultivation practices were among the variables studied. Interviews and secondary sources such as community development block headquarters, research journals, books, bulletins, and village level extension workers were used to collect data. The data analysis was primarily concerned with summarizing findings and addressing research questions.

Result Discussion

Table 1: Adoption level of respondents in basmati rice cultivation

S. No.	Statement	High		Medium		Low	
		F	%	F	%	F	%
1	Improved varieties	56	31.11	93	51.67	31	17.22
2	Seed rate for nursery	49	27.22	111	61.67	20	11.11
3	Field preparation of nursery	54	30.00	88	48.89	38	21.11
4	Nursery raising method	34	18.89	126	70.00	20	11.11
5	Preparation of field	83	46.11	66	36.67	31	17.22
6	Sowing method	132	73.33	38	21.11	0	0.00
7	Seed treatment	48	26.67	69	38.33	63	35.00
8	Irrigation management	121	67.22	59	32.78	0	0.00
9	Appropriate time and method of transplanting	79	43.88	91	50.56	10	5.56
10	**Fertilizer and manure management**						
a)	Organic manure qt/ha.	76	73.33	27	15.00	21	11.67
b)	Nitrogen kg. /ha.	112	62.22	49	27.22	19	10.56
c)	Phosphorus kg. /ha.	58	32.22	93	51.67	29	16.11
d)	Potash kg/ ha.	22	12.22	67	37.22	91	50.56
11	Micro nutrients (Zn, Mg, CA, Fe, S, etc.)	14	7.78	70	38.89	96	53.33
12	Application of bio-fertilizers	29	16.11	59	32.78	92	51.11
13	Weed management	82	45.56	69	38.33	29	16.11
14	Control of major diseases in basmati rice	58	32.22	91	50.56	31	17.22
15	Control of major insect-pest in basmati rice	68	37.78	89	49.44	23	12.78
16	Harvesting time	118	65.56	62	34.44	0	0.00
17	Threshing time	109	60.56	71	39.44	0	0.00

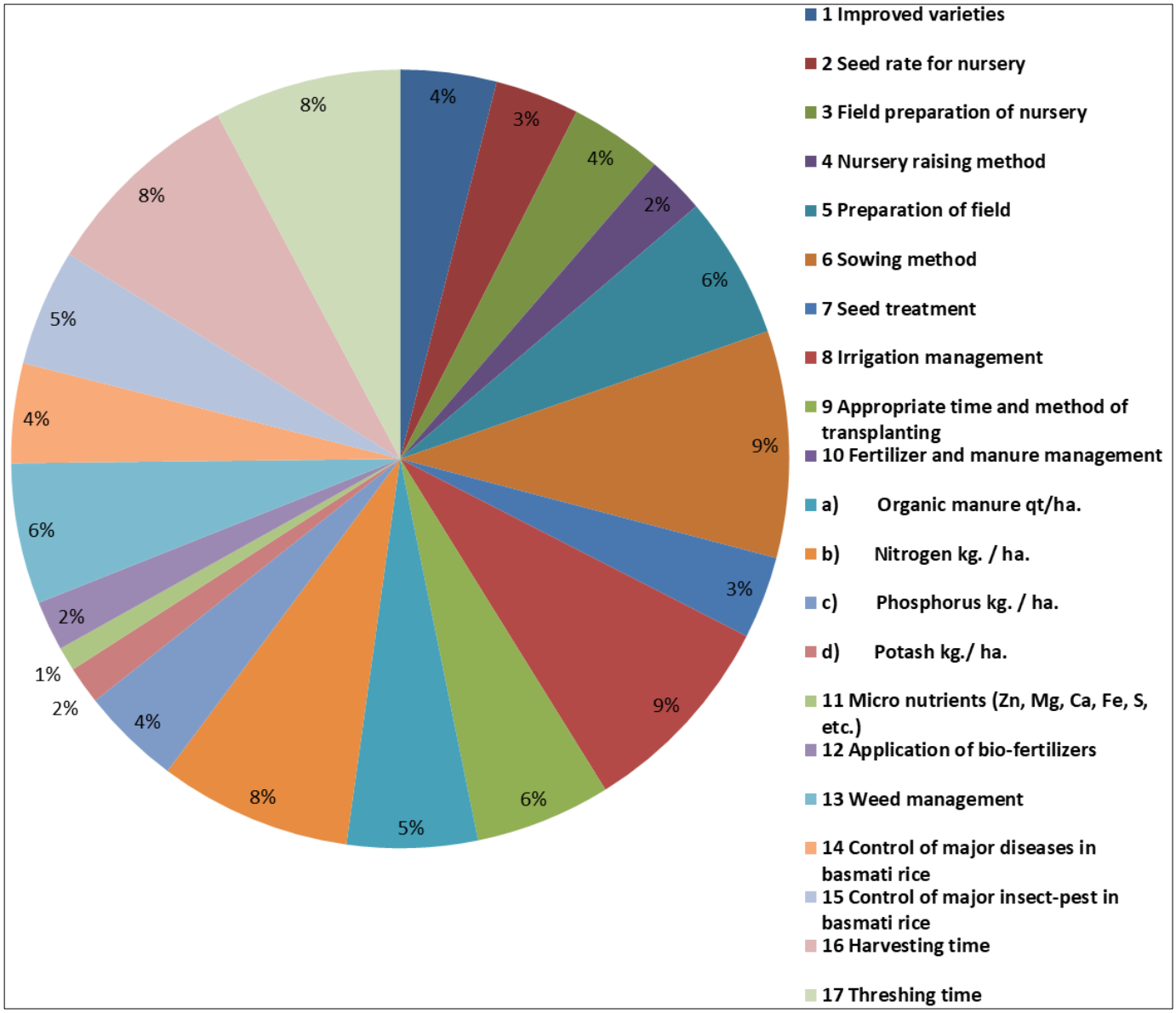

Fig 2: Adoption level of respondents in basmati rice cultivation

The study found that most respondents were moderately adopting improved varieties of basmati rice crop, with 51.67% being medium-level adopters. The majority of farmers partially adopted recommended high-yielding varieties. The majority of respondents were medium-level adopters of the recommended seed rate for nursery in basmati rice crop, with 61.67% being medium-level adopters. The majority of respondents were medium-level adopters of the optimum seed rate. The majority of respondents were medium-level adopters of the preparation of nursery fields for basmati rice cultivation, with 48.89% being medium-level adopters and 30.0% being high-level adopters. The adoption of selected field preparation practices was medium among paddy growers. The study reveals that most respondents were moderately adopting nursery raising methods for basmati rice cultivation. 70.00% of respondents were medium-adopter, 18.89% were high-adopter, and 11.11% were low-adopter. The preparation of the field was high-adopter, with 46.11% and 36.67% of respondents expressing high adoption. The field was plowed 20-25 cm deep by mould board in summer to expose harmful insects, pests, and weed rhizomes. Puddling was also common, with an earthen bund around the field. The sowing method was high-adopter, with 73.33% of respondents adopting it. The seed treatment was low-adopter, with 38.33% adopting it, 35.00% being low-adopter, and 26.67% being low-adopter. The study highlights the importance of proper preparation and sowing methods for successful rice cultivation

The study reveals that most respondents have high levels of adoption of irrigation management practices in basmati rice crop cultivation. The majority of respondents are aware of the critical stages of irrigation management, with 67.22 percent adopting it. The appropriate time and method of transplanting are also well-adopted, with 50.56 percent adopting it, followed by 43.88 percent. The study recommends transplanting seedlings when they are ready for transplanting, at the optimum age of three to four weeks for short duration varieties and four to five weeks for medium and long duration varieties. The use of organic manure is also well-adopted, with 51.67 percent adopting it, followed by 37.77 percent and 10.56 percent. These findings highlight the importance of effective irrigation management and fertilizer management in basmati rice crop production. The study reveals that most respondents in the study have high levels of adoption for the appropriate dose and application of nitrogenous fertilizers in basmati rice crop production. The majority of respondents are in the high level of adoption category, with 62.22% of respondents stating they have high knowledge about the

appropriate dose, right method, time, and application of nitrogenous fertilizers. The majority of respondents are in the medium level of adoption category, with 51.67% of respondents stating they have medium knowledge about the recommended dose and method of applying phosphatic fertilizers. The majority of respondents are in the low level of adoption category, with 50.56% of respondents stating they have low knowledge about the application of Singh et *al.* (2008) [29], Hanumanaikar et *al.* (2011) [30], Singha et *al.* (2011) [31], Thorat et *al.* (2011) [27], Ali and Jagadeeshwara (2013) [1] and Deka and Kalita (2014) [16] The study reveals that most respondents adopted practices like fertilizer application and manure management for basmati rice cultivation. However, nitrate-containing fertilizers should be avoided as they are more susceptible to nitrogen loss through leaching and denitrification. Diammonium phosphate (DAP) is an excellent fertilizer for basal dressing in paddy fields. For best results, apply full dose of phosphorus and potash and half dose of nitrogen before last puddling. Most respondents were low in the application of micro nutrients (Zn, Mg, Ca, Fe, S) in basmati rice crop production. Bio-fertilizers were also low in adoption, with 51.11 percent belonging to low level, 32.78 percent to medium level, and 16.11 percent to high level. Azola and blue green algae were used as bio-fertilizers. Weed management practices were medium in adoption, with 51.67 percent using cultural practices and 37.78 percent using chemical methods. Most respondents were moderate in controlling major diseases in basmati rice, with 50.56 percent and 32.22 percent respectively. The study highlights the importance of incorporating appropriate weed management practices and cultural practices in rice cultivation. The study reveals that most farmers are unaware of the symptoms of diseases, leading to reduced yields. Most respondents are moderately adopting control measures for major insect pests in basmati rice crop management. However, many respondents are not adopting practices like measuring major diseases and insect pests. The study also shows that most respondents are high level adopters of appropriate harvesting and threshing time for basmati rice. Harvesting should be done as soon as the crop matures to ensure good grain quality and consumer acceptance. The right stage for harvesting is when about 80 percent panicles ripened spikelets are straw-colored and contain about 20% moisture. The study also finds that age, caste, education, and family characteristics do not significantly influence the adoption of improved varieties, seed rate for nursery, and field preparation of nursery nursery in basmati rice production technology. However, age, education, type and size of family, institutional membership, size of land holding, live-stock, and ownership of farm assets positively influence the adoption of nursery raising methods, seed treatment, field preparation, appropriate time and method of transplanting, improved varieties, and irrigation management in basmati rice production technology. In terms of control of major diseases and insect-pests, the type and size of family, institutional membership, size of land holding housing pattern, and live-stock have not been significantly associated with the adoption of improved basmati rice production technology.

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