PROFILE CHARACTERISTICS OF PADDY FARMING SUSTAINABILITY AND ADOPTION OF RECOMMENDED SUSTAINABLE FARMING PRACTICES IN TELANGANA STATE, INDIA

ABSTRACT

Agriculture caused significant harm to the environment for a long time. More acreage, fertiliser and pesticides were used to boost the output. Sustainable development is one that meets present needs without compromising the ability of future generations to meet their own. According to study, a number of factors can affect a farmer's decision to adopt sustainable practises. The research investigation employed Ex-post-facto-research design as the event has already happened. The present study aimed to assess the profile characteristics of farmers on Paddy farming sustainability and adoption of recommended sustainable farming practices comprising the data from three different zones of the Telangana state. Three districts namely Nizamabad, Khammam and Nalgonda from each zone of Telangana state were selected for the purpose respectively during the year 2021.as these three districts account for paddy area compared to other districts. Purposive sampling technique was employed for data collection from 216 paddy growing farmers by standardized and pre-tested interview schedule. Findings revealed that majority of the farmers were middle-aged (54.62 %), educated up to primary school (25.19 %), semi-medium in land holdings (25.32 %), possessed medium income (55.56 %), high farming experience (60.18 %), medium level of mass media exposure (73.14 %), medium level of extension contact(56.10 %), medium level of extension participation (73.60 %), medium level of management orientation (71.75 %), high level on farming commitment(54.62 %), medium level on scientific orientation(58.10 %), high level on achievement motivation(51.86 %), medium level on innovativeness(81.00 %), medium level of economic motivation (67.50 %), medium level of decision-making pattern (62.51 %), medium level of value orientation (52.79 %), medium level of aspiration (64.35 %) and medium risk orientation (53.20 %).

Keywords: Adoption, Paddy farmers, Profile characteristics, Paddy farming sustainability, recommended sustainable farming practices

INTRODUCTION

The Food Agricultural Organization (FAO) definition of sustainable agriculture, is “the management and conservation of natural resource base and orientation of technological and institutional change to ensure the attainment and continued satisfaction of human needs for present and future generations” (FAO 2006). There are 51 million more people who

consume rice each year in the Asia-Pacific Region, which is home to more than 56% of the world's population. It is uncertain whether the current 524 million tonnes of rice produced annually would increase to 700 million tonnes by 2025 while utilising less water, less chemicals, less people, and less land. The US Department of Agriculture assessed worldwide rice availability in the 2019-20 marketing season at 67.10 million tonnes in its November report. In 2013-14, India ranked first in rice area (43.9 million hectares) and second in rice production (106.5 million tonnes) (Agricultural Market Intelligence Centre 2021). Taking all of this into account, annual production must be increased from 586 to 756 million metric tonnes by 2030. Since the previous two decades, various countries have recognised its significance and adjusted their trade policies, increased area under high yielding varieties and developed technologies to overcome the challenges that countries face in paddy production. Without a doubt, each of these characteristics considerably increases a nation's potential to expand paddy output. The enormous triple challenges of boosting agricultural productivity, ensuring socio-economic, technological, institutional, and environmental sustainability and reducing poverty are being met head-on by India. These challenges are all made more difficult by climate change, international competition and rapidly evolving technologies. The world population will reach over nine billion people by 2050, posing a threat to ecological services and food production that depend on good soils. As climate change putting soils in first priority at the global agenda. With this, National Mission for Sustainable Agriculture (NMSA), a component of the National Action Plan on Climate Change (NAPCC), was implemented for the first time during the 11th plan. Additionally, the Rainfed Areas Development Programme (RADP) and the National Project on Management of Soil Health and Fertility were introduced. For sustainable agriculture, it is advised that conservation agriculture, integrated nutrient management, carbon sequestration, erosion control, saline and alkaline soil management, legislation for soil protection, development of remote sensing and GPS-based Decision Support System (DSS) and amelioration of polluted soil be used.

New technologies are created by research scientists and then transferred and promoted to rural communities by extension workers. It has been said that scientists have created a sizable number of technologies that are very helpful to farmers. In addition, it is evident that, aside from a few technologies, primarily some superior crop cultivars, very few technologies have either made it to farms on a large scale or have been fully acknowledged by farmers as having a positive impact on short-term production or long-term sustainability. The recommended agronomic practises such as efficient crop and soil management, improved

inputs, land levelling, and biomass removal were also included. The sustainable practises that are currently available include direct seeding, alternate wetting and drying (water smart), alleyways (pest and disease smart), and climate resilient technologies. A project led by Core CarbonX (CCX) and Vida Carbon Corp aims to help Telangana's paddy farmer community implement improved water management practises across 100,000 hectares of rice fields. Farmers in Telangana are not financially rewarded for conserving either water or energy because they are both heavily subsidised. By training farmers about "alternative wetting and drying" techniques, CCX hopes to solve this problem. In this farming method, a gauge is utilised to show how much water is present in different parts of the field. With the use of this technology, farmers can precisely manage the water flow to their crops. Conducted a study among the rural youth of rainfed and irrigated tracts and two third of them (66.66 %) had medium level of aspiration whereas, 15.00 per cent of them had high level of aspiration whereas 18.33 per cent of them had low level of aspiration in rainfed tract. In irrigated tract majority of them (69.99 %) had medium level of aspiration whereas, 8.33 per cent and 21.66 per cent of them had low and high level of aspiration (Sajjan 2006). Study on analysis of livelihood security among agricultural labourers in Karnataka that in rain fed situation slightly more than half of farmers 54.29 per cent were having high value orientation, followed by medium (27.14 %) and low (18.57 %) value orientation. In irrigated region slightly more than three fifth 60.00 per cent had low value orientation, while medium 25.71 Per cent and 14.29 Per cent of them had medium and low value orientation, respectively. Similarly, in plantation region little less than half of farmers 45.71 per cent had medium value orientation, followed by low (31.43 %) and high (22.86 %). With regards to pooled situation, 36.67 per cent had low value orientation, followed by medium (32.86 %) and high (30.47 %) (Mamathalakshmi 2013). Large majority (70.00 %) of the paddy growers had medium management orientation while 19.00 and 11.00 per cents of paddy growers were having low and high management orientation, respectively (Singh and Pandey 2013). It was quite evident from the results that among irrigated farming system, more than one third (40.00 %) of them had high farming commitment whereas 35.00 Per cent and 25.00 Per cent of them had medium and low farming commitment. In case of rainfed farming system little less than half of farmers 45.00 per cent had medium farming commitment followed by high (28.33 %) and low (26.67 %). In combined situation, more than one third of farmers (40.00 %) had medium farming commitment, while 34.17 Per cent and 25.83 Per cent were in high and low farming commitment (Sunitha (2015). In her study on decision making pattern and work participation of farm women in management of coffee plantation in kodagu district reported that two third

of them (66.67 %) had medium decision-making, whereas 17.78 and 15.55 per cent of them were having high and low decision-making, respectively (Supriya 2016). Little less than half (45.56 %) of them had medium extension participation, while 28.89 per cent of them had low extension participation and 25.55 per cent of them had high extension participation (Supriya 2016). Little less than half (45.83 %) of them had medium economic motivation followed by low economic motivation (35.83 %) and 18.34 per cent of them were in high economic motivation. Little less than half 45.83 per cent of them were in high achievement motivation followed by low achievement (36.67 %) and 17.50 per cent of them were in medium achievement motivation (Leelavathi 2017). More than two fifth 43.89 per cent of the paddy growers had medium scientific orientation whereas, 31.67 and 24.44 per cent of them had high and low scientific orientation, respectively (Nagraj *et al.* 2018). Nearly 64.00 per cent of them had medium scientific orientation, followed by (22.67 %) and (13.33 %) were having low and high scientific orientation, respectively (Shambharkar *et al.* 2018). More than three fifth (62.50 %) of them were in high farming experience followed by medium (27.50 %) and low farming experience (10.00 %), respectively (Shwetha and Shivalingaih 2018). One third of the farmers 38.33 per cent were having high farming experience whereas 35.00 per cent and 26.67 per cent of them had medium and low farming experience, respectively (Parmar 2018). Slightly more than three fifth 60.00 per cent of the farmers were having medium economic motivation while 24.67 and 16.00 per cent of them had low and high economic motivation, respectively (Shambharkar *et al.* 2018). Half of the farmers (82.50 %) adopted different farming systems had medium innovativeness while 12.50 per cent of them had low and only 05.00 per cent of them had innovativeness (Shwetha and Shivalingaih 2018). Nearly three fifth (57.50 %) of them were having medium innovativeness while 23.33 per cent were in high innovativeness and 19.17 per cent had low innovativeness. More than three fifth (60.83 %) of them had medium mass media exposure whereas 27.50 per cent had low and 11.67 per cent had high mass media exposure (Verma 2019). More than half (55.00 %) of them had medium annual income followed by high (29.17 %) and low (15.83 %) annual income, respectively (Verma 2019). Half of the farmers (87.50 %) had medium land holding whereas, 12.50 per cent had large land holding (Ghosh *et al.* 2019). Half of them (87.50 %) had medium land holding whereas, 12.50 per cent had large land holding (Ghosh *et al.* 2019). More than two third (70.00 %) of them were having middle age, while 15.00 and 15.00 per cent of them had young and old age, respectively (Ghosh *et al.* (2019). Nearly half (45.00 %) of them had rare extension contacts while 32.50 per cent had never extension contacts, 17.50 per cent had occasionally extension contacts whereas, 05.00 per cent of them had frequently

extension contacts (Ghosh *et al.* (2019). More than half (60.83 %) of them had medium contacts with extension personnel. However, 24.16 per cent had low contacts with extension personnel and 15.00 per cent had high contacts with the personnel of different extension functionaries (Deshmukh *et al.* 2020). Slightly more than three fifth (60.83 %) of them had medium extension contact followed by low (21.67 %) and high (17.50 %) extension contact, respectively (Jadhav 2020). Half of (79.16 %) of them were in medium annual income followed by 11.66 per cent of them had high annual income and 09.16 per cent them had low annual income (Deshmukh *et al.* 2020). Half of the farmers (84.17 %) had medium annual income while 10.00 per cent of them had high annual income and only few (05.83 %) of them were in low annual income (Jadhav 2020). Less than one third (27.50 %) of them were observed marginal land holding, followed by small (25.83 %), semi medium (21.66 %), medium (20.00 %) and 05.00 per cent of them had big land holding (Deshmukh *et al.* 2020). More than one third (33.33 %) of them distributed under small farmers while 27.50 per cent of them were found medium farmers and 14.17 per cent of them comes under marginal farmers whereas; 20.00 per cent of them were under semi medium farmers. Only 05.00 per cent of them were under big farmers (Jadhav 2020). Less than one third (27.50 %) of them were having marginal land holding, followed by small (25.83 %), semi medium (21.66 %), medium (20.00 %) and 05.00 per cent of them hold big land holding (Deshmukh *et al.* 2020). Nearly two fifth (33.33 %) of them were small farmers while 27.50 per cent of them were medium farmers and 14.17 per cent of them comes under marginal farmers whereas; 20.00 per cent of them found under semi medium farmers. Only 05.00 per cent of them distributed under big farmers (Jadhav 2020). Two third (62.50 %) of them were having middle age, followed by old age 19.16 per cent and young age 18.34 per cent (Deshmukh *et al.* 2020). Two third (66.67 %) of them were having medium risk orientation whereas; 28.33 per cent and 05.00 per cent were having low and high level, respectively (Jadhav 2020). Two third (66.40 %) of them were in middle age, whereas 17.20 per cent and 16.40 per cent of them had young and old age, respectively (Meshram *et al.* 2021).

MATERIALS AND METHODS

The research investigation employed Ex-post-facto-research design as the event has already happened. The present study aimed to assess profile characteristics of Paddy farmers and delineate the adoption of recommended sustainable farming practices from three different zones of the Telangana state. Three districts namely Nizamabad, Khammam and Nalgonda from each zone of Telangana state were selected for the purpose respectively during the year

2021 as these three districts accounted for more paddy area compared to other districts. Purposive sampling technique was employed for data collection from 216 paddy growing farmers by standardized and pre-tested interview schedule. Likewise, two blocks from each district were selected based on paddy area which constitutes a total of six blocks. From each block, three villages were selected by using simple random technique comprising 18 villages. 12farmers from each village were selected by using simple random sampling technique. So, 72 respondents were selected from each district. Thus, the total sample constituted for the investigation was 216 farmers who were the respondents of the investigation. For the present study, paddy farming sustainability was operationalised as the extent to which a farmer gets sustainable and higher yield of rice over the years by depending majorly on on-farm inputs and by adopting proper soil, water and crop management practices which are eco -friendly and economically rewarding to farmers. Adoption is not an instant decision. An individual passes through several mental stages in the course of adoption of an idea, practice or object. Adoption was operationalized as practising the recommended practices by the farmers as per recommendations.

Statistical Tools and Tests Used

The data collected for the purpose of the study was objectively scored, categorized and tabulated. The study's analysis of the data obtained through the use of personal interviews included the use of the following statistical tools. The use of the field survey approach was made to help attain the stated objectives. The researcher introduced himself to the respondents and went over the goal or purpose of the study before the interview. The respondents were questioned in their residences or farms. Investigator established a cordial atmosphere among themselves to prevent misunderstandings. Both descriptive and inferential statistics were utilized such as class interval, Per cent and frequency were employed.

Data on Rice producing countries around the world

Chart 1: Major Rice Producing Countries in the World (Milled production in million tonnes)

Country	2020-2021	2021-2022*	Change over 2020-2021
China	148.30	149.00	0.70
India*	**122.00***	**121.00***	**-1.00***
Indonesia	35.20	35.30	0.10
Vietnam	27.10	26.90	-0.20
Thailand	18.83	19.50	0.67

Burma	12.60	12.80	0.20
Philippines	12.40	12.30	-0.10
Japan	7.57	7.58	0.01
Pakistan	8.18	8.20	0.02
Brazil	7.90	7.82	-0.08
USA	7.23	6.46	-0.77
Nigeria	4.89	5.00	0.11
Egypt	4.00	4.00	0.00
South Korea	3.51	3.77	0.26
European Union	1.96	1.99	0.00

Source:www.usda.gov

Chart 2: State wise area under Paddy in India

State	2019-2020			2020-2021		
	Lakh ha.	Lakh acres	% to total area	Lakh ha.	Lakh acres	% to total area
Telangana*	7.33	18.11	24.27	11.31	27.95	32.11
Tamil Nadu	10.42	25.75	34.50	10.51	25.97	29.83
Andhra Pradesh	6.74	16.65	22.31	6.82	16.85	19.36
West Bengal	2.10	5.19	6.95	2.52	6.23	7.15
Assam	1.33	3.29	4.40	1.43	3.53	4.06
Odisha	0.69	1.71	2.28	1.00	2.47	2.84
Chhattisgarh	0.54	1.32	1.77	0.84	2.08	2.39
Kerala	0.67	1.66	2.22	0.78	1.93	2.21
Other	0.39	0.96	1.29	0.02	0.04	0.05
Total	30.21	74.64	100.00	35.23	87.05	100.00

Chart 3: Year wise Area of Paddy in Telangana state (Total Kharif and Rabi 2020-2021)

S. No	Years	Area (Acres)	Yield (Kgs/acre)	Production (Tonnes)
1.	2014-2015	34,97,571	1,949	68,17,273
2.	2015-2016	25,85,170	1,768	45,70,677
3.	2016-2017	45,18,519	2,191	98,98,243
4.	2017-2018	48,49,121	1,937	93,94,768
5.	2018-2019	47,73,519	2,096	1,00,02,947
6.	2019-2020	79,47,403	2,243	1,78,26,799
7.	**2020-2021***	**1,04,23,177***	2,096	2,18,51,471

Source: Directorate of Economics & Statistics and Telangana State Statistical Abstract, 2021

Chart 4:Area of Rice in Telangana state (Vanakalam (Kharif) 2019-2020).

S. No	Rice Vanakalam	All India	Telangana
1.	**Area ('000 Hectares) ***	39,013.0	**1,096.0***
2.	Production('000 Tonnes)	1,02,276.5	4,021.2
3.	Yield (Kg./Hectare)	2,621.6	3,669.0

Source: www.eands.dacnet.nic.in, DES, GOI and Telangana State Statistical Abstract, 2021.

Chart 5:Area of Rice in Telangana state (Yasangi (Rabi) 2019-2020).

S. No	Rice Yasangi	All India	Telangana
1.	**Area ('000 Hectares) ***	4,649.3	**915.0***
2.	Production('000 Tonnes)	16,593.8	3,406.5
3.	Yield (Kg./Hectare)	3,569.1	3,723.0

Source: www.eands.dacnet.nic.in, DES, GOI and Telangana State Statistical Abstract, 2021.

Chart 6: Area of Rice in Telangana state (Total Kharif and Rabi 2019-2020).

S. No	Rice Total	All India	Telangana
1.	**Area ('000 Hectares) ***	43,662.3	**2,011.0***
2.	Production('000 Tonnes)	1,18,870.3	7,427.8
3.	Yield (Kg./Hectare)	2,722.5	3,693.6

Source: www.eands.dacnet.nic.in, DES, GOI and Telangana State Statistical Abstract, 2021.

Chart 7: Annual Rainfall – Deviation in Percentage in Telangana state (2020-21).

S. No	Agro-climatic zones	District	Annual Rainfall (mm)		
			Normal	Actual	Deviation (%)
1.	Northern Telangana Zone	Nizamabad	1,042.4	1,020.3	-2.0
2.	Central Telangana Zone	Khammam	1,036.0	1,380.4	33.0
3.	Southern Telangana	Nalgonda	704.2	915.5	30.0

	Zone				

Source: Directorate of Economics & Statistics and Telangana State Statistical Abstract, 2021. State Average Normal Rainfall (mm) = 905.4, Actual Rainfall (mm) = 1,322, State Average Deviation (%) = 46 %

Chart 8: Data on Agro-climatic zones in Telangana state.

S. No	Agro-climatic zones	District	No. of Revenue Divisions	No. of Revenue Mandals	No. of Revenue Villages	No. of Gram Panchayats
1.	Northern Telangana Zone	Nizamabad	3	29	450	530
2.	Central Telangana Zone	Khammam	2	21	380	589
3.	Southern Telangana Zone	Nalgonda	3	31	566	844

Source: Telangana State Remote Sensing Applications Centre (TRAC) and Telangana State Statistical Abstract, 2021.

Chart 9: Area of Paddy in all the districts of three zones in Telangana State (Total Kharif and Rabi 2020-21).

S. No	Agro-climatic zones	Districts	Area (Acres) *	Yield (Kgs/acre)	Production (Tonnes)
1.	Northern Telangana Zone	**Nizamabad***	**7,70,573**	2,359	18,17,467
		Jagtial	5,79,590	2,275	13,18,607
		Karimnagar	5,17,472	2,235	11,56,784
		Kamareddy	4,93,331	2,313	11,41,069
		Peddapalli	4,02,682	2,112	8,50,507
		Rajanna Sircilla	3,15,976	2,158	6,81,931
		Mancherial	2,74,133	1,835	5,03,009
		Nirmal	2,01,325	2,076	4,17,977
		Kumuram Bheem	71,568	1,790	1,28,082

		Adilabad	2,613	1,879	4,909
2.	Central Telangana Zone	**Khammam***	**5,05,520**	2,004	10,13,087
		Siddipet	5,01,545	2,315	11,60,864
		Medak	4,06,340	2,025	8,22,769
		Mahabubabad	3,15,853	1,914	6,04,587
		Jangaon	3,09,101	2,011	6,21,560
		Warangal Rural	2,45,079	2,070	5,07,395
		Warangal Urban	2,02,625	2,005	4,06,288
		Bhadradri Kothagudem	1,85,362	1,977	3,66,441
		Jayashankar	1,80,378	1,946	3,50,940
		Sangareddy	1,59,691	2,027	3,23,645
		Mulugu	1,54,199	1,840	2,83,673
3.	Southern Telangana Zone	**Nalgonda***	**8,54,871**	2,141	18,30,370
		Suryapet	8,33,249	2,133	17,77,598
		Yadadri Bhuvanagiri	4,50,480	1,969	8,86,800
		Wanaparthy	3,23,827	1,912	6,19,192
		Nagarkurnool	2,46,229	1,875	4,61,576
		Mahabubnagar	2,35,263	2,029	4,77,256
		Narayanpet	1,99,658	1,962	3,91,673
		Rangareddy	1,70,669	2,075	3,54,210
		Vikarabad	1,45,254	1,796	2,60,864
		Jogulamba Gadwal	1,39,131	1,800	2,50,461
		Medchal-Malkajgiri	29,590	2,024	59,880

Source: Telangana State Statistical Abstract, 2021.

Chart 10: Sampling Procedure in the Telangana State

S. No.	Districts	Blocks	Villages	No. of farmers selected
1.	Nizamabad	Bodhan	Saloora	12
			Bodhan (rural)	12
			Bodhan (urban)	12
		Kotgiri	Kotgiri	12
			Ethonda	12
			Kallur	12
2.	Khammam	Kalluru	Kalluru	12
			Chandrupatla	12
			Chennuru	12
		Nelakondapalle	Cheruvumadharam	12
			Nelakondapalle	12
			Bodulabanda	12
3.	Nalgonda	Miryalaguda	Thungapahad	12
			Chinthapalli	12
			Tadkamalla	12
		Nidamanur	Tummadam	12
			Regulagadda	12
			Bankapur	12
Total	**3**	**6**	**18**	**216**

RESULTS AND DISCUSSION

The data collected from the respondents was tabulated and analysed using suitable statistical tools and techniques. The results were explained along with the inferences drawn to the objectives set forth for the investigation.

1. Personal characteristics of Paddy farmers

1. Age

Table 1. revealed that, slightly more than half of the respondents (54.62 %) were falling under middle age category, while a little over one fourth 24.53 per cent and the remaining 20.85 per cent belonged to old age and young age group, respectively. India is

having half of its population as youth and rural farmers are little above youth in age due to lesser preference to have agriculture as their occupation. Thus, it indicates that they possess the maturity and motivation to take on any obstacle in order to improve their family's situation, while also taking the best possible action and having fairly good life experiences and making farming decisions. Furthermore, farmers in their middle age tend to be more efficient, sensitive and family-oriented. Additionally, they could be motivated and involved at farm work. The findings were in agreement with the results of studies conducted by Ghosh *et al.* (2019), Deshmukh *et al.* (2020) and Meshram *et al.* (2021).

2. Education

It could be observed from table 1. that, a little over one fourth of the farmers were educated up to primary school (25.19 %), followed by illiterate (24.09 %), secondary school (22.29 %), high school (12.09 %), intermediate (07.46 %), graduate (04.69 %) and post graduate (04.19 %). Education is a fundamental factor in shaping and bringing about desired changes in people and this is a universal truth. The farmers with a good level of education have a natural tendency towards embracing changes in the social system. Farmers have learned the value of education as a tool for raising their general standard of living and are aware of its importance. A common social context may have contributed to the fact that all of the respondents had a fair amount of education. Given that most farmers had some level of education, they were able to learn about current technologies and sustainable farming methods. Similar results were observed in the study of Ghosh *et al.* (2019), Deshmukh *et al.* (2020) and Meshram *et al.* (2021).

3.Land holding

The results in table 1. indicated that, most of farmers were small (30.20 %), followed by a little over one fourth semi-medium (25.32 %), marginal (23.80 %), medium (10.51 %) and large (10.17 %).The distribution of land ownership is consistent with national trends, according to which 80 percent of all land holdings are small and medium-sized. The major occupation of the family that has inherited the land from their ancestors is agriculture. This finding might be due to that they might have passed down hereditary land deviations from one family to the next family and there are no other sources of income and practically all of them rely on land for their livelihood security. The findings of Ghosh *et al.* (2019), Deshmukh *et al.* (2020) and Jadhav (2020) also expressed similar results as that of the present study.

4. Annual income

It could be seen from table 1. that, slightly more than half of the farmers fall under medium income category (55.56 %), while 23.61 and 20.83 per cent were belonged to high and low income category. This may be the result of farmers cultivating high-value crops along with Paddy or due to their secondary school level and the lack of other businesses in their community. The results of the study were in agreement with that of studies of Verma (2019), Deshmukh *et al.* (2020) and Jadhav (2020).

5. Farming experience

It could be observed from table 1. that, slightly more than the three fifth of the farmers had higher farming experience (60.18 %), whereas a little over one fourth(27.52 %) and 12.30 per cent had medium and low level on farming experience. It can be inferred from these findings that the sampled paddy growers were found it easier to make decisions about agriculture in general and rice production in particular if they had acceptable farming experience. An increase in farming experience improves their interactions with progressive farmers, extension agents and more Paddy farming sustainability. Similar results were observed in the studies of Shwetha and Shivalingaih (2018) and Parmar (2018).

Table 1 Distribution of respondents based on personal characteristics

S. No.	Characteristics	Category	Farmers (n =216)	
			F	%
1.	Age	Young (<35 years)	53	24.53
		Middle (35-50 years)	118	54.62
		Old (>50 years)	45	20.85
2.	Education	Illiterate (0)	52	24.09
		Primary school (1)	54	25.19
		Secondary school (2)	49	22.29
		High school (3)	26	12.09
		Intermediate (4)	16	07.46
		Graduation (5)	10	04.69
		Post-graduation (6)	09	04.19
3.	Land holding	Marginal (<1 ha)	50	23.80
		Small (1-2 ha)	65	30.20
		Semi medium (2-4 ha)	56	25.32
		Medium (4-10 ha)	23	10.51
		Large (>10 ha)	22	10.17
4.	Annual income	Low (< 60,000)	45	20.83

		Medium (60,000-1,20,000)	120	55.56
		High (>1,20,000)	51	23.61
5.	Farming experience	Low (<14 years)	26	12.30
		Medium (15-30 years)	60	27.52
		High (>30 years)	130	60.18

f = frequency of farmers, Per cent = %

2. Communication characteristics of Paddy farmers

1. Mass media exposure

The data presented in Table 2. states that three fourth i.e., 73.14 per cent had medium level of mass media exposure, while 14.81 and 12.05 per cent were coming under the low and high level of mass media exposure respectively. Mass media contact increases farmer's ability in knowing recent information and technology and also widens the mental horizon of farmers to accept and adopt practices in agriculture. Various channels such as television, radio, newspaper *etc.*, were reinforcing the confidence in farmers to take up new activities or new innovations. The results of the study were in agreement with that of studies of Verma (2019).

2. Extension contact

The data in table 2. shows that majority of the farmers (56.10 %) were possessed medium level of extension contact, whereas a little over one fourth (23.10 %) and 20.80 per cent had high and low level on extension contact, respectively. The reason for medium extension contacts of farmers might be that, farmer's regular and frequent visits to Krishi Vignan Kendra's in finding information on Paddy sustainable practices and also information provided by agriculture officers on improved practices whenever needed and different sources of information influence the knowledge, attitude and perception of the farmer towards Paddy farming sustainability and adoption. Similar results were observed in the studies of Ghosh *et al.* (2019), Deshmukh *et al.* (2020) and Jadhav (2020).

3. Extension participation

The results shown in Table 2. states that three fourth (73.60 %) of respondents had medium level of extension participation, whereas 21.20 and 05.20 per cent had high and low level of extension participation, respectively. The pertinent reasons may be that most of the farmers had good contact with extension functionaries of line department and private companies as a result they could have participate actively in various extension activities for gathering the recent information and to know the worth of Paddy sustainable farming technologies. This result is in accordance with the results of Supriya (2016).

Table 2: Distribution of communication characteristics of the respondents

S. No.	Characteristics	Category	Class interval	Farmers (n =216)	
				F	%
1.	Mass media exposure	Low	3-6	32	14.81
		Medium	6-8	158	73.14
		High	8-11	26	12.05
2.	Extension contact	Low	5-7	45	20.80
		Medium	7-9	121	56.10
		High	9-11	50	23.10
3.	Extension participation	Low	4-8	11	05.20
		Medium	8-12	159	73.60
		High	12-16	46	21.20

f = frequency of farmers, Per cent = %

3. Psychological characteristics of Paddy farmers

1. Management orientation

71.75 per cent of the respondents were shown to have medium level of management orientation, while 17.60 per cent and 10.65 per cent of them had high and low level of management orientation, respectively (Table 3). The probable reason for the above trend might be that field extension officers and functionaries do have interactions with farmers to manage the crop planning, production and marketing activities and re-orient level of management and aware of the significance of management in their farm, but at the same time, they do not take enough care in the planning, production and marketing of their Paddy produce at the right time in the right place at the right market. This result is in accordance with the results of Singh and Pandey (2013).

2. Farming commitment

The results from Table 3. Revealed that, more than half of the farmers (54.62 %) were having high level of farming commitment, while one third (30.56 %) and (14.82 %) had medium and low level on farming commitment, respectively. Commitment to farming involves making the effort to not only make a living but also to preserve the resource base and make a life continuously. Despite the allure of intensive agriculture methods that prioritise the use of agrochemicals, due to long-term considerations, dedicated farmers have turned to Paddy sustainable farming. This is reflected in having high farming commitment. Similar findings were presented by Sunitha (2015).

3. Scientific orientation

The results shown in Table 3. states that, nearly three fifth of the farmers (58.10 %) had medium level of scientific orientation, while 24.80 per cent and 17.10 per cent of them had low and high level scientific orientation, respectively. This result is in accordance with the results of Nagraj *et al.* (2018) and Shambharkar *et al.* (2018).

4. Achievement motivation

The results appearing in Table 3. revealed that half of the farmers (51.86 %) were having high level of achievement motivation, followed by one third 25.46 per cent and 22.68 per cent with medium and low level of achievement motivation, respectively. The reason is that an individual's basic character, which drives and assists them in doing anything, is accomplishment motivation. It is a psychological condition that a person internalises and motivates them to strive for greater standards of living and earning. The findings were in agreement with the results of studies conducted by Leelavathi (2017).

5. Innovativeness

The data presented in Table 3. indicates that half of the farmers (81.00 %) were having medium level of innovativeness, whereas 12.90 and 06.10 per cent had low and high level of innovativeness, respectively. The personality of an individual is more so influenced by innovation. A person who is more innovative than others can do tasks faster and with more accuracy. In general, innovations increase with increased levels of formal education. In such circumstances, respondents try to learn more and experiment with new concepts and technologies within their means and constraints. Farmers who are more open to innovation will also try to learn as much as they can about the new technology in order to adopt it as quickly and accurately as possible. Similar results were observed in the studies of Shwetha and Shivalingaih (2018) and Verma (2019)

6. Economic motivation

The data in Table 3. shown that two third of farmers (67.50 %) were found to have medium level of economic motivation, whereas 18.20 and 14.30 per cent of them had low and high level on economic motivation, respectively. It might be the result of a desire for high agricultural returns in order to maintain a high level of living. The other factor might be that farmers are starting to focus more and more on the market in order to increase their profits. This finding is conformity with the findings of Leelavathi (2017) and Shambharkar *et al.* (2018).

7. Decision making pattern

Slightly more than three fifth of farmers (62.51%) were having medium level of decision-making, while 19.90 per cent and 17.59 per cent had high and low level of decision-making respectively (Table 3). The key to improving profits from agriculture and allied activities is to make wise decisions. Farmers must make decisions based on the situation at hand, the resources at their disposal and the paddy sustainability of their farming. Similar results were observed from the studies of Supriya (2016).

8. Value orientation

The data pertaining to Table 3. states that slightly more than half of farmers i.e., 52.79 per cent were possessing medium level of value orientation, followed by 32.40 and 14.81 per cent of them high and low level of the same, respectively. The most likely explanation is that, rural value systems need to be pushed on a larger scale in order to keep up with continuous innovations and modern-day needs. The results of value orientation are in agreement with the results of Mamathalakshmi (2013).

9. Level of Aspiration

The data disclosed in Table 3. revealed that, about 64.35 per cent were having medium level of level of aspiration, whereas 20.83 and 14.82 per cent of them had low and high level of aspiration, respectively. This might be due to the situational circumstances. Similar results were observed in the studies of Sajjan (2006).

10. Risk orientation

It could be observed from table 3. that, majority of the farmers had medium level of risk orientation (53.20 %) followed by high (31.10 %) and low (15.70 %). For the sustainability of their Paddy farming, the farmers in these groups may have made the decision to take a risk and put out the effort to adopt modern agricultural technology or recommended sustainable practices. It might be because farmers need to take risks to make money so that they can enhance their livelihood security. Findings were in line with the Jadhav (2020).

Table 3: Distribution of psychological characteristics of the respondents

S. No.	Characteristics	Category	Class interval	Farmers (n =216)	
				f	%
1.	Management orientation	Low	34-42	23	10.65
		Medium	42-50	155	71.75
		High	50-58	38	17.60
2.	Farming commitment	Low	14-17	32	14.82
		Medium	17-20	66	30.56
		High	20-23	118	54.62

3.	Scientific orientation	Low	19-23	52	24.80
		Medium	23-27	127	58.10
		High	27-31	37	17.10
4.	Achievement motivation	Low	16-20	49	22.68
		Medium	20-24	55	25.46
		High	24-28	112	51.86
5.	Innovativeness	Low	12-16	28	12.90
		Medium	16-20	175	81.00
		High	20-24	13	06.10
6.	Economic motivation	Low	10-13	39	18.20
		Medium	13-16	146	67.50
		High	16-19	31	14.30
7.	Decision making pattern	Low	18-23	38	17.59
		Medium	23-28	135	62.51
		High	28-33	43	19.90
8.	Value orientation	Low	12-16	32	14.81
		Medium	16-20	114	52.79
		High	20-24	70	32.40
9.	Level of Aspiration	Low	19-24	45	20.83
		Medium	24-29	139	64.35
		High	29-34	32	14.82
10.	Risk orientation	Low	15-20	34	15.70
		Medium	20-24	115	53.20
		High	24-29	67	31.10

f= frequency of farmers, Per cent = %

CONCLUSION

It has become increasingly important to embrace recommended sustainable practises and utilise inputs like equipment and fertiliser application. Sustainable business practises increase productivity without harming the environment. Future studies can explore the synchronicity of adoption of advised sustainable practises. This could assist policymakers in comprehending the aspects affecting farmers as they implement suggested sustainable practises. Investigation revealed that, farmers' adoption choices are heavily influenced by availability of advisory services, agrochemicals, organic fertilizers, education, economic

motivation, innovativeness, achievement motivation, level of aspiration and risk orientation. Governments and line departments should provide farmers with numerous opportunities to learn more about advised sustainable farming techniques through on-campus or off-campus events. As one Nation one fertilizer brings all the farmers under same platform to follow the fertilizer use efficiency across the country to fill the gap between farmers and Bharat brands in order to avoid dealer's black market. With this there will be a enhancement in usage of both organic and inorganic agrochemicals on sustainable basis for sustainability of future generations leads to sustainable agriculture across the country to enhance the life expectancy of people for long healthy life and standard of living. So that, unifying all brands under a single umbrella brand, it aims to increase fertiliser transparency and affordability for all small and marginal farmers along with progressive farmers in the country.

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Image 1. Glimpse of Data collection using standardized interview schedule.