ADOPTION OF RECOMMENDED SUSTAINABLE FARMING PRACTICES IN TELANGANA STATE, INDIA

ABSTRACT

Agriculture had a significant negative impact on environment for many decades. More land, fertiliser and pesticides had been used to increase the yield. Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs. According to research, a number of factors can affect farmers' decisions to effectively implement sustainable practises. This present investigation was undertaken during 2021-22to specify the item wise adoption of recommended sustainable farming practices in three districts namely Nizamabad, Khammam and Nalgonda districts representing North, Central and South agro climatic zones of Telangana state respectively as these three districts account for more paddy area from amongst the respective zones. Purposive sampling technique was employed for data collection from 216 paddy farmers by utilizing well developedstandardisedinterview schedule. Findings revealed thatitem wise adoption of recommended sustainable practices, depictsthe partial adoption of listed components such as puddling, selection of variety, selection of certified seed, seed rate, seed treatment, nursery seed bed raising, age of seedling, time of transplanting, method of transplanting, row spacing, fertilizers application, weed management, integrated pest and disease management, time of harvesting and method of harvesting.It may be a result of the farmers' extensive agricultural experience, participation in and connections with extension services, drive for success, level of desireand innovativeness in their farming methods. The aforementioned pattern of findings was also influenced by the efforts of line departments and front-line extension organisations like the District Agricultural Advisory and Transfer of Technology Centre (DAATTC)and KrishiVigyanKendra's.

Keywords: Adoption, Paddy farmers, Paddy farming sustainability, recommended sustainable farming practices, regression

INTRODUCTION

Sustainable Agriculture has been the buzz word nowadays. The Food and Agriculture Organization defined Sustainable Agriculture, as "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). The Asia-Pacific Region, which is home to more than 56% of the world's population, adds 51 million new rice consumers each year. It is unclear whether the present 524 million tonnes of rice produced annually will be expanded to 700 million tonnes by 2025 using less land, fewer people, less water and fewer pesticides. 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). The obstacles that countries confront in paddy production differ from one another in terms of population, commodity choice and natural endowment to boost production and productivity. Taking all of this into account, annual production must be boosted 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 methods of producing efficiently with soil and water.All of these characteristics, without a doubt, contribute significantly to a country's potential for increased paddy output. India is forging ahead to meet the enormous triple challenges of increasing agricultural output, ensuring socio-economic, technological, institutional and environmental sustainability and alleviating poverty, all of which are exacerbated by climate change, global competition and rapidly expanding technologies.

The research scientist develops new technologies, which the extension functionaries transfer and promote to farming communities. It has been said that researchers developed a significant number of technologies whichare extremely beneficial to farmers. Simultaneously, it is clear that, with the exception of few technologies, primarily some good crop cultivars, few technologies have either reached farms on a large scale or farmers have truly recognised their contribution to increasing production in the short run or increasing sustainability in the long run.The available sustainable practices include direct seeding, alternate wetting and drying (water smart), alley ways formation (pest and disease smart), climate resilient technologies (climate smart) and recommended agronomic practises such as effective crop and soil management, improved inputs, land levelling and biomass removal etc., CoreCarbonX (CCX) and Vida Carbon Corp have worked on a project to assist the paddy farming community in Telangana in implementing enhanced water management techniques in 100,000 hectares of rice fields.Telangana farmers have no financial incentive to preserve water or energy because both are completely subsidised. CCX intends to address this issue by educating farmers on "alternative wetting and drying" approaches. A gauge is used in this farming practise to display how much water is in various regions of the field. Farmers can carefully control the water supply to their crops with this technology. Methane emissions can be reduced by restricting the amount of time rice fields are submerged in water.Without changing any other agricultural production inputs, seed substitution can increase output by 10-20% (Pandey *et al.* 2020). Tractors, combine harvesters, and tube well irrigation are widely used, although paddy transplanters, direct seeded rice technologies, and mechanical weeders are less adopted. Farmers adopted new implements, equipment, and techniques on their farm when the government provided financing through various schemes (Lather 2020). A survey was undertaken from 2017 to 2019 throughout two kharif and two rabi seasons revealed intriguing statistics such as the formal sector contributing 96 to 100% of SRR for commercial crops, 70 to 90% for cereals, 75 to 100% for pulses, and negligible for oilseeds. The biggest contribution of the formal sector is due to the prevalence of seed subsidy programmes and the availability of excellent seeds. The informal supply of seed mostly consists of farmer-to-farmer exchange and farm conserved seeds, which are important sources of seeds for resource-poor farmers(Prabhavathi*et al.* 2020). (Serebrennikov*et al.* 2020), reported that, practically all research in their systematic reviews found a favourable relationship between the adoption of sustainable practises and environmental attitude and claimed that, perception is an important component in influencing whether or not sustainable practises will be adopted. Agriculture accounts for approximately 17% of greenhouse gas emissions that contribute to global climate change.(Lynch *et al.*2021). During the last three decades, paddy demand has steadily increased, and it has played an important role in strategic food security, as well as in the planning and development of policies across many nations(FAO 2021). A variety of factors contribute to the spread of pests and plant ailments. Increased temperature and precipitation levels promote pest species establishment and spread by providing a warm, humid habitat and the necessary hydration for development. Pesticides, fertilisers, and farm chemicals used to combat pests and diseases can contaminate freshwater, marine habitats, the atmosphere, and the soil(Sen *et al.* 2021).While agricultural productivity has expanded dramatically, the change from natural farming to agriculture has reduced soils' ability to sustain them, resulting in negative impacts such as soil erosion, compaction, soil structure loss, nutrient degradation, and soil salinity. This causes soil deterioration and changes in hydrological conditions(Srinivasarao*et al.* 2021). When researching mechanisms to improve China's agriculture system, Eco-compensation was introduced as a moderation (Li *et al.* 2021). Paddy is grown in 152 million hectors around the world and yields 586 million tonnes. Asian countries cover more than 90% of the paddy area, accounting for over 92% of global production, while Asians consume approximately 90% of global consumption. China, India, Indonesia, Bangladesh, Thailand, Japan, Pakistan, Burma, and Brazil are among the fastest expanding economies(Papademetriou(space)2022). Paddy SRR in Uttar Pradesh's Chandauli district reduced yield under irrigated conditions due to lack of adoption of sustainable practises such as reduced SRR. Farmers with advanced technical expertise rely heavily on sustainable practises such as crop rotation, land rotation, green and organic manures, integrated pest management (IPM), rotational grazing, seedbed preparation, and cultivation for weed control(Ouattara*et al.* 2022).(et al..,2022)

MATERIALS AND METHODS

The research investigation employedEx-post-facto-research design as the event has already happened. The present study aimed to assess item wiseadoption ofrecommended sustainable farming practices which includes 53 itemscomprising the data from three different zones of the Telangana state. Three districts namely Nizamabad, Khammam and Nalgonda from each zone of Telangana state wereselected for the purpose during the year2021-2022 as these three districts account 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.Two blocks from each district were selected based onpaddy area which constitutes a total of six blocks. Again, from each block, three villages were selected by using simple random technique comprising 18 villages. In each identified village, 12(space)farmers were selected by using simple random technique. About 72 respondents were selected from each district. Thus, the total respondents constituted for the purpose was 216 farmers. Adoption is not an instant decision. It is a process through which an individual passes from first hearing of an innovation to its final adoption.Adoption was operationalized as practising the recommended practices by the farmers as per recommendations.The response of each statement was rated on three-point continuum namely completeadoption, partial adoption, noadoption with the scores of 3,2 and 1 for positive statements and 1,2 and 3 for negative statements, respectively.Thus, the possible score for adoption ranges between minimum of 53 and maximum of 159.Both descriptive and inferential statistics such as means, percent, frequency and rank were employed.

RESULTS AND DISCUSSIONS

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

1. Puddling

The results revealed that, majority of the farmers (92.59 %) were completely adopting the practice of about 4-5 cm standing water for puddling,followed bypartial adoption(07.41 %)and no adoption (00.00 %). Puddling is the basic operation for paddy cultivation and this may be the reason why majority of the respondents are resorting to puddling. Similar findings were quoted by Matto(2014) and Karangami (2017).

2. Selection of variety

It was reported that, 50.92 per cent of farmers fall under partial adoption, followed by complete adoption of about nearly two fifth (35.19 %) and no adoption (13.89 %) of selection of variety according to market demand.

Slightly more than half of growers (53.24 %) were having a partial adoption of selection of variety is based on pest and disease tolerance, while 27.77 and 18.99 per cent of them had a complete and no adoption, respectively.

Half of the farmers (51.85 %) had partial adoption, while 31.49 and 16.66 per cent of them had complete and no adoption on selection of variety is based on duration, respectively.

Nearly two fifth of farmers (39.36 %) were having partial adoption of sowing the recommended varieties in their area, while 30.55 and 30.09 per cent of them had no adoption and complete adoption, respectively.Hence, the probable reason for the above trend might be due to field extension officers and functionaries do have interactions with farmers to manage the crop planning, production, various aspects of seed selection and marketing activities and re-orient level of crop management practices.This finding was in tune with the results ofMatto(2014) and Karangami (2017).

3. Selection of certified seed

62.97 per cent expressed partial adoption of use of quality certified seeds, while 18.98 and 18.05 per cent were falling under the complete and no adoption, respectively.

Slightly more than half of farmers (53.25 %) were having partial adoption, followed by complete (34.72 %) and no adoption (12.03 %) of selection of certified seed based on seed size and seed germination.

It was indicated that two third of farmers (66.68 %) were having partial adoption of sowing Paddy as per the recommended methods, transplanting method, while 19.44 per cent of them had complete adoption, whereas 13.88 per cent for no adoption. This might be due to farmer's confusion with private and government subsidy seed material. Some dealers were selling poor quality seed material and extension functionaries had looked after this issues and addressed the same in study areas.The results were in agreement with the findings of Matto(2014) and Karangami (2017).

4. Seedrate

It disclosed that little less than half offarmers (47.24 %) had partial adoption of the recommended seed rate. While only 38.88 per cent of the farmers had complete and 13.88 per cent of the farmers had no adoption of recommended seed rate. The probable reason for this trend might be due to own practice gives higher yield rather than recommended seed rate due to weather and climate change constraints from time to time and region to region.Similar results were observed in the studies ofMatto(2014) and Karangami (2017).

5. Seed treatment

It presents that nearly half of farmers (47.22 %) were not adopting seed treatment with fungicide or bioagents (Trichoderma, Azosprillum), whereas a little over one fourth (37.04 %) and 15.74 per cent ~~per cent~~ had partial and completeadoption, respectively.

Half of the farmers (82.88 %) were having complete adoption, followed by partial (13.42 %) and no adoption (03.70 %) of pre-germination of paddy seeds. The pertinent reasons may be that,most of the farmers had felt that pre-germination of paddy seed is good rather than other chemical methods of seed treatment.This result is in accordance with the results ofMatto(2014) and Karangami (2017).

6. Nursery seed bed raising

It states that two third of them had 66.21 per cent of partial adoption of soil test-based fertilizer application, whereas 22.68 and 11.11 per cent had no adoption and complete adoption, respectively.

It concluded that half of the farmers (56.95 %) were having a partial adoption of raise size of seed bed at 100 m^2 for seedling, whereas 25.00 and 18.05 per cent of them had a complete and no adoption, respectively.

Slightly more than the three fifth (61.12 %) were having a partial adoption, whereas 24.07 per cent and 14.81 per cent of them had complete and no adoption of raising seed bed at 5 to 6 cm for seedling, respectively.

Half of the respondents (80.11 %) were having partial adoption of preparing seed bed during (1st week of June- Kharif), (1st week of October- Rabi), followed by complete (17.12 %) and (02.77 %) of them were in no adoption.

It stated that majority of them (62.97 %) were having partial adoption, whereas 20.83 and 16.20 per cent of them had no adoption and complete adoption of applying 20 kg of neem or castor cake; 0.5-1.0 kg N, 0.5 kg P_2O_5, 0.5 kg k_2O or 50 gms ammonium sulphate, 37 gms single super phosphate per seed bed at the time of seed bed preparation, respectively.

Three fourth of farmers (75.46 %) were completely adopting the practice of sowing at the recommended time, kharif-for transplanting method:3rd week of May to 1st fortnight of June, October-rabi, while 19.92 and 04.62 per cent of them had a partial and no adoption, respectively.

It was found that majority of users (50.01 %) were having partial adoption of applying the recommended dosage of fertilizers at the time of nursery preparation,(space)275 g Urea,450 g DAP per 100 m^2, 200 g MOP, whereas 43.05 and 06.94 per cent of them had a complete and no adoption, respectively.

Large majority of farmers (70.84 %) were having partial adoption, followed by no adoption (17.59 %) and complete adoption (11.57 %) of sowing 40-50 kg seed on raised bed of 100 m^2.

It indicated that more than two fifth (43.53%) were having partial adoption of sowing seed at 10 cm apart rows across the raised bed length, followed by no adoption (39.35 %) and complete adoption (17.12 %).The probable reasons might attribute to most farmers unaware of importance of soil health card given by soil health card scheme through extension workers, on timepreparation ofnursery seedbed,nursery bed preparation practices were done as per their convenience in the field, sowingon the recommended time and applying the fertilizers at the time of nursery preparation with very few recommendations.Findings were in line with the Matto(2014) and Karangami (2017).

7. Age of seedling

79.18 per cent of farmers were having a partial adoption of transplanting 25 to 40 days old seedling, while 15.27 per cent and 05.55 per cent of them had complete and no adoption, respectively

It disclosed that large numbers of the respondents (69.91 %) were having partial adoption, followed by complete (26.85 %) and no adoption (03.24 %) of trimming of top aged seedlings before late transplanting.

92.60 per cent of them were having complete adoption of maintaining closer spacing of aged seedlings, followed by equal per cent of partial adoption (03.70 %) and no adoption (03.70 %).

It found that majority of respondents (91.67 %) had complete adoption, followed by partial adoption (04.63 %) and no adoption (03.70 %) of increasing number of aged seedlings per hill.The reason forthis might be due to labour shortage during peak season as most of the farmers does sowing at the right time to avoid yield loss and somefarmers expressed that due to other crops activities also coincide sometimes to perform the field operation practices.This finding was in tune with the results ofMatto(2014) and Karangami (2017).

8. Time of transplanting

It stated that majority of the farmers (90.74%) had complete adoption of recommended time of transplanting, 05.56 per cent had partial and only 03.70 per cent of the farmers had no adoption of recommended time of transplanting in (first fortnight of June-July kharif), (October November- rabi).The pertinent reasons may be that most of the farmers hadgood 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 technologies.The results were in agreement with the findings ofMatto(2014) and Karangami (2017).

9. Method of transplanting

It reveals that half of the farmers (89.81 %) were having complete adoption of transplanting the recommended number of seedlings per hill, 2-3 seedlings per hill, while 06.49 per cent and 03.70 per cent of them had partial and no adoption, respectively.The farmers had realized to avoid gap filling in later stages if any damage of seedlings per hill.Similar results were observed in the studies ofMatto(2014) and Karangami (2017).

10. Row spacing

Regarding the recommended spacing between the two hills, a majority (53.71%) of the farmers had complete adoption followed by two fifth 45.83 per cent and 00.46 per cent had partial and no adoption of recommended spacing respectively. Most farmers had realized to avoid pest and disease in further stages of crop growth and nutrition competition. In fact, to get proper sun light to entire crop.This result is in accordance with the results ofMatto(2014) and Karangami (2017).

11. Fertilizers in transplanted paddy

Slightly more than half of farmers (50.47 %) had partial adoption of recommended basal dose: ½ dose of N & full dose of P2O5, K2O and ZnSO4, top dressing: remaining ½ dose of N in 2 splits: -1st at early tillering stage (15-18 Days After Transplanting), -2nd at panicle and flag leaf initiation (30 Days After Transplanting), while 46.29 per cent and 03.24 per cent of them had complete and no adoption, respectively.

Two third of the farmers had partial adoption (68.07 %), while 27.31 and 04.62 per cent of them were having complete and no adoption of applying the recommended dosage of nutrients for crop, farm yard manure @ 10 T/ha, N @ 120 kg/ha, P2O5 @ 60 kg/ha, K2O @ 40 kg/ha, ZnSO4 @ 10 – 15 kg/ha, respectively.

Nearly three fifth 59.74 per cent of them were having partial adoption of application of 250 g of ammonium sulphate after transplanting of 8-10 days and 15-18 days, whereas 35.64 and 04.62 per cent of them had a complete and no adoption, respectively. The probable reason for the above trend might be that as per requirement of fertilizers farmers followed the same.Findings were in line with theMatto(2014) and Karangami (2017).

12. Weed management in transplanted paddy

Slightly more than three fifth of farmers(61.59 %) had partial adoption of recommended weed management. While as, nearly two fifth 35.64 per cent and 02.77 per cent of the farmers had complete and no adoption of recommended weed management with the statement of apply 1.5-2.0 kg ai ha^{-1}butachlor at 4 to 7 DAT for weed control respectively.

With the statement of start weeding at 45 to 50 days after transplanting farmers were in partial adoption (84.27 %), while 11.11 per cent and 04.62 per cent of them had complete and no adoption, respectively.Reason for partial adoption of weed management is based on availability of weedicidesin the particular block andfarmers practiced the(their)own field operations accordingly.The results were in agreement with the findings ofMatto(2014) and Karangami (2017).

13. Integrated pest and disease management

With respect to the item,cultural practiceof stem borer –collection and destruction of stubbles in field shows that, half of the farmers (73.62 %) were having partial adoption, while 13.42 per cent and 12.96 per cent of them had no and complete adoption, respectively.

It indicated that nearly three fifth (59.73 %) of the farmers had partial adoption of the mechanical practice such as removal and destruction of infested plant parts. While as, only 23.61 per cent of the farmers had complete and 16.66 per cent of the farmers had no adoption of mechanical practice- removal and destruction of infested plant parts.

Slightly more than half of the farmers (54.18 %) had partial adoption followed by 27.31 per cent and 18.51 per cent had complete and no adoption of cultural practice viz., a) applyingCarbofuran 10 kg/ac, respectively.

Half of the farmers opinedthat (55.57 %) had partial adoption of recommended application ofChlorpyriphos 2.5 ml/l of water, whereas, 30.55 per cent and 13.88 per cent had complete and no adoption, respectively.

51.86 per cent of farmers were having a partial adoption, while 31.94 per cent and 16.20 per cent of them had complete and no adoption of recommended application of chlorantraniliprole 4 kg/ac, respectively.

It was concluded that,more than half of the farmers (52.32 %) had partial adoption of the cultural practice of brown plant hopper a) sprayingMonocrotophos 2.2 ml/litre of water/ac. While as, only 30.09 per cent of the farmers had completed and 17.59 per cent of them had no adoption.

With regard to item b) sprayingAcephate 1.5 gms/litre of water revealed that majority of respondents were in partial adoption (81.49 %), followed by complete adoption (12.96 %) and no adoption (05.55 %).

It was stated that,two third of farmers (65.29 %) were partially adopting cultural practice in leaf folder - collection and destroying eggs and larvae, while 26.38 per cent and 08.33 per cent of them were having complete and no adoption, respectively.

62.97, 25.92 and 11.11 per cent of them had a partial, complete and no adoption of cultural practice- (a) sprayingMonocrotophos 1.6 ml/litre of water, respectively.

It found that slightly more than the three fifth of farmers (63.44 %) were partial adoption, whereas 29.62 and 06.94 per cent of them (b) sprayingchloripyriphos 2.5ml/litre of water/ac. adopters had complete and no adoption, respectively.

It observed that more than half of the farmers 58.80 per cent were in partial adoption, while 30.09 and 11.11 per cent of them had complete and no adoption of cultural practice in Blast – a) sprayingTricyclazole @ 0.6 gms/litre of water, respectively.

More than two fifth of the farmer 61.12 per cent were having a partial adoption of cultural practice in Bacterial leaf blight (a)Strepthocycline (200 ppm) 0.2 gms//litre of water or (b) spraying Copperoxycloride solution 3 gms/litre of water, followed by complete (28.24 %) and noadoption (10.64 %).

It showed that more than half of the farmers (54.18 %) were having partial adoption, while 34.25 and 11.57 per cent of them had complete and no adoption of cultural practice in false smut of (a) sprayingHexaconazole 2ml/litres of water, respectively.

Little less than half of the farmers 44.45 per cent were having partial adoption of (b) sprayingPropiconazole 1 ml/litres of water, whereas 31.94 and 23.61 per cent of them had complete and no adoption, respectively.

It was observed that, most farmers were having partial adoption (47.23 %), while 39.81 and 12.96 per cent of them had a complete and no adoption of cultural practice in sheath blight of (a) sprayingHexaconazole 2ml/l, respectively.

It was stated that majority of farmers had partial adoption of (b) sprayingPropiconazole 1 ml/litres of water (55.11 %), followed by complete adoption (27.77 %) and no adoption (17.12 %).

It indicates that nearly half of them were having partial adoption (62.97 %), whereas 25.00 and 12.03 per cent of them had complete and no adoption of (c) sprayingAzoxystrobin + Tebuconazole 0.4 gms/l, respectively.Reason might be due to many aspects, like based on availability of agrofertilizersin particular block varies with region to region and trade name of agrochemicals get changes accordingly farmers practiced the field operations.This result is in accordance with the results of Matto(2014) and Karangami (2017).

14. Time of harvesting

Table 1. indicates that half of the farmers (82.40 %) were having complete adoption on time of harvesting, whereas 11.11 and 06.49 per cent had no and partialadoption on time of harvesting at the recommended time, respectively.The pertinent reasons may be that in order to avoid monsoon occurrence during harvesting time and to save their yield on conserved basis.Findings were in line with theMatto(2014) and Karangami (2017).

15. Method of harvesting

It observed that majority of the farmers stated thatwith the statement harvesting manually or machine was 87.96 per cent of farmers were having completeadoption, while 08.34 per cent and 03.70 per cent of them had partial and no adoption, respectively.

Half of the farmers opined that (87.50 %) were having complete adoption, whereas 08.80 and 03.70 per cent had partial and no adoption of drying paddy after harvesting for 1 to 2 dayswhereas 85.64 per cent them fall under complete adoption category on croprotation(growinglegumesbeforecereals)to enhancefarms biologicalstability followed by partial (10.64 %) and no adoption (03.72 %) category. Most farmers preferring combine harvester to avoid yield loss in the field and high cost of labour charges during peak season time.This result is in accordance with the results of Matto(2014) and Karangami (2017).

Table1:Item wise adoption of recommended sustainable farming practices

S. No.	Practices	CA	PA	NA	Mean score	Overall Rank
		f&%	f&%	f&%		
1	**Puddling**					
1.1	4-5 cm standing water for puddling	192 (92.59)	16 (07.41)	0 (00.00)	2.925	01
2	**Selection of variety**					
2.1	Selection of variety according to market demand	76 (35.19)	110 (50.92)	30 (13.89)	2.213	25
2.2	Selection of variety based on pest and disease tolerance.	60 (27.77)	115 (53.24)	41 (18.99)	2.083	40
2.3	Selection of variety based on duration	68 (31.49)	112 (51.85)	36 (16.66)	2.148	31
2.4	Sowing the recommended varieties in your area? name it	65 (30.09)	85 (39.36)	66 (30.55)	02.00	47
3	**Selection of certified seed**					
3.1	Use of quality certified seed material	41 (18.98)	136 (62.97)	39 (18.05)	2.004	46
3.2	Selection of certified seed based on seed size& seed germination.	75 (34.72)	115 (53.25)	26 (12.03)	2.232	20
3.3	Sowing Paddy as per the recommended methods? -Transplanting Method -Direct Sowing Method	42 (19.44)	144 (66.68)	30 (13.88)	2.604	12
4	**Seed rate**					
4.1	Use the recommended seed rate? -For Transplanting: Kharif - 60-80 kg/ha, (Rabi-80-100 kg/ha)	84 (38.88)	102 (47.24)	30 (13.88)	2.251	19
5	**Seed treatment**					
5.1	Seed treatment with fungicide or bio-agents (Trichoderma,Azosprillum)	34 (15.74)	80 (37.04)	102 (47.22)	1.688	53
5.2	Pre-germination of paddy seeds	179 (82.88)	29 (13.42)	08 (03.70)	2.790	09
6	**Nursery seed bed raising**					
6.1	Soil test based fertilizer	24	143	49	1.883	51

	application	(11.11)	(66.21)	(22.68)		
6.2	Raise size of seed bed at100 m^2 for seedling	54 (25.00)	123 (56.95)	39 (18.05)	2.069	43
6.3	Raise seed bed at 5 to 6 cm for seedling	52 (24.07)	132 (61.12)	32 (14.81)	2.093	37
6.4	Prepare seedbed during (1st week of June-kharif), (1^{st} week of October- rabi)	37 (17.12)	173 (80.11)	6 (02.77)	2.144	33
6.5	Apply 20 kg of neem or castor cake; 0.5-1.0 kg N, 0.5 kg P_2O_5, 0.5 kg k_2O or 50 gms ammonium sulphate, 37 gms single super phosphate per seed bed at the time of seed bed preparation	35 (16.20)	136 (62.97)	45 (20.83)	1.953	49
6.6	Sow on the recommended time of Sowing? Kharif-Fortransplanting method:3rd week of May to 1st fortnight of June, October-Rabi	163 (75.46)	43 (19.92)	10 (04.62)	2.711	11
6.7	Apply the recommended dosage of fertilizers at the time of nursery preparation? -275 g Urea -450 g DAP per 100 m^2 -200g MOP	93 (43.05)	108 (50.01)	15 (06.94)	2.362	15
6.8	Sow 40-50 kg seed on raised bed of 100 m^2.	25 (11.57)	153 (70.84)	38 (17.59)	1.939	50
6.9	Sowseed at 10 cm apart rows across the raised bed length.	37 (17.12)	94 (43.53)	85 (39.35)	1.776	52
7	**Age of seedling**					
7.1	Transplant 25 to 40 days old seedling	33 (15.27)	171 (79.18)	12 (05.55)	2.093	37
7.2	Trimming of top for aged seedlings before late transplanting	58 (26.85)	151 (69.91)	07 (03.24)	2.232	20
7.3	Maintaining closer spacing of aged seedlings	200 (92.60)	08 (03.70)	08 (03.70)	2.888	02
7.4	Increasing number of aged seedlings per hill	198 (91.67)	10 (04.63)	08 (03.70)	2.879	03
8	**Time of transplanting**					
8.1	Transplant in (first fortnight of June-JulyKharif), (October November-Rabi)	196 (90.74)	12 (05.56)	08 (03.70)	2.869	04
9	**Method of transplanting**					

9.1	Transplant the recommended number of seedlings per hill? 2-3 seedlings per hill	194 (89.81)	14 (06.49)	08 (03.70)	2.860	05
10	**Row spacing**					
10.1	Maintain the recommended spacing between the two hills? -15 x 15 cm	116 (53.71)	99 (45.83)	01 (00.46)	2.534	13
11	**Fertilizers in transplanted paddy**					
11.1	Apply fertilizers as per the recommended? • Basal Dose: ½ dose of N & full dose of P2O5, K2O & ZnSO4 • Top Dressing: Remaining ½ dose of N in 2 splits: -1st at early tillering stage (15-18DAT) -2nd at panicle and flag leaf initiation (30 DAT)	100 (46.29)	109 (50.47)	07 (03.24)	2.432	14
11.2	Apply the recommended dosage of nutrients for crop? • FYM @ 10 T/ha • N @ 120 kg/ha • P2O5 @ 60 kg/ha • K2O @ 40 kg/ha • ZnSO4 @ 10 – 15 kg/ha	59 (27.31)	147 (68.07)	10 (04.62)	2.227	22
11.3	Apply 250 g of ammonium sulphate after transplanting of 8-10 days and 15-18 days.	77 (35.64)	129 (59.74)	10 (04.62)	2.311	17
12	**Weed management in transplanted paddy**					
12.1	Apply 1.5-2.0 kg ai ha^{-1}butachlor at 4 to 7 DAT for weed control	77 (35.64)	133 (61.59)	06 (02.77)	2.330	16
12.2	Start weeding at 45 to 50 days after transplanting	24 (11.11)	182 (84.27)	10 (04.62)	2.065	45
13	**Integrated pest and disease management**					
13.1	**Stem borer - CLP**- Collect and destruct stubbles in field.	28 (12.96)	159 (73.62)	29 (13.42)	1.995	48
13.2	**MP**- Removal and destruction of infested plant parts.	51 (23.61)	129 (59.73)	36 (16.66)	2.069	43
13.3	**CP**- a) Apply Carbofuran10	59	117	40	2.088	39

	kg/ac	(27.31)	(54.18)	(18.51)		
13.4	b) Apply Chloripyriphos2.5 ml/t of water	66 (30.55)	120 (55.57)	30 (13.88)	2.167	29
13.5	c) Apply chlorantraniliprole4 kg/ac.	69 (31.94)	112 (51.86)	35 (16.20)	2.158	30
13.6	**Brown plant hopper – CP –** a)Spray Monocrotophos2.2 ml/litter of water/ac	65 (30.09)	113 (52.32)	38 (17.59)	2.125	35
13.7	b) Spray Acephate 1.5 gms/litter of water	28 (12.96)	176 (81.49)	12 (05.55)	2.074	42
13.8	**Leaf folder - CLP-** Collect and destroy eggs and larvae.	57 (26.38)	141 (65.29)	18 (08.33)	2.181	27
13.9	**CP-** a) Spray Monocrotophos1.6 ml/litter of water	56 (25.92)	136 (62.97)	24 (11.11)	2.148	31
13.10	b) Spray Chloripyriphos2.5ml/litter of water/ac.	64 (29.62)	137 (63.44)	15 (06.94)	2.227	22
13.11	**Blast** – **CP** – a) Spray Tricyclazole @ 0.6 gms/litter of water	65 (30.09)	127 (58.80)	24 (11.11)	2.190	26
13.12	**Bacterial leaf blight – CP -** a)CP- Strepthocycline (200 ppm) 0.2gms//litre of water b) Spray Copper oxycloride solution (3 gms/litre of water	61 (28.24)	132 (61.12)	23 (10.64)	2.176	28
13.13	**False smut** – a)CP-Spray Hexaconazole 2ml/litres of water	74 (34.25)	117 (54.18)	25 (11.57)	2.227	22
13.14	b) Spray propiconazole 1 ml/litres of water	69 (31.94)	96 (44.45)	51 (23.61)	2.083	40
13.15	**Sheath blight- CP-** a) Spray Hexaconazole 2ml/l	86 (39.81)	102 (47.23)	28 (12.96)	2.269	18
13.16	b) Spray propiconazole 1 ml/litres of water	60 (27.77)	119 (55.11)	37 (17.12)	2.106	36
13.17	c) Spray Azoxystrobin +	54 (25.00)	136 (62.97)	26 (12.03)	2.130	34

	Tebuconazole 0.4 gms/l					
14	**Time of harvesting**					
14.1	Harvest crop at the recommended time? -At physiological maturity stage when leaves and panicles turn yellow.	178 (82.40)	14 (06.49)	24 (11.11)	2.720	10
15	**Method of harvesting**					
15.1	Harvest manually or machine	190 (87.96)	18 (08.34)	08 (03.70)	2.841	06
15.2	Dry paddy after harvesting for 1 to 2 days	189 (87.50)	19 (08.80)	08 (03.70)	2.837	07
15.3	Croprotation(growinglegumesbeforecereals)toenhancefarms biologicalstability.	185 (85.64)	23 (10.64)	08 (03.72)	2.818	08

f = frequency of farmers, Per cent = %, (Figures in parentheses indicate percentages), CA = Complete adoption, PA = Partial adoption, NA = No adoption

2. Contribution of selected independent factors on Adoption of recommended sustainable farming practices.

Multiple linear regression analysis was carried out to determine the contribution of the selected factorsin predicting the adoption of recommended sustainable farming practices.

Null hypothesis: There will be no contribution of the factors viz; age, education, annual income, land holding, farming experience,mass media exposure, extension contact, extension participation, management orientation, farming commitment, scientific orientation, achievement motivation, innovativeness, economic motivation, decision making pattern, value orientation, level of aspiration, risk orientationandadoption of recommended sustainable farming practices.

Empirical hypothesis: There will be a significant contribution of the factors viz; age, education, annual income, land holding, farming experience,mass media exposure, extension contact, extension participation, management orientation, farming commitment, scientific orientation, achievement motivation, innovativeness, economic motivation, decision making pattern, value orientation, level of aspiration, risk orientationandadoption of recommended sustainable farming practices.

On the whole it could be observed from the table 2. that theadoption of recommended sustainable farming practices and the explanatory variables were dispensing multiple regression coefficients of 1.817which was found to be highly significant. The selected variables such asage, education, annual income, land holding, farming experience,mass media exposure, extension contact, extension participation, management orientation, farming commitment, scientific orientation, achievement motivation, innovativeness, economic motivation, decision making pattern, value orientation, level of aspiration,risk orientationtogether contributed to the tune of total variation to the extent of 88 per cent. The unexplained variation to the extent of 12 per cent may be attributed to the factors which were not included in the study.The F value 98.3671was found to be showing significant variation at 99% confidence level.This confirms the regression equation as a model of fit for the impact of personal, communication and psychological factors on the adoption of recommended sustainable farming practices.

Table 2: Multiple linear regression analysis of profile characteristics on Adoption of recommended sustainable farming practices. n=(216)

S.No.	Profile characteristics	Regression coefficient	Standard error	't' value
1.	Age	0.0354	0.0111	3.1722**
2.	Education	0.391	0.149	2.633**
3.	Annual income	0.3780	0.1310	2.8851**
4.	Land holding	-0.1666	0.1112	-1.4972 ^{NS}
5.	Farming experience	0.1736	0.0574	3.0222**
6.	Mass media exposure	0.0098	0.0210	0.4674 ^{NS}
7.	Extension contact	0.0193	0.0487	0.3967 ^{NS}
8.	Extension participation	0.1089	0.0340	3.1961**
9.	Management orientation	0.0725	0.0173	4.1779**
10.	Farming commitment	0.353	0.154	2.331*
11.	Scientific orientation	-0.0958	0.0360	-2.6574 ^{NS}
12.	Achievement motivation	-0.0397	0.0287	-1.3834 ^{NS}
13.	Innovativeness	0.0756	0.0340	2.2200*
14.	Economic motivation	0.353	0.154	2.331*
15.	Decision making pattern	0.0160	0.0207	0.7734 ^{NS}

16.	Value orientation	0.1723	0.0430	4.0010**
17.	Level of Aspiration	0.629	0.378	1.664*
18.	Risk orientation	0.7729	0.0347	22.2637**

Multiple R = 1.817, R^2= 0.888, F = 98.3671
** Significant at 1% level, * Significant at 5% level, NS: Non-significant

Age, education, annual income, farming experience, extension participation, management orientation, value orientation and risk orientation were most important determinants of adoption of recommended sustainable farming practices, since it was most visible and tangible aspect that made variation in the adoption of recommended sustainable farming practices at 99 per cent level of significance and farming commitment, innovativeness, economic motivation, level of Aspiration significantly contributed for the variation in adoption of recommended sustainable farming practices at 95 % level of significance. While Land holding, mass media exposure, extension contact, scientific orientation, achievement motivation and decision-making pattern were having non-significant. Hence,the null hypothesis was rejected and empirical hypothesis was accepted. The alternative hypothesis that there is significant contribution of independent factors on adoption of recommended sustainable farming practices was accepted. From the results, it could be inferred that the plausible reasons might be that personal, communication and psychological factors were the deciding factors of adoption of recommended sustainable farming practices. Independent variables were having synergic effects to one other, helping each other to have a contribution to the adoption of recommended sustainable farming practices.These findings are similar with the results of Sunitha (2015).

CONCLUSION

Increasing use of inputs such as fertilizer application and equipment, recommended sustainable practices adoption has become necessary for sustainable farming. Sustainable practices boost output, while having no detrimental influence on environment. The simultaneities among adoption of recommended sustainable practices can be examined in future research. This may help policymakers to understand factors influencing on farmers while adopting recommended sustainable practices. Results revealed that farmers' adoption choices are heavily influenced byavailability of advisory services, agrochemicals, organic fertilizers, education, economic motivation, innovativeness, level of aspiration and risk orientation. As line departments and governments should make it possible for farmers to learn more about recommended sustainable farming practices through various means and methods at on or off campus activities.

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