Impact of Technologies Assessed, Refined, Demonstrated and Disseminated to Paddy Farmers - A Case Study

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Abstract

The present paper highlights the level of knowledge and extent of adoption of paddy production technologies and the impact on productivity and profitability of farmers in Karimnagar district of Telangana State. Ex post facto research design was adopted and ninety farmers were selected for the study. A high level of knowledge, high extent of adoption and a minimum of ten percent increased productivity and profitability were observed among the farmers adopting the technologies as compared to the non-adopter farmers. A positive and significant correlation was observed with most of the profile characteristics of farmers adopting the technologies when compared to non-adopter farmers.

Keywords: Knowledge, Adoption, Productivity, Profitability, Paddy, Production technologies

The Krishi Vigyan Kendra (KVK), Karimnagar is working to pioneer suitable location specific technologies for its mandatory crops such as paddy, cotton, maize, groundnut, redgram, *etc.* This paper is mainly focused on paddy crop which is one of the prominent crops of the region. Technologies are continuously assessed, refined, demonstrated and disseminated for the benefit of the farming community. Important technologies of paddy which are disseminated include soil test based fertilizer application, growing of green manuring crop preceding paddy, seed treatment, nursery management, introduction of improved varieties, weed management, fertilizer management, water management, pest and disease management, System of Rice Intensification (SRI), modified SRI, direct seeding with drum seeder, aerobic rice management of zinc deficiency, Integrated Pest Management (IPM), Integrated Nutrient Management (INM), hybrid seed production and usage of post emergence herbicides.

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KVK, Karimnagar conducted "Farmer Field Schools" (FFS), in the 15 adopted villages, on paddy crop to improve the production and productivity through Integrated Crop Management (ICM), direct seeding and hybrid seed production *etc.* The FFS was expected to enhance the knowledge and adoption of recommended package of practices in paddy crop. The KVK is also acting as a resource and knowledge centre for technologies in the district.

This paper examines the performance of the KVK in terms of the paddy technologies percolated among the farmers of Karimnagar district.

The objectives are (a) to study the personal, psychological, socio-economic and situational characteristics of farmers adopted by the KVK, (b) to compare the level of knowledge and extent of adoption of paddy technologies by these farmers; and (c) also study the impact of technology adoption on productivity and profitability of paddy crop.

Methodology

Ex-post facto research design combined with exploratory type of research design was adopted. Prakasam KVK was selected purposively as it was recognized as the best KVK for the year 2006-07 by the Indian Council of Agricultural Research (ICAR) at the National level. It has been serving the farming community for over two decades.

Fifteen villages where KVK worked during the period 1993-2008 constituted the study area. The sample consisted of two categories i.e. farmers adopting KVK technologies and farmers not adopting KVK technologies. This paper presents the result drawn from the survey of a total of 60 farmers adopting technologies and 30 non-adopter farmers, growing paddy crop. From each village, four farmers who are adopting the technologies and two farmers who are not adopting the KVK technologies were randomly selected and served as respondents.

Findings

Profile of the Paddy Farmers

Most of the farmers adopting KVK technologies belonged to middle age, with high level of mass media exposure, extension contact, innovativeness, scientific orientation and economic orientation. Non-adopters belonged to middle age group and had medium to low level of mass media exposure, extension contact, innovativeness, scientific orientation and economic orientation. It can be understood

that high level of social participation, mass media exposure shall drive the individuals to have high level of extension contacts. Under normal circumstances the young and middle aged individuals are attracted easily to experiment with new technology due to their innovativeness and risk orientation.

Level of Knowledge of Farmers on Technologies Imparted through KVK

The levels of knowledge of the farmers adopting the paddy technologies and farmers not adopting the paddy technologies disseminated by the KVK are presented in Table 1. It is observed that the farmers adopting the technologies possessed more knowledge than the non-adopter farmers. It could also be concluded that there exists a significant difference between the knowledge of both groups of farmers.

Table 1. Knowledge Level of Paddy Farmers

Sr. No.	Respondent category	Size of the sample (n)	Mean score	S.D.	'Z' value
1.	Farmers adopting the technologies	60	56.58	3.02	3.53*
2.	Farmers not adopting the technologies	30	34.73	3.16	

*Significant at 0.01 level of significance.

It is observed that the majority of the farmers adopting the technologies had high level of knowledge (43.34% farmers) followed by medium level of knowledge (31.66% farmers) and low level of knowledge (25.00% farmers) whereas, majority of the farmers not adopting the technologies had medium level of knowledge (40.00% farmers) followed by low (33.34% farmers) and high level of knowledge (26.66% farmers) (Table 2). The findings are in line with the findings of Rao *et al.*, (2012).

Table 2. Distribution of Respondents according to their Knowledge Level of Paddy Crop

Category	Farmers adopting technologies (n=60)			Farmers not adopting technologies (n=30)		
	Low (29-38)	Medium (39-48)	High (49-58)	Low (29-38)	Medium (39-48)	High (49-58)
Frequency	15	19	26	10	12	8
Percentage	25.00	31.66	43.34	33.34	40.00	26.66

It is concluded that majority of the farmers who adopted the technologies had high level of knowledge whereas non-adopter farmers had medium level of knowledge (Table 2).

Item analysis was done to identify the extent of knowledge of farmers on various paddy technologies and ranks were assigned to all technologies based on the total score obtained on each technology. The farmers who adopted the technologies had high level of knowledge on hybrid paddy and varietal seed production which ranked 1st followed by weed management with recommended herbicides (2nd) (Table 3). The reasons for high level of knowledge on these technologies could be continuous organization of farmers field school, farmer – scientist interactions, field days and focused group discussions by the KVK scientists.

Item wise Analysis of the Level of Knowledge of Paddy Production Technologies by the Farmers of Karimnagar District.

Table 3. Item wise Analysis of Farmers adopting Technologies on Level of Knowledge of Paddy Production Technologies in Karimnagar District N=60

Sr. No.	Paddy Production Technologies	Level of Knowledge				Total score	Mean score	Rank
		Yes		No				
		F	%	F	%			
1	Soil samples collected up to 15-20cm depth in V shape for soil testing	54	90.0	06	10.0	114	1.90	V
2	Soil test based fertilizer application is economical	53	88.3	07	11.7	113	1.88	VI
3	Growing of green manure crop preceding rice and incorporating into the soil improves the soil fertility	56	93.3	04	6.7	116	1.93	III
4	Seed treatment with fungicide reduces the disease incidence in the initial stages of plant growth	52	86.7	08	13.3	112	1.86	
5	Spraying of herbicide cyhalofop butyl 10% solution @ 2 ml /lt of water reduces the weeds of echinocloa in nursery	50	83.3	10	16.7	110	1.83	
6	Stem borer and Gall midge incidence at early growth stage will be effectively controlled by application of 1 kg carbofuron granules in 1 acre nursery one week before transplantation	56	93.3	04	6.7	116	1.93	III
7	Transplantation of lesser seedlings(2-3) per hill and shallow transplantation facilitates more tillers leads to higher yields	50	83.3	10	16.7	110	1.83	
8	Application of complex fertilizers at basal and straight fertilizers in split up with recommended doses reduces the pest and disease incidence	50	83.3	10	16.7	110	1.83	
9	Creation of alley ways help to control BPH	56	93.3	04	6.7	116	1.93	III

Sr. No.	Paddy Production Technologies	Level of Knowledge				Total score	Mean score	Rank
		Yes		No				
		F	%	F	%			
10	Weeds can be effectively controlled by using recommended herbicides at 3-5 days after transplanting by keeping a thin film of water in the field	58	96.7	2	3.3	118	1.96	II
11	Mid season drainage is important for obtaining higher yields	52	86.7	08	13.3	112	1.86	
12	Timely management of zinc deficiency with foliar spray increases the yields	54	90.0	06	10.0	114	1.90	V
13	Application of recommended dose of fertilizers before panicle initiation stage reduces pest and disease incidence	50	83.3	10	16.7	110	1.83	
14	Application of urea with neem cake or neem oil reduces the nitrogen loss	48	80.0	12	20.0	108	1.80	
15	Harvesting of paddy needs to be done close to the ground level to prevent pest incidence	56	93.3	04	6.7	116	1.93	III
16	Aerobic rice does not require wet land preparation and reduces the time for land preparation with lesser labour and lesser seed rate	30	50.0	30	50.0	90	1.50	
17	Direct seeding in rice with drum seeder reduces the labour requirement, seed rate and facilitates timely sowing	53	88.3	07	11.7	113	1.88	VI
18	Direct seeding in rice with drum seeder reduces the crop period for 7-10 days and also reduces one irrigation	53	88.3	07	11.7	113	1.88	VI
19	In direct seeding in rice with drum seeder yields will be on par with the normal transplantation with lesser cost of cultivation	53	88.3	07	11.7	113	1.88	VI
20	In SRI higher yields will be obtained with lesser cost of cultivation and with lesser water	50	83.3	10	16.7	110	1.83	
21	Post emergence herbicide cyalofop butyl @ 400 ml/acre and ethoxy sulfuron @ 50 gm/ acre spraying at 2-3 leaf stage of weeds will effectively control all the weeds	45	75.0	15	25.0	105	1.75	
22	Post emergence herbicide bispyribac sodium @ 120 ml/ acre will effectively control both the monocots and broad leaved weeds	45	75.0	15	25.0	105	1.75	
23	WGL -32100 (Warangal Sannalu) a fine grain variety has good cooking quality will come to harvest 15 days earlier and gives higher yield than BPT 5204	55	91.7	05	8.3	115	1.91	IV

Sr. No.	Paddy Production Technologies	Level of Knowledge				Total score	Mean score	Rank
		Yes		No				
		F	%	F	%			
24	NLR 34449 a fine grain variety has good cooking quality will have blast tolerance and gives higher yield than BPT 5204	50	83.3	10	16.7	110	1.83	
25	Usage of lesser seed rate 10 Kg per acre also gives yields on par with the normal seed rate 30 kg per acre and reduces seed cost	50	83.3	10	16.7	110	1.83	
26	Grain discolouration will be effectively controlled by spraying with profenophos @ 400 ml and propiconazole@ 200 ml per acre before panicle emergence	50	83.3	10	16.7	110	1.83	
27	Hybrid seed production in rice gives higher net returns compared to normal rice cultivation	60	100.0	0	0.0	120	2.00	I
28	Stem borer will be effectively controlled with auto confusion technology by using YSB exosect tablets @ 80 /ha	40	66.7	20	33.3	100	1.66	
29	Seed production in rice gives higher net returns compared to normal rice cultivation	60	100.0	0	0.0	120	2.00	I

The farmers who adopted the technologies had the lowest level of knowledge on aerobic paddy and auto confusion technology for stem borer management. In case of non adopter farmers, the practices like hybrid paddy and varietal seed production ranked 1st followed by green manuring to improve the soil fertility (2nd) (Table 4). The latter had low level of knowledge on direct seeding and SRI cultivation. The non-adopter farmers are seldom inspired and motivated and influenced by the actions and deeds of their fellow adopted farmers. These farmers not adopting technologies want to replicate the successful practices carried out by the farmers who have adopted the technologies. Hence, the same level of knowledge of adopter farmers on these technologies is reflected in case of non-adopter farmers also.

The reasons for high level of knowledge on these technologies could be suitability of the agro ecosystem of Karimnagar district, for hybrid and varietal seed production, as this was clearly envisaged by the KVK Scientists to the paddy farmers. Realizing the ill effects of continuous application of inorganic fertilizers, the farmers resorted to the application of green manure to improve the soil fertility. The continuous organization of farmers field school, farmer – scientist interactions, field days and focused group discussions by the KVK scientists resulted in formation of alleys in paddy crop to control the brown plant hopper (BPH).

Table 4. Item wise Analysis of Farmers not adopting technologies on Level of Knowledge of Paddy Production Technologies in Karimnagar District N=30

S. No.	Paddy Production Technologies	Level of Knowledge				Total score	Mean score	Rank
		Yes		No				
		F	%	F	%			
1	Soil samples collected up to 15-20cm depth in V shape for soil testing	15	50.0	15	50.0	45	1.50	V
2	Soil test based fertilizer application is economical	15	50.0	15	50.0	45	1.50	V
3	Growing of green manure crop preceding rice and incorporating into the soil improves the soil fertility	22	73.3	08	26.7	52	1.73	II
4	Seed treatment with fungicide reduces the disease incidence in the initial stages of plant growth	18	60.0	12	40.0	48	1.60	IV
5	Spraying of herbicide cyhalofop butyl 10% solution @ 2 ml /lt of water reduces the weeds of echinocloa in nursery	15	50.0	15	50.0	45	1.50	V
6	Stem borer and Gall midge incidence at early growth stage will be effectively controlled by application of 1 kg carbofuron granules in 1 acre nursery one week before transplantation	15	50.0	15	50.0	45	1.50	V
7	Transplantation of lesser seedlings(2-3) per hill and shallow transplantation facilitates more tillers leads to higher yields	18	60.0	12	40.0	48	1.60	IV
8	Application of complex fertilizers at basal and straight fertilizers in split up with recommended doses reduces the pest and disease incidence	20	66.7	10	33.3	50	1.66	III
9	Creation of alley ways help to control BPH	20	66.7	10	33.3	50	1.66	III
10	Weeds can be effectively controlled by using recommended herbicides at 3-5 days after transplanting by keeping a thin film of water in the field	20	66.7	10	33.3	50	1.66	III
11	Mid season drainage is important for obtaining higher yields	20	66.7	10	33.3	50	1.66	III

S. No.	Paddy Production Technologies	Level of Knowledge				Total score	Mean score	Rank
		Yes		No				
		F	%	F	%			
12	Timely management of zinc deficiency with foliar spray increases the yields	20	66.7	10	33.3	50	1.66	III
13	Application of recommended dose of fertilizers before panicle initiation stage reduces pest and disease incidence	18	60.0	12	40.0	48	1.60	IV
14	Application of urea with neem cake or neem oil reduces the nitrogen loss	15	50.0	15	50.0	45	1.50	V
15	Harvesting of paddy needs to be done close to the ground level to prevent pest incidence	20	66.7	10	33.3	50	1.66	III
16	Aerobic rice does not require wet land preparation and reduces the time for land preparation with lesser labour and lesser seed rate	10	33.4	20	66.6	40	1.33	VI
17	Direct seeding in rice with drum seeder reduces the labour requirement, seed rate and facilitates timely sowing	10	33.4	20	66.6	40	1.33	VI
18	Direct seeding in rice with drum seeder reduces the crop period for 7-10 days and also reduces one irrigation	10	33.4	20	66.6	40	1.33	VI
19	In direct seeding in rice with drum seeder, yields will be on par with the normal transplantation with lesser cost of cultivation	10	33.4	20	66.6	40	1.33	VI
20	In SRI higher yields will be obtained with lesser cost of cultivation and with lesser water	10	33.4	20	66.6	40	1.33	VI
21	Post emergence herbicide cyalofop butyl @ 400 ml/acre and ethoxy sulfuron @ 50 gm/ acre spraying at 2-3 leaf stage of weeds will effectively control all the weeds	15	50.0	15	50.0	45	1.50	V
22	Post emergence herbicide bispyribac sodium @ 120 ml/ acre will effectively control both the monocots and broad leaved weeds	15	50.0	15	50.0	45	1.50	V
23	WGL -32100 (Warangal Sannalu) a fine grain variety has good cooking quality will come to harvest 15 days earlier and gives higher yield than BPT 5204	20	66.7	10	33.3	50	1.66	III

S. No.	Paddy Production Technologies	Level of Knowledge				Total score	Mean score	Rank
		Yes		No				
		F	%	F	%			
24	NLR 34449 a fine grain variety has good cooking quality will have blast tolerance and gives higher yield than BPT 5204	20	66.7	10	33.3	50	1.66	III
25	Usage of lesser seed rate 10 Kg per acre also gives yields on par with the normal seed rate 30 kg per acre and reduces seed cost	20	66.7	10	33.3	50	1.66	III
26	Grain discolouration will be effectively controlled by spraying with profenophos @ 400 ml and propiconazole@ 200 ml per acre before panicle emergence	15	50.0	15	50.0	45	1.50	V
27	Hybrid seed production in rice gives higher net returns compared to normal rice cultivation	25	83.3	5	16.7	55	1.83	I
28	Stem borer will be effectively controlled with auto confusion technology by using YSB exosect tablets @ 80 /ha	15	50.0	15	50.0	45	1.50	V
29	Seed production in rice gives higher net returns compared to normal rice cultivation	25	83.3	5	16.7	45	1.83	I

The farmers experienced methods of collecting the soil samples for testing, through a series of method demonstrations conducted by KVK Scientists. The farmers were empowered and enriched on necessary competencies to apply need based fertilizers based on the results generated from soil testing as it gives more economic returns. The farmers who adopted paddy technologies had the lowest level of knowledge on aerobic paddy due to non availability of tractor drawn seed cum fertilizer drill. The farmers not adopting the technologies are not aware of these types of technologies adopted by KVK adopted village farmers because of their low level of knowledge in paddy cultivation.

Extent of Adoption of Technologies Imparted through KVK

The extent of adoption of paddy technologies by the farmers adopting the technologies and non-adopters is presented in Table 5. It is observed that with reference to the extent of adoption of paddy technologies the difference is significant between the two groups.

Table 5. Extent of Adoption of Paddy Technologies

Respondent category	Size of the sample (n)	Mean score	S.D.	'Z' value
Farmers adopting technologies	60	63.55	8.85	2.45*
Farmers not adopting technologies	30	33.70	3.29	

*Significant at 0.01 level of probability

The majority of the farmers who adopted technologies had high level of adoption (36.67% farmers) followed by medium level of adoption (33.33% farmers) and low level of adoption (30.00% farmers). Among non-adopter farmers, majority had low level of adoption (43.33% farmers) followed by medium (33.34% farmers) and high level of adoption (23.33% farmers) (Table 6). These findings are in agreement with the findings from earlier studies of Krishnamurthy *et al* (1998), Ramesh and Govind, (2000) and Rao *et al.,* (2012).

Table 6. Distribution of Respondents according to Extent of Adoption of Paddy Technologies

Category	Adopter farmers (n=60)			Non adopter farmers (n=30)		
	Low (33-55)	Medium (56-78)	High (79-100)	Low (33-55)	Medium (56-78)	High (79-100)
Frequency	18	20	22	13	10	7
Percentage	30.00	33.33	36.67	43.33	33.34	23.33

Item analysis was done to identify the extent of adoption of various paddy technologies by both categories of farmers. The ranks were assigned to all the technologies based on the total score obtained on each technology. The farmers adopting the technologies had higher adoption of hybrid/variety seed production, weed management with recommended herbicides and mid season drainage. These technologies are ranked 1st followed by management of zinc deficiency (2nd) (Table 7). The low level of adoption by these farmers was found on aerobic paddy and auto confusion technology for stem borer management. In case of farmers not adopting technologies, hybrid seed production, varietal seed production, weed management with herbicides and mid season drainage are ranked 1st followed by usage of WGL 32100 variety (2nd) (Table 8).

Item wise Analysis of the Extent of Adoption of Paddy Production Technologies by the Farmers of Karimnagar district.

Table 7. Item wise Analysis of Farmers adopting Technologies on Extent of Adoption of Paddy Production Technologies in Karimnagar district N=60

Sr. No.	Paddy Production Technologies	Extent of Adoption						Total score	Mean score	Rank
		Fully adopted		Partially adopted		Not adopted				
		F	%	F	%	F	%			
1.	Soil samples collected up to 15-20cm depth in V shape for soil testing	39	65.0	11	18.3	10	16.7	149	2.48	
2.	Soil test based fertilizer application is economical	42	70.0	9	15.0	9	15.0	153	2.55	
3.	Growing of green manure crop preceding rice and incorporating into the soil improves the soil fertility	48	80.0	0	0.0	12	20.0	156	2.40	
4.	Seed treatment with fungicide reduces the disease incidence in the initial stages of plant growth	55	91.6	0	0.0	5	8.4	170	2.80	IV
5.	Spraying of herbicide cyhalofop butyl 10% solution @ 2 ml /lt of water reduces the weeds of echinocloa in nursery	50	83.4	0	0.0	10	16.6	160	2.60	
6.	Stem borer and Gall midge incidence at early growth stage will be effectively controlled by application of 1 kg carbofuron granules in 1 acre nursery one week before transplantation	52	86.6	0	0.0	8	13.4	164	2.74	VI
7.	Transplantation of lesser seedlings(2-3) per hill and shallow transplantation facilitates more tillers leads to higher yields	53	88.3	0	0.0	7	11.7	166	2.76	V
8.	Application of complex fertilizers at basal and straight fertilizers in split up with recommended doses reduces the pest and disease incidence	42	70.0	18	30.0	0	0.0	162	2.70	
9.	Creation of alley ways help to control BPH	50	83.4	10	16.6	0	0.0	170	2.83	III

Sr. No.	Paddy Production Technologies	Extent of Adoption						Total score	Mean score	Rank
		Fully adopted		Partially adopted		Not adopted				
		F	%	F	%	F	%			
10.	Weeds can be effectively controlled by using recommended herbicides at 3-5 days after transplanting by keeping a thin film of water in the field	60	100.0	0	0.0	0	0.0	180	3.00	I
11.	Mid season drainage is important for obtaining higher yields	60	100.0	0	0.0	0	0.0	180	3.00	I
12.	Timely management of zinc deficiency with foliar spray increases the yields	51	85.0	9	15.0	0	0.0	171	2.85	II
13.	Application of recommended dose of fertilizers before panicle initiation stage reduces pest and disease incidence	48	80.0	11	18.3	1	1.7	167	2.78	V
14.	Application of urea with neem cake or neem oil reduces the nitrogen loss	35	58.3	20	33.3	5	8.4	150	2.50	
15.	Harvesting of paddy needs to be done close to the ground level to prevent pest incidence	50	83.4	10	16.6	0	0.0	160	2.60	
16.	Aerobic rice does not require wet land preparation and reduces the time for land preparation with lesser labour and lesser seed rate	25	41.6	0	0.0	35	58.4	110	1.80	
17.	Direct seeding in rice with drum seeder reduces the labour requirement, seed rate and facilitates timely sowing	50	83.4	0	0.0	10	16.6	160	2.60	
18.	Direct seeding in rice with drum seeder reduces the crop period for 7-10 days and also reduces one irrigation	50	83.4	0	0.0	10	16.6	160	2.60	
19.	In direct seeding in rice with drum seeder yields will get on par with the normal transplantation with lesser cost of cultivation	50	83.4	0	0.0	10	16.6	160	2.60	
20.	In SRI higher yields will be obtained with lesser cost of cultivation and with lesser water	30	50.0	15	25.0	15	25.0	135	2.25	

Sr. No.	Paddy Production Technologies	Extent of Adoption						Total score	Mean score	Rank
		Fully adopted		Partially adopted		Not adopted				
		F	%	F	%	F	%			
21.	Post emergence herbicide cyalofop butyl @ 400 ml/acre and ethoxy sulfuron @ 50 gm/acre spraying at 2-3 leaf stage of weeds will effectively control all the weeds	40	83.3	15	25.0	5	8.3	155	2.58	
22.	Post emergence herbicide bispyribac sodium @ 120 ml/ acre will effectively control both the monocots and broad leaved weeds	40	66.6	15	25.0	5	8.4	155	2.58	
23.	WGL -32100(Warangal Sannalu) a fine grain variety has good cooking quality will come to harvest 15 days lesser and gives higher yield than BPT 5204	55	91.6	5	8.4	0	0.0	170	2.83	III
24.	NLR 34449 a fine grain variety has good cooking quality will have blast tolerance and gives a higher yield than BPT 5204	40	67.0	20	33.0	0	0.0	160	2.66	
25.	Usage of lesser seed rate 10 Kg per acre also gives yields on par with the normal seed rate 30 kg per acre reduces seed cost	50	83.4	10	16.6	0	0.0	170	2.83	III
26.	Grain discolouration will be effectively controlled by spraying with profenophos @ 400 ml and propiconazole@ 200 ml per acre before panicle emergence	55	91.6	5	8.4	0	0.0	170	2.83	III
27.	Hybrid seed production in rice gives higher net returns compared to normal rice cultivation	60	100.0	0	0.0	0	0.0	180	3.00	I
28.	Stem borer will be effectively controlled with auto confusion technology by using YSB exosect tablets @ 80 /ha	30	50.0	0	0.0	30	50.0	120	2.00	
29.	Seed production in rice gives higher net returns compared to normal rice cultivation	60	100.0	0	0.0	0	0.0	180	3.00	I

Table 8. Item wise Analysis of non-adopter Farmers on Extent of Adoption of Paddy Production Technologies in Karimnagar district N=30

Sr. No.	Paddy Production Technologies	Extent of Adoption						Total score	Mean score	Rank
		Fully adopted		Partially adopted		Not adopted				
		F	%	F	%	F	%			
1	Soil samples collected up to 15-20cm depth in V shape for soil testing	0	0.0	0	0.0	30	100.0	30	1.00	
2	Soil test based fertilizer application is economical	0	0.0	0	0.0	30	100.0	30	1.00	
3	Growing of green manure crop preceding rice and incorporating into the soil improves the soil fertility	2	6.7	8	26.7	20	66.6	42	1.40	III
4	Seed treatment with fungicide reduces the disease incidence in the initial stages of plant growth	0	0.0	5	16.7	25	83.3	30	1.00	
5	Spraying of herbicide cyhalofop butyl 10% solution @ 2 ml / lt of water reduces the weeds of echinocloa in nursery	0	0.0	0	0.0	30	100.0	30	1.00	
6	Stem borer and Gall midge incidence at early growth stage will be effectively controlled by application of 1 kg carbofuron granules in 1 acre nursery one week before transplantation	0	0.0	10	33.3	20	66.7	40	1.33	IV
7	Transplantation of lesser seedlings(2-3) per hill and shallow transplantation facilitates more tillers leads to higher yields	0	0.0	0	0.0	30	100.0	30	1.00	
8	Application of complex fertilizers at basal and straight fertilizers in split up with recommended doses reduces the pest and disease incidence	0	0.0	10	33.4	20	66.6	40	1.33	II
9	Creation of alley ways help to control BPH	4		0	0.0	26	86.6	34	1.13	VI
10	Weeds can be effectively controlled by using recommended herbicides at 3-5 days after transplanting by keeping a thin film of water in the field	10		10	33.3	10	33.4	60	2.00	I

Sr. No.	Paddy Production Technologies	Extent of Adoption						Total score	Mean score	Rank
		Fully adopted		Partially adopted		Not adopted				
		F	%	F	%	F	%			
11	Mid season drainage is important for obtaining higher yields	10		10	33.3	10	33.4	60	2.00	I
12	Timely management of zinc deficiency with foliar spray increases the yields	5		10	33.3	15	50.0	40	1.33	IV
13	Application of recommended dose of fertilizers before panicle initiation stage reduces pest and disease incidence	0		5	16.7	25	83.3	35	1.16	V
14	Application of urea with neem cake or neem oil reduces the nitrogen loss	0		0	0.0	30	100.0	30	1.00	
15	Harvesting of paddy needs to be done close to the ground level to prevent pest incidence	0		10	33.3	20	76.7	40	1.33	IV
16	Aerobic rice does not require wet land preparation and reduces the time for land preparation with lesser labour and lesser seed rate	0		0	0.0	30	100.0	30	1.00	
17	Direct seeding in rice with drum seeder reduces the labour requirement, seed rate and facilitates timely sowing	0		0	0.0	30	100.0	30	1.00	
18	Direct seeding in rice with drum seeder reduces the crop period for 7-10 days and also reduces one irrigation	0		0	0.0	30	100.0	30	1.00	
19	In direct seeding in rice with drum seeder yields will get on par with the normal transplantation with lesser cost of cultivation	0		0	0.0	30	100.0	30	1.00	
20	In SRI higher yields will be obtained with lesser cost of cultivation and with lesser water	0		0	0.0	30	100.0	30	1.00	
21	Post emergence herbicide cyalofop butyl @ 400 ml/acre and ethoxy sulfuron @ 50 gm/acre spraying at 2-3 leaf stage of weeds will effectively control all the weeds	0		0	0.0	30	100.0	30	1.00	

Sr. No.	Paddy Production Technologies	Extent of Adoption						Total score	Mean score	Rank
		Fully adopted		Partially adopted		Not adopted				
		F	%	F	%	F	%			
22	Post emergence herbicide bispyribac sodium @ 120 ml/ acre will effectively control both the monocots and broad leaved weeds	0		0	0.0	30	100.0	30	1.00	
23	WGL -32100(Warangal Sannalu) a fine grain variety has good cooking quality will come to harvest 15 days earlier and gives higher yield than BPT 5204	5		10	33.3	15	50.0	50	1.66	II
24	NLR 34449 a fine grain variety has good cooking quality will have blast tolerance and gives higher yield than BPT 5204	5		0	0.0	25	83.3	40	1.33	IV
25	Usage of lesser seed rate 10 Kg per acre also gives yields on par with the normal seed rate 30 kg per acre reduces seed cost	0		5	16.7	25	83.3	35	1.16	V
26	Grain discolouration will effectively controlled by spraying with profenophos @ 400 ml and propiconazole@ 200 ml per acre before panicle emergence	0		5	16.7	25	83.3	35	1.16	V
27	Hybrid seed production in rice gives higher net returns compared to normal rice cultivation	15		0	0.0	15	50.0	60	2.00	I
28	Stem borer will be effectively controlled with auto confusion technology by using YSB exosect tablets @ 80 /ha	0		0	0.0	30	100.0	30	1.00	
29	Seed production in rice gives higher net returns compared to normal rice cultivation	15		0	0.0	15	50.0	60	2.00	I

Majority of the farmers adopted hybrid seed and varietal seed production technology. The reason could be that the KVK scientists conducted more demonstrations on seed production keeping in view the suitability of agro-climatic conditions of adopted villages. The farmers who adopted technologies learnt practically, following the principle of learning by doing. KVK works on the philosophy that farmers cannot adopt the technology unless the source of availability of the concerned technology is well known. The adopter farmers had lower adoption

on auto confusion technology for stem borer management probably due to non availability of YSB pellets in the local market. The non-adopter paddy farmers also had high extent of adoption on hybrid and varietal seed production, weed management with herbicides and mid season drainage. The reason could be that these farmers were influenced by the demonstrations or farmers who participated in end field schools. The performances of the demonstrated technologies had a visible impact on non-adopter farmers.

Productivity and Profitability of Paddy Crop

Difference in productivity of paddy crop was observed at the fields of farmers adopting KVK technologies and farmers not adopting KVK technologies. The paddy yield was 6429 kg/ha and 5827 kg/ha at the field of farmers adopting KVK technologies and not adopting KVK technologies, respectively. The farmers who are adopting the KVK technologies got approximately 10 per cent (602 Kg/ha) more yield than the KVK non-adopter farmers. This may be called an impact of KVK technologies on crop productivity. This result is in conformity with the result of Vichare (2007), Razack (2000). Considerable amount of difference was also observed in net return between these two categories of farmers. The profitability of paddy was found to be INR 39,164 per hectare for farmers adopting the technologies. It was INR 32,962 per hectare in case of non-adopter farmers. Approximately 19 per cent (INR 6202 per hectare) more net return was obtained by the KVK farmers who adopted technologies than the non-adopter farmers. This is an impact of the KVK activities on the farmers' economy.

Relationship between Knowledge, Adoption, Profitability and Profile Characteristics of Farmers

Correlation coefficients were calculated between level of knowledge, extent of adoption of technologies, profitability and profile characteristics of farmers such as age, education, mass media exposure, extension contact, innovativeness, social participation, scientific orientation, risk preference and economic orientation for both the categories of the farmers. Correlation coefficient (r) between level of knowledge of KVK adopted paddy farmers with their profile characteristics show that there is a positive and significant relationship between education, mass media exposure, extension contact, social participation and scientific orientation and level of knowledge of farmers who adopted the technologies in paddy crop. In case of paddy farmers who had not adopted the technologies it was found that there is positive and significant relationship between education, social participation and

mass media exposure and level of knowledge.

A positive and significant relationship was observed between education, extension contact, scientific orientation and risk preference and extent of adoption in case of paddy farmers adopting technologies. In case of non-adopter paddy farmers, a positive and significant relationship was found between education, scientific orientation and social participation and extent of adoption of technologies.

A positive and significant relationship was observed between extension contact, mass media exposure, risk preference and profitability of KVK adopter farmers. In case of non-adopter paddy farmers, a positive and significant relationship was observed between mass media exposure, social participation and profitability.

It is evident from the data in Table 9 that education, mass media exposure, extension contact, social participation and scientific orientation are positively and significantly related with level of knowledge with KVK adopter paddy farmers. The degree of formal education possessed by individuals enhances their intellectual base of observing the external knowledge. Mass media exposure, extension contact and social participation supplement the farmers in getting technical knowledge. Scientific orientation inculcates the spirit of inquisitiveness, analytical abilities and comprehension skills to know the happenings in the society, related to the given profession. The positive and significant relationship of the variables education and mass media exposure with the level of knowledge of KVK non-adopter farmers in paddy crop indicate that education acts as a platform to enhance the knowledge base of an individual. The exposure to various kinds of media like print, electronic and other mass media reinforces the learning / knowledge through various sources.

Table 9. Correlation Coefficient between Level of Knowledge, Extent of Adoption and Profitability with Profile Characteristics

Sr. No.	Characteristics	Level of knowledge		Extent of adoption		Profitability	
		Adopter	Non adopter	Adopter	Non adopter	Adopter	Non adopter
1.	Age	0.109^{NS}	0.106^{NS}	0.120^{NS}	0.126^{NS}	0.130^{NS}	0.232^{NS}
2.	Education	0.212^{*}	0.192^{*}	0.211^{*}	0.162^{*}	0.210^{NS}	0.160^{NS}
3.	Mass media exposure	0.245^{*}	0.201^{*}	0.176^{NS}	0.216^{NS}	0.190^{*}	0.216^{*}

4.	Extension contact	0.209*	0.192NS	0.201*	0.186NS	0.211*	0.179NS
5.	Innovativeness	0.685NS	0.562NS	0.675 NS	0.625NS	0.654NS	0.625NS
6.	Social participation	0.345**	0.234*	0.312NS	0.292*	0.304**	0.291*
7.	Scientific orientation	0.321*	0.221NS	0.311*	0.215*	0.221NS	0.216NS
8.	Risk preference	0.248NS	0.628NS	0.263*	0.218NS	0.210*	0.625NS
9.	Economic orientation	0.256NS	0.562NS	0.209NS	0.461NS	0.200*	0.391NS

* Significant at 0.05 level of probability

** Significant at 0.01 level of probability NS –Non Significant

With regard to the extent of adoption of technologies by farmers adopting technologies, positive and significant correlation was observed with education, extension contact, scientific orientation and risk preference. The more the contact with various line departments the more were the chances of getting aware about new ideas and clarification of prejudices. More scientific orientation leads to understanding the rationale behind the application of technology. The risk preference increases the individual acceptance of hurdles in implementation of new ideas and also the levels of preparedness. The variables such as education, social participation and scientific orientation were positively and significantly correlated with the extent of adoption of KVK non-adopter paddy farmers. Education paves the way to quench the need for information for adoption. Social participation and scientific orientation also act as supporting psychological variables to verify and clarify the misconception in adoption of technologies.

The profile characteristics like mass media exposure, extension contact, social participation, risk preference and economic orientation were positively and significantly correlated with profitability achieved by adopted paddy farmers. Mass media exposure, extension contact and social participation facilitate quick acquisition of knowledge and better adoption thereby helping in reaping higher profitability. It is possible for an individual who has risk preference and income orientation to work towards higher profits.

Conclusions

KVKs are grass root district level agricultural science centres meant for application of technology through assessment, refinement and demonstration of proven technologies under different 'micro farming' situations.

The study has shown that the farmers of KVK Karimnagar who had adopted technologies had better profile characteristics compared to farmers who had

not adopted the technologies. The former had a higher level of knowledge and adoption of paddy technologies, whereas the latter had medium to low level of knowledge and adoption. The differences could be attributed to on-farm testing, demonstrations, farmer field schools and farmer-scientist interactions conducted by the KVK in the adopted villages. Adoption quotient, productivity and profitability also exhibited a similar trend. Correlation analysis indicated that education, mass media exposure, extension contact, social participation and scientific orientation were positively and significantly associated with level of knowledge of farmers adopting the technologies. With regard to the extent of adoption by the adopter farmers, positive and significant correlation was observed with education, extension contact, scientific orientation and risk preference. The profile characteristics like mass media exposure, extension contact, social participation, risk preference and economic orientation were positively and significantly correlated with profitability of farmers adopting the technologies.

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