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ADOPTION OF SUSTAINABLE FARMING PRACTICES IN PADDY CULTIVATION IN KANYAKUMARI DISTRICT OF TAMIL NADU, INDIA

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Abstract

Sustainable Agriculture is a system of agriculture committed to maintain and preserve the agriculture base of soil, water and atmosphere ensuring future generations the capacity to feed themselves with an adequate supply of safe and wholesome food." Paddy (*Oryza sativa* L.), an important cereal crop in the world, provides a staple food for nearly half of the global population. Paddy has shaped the culture, diets and economics of thousands of millions of people. A lot of research efforts are made and propagated to the paddy farmers to adopt improved agricultural practices to sustain the paddy production. In this study an attempt is to made to study the extent of the adoption of the sustainable farming practices in paddy cultivation by the paddy growers of Kanyakumari district. Proportionate random sampling procedure was adopted to select 120 respondents for the collection of data. The results reveal that more than eighty per cent of the respondents adopt three sustainable farming practices viz., ''*summer ploughing*,''''*not disturbing beneficial insects like dragon flies*, *damsel flies, water strider*, *ground beetles* and *spiders*''and ''*transplanting seedling at the right time.* 'More than fifty per cent of the respondents adopt five sustainable farming practices viz., ''*trimming the bunds and plastering to prevent water leakage*'', ''*sealing the rat holes with clay soil*'', ''*keeping seeds in wet gunny bags in darkness for 24 hours to facilitate sprouting*'', ''*seed treatment-using cowurine*'' and ''*adopting crop rotation.*'' It is the need of the hour to encourage the farmers to adopt sustainable farming practices.

Key words: Adoption, Sustainable farming Practices, Paddy cultivation.

Introduction

Sustainable Agriculture is a system of agriculture that is committed to maintain and preserve the agriculture base of soil, water and atmosphere ensuring future generations the capacity to feed themselves with an adequate supply of safe and wholesome food. The ultimate goal or the ends of sustainable agriculture is to develop farming systems that are productive and profitable, conserve the natural resource base, protect the environment and enhance health and safety and to do so over the long-term. The means of achieving this includes low input methods and skilled management, which seek to optimize the management and use of internal production inputs (i.e., on-farm resources) in ways that provide acceptable levels of sustainable crop yields and livestock production and result in economically profitable returns. This approach emphasizes cultural and management practices such as crop rotation, recycling of animal manures and conservation tillage to control soil erosion and nutrient losses and to maintain or enhance soil productivity. Low-input farming systems seek to minimize the use of external production inputs (i.e., off-farm resources), such as purchased fertilizers and pesticides, wherever and whenever feasible and practicable: to lower production costs: to avoid pollution of surface and groundwater: to reduce pesticide residues in food: to reduce farmer's overall risk: and to increase both the short-term and long-term farm profitability. (Kanagasabapathi and Sakthivel, 2017). It is based on the minimal use of off-farm inputs and management practices that restore, maintain and enhance ecological harmony (Vandermeer *et al.*, 1998; Greene and Kremen, 2003).

Paddy is an important staple food crop for more than 60 percent of the world population. In 2008, more than 430 million metric tonnes of paddy were consumed worldwide, according to the USDA. India is an important

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centre of paddy cultivation. The paddy is cultivated on the largest areas in India. The Gross Cropped Area in Tamil Nadu is around 58.43 lakh hectares of which the Gross Irrigated Area is 33.09 lakh hectares which is 57% and the balance 43% of the area are under rainfed cultivation. Major efforts are required to increase the productivity of rainfed crops by overcoming the various challenges such as; erratic monsoon rains, soil with low nutrient and organic contents / poor water holding capacity, soil and water erosion, etc. Tamil Nadu one of the leading paddy growing states in India, has been cultivating paddy from time immemorial as this State is endowed with all favourable climatic conditions suitable for paddy growing.

Inthis study, an attempt is made to analyse the sustainable farming practices in paddy cultivation in Kanyakumari district of Tamil Nadu State with the specific objective of assessing the extent of adoption of sustainable farming practices by the paddy cultivating farmers.

Materials and Methods

Kanyakumari district of Tamil Nadu state was selected for the study. Rajakkamangalam block of Agastheeswaram taluk was identified for the study. A sample size of 120 was fixed for the study considering the limitations of time and other resources of the researcher. Based on the proportionate random sampling method, one hundred and twenty respondents were identified for the study from six villages. The statistical tools used in the study were percentage analysis and cumulative frequency method. A structured and pre-tested interview schedule was used for collection of the required data.

Results and Discussion

Extent of adoption of sustainable farming practices on paddy cultivation

The extent of adoption of sustainable farming practices in paddy cultivation technologies by the paddy growers was worked out and salient findings are given in tables 1 and 2

A. Overall adoption level:

An analysis of table 1 shows that nearly half (49.17 percent) of the respondents fell under medium level of adoption category. The respondents under higher and low levels of adoption categories were 35.00 percent and 15.83 percent, respectively. Nearly half of the respondents had medium level of adoption of sustainable farming practices in paddy cultivation. It is quite encouraging to note that about half of the paddy growers are adopting sustainable farming practices. The reason for the respondents under medium level of adoption may be due to the effect of training programmes conducted by state department of agriculture which might have motivated the respondents to adopt the sustainable farming practices in paddy cultivation. This finding is in line with the findings of Syed, (2016)

Table 1: Distribution of respondents according to their overall extent of adoption of Sustainable farming practices in paddy cultivation. (n = 120).

S.No	Category	Number of respondents	Per cent
1	Low	19	15.83
2	Medium	59	49.17
3	High	42	35.00
	Total	**120**	**100**

B. Technology-wise extent of adoption level sustainable farming practices in paddy cultivation:

The respondents ranging from 80.00 to 100.00 percent had adoption on three sustainable farming practices viz., use of 'summer ploughing' (95.00%), 'not disturbing the beneficial insects like dragon flies, damsel flies, water strider, ground beetles and spiders' (88.33%) and 'transplanting seedling at the right time' (83.33%). The reasons for the above result might be because all the above practices were traditional and commonly used by many of the farmers. So the farmers adopted them easily.

The respondents ranging from 50.00 to 79.99 percent had adoption on five sustainable farming practices viz., 'trimming and plastering the bunds to prevent water leakage' (75.83%), 'sealing the rat holes with clay soil' (71.66%), 'keeping seeds in wet gunny bags in darkness for 24 hours to facilitate sprouting' (65.00%), 'seed treatment-using cow urine' (56.66%) and 'adopting crop rotation like '*paddy- paddy- fallow*', '*paddy- paddy- pulses*', '*paddy- paddy- vegetables*', '*paddy- paddy- tapioca*', '*paddy- paddy- green manure*' (52.16%). The reasons for the above result might be due to the reason that these practices were easily available to the farmers and could be followed easily.

The respondents ranging from 30.00 to 49.99 percent had adoption on nine sustainable farming practices viz., use of 'timely hand weeding' (48.33%), 'applying manure like farm yard manure, poultry manure, goat manure' (46.94%), 'drying the grains in sunlight and keeping them in dark room with proper ventilation to keep the grains in less than 12% moisture level' (45.83%), 'applying green leaf manures like neem, glyricidia, poovarasu, pungum' (45.20%), 'clipping of paddy seedlings to control stemborer eggs before transplanting' (44.16%), 'applying oilcakes like neem cake' (42.50%), 'seed treatment- using bio fertilizer azospirillum, azotobacter' (41.66%), 'flooding

the field and then draining to expose and remove larvae and pupae concealed in the soil' (40.83%) and 'maintaining optimum plant density 55 to 60 hills per meter square to decrease the damage by insects.' (40.00%). The reasons for the above result might be due to medium to high extension agency contact of the farmers.

The respondents ranging from 1.00 to 29.99 percent had adoption on eight sustainable farming practices viz., 'applying bio fertilizers- rhizobium, azolla, azotobacter, azospirillum, blue green algae' (30.99%), 'ploughing dried cow-dung and spreading ash mixture uniformly across the field to facilitate aeration to activate the microbes in the soil' (25.00%), 'spraying neem oil or pungam oil (1:4) to control insects' (20.83%), 'tillage ie, turning the soil between crop to incorporate crop residues and soil amendments to remove existing weed growth' (20.00%), 'applying compost' (15.83%), applying 'plant growth regulators like panchagavya' (14.16%), 'applying greenmanures like sunnhemp, daincha, pillipesara' (13.33%) and 'burning of farm waste and trash on nursery beds as the heat generated by burning sterilizes the soil and nutrients like potash also get added' (12.50%). The reasons for the above result might be due to the insufficient knowledge about those practices. Hence farmers adopted these practices to a lesser extent. However greater awareness and trainings are needed to motivate the farmers to adopt these sustainable farming practices.

Table 2: Distribution of respondents according to their technology-wise extent of adoption of sustainable farming practices in paddy cultivation (n=120).

S.	Technologies	No.	Percent
1	Summer ploughing. (It helps to increase aeration & infiltration capacity of soil)	114	95.00
2	Not disturbing beneficial insects (parasites & predators) like dragon flies, damsel flies, water strider, ground beetles and spiders.	106	88.33
3	Transplanting seedling at the right time. (18-21 days)	100	83.33
4	Trimming and plastering the bunds to prevent water leakage.	91	75.83
5	Sealing the rat holes with clay soil.	86	71.66
6	Keeping seeds in wet gunny bags in darkness for 24 hours to facilitate sprouting.	78	65.00
7	Seed treatment- (Using cow urine solution @500ml cow urine+2.5 lit water)	68	56.66
8	Adopting crop rotation		
	i. Paddy-Paddy-Fallow	104	86.66
	ii. Paddy-Paddy-Pulses (Black gram, Green gram)	87	72.50
	iii. Paddy-Paddy-Vegetables (Cucumber, Brinjal, Bhendi, Chilly)	70	58.33
	iv. Paddy- Paddy-Tapioca	10	8.33
	v. Paddy-Paddy-Green manure	42	35.00
	Mean percentage		**52.16**
9	Timely hand weeding. (1st weeding 15-21 days, 2nd weeding 45-60 days)	58	48.33
10	Applying Manures (Nutrient management)		
	i. Farm Yard Manure @12.5 tonnes/ha	108	90.00
	ii. Poultry manure @5 tonnes/ha	46	38.33
	iii. Goat manure @12.5 tonnes/ha	15	12.50
	Mean percentage		**46.94**
11	Drying the grains in sunlight and keeping them in dark room with proper ventilation to keep the grains in less than 12% moisture level.	55	45.83
12	Applying green leaf manure (Nutrient management) @6.25 tonnes/ha		
	i. Neem - Azadirachta indica	112	93.33
	ii. Glyricidia - Glyricidia maculata Syn. G.sepium	37	30.83
	iii. Poovarasu - Thespesia populnea	30	25.00
	iv. Pungum - Pongamia glabra	38	31.66
	Mean percentage		**45.20**
13	Clipping of paddy seedlings to control stemborer eggs before transplanting	53	44.16
14	Applying oilcakes		
	i. Neem cake@210kg/ha	51	42.50
15	Seed treatment-Using Bio-fertilizer Azospirillum, Azotobacter (1.25kg/ha + 1 lit. rice gruel)	50	41.66

Table 2 Continue ...

Table 2 Continue ...

16	Flooding the field and then draining to expose and remove larvae and pupae concealed in the soil.	49	40.83
17	Maintaining optimum plant density 55 to 60 hills per meter square to decrease the damage by insects.	48	40.00
18	Applying Bio-fertilizers		
	i. Rhizobium - 50-100 kg N/ha	11	9.16
	ii. Azolla - 10-15 kg P_2O_5/ha	64	53.33
	iii. Azotobacter - 20-25 kg N/ha	33	27.50
	iv. Azospirillum - 20-25 kgN/ha	65	54.16
	v. Blue green algae - 20-25 kg N/ha	13	10.83
	Mean percentage		**30.99**
19	Ploughing dried cow-dung and spreading ash mixture uniformly across the field to facilitate aeration to activate the microbes in the soil.	30	25.00
20	Spraying neem oil or Pungam oil (1:4) to control insects	25	20.83
21	Tillage ie, turning the soil between crop to incorporate crop residues and soil amendments to remove existing weed growth	24	20.00
22	Applying compost (vermicompost) @ 5 tonnes/ha	19	15.83
23	Plant growth regulators- (Panchagavya 2 spray in 3%)		
	i. At tillering stage		
	ii. At booting stage	17	14.16
24	Applying green manure (Nutrient management) @6.25 tonnes/ha (ploughed into the soil		
	45-50 days after sowing)		
	i. Sunnhempn - Crotalaria juncea	34	28.33
	ii. Daincha - Sesbania aculeate	9	7.50
	iii. Pillipesara - Phaseolus trilobus	5	4.16
	Mean percentage		**13.33**
25	Burning of farm waste and trash on nursery beds as the heat generated by burning sterilizes the soil and nutrients like potash also get added	15	12.50

Conclusion

It is high time to make the farmers to realize the importance of sustainable agriculture. Government and voluntary agencies should organize method demonstrations and result demonstrations in farmer holdings on sustainable farming practices to show the worthiness of sustainable farming practices. The use of FYM, bio-fertilizer and other manures have been found more useful and effective in increasing the soil fertility. Hence the information on these aspects need to be popularized. Research can be carried out to find out the farmers knowledge and adoption of sustainable farming practices so that more strategies may be employed to encourage the adoption of sustainable farming practices.

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