ADOPTION OF ORGANIC MANURES AND CROP RESIDUE MANAGEMENT IN HARYANA

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ABSTRACT

Organic agriculture is a holistic production management system which promotes and enhances agro-ecosystem health, including biodiversity, biological cycles, and soil biological activity. It emphasizes on the use of management practices in preference to the use of off –farm inputs. Organic farming is essentially an agriculture employing a knowledge/understanding of naturally occurring processes. Organic farming methods combine scientific knowledge and modern technology with traditional farming practices based on thousands of years of agriculture. It is a production system, which favours maximum use of organic materials like crop residues, FYM, compost, green manure, oil cakes, bio-gas slurry etc. to improve soil health. Rural poverty, the high cost of purchased inputs and environmental problems, all support the view that farmers should rely as much as possible on local inputs to enhance the productivity of the soils. More than half of farmers (55.33%) belonged to medium level of adoption of organic paddy farming practices whereas, adoption percentage for organic manures and crop residues was found highest (62.64%) and ranked first. Interestingly 107 farmers (71.33%) have applied FYM to full extent and 28.67 per cent of farmers adopted FYM partially. Thus it means cent per cent farmers used FYM to full or partial adoption. A significant difference was observed between the farmers of Kurukshetra and Kaithal districts regarding organic manures and crop residues and also a significant difference was observed among the farmers of Kaithal and Karnal districts.

Keywords: *organic agriculture, climate change, mitigation, adoption and organic paddy*

INTRODUCTION

Organic agriculture aiming at producing food has a huge potential to mitigate climate change and sustainable use of natural resources. Organic management system is one of the options to improve in natural resource or even improve the degraded land. As the natural resources of any country are the national treasure, we need proper planning to make best use of them. Therefore, suitable management practices are urgently needed to preserve the production potential of agricultural lands. (Patel *et al.*, 2015). Organic agriculture, as an adaptation strategy to climate change and variability, is a concrete and promising option for rural communities. Organic agriculture is a sustainable livelihood strategy with decades of use in several climate zones and under a wide range of specific local conditions. Further research is needed on yields in organic agriculture and its mitigation and sequestration potential. An important potential contribution of organically managed systems to climate change mitigation is identified in the careful management of nutrients. Organic agriculture avoids nutrient exploitation and increases soil organic matter content. Production in organic agriculture systems is thus less prone to extreme weather conditions, such as drought, flooding, and water logging. Organic agriculture accordingly addresses key consequences of climate change, namely increased occurrence of extreme weather events, increased water stress and drought, and problems related to soil quality. Furthermore, organic agriculture reduces the vulnerability of the farmers to climate change and variability. This leads to higher economic and ecological stability through optimized ecological balance and risk-spreading. Second, organic agriculture is a low-risk farming strategy with reduced input costs and, therefore, lower risks with partial or total crop failure due to extreme weather events or changed conditions in the wake of climate change and variability (Vinaya et al, 2017 and Eyhorn 2007). Organic agriculture also seems to perform better than conventional agriculture under water constraints (Badgley *et al.*, 2007).

Organic agriculture farmers need to implement a series of practices that optimize nutrient and energy flows and minimize risk, such as crop rotations and enhanced crop diversity, different combinations of livestock and plants, symbiotic nitrogen fixation with legumes, application of organic manure and biological pest control. Reduced use of synthetic fertilizers is believed to result in lower yields per land unit, depending on the level of intensity of the previous management system. A review by Badgley *et al.* (2007) calculated average yield losses in the case of developing countries, an increase of yield or hardly any yield reduction. In

paddy rice, nitrogen is supplied by nitrogen-fixing organisms like Azolla with yields comparable to conventional systems. Keeping In the view the above facts and importance of Organic Manures and Crop Residue adoption for the country as a whole and Haryana in particular, the present study 'Organic Manures and Crop Residue Adoption Management in Haryana' was undertaken

OBJECTIVES

(a) To know the adoption level of farmers with respect to organic paddy farming

(b) To know the district-wise adoption level of farmers with respect to organic paddy farming

(c) To know the adoption level of farmers with respect to various aspects of organic paddy farming

(d) To know the Adoption level of farmers with respect to organic manures and crop residues

METHODOLOGY

Haryana being the important contributor state to the Basmati export of India was selected purposively. Three districts viz., Kaithal, Karnal and Kurukshetra were also purposively selected since these districts have maximum area as well as production of rice. Siwan, Karnal and Pehowa blocks were randomly selected from Kaithal, Karnal and Kurukshetra districts, respectively. From each selected block two villages Siwan and Kangthali from Siwan, Kachchwa and Kunjpura from Karnal, Seonsar and Kamoda from the Pehowa blocks were selected randomly. Further, from each selected village, 25 farmers were selected randomly and in this way a total number of 150 respondents were interviewed to ascertain the constraints faced by them in organic paddy cultivation. The data were collected through a pretested well-structured personal interview schedule.

RESULTS AND DISCUSSION

Adoption level of farmers with respect to organic paddy farming

The adoption score of organic paddy farmers ranged from 16 to 68 against a maximum possible score of 82. The data presented in Table 1 indicated that more than half of farmers (55.33%) belonged to medium level of adoption of organic paddy farming practices while 24.00 per cent of them belonged to low category and remaining 20.67 per cent of them were in high adoption category.

Table 1: Adoption level of farmers with respect to organic paddy farming **n=150**

Sr. No.	Adoption category	Score range	No.	Percent
1	Low	16-33	36	24.00
2	Medium	34-51	83	55.33
3	High	52-68	31	20.67

The data further depicted that more than three-fourth of the respondents (79.33%) had medium to low adoption status of organic paddy farming practices. However, only 20.67 per cent had high adoption.

District-wise adoption level of farmers with respect to organic paddy farming

Further analysis of adoption level at district level (Table 2) indicated that among low level (41.67%) farmers belonged to Kaithal district, among medium level (34.94%) farmers belonged to Karnal district and among high level (41.94%) farmers belonged to Karnal district. Karnal district farmers possess first position in high level 41.94 per cent and medium level 34.94 per cent of farmers, and third position in low level with 22.22 per cent of farmers.

Table 2: District-wise adoption level of farmers with respect to organic paddy farming **n= 150**

Sr. No.	Adoption Category	Score range	No. of farmers	Kaithal (n=50)	Kurukshetra (n=50)	Karnal (n=50)
1	Low	16-33	36	15 (41.67)	13 (36.11)	08 (22.22)
2	Medium	34-51	83	26 (31.33)	28 (33.73)	29 (34.94)
3	High	52-68	31	09 (29.03)	09 (29.03)	13 (41.94)

***** Figures in the parenthesis are percentage

Adoption level of farmers with respect to various aspects of organic paddy farming

The recommended practices for organic paddy included in this study to determine the adoption level were, use of organic manure and crop residues, weed management, vermicompost, use of bio fertilizers and pest management by the respondents.

The data in Table 3 indicated that the adoption percentage for organic manures and crop residues was found highest (62.64%) and ranked first. There are several factors which effect the proper adoption of the recommendations of using different types of organic manures by the farmers. There are competitive uses of organic material such as dung cakes for domestic cooking fuel and sugarcane baggasse as fuel in sugar factories and villages (Tarafdar *et al.*, 2008).

Further analysis indicated that 43.33 per cent of respondents had high level of adoption regarding organic manures and crop residues but still one-fifth of the respondents belonged to low adoption level. The practice of crop residue management was adopted and practiced by the organic paddy farmers. Various crop residues such as wheat straw, rice straw, vegetable wastes were used for composting which helped in maintaining organic matter along with moisture in soils.

Table 3: Adoption level of farmers with respect to various aspects of organic paddy farming **n=150**

Sr. No.	Organic farming aspects	Adoption level	Score range	Frequency	Percent	Mean score	Percentage of mean score	Rank Order
1	Use of organic manures and crop residues	Low	0 – 4	30	20.00	8.77	62.64	I
		Medium	5 – 10	55	36.67			
		High	11 – 14	65	43.33			
2	Use of Bio-fertilizer	Low	0 – 3	35	23.33	6.82	56.83	II
		Medium	4 – 8	63	42.00			
		High	9 – 12	52	34.67			
3	Vermicompost	Low	0 – 1	40	26.67	3.21	53.56	IV
		Medium	2 – 4	67	44.67			
		High	5 – 6	43	28.67			
4	Weed management	Low	0 – 3	28	18.67	6.74	56.17	III
		Medium	4 – 8	82	54.67			
		High	9 – 12	40	26.67			
5	Pest management	Low	0 – 9	37	24.67	15.52	51.73	V
		Medium	10 – 20	77	51.33			
		High	21 – 30	36	24.00			

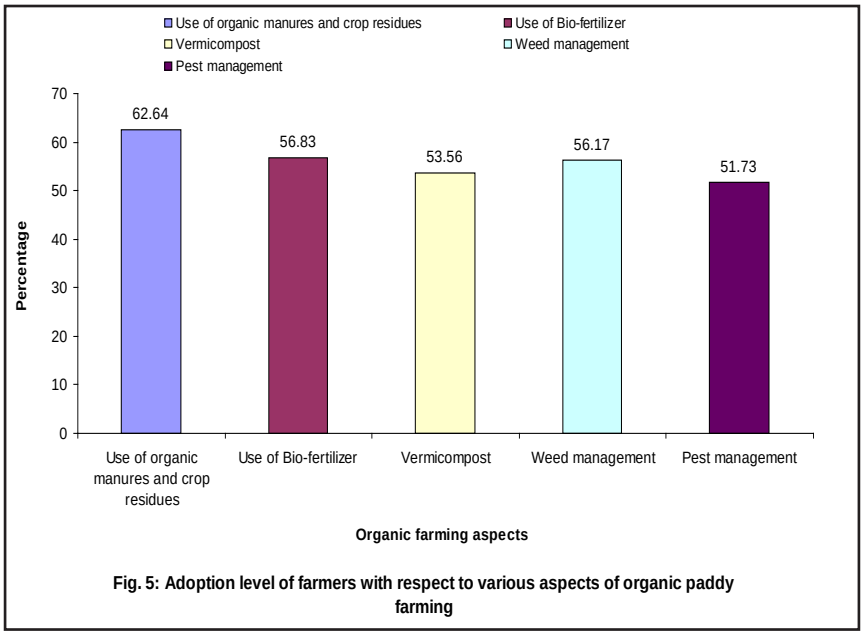

Fig. 5: Adoption level of farmers with respect to various aspects of organic paddy farming

Adoption level of farmers with respect to organic manures and crop residues

The data pertaining to adoption level of farmers with respect to organic manures and crop residues in organic paddy farming in Table 4 explained that, 'time and quantity of FYM used' ranked first with highest mean score of 1.71 followed by 'crop residues incorporation in the soil' ranked second with the weighted mean score of 1.58. 'Land preparation by non-burning vegetation' ranked third with the weighted mean score of 1.35. Rice and wheat straw are disposed off by burning which should have been returned to the soil. Proper technology either for the composting or in situ incorporation of residue has not been popularised amongst the farmers (Tarafdar *et. al.*, 2008).

In organic agriculture, preparation of land by burning vegetation is restricted to a minimum. 'Farm yard manure application method', 'farm yard manure preparation method' and the 'stage of green crop incorporation' were ranked as fourth, fifth and sixth with a weighted mean score of 1.29, 1.23 and 0.94, respectively. The seventh and the last factor was 'organic/ solid waste management' with a weighted mean score of 0.68. The findings of the study indicated that almost all the organic farmers had used farm yard manure as plant nutrients source. These findings are in conformity with Assis and Mohd Ismail (2011).

Table 4: Adoption level of farmers with respect to organic manures and crop residues **n=150**

Sr. No.	Organic farming practices	Adoption level			Total weighted score	Weighted mean score	Rank order
		Full (%)	Partial (%)	No (%)			
1	Time and quantity of FYM applied	107 (71.33)	43 (28.67)	0	214	1.71	I
2	FYM application method	76 (50.67)	41 (27.33)	33 (22.00)	152	1.29	IV
3	FYM preparation method	68 (45.33)	48 (32.00)	34 (22.67)	136	1.23	V
4	Crop residues incorporation	89 (59.33)	59 (39.33)	2 (1.33)	178	1.58	II
5	Organic/ solid waste management	29 (19.33)	44 (29.33)	77 (51.33)	58	0.68	VII
6	Land preparation by non-burning vegetation	78 (52.00)	46 (30.67)	26 (17.33)	156	1.35	III
7	Stage of green crop incorporation	14 (9.33)	113 (75.33)	23 (15.33)	28	0.94	VI

Katyal (2015) has expressed that with the exclusive focus on fertilizers, age-old practice of organic got side tracked. It clearly indicates that organic manures did not receive as much prominence as accorded to chemical fertilizers.

The crop residues have been traditionally used for preparing compost. For this, crop residues are used as animal bedding and are then heaped in dung pits. In the animal shed each kilogram of straw absorbs about 2-3 kg of urine, which enriches it with N. The residues of rice crop from one hectare land, on composting, give about 3 tons of manure as rich in nutrients as farmyard manure (FYM). Indian Agricultural Research Institute (IARI), New Delhi, has successfully developed a biomass-compost unit for making of good quality compost from crop residues (Gupta and Bhatia, 2012).

Adoption level of farmers of all three districts on various aspects

The data were analyzed to see if any significant difference existed in the adoption level of the respondents among the three districts. Aspect wise mean adoption score of the farmers of all the three districts were calculated and 'Z' test was applied to ascertain the difference (Table 5). Organic farmers of Karnal district were having higher mean adoption of organic manures and crop residues (9.35%), weed management (7.24%) as well as use of bio fertilizers (7.35%) in comparison to the Kurukshetra and Kaithal. While assessing the adoption of farmers of all the three districts on various aspects of organic paddy growing a significant difference was observed between the farmers of Kurukshetra and Kaithal districts regarding organic manures and crop residues (Z value 2.41) and also a significant difference was observed among the farmers of Kaithal and Karnal districts regarding their adoption about organic manures and crop residues (Z value0.27), weed management(Z value 2.12)as well as overall adoption. There was no significant difference on any aspect between Kurukshetra and Karnal districts.

The 'Z' value concluded that no major or big

Table 5: Adoption level of farmers of all three districts on various aspects **n=150**

Sr. No.	Aspects	Mean adoption score (n=50)			' Z' Value		
		Kaithal (KT)	Kurukshetra (KK)	Karnal (KL)	KT & KK	KT & KL	KK & KL
1	Organic manures and crop residues	8.77	8.20	9.35	2.41*	0.27*	1.05
2	Weed management	6.20	6.78	7.24	0.05	2.12*	0.29
3	Vermicompost	3.10	3.34	3.20	0.26	0.06	0.03
4	Use of bio fertilizers	6.30	6.80	7.35	0.32	0.46	0.07
5	Pest management	15.03	16.01	15.50	0.64	1.27	0.60
6	Overall adoption	39.4	41.13	42.70	1.69	2.18*	0.59

* Significant at 5 per cent level of significance

difference was found about the adoption of farmers among the three different districts while comparing the adoption of farmers with various permutations and combinations. The reason behind such a non significant difference might be because of the fact that all the three districts are located adjacent to each other and moreover seem to be sisterly related with one another. All these three districts are known to be a wet as well as the richest zone of Haryana.

CONCLUSION

Organic agriculture aiming at producing food has a huge potential to mitigate climate change and sustainable use of natural resources. Organic agriculture, as an adaptation strategy to climate change and variability, is a concrete and promising option for rural communities. Three districts viz., Kaithal, Karnal and Kurukshetra were also purposively selected since these districts have maximum area. More than half of farmers (55.33%) belonged to medium level of adoption of organic paddy farming practices and adoption level at district level among high level (41.94%) farmers belonged to Karnal district. Aspects wise the adoption percentage for organic manures and crop residues was found highest (62.64%) and ranked first. Adoption level of farmers with respect to organic manures and crop residues in organic paddy farming that, 'time and quantity of FYM used' ranked first with highest mean score of 1.71.

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