Original Research Article

Identification and Documentation of Organic Farming Practices in Wheat Crop in Jabalpur District

ABSTRACT

Organic farming is the farming of present century. Several individual and indigenous practices are followed by farmers in several regions of the world to achieve the aim of organic production. Hence, the present study was conducted in Jabalpur district of Madhya Pradesh 2021-22 to identify and document the different organic farming practices followed by farmers in wheat crop. Among different blocks of the district 120 farmers practicing organic farming under Paramparagat Krishi Vikas Yojana were selected using ex-post facto design and three stage multi sampling and interviewed through structured interview schedule and open-ended responses were collected, tabulated, classified and analyzed using frequency and percentage. A vast variety of practices were seen among the respondents including a few of the recommended and a few indigenous practices which were discussed in the study. More trainings and demonstrations on organic farming should be conducted by the government and agencies involved in promoting organic farming to enrich the knowledge of farming towards adopting recommended organic farming practices.

Keywords: Organic farming, document, paramparagat Krishi vikas yojana, indigenous.

1. INTRODUCTION

After attainment of production enough to feed the entire population of the nation, India is now on the road to attain sustainable and healthy production. In order to achieve this path many alternative methods are being employed in agriculture. Organic farming is one of these alternate forms that are aimed at sustainable agricultural production along with conservation of natural resources. Its global importance owes to adverse effects of modern agricultural practices on environment and soil health and appearance of pesticide residues in human food chain. It is a holistic way of farming in which quality agricultural production is achieved with an aim to conserve, rather improve, natural resources where as conventional or modern farming, on the other hand, is more akin to the factory farming which gives emphasis on input based maximization of crop productivity. Organic farming relies on crop rotations, green manures, organic manures, biofertilizers, composts and biological pest management for crop production excluding or strictly limiting the use of synthetic fertilizers, chemical pesticides, plant growth regulators and livestock feed additives [1]. National Mission for Sustainable Agriculture was started in 2015-16 with aim of improving soil fertility and promoting organic farming through Paramparagat Krishi Vikas Yojana. Many clusters of farmers were formed by the various agricultural departments of the different states pf the country to promote organic farming among them. Many farmers among them are practicing recommended organic cultivation practices whereas a few of them have included their own indigenous methods to these recommendations. Hence, recommended and indigenous practices followed by farmers in organic farming is identified and documented in this study.

2. MATERIALS AND METHODS

The study was conducted in the Jabalpur district of Madhya Pradesh. Among the seven blocks of the district, four blocks namely Jabalpur, Patan, Majholi and Sihora with organic clusters of farmers were selected and 24 organic farmers from each cluster of the each block and two clusters from Sihora block constituted sample size of 120 farmers for the study. Data was collected through direct interview, edited, compiled, tabulated and analyzed using basic statistics such as frequency and percentage. For documenting the organic practices the whole practice was recorded and presented in the table.

3. RESULTS AND DISCUSSION

Before discussing the organic practices followed by farmers, the organic materials and mixtures prepared by farmers for application in the crop were discussed as:

1. Jeevamrut: It is a natural liquid fertilizer prepared by mixing 10 kg of cow dung, 10 litres of cow urine, 2 kg of jaggery, 2kg of gram flour (a grinded mixture of chickpea, moong, urd, cowpea), 1kg of healthy live soil (so the name of fertilizer Jeevamrut, 'jeev' means 'live') and 200 litres of water.
2. Beejamrut: It is a treatment used for seeds, seedlings or any planting material. It protects them from fungus, soil borne and seed borne diseases. It is prepared by mixing 5kg of cow dung, 5 litres of cow urine, 1 litre of cow milk and 250gm quick lime in 100 litres of water and kept for 12-24 hours in shade.
3. Amritpani: Amritpani is a liquid manure used for seed treatment and soil application to enhance better rooting and soil fertility. It is prepared by mixing 10 kg of fresh cow dung, 250 gm of desi ghee (clarified butter), 500 gm of honey and 20 litres of water.
4. Panchgavya: It is a growth regulator produced from combination of five cow by-products by fermenting and so called panchgavya ('panch' means 'five'). It is prepared by mixing 4 kg of cow dung slurry, 1 kg of fresh cow dung, 3 litres of cow urine, 2 litres of cow milk, 2 litres of curd and 1 kg of desi ghee and fermented for 1 to 2 weeks via thorough stirring 2 to 3 times a day [2]. It not only enhances soil fertility but also adds to plant immunity against insects-pests.
5. Sanjeevak: Sanjeevak is an ancient indigenous scientific method of enhancing the microbial activity in the soil. It is prepared by mixing 100 litres of fresh cow urine, 100 kg of fresh cow dung, 500 gm of and 300 litres of water by mixing and fermenting for 10 days.
6. Vermiwash: Vermiwash is the organic drainage collected from vermicompost units in 1 litre quantity and mixed with 1 litre of cow urine diluted in 200 litre water. It is an organic fertilizer for plants.
7. Gajarghas swaras: Gajarghas swaras is rich in nitrogen content and prepared by crushing 2 kg of gajar ghas (*Parthenium hysterophorus* or congress grass) easily available weed and mixing it with 20 litres of water and 20 gm of alum, filtered and stored for 15 days before applying.
8. Brahmastra: It is a biopesticide prepared against sucking pests like aphids by mixing 3 kg of crushed neem leaves in 10 litres of cow urine, 10 kg crushed leaves of pomegranate, 10 kg custard, 10 kg guava and 10 kg papaya leaves in water, mixed and boiled to half and kept for 24 hours later filtered and stored for use.
9. Neemastra: Neemastra as the name says is a biopesticide against sucking pests prepared from neem leaves by crushing 5 kg leaves in water and mixing it with 5 litres of cow urine and 2kg of cow dung and fermented for 24 hours and stirred continuously, filtered and diluted to 100 litres.

Right from the filed preparation to harvesting and storage total 11 practices were documented from the farmers;

1. Season

- October to January are the main months of rabi season for sowing wheat in irrigated and unirrigated areas.

2. Land and soil preparation

- Green manures plants like sunhemp or dhaincha were grown in the field before 2 months of sowing the wheat crop. Ploughing and mixing in the soil before flowering was done in the field or if green manure plants were not sown in the main field, the green leaf plants were ploughed through bringing from other areas in the areas with water shortage. Farmers who couldn't afford green manure plants incorporated kharif crops residues in the soil and ploughed. Neem leaves were also included in the green leaf manure plants to avoid termite attack. Some of the well awared farmers also mixed Trichoderma viride culture in this mixture to hasten microbial growth in the field.
- According to the availability, farm yard manure (FYM) was incorporated in the last plough along with mixing the vermicompost, PSB, azotobacter and lime (in acidic soils). Farmers who had biogas plants at home included bio-gas slurry in this mixture [3]. In termite affected fields neem cake was applied along with the above mixture.
- Jeevamrut was sprayed on the field before sowing in 1:10 with water.

3. Varieties

- Sujata, Lok 1 and Sharbati (MP-4010, HW 2004) were the popular varieties sown in the selected areas.

4. Seed and sowing

- Healthy seeds were selected by mixing in water and discarding floating seeds.
- Seeds were primed by soaking for 2-10 hours and drying back in shade to ensure good germination.

- Seeds were treated in following ways to avoid seed born diseases:
- Beejamrut: It was sprayed on the seeds @ 105 kg per 10 kg seeds and seeds were dried in the shade.
  Or
- Amritpani: Seeds were treated with amritpani and dried in the shade before sowing.
- Seeds treated with beejamrut or amritpani were again treated with *Trichoderma viride* @ 1.5 kg per 10 kg seeds and mixture of azotobacter and PSB biofertilizers @ 10 gm per kg seeds as per availability and accessibility with the farmers and dried in the shade.
- Hot water treatment: It was the most common and cheapest method to avoid seed born diseases. Seeds were treated with hot water at 50^0C temperature for 10-30 min and dried. Treated seeds were sown after 1-5 hours of treatment at 20 to 22.5cm line spacing and 5cm depth @ 75 to 125 kg per ha.

5. Mulching

- A few of the farmers with good kharif residue left kept the kharif residue on the bunds and mulched the fields after 5-10 hours of sowing [4].

6. Intercropping

- Wheat was intercropped with peas, mustard, sunflower and vegetables.

7. Nutrient management

- Jeevamrut @ 375 litres was sprayed 15 days after sowing and repeated 1 month, 50 days and 75 days after first spray in 1:10 with water.
- Panchgavya was sprayed @ 1 lit in 30-50 litres of water in the standing crop for fertility enhancing and plant growth enhancing by increasing plant immunity [5].
- Sanjeevak was foliar sprayed for good microbial growth in the soil.
- Mixture of castor, karanj, groundnut and neem cake @ 2-2.5 tonnes per ha was top dressed in the field before first irrigation.
- Vermiwash was foliar sprayed in 1 week intervals from 15 days after sowing till grain formation.
- Gajarghas swaras was sprayed on land to increase the nitrogen content of the soil.

8. Irrigation management

- Organic wheat was also irrigated in the same manner as the inorganic wheat as 15-30, 40-45, 60-65, 80-85 and 100-105 days after sowing according to the availability of the water.
- Jeevamrut @ 200 litres was also applied in the field with these first four or two irrigations.

9. Weed management

- First weeding by hand or mechanical was done after first irrigation and repeated after 15 days intervals from first weeding.
- Bunds and drains were also cleaned to avoid weed growth.

10. Pest and disease management

- Farmers applied neem leaf manure @ 5 q per ha or neem cake @ 2.5 q per ha in soil to protect the crop from the termites and weevils.
- A piece of asafoetida (around a size of arecanut) was wrapped in a piece of cloth and kept in the irrigation channel to run away the termites from the fields. Queens were collected and destroyed to check the termite population.
- Only a few number of farmers with good knowledge and finance released Trichogramma parasitoid @ 125000 per ha weekly to kill army worms in the affected areas.
- Neem leaf extract obtained by crushing 5 kg neem leaves and boiling in the water and diluting to 100 litres was sprayed against the army worms.
- Neem Seed Kernel Extract (NSKE) 5% readily available in market was the easiest and most used biopesticide against pests and diseases.
- Fermented solution of 15 litres cow urine, 2 kg cow dung and 15 kg crushed neem leaves in 100 litres of water was foliar sprayed against insects and pests.
- Brahmastra was used @ 2 litres in 100 litres water and sprayed in acre against sucking pests like aphids.
- Neemastra, diluted to 100 litres and sprayed against sucking pests like aphids.
- Mustard cake crushed @ 1 kg and added with 5 litres of milk and 100 litres water was mixed and sprayed against karnal bunt.
- Sour buttermilk which was easily available with farmers was sprayed @ 5 litres in 200 litres of water against rust.
- Foliar spray of cow dung and dried neem leaves ashes to avoid attack of sucking pests.
- Foliar spray of hibiscus dry leaf extract was done against rust.
- Bird perches for owls to feed rat were established in the fields.
- Horse gram flour, cotton thread and cement powder were mixed to form balls and kept near holes of rodents.

11. Harvesting and storage

- Harvested manually or mechanically, threshed manually or mechanically, sun dried and stored in mud, steel containers or gunny bags by mixing dried neem leaves in different layers.

Fig.1. Picture of farmer showing biogas slurry plant

Fig.2. Picture of farmer showing mud storage structure

Fig. 1 and Fig. 2 were the pictures of farmer and investigator during the data collection for the study showing biogas slurry plant and mud storage.

The percentage of farmers practicing above identified and documented organic practices is explained in the table 1.

Table 1. Distribution of farmers according to the use of organic farming practice (n=120)

S. no.	Organic farming practices	Frequency	Percentage
I	**Soil and plant health management**		
A	**Organic manure**		
1.	Application of Farm Yard Manure (FYM)	120	100.00
2.	Application of biogas slurry	27	22.50
3.	Application of green manures	20	16.67
4.	Application of green leaf manures	34	28.34
5.	Application of kharif residue	100	83.34
6.	Application of neem leaves manure	92	76.67
B	**Composts**		
7.	Application of vermicompost	78	65.00
C	**Bio fertilizers**		
8.	Application of *Trichoderma viride*	58	48.34
9.	Application of Phosphorus Solubilizing Bacteria (PSB)	82	68.33
10.	Application of Azotobacter	46	38.34
D	**Other**		
11.	Beejamrut	57	47.50
12.	Amritpani	60	50.00
13.	Jeevamrut	68	56.67
14.	Panchgavya	105	87.50
15.	Sanjeevak	15	12.50
16.	Castor, groundnut, neem cake	94	78.34
17.	Vermiwash	78	65.00
18.	Gajarghas swaras	80	66.67
II	**Pest and disease management**		
E	**Biopesticides**		
19.	NSKE 5%	95	79.17
F	**Bio control agents**		
20.	*Trichogramma* parasitoid	05	04.17
G	**Others**		
21.	Asafoetida	34	28.34
22.	Fermented solution of neem leaves and cow urine and dung	45	37.50
23.	Brahmastra	56	46.67
24.	Neemastra	88	73.33
25.	Mustard cake	73	60.83
26.	Sour buttermilk	64	53.34
27.	Ashes spray	91	75.84
28.	Hibiscus leaf extract spray	15	12.50
29.	Bird perches	59	49.17

30.	Poison balls	90	75.00

From Table 1. it was clear that cent per cent of the farmers applies FYM and 83.34 per cent kharif residue due to easy availability. This result is in line with other studies conducted by Noorjehan, 2004 [5]. Also 87.50 per cent also applies panchgavya which is prepared from five materials obtained from livestock like cow. NSKE is applied by 79.17 per cent of the farmers as it is easily available in the market. Application of neem leaves manures was seen among 76.67 per cent followed by application of cow dung ashes (75.84%), poison balls (75.00%) against rodents in the fields and neemastra (73.33%) prepared by neem easily available in surrounding areas. Among all the organic farming practices documented, practices which were followed by very less number of farmers were use of bio control agents (04.17%), hibiscus leaf extract spray (12.50%), sanjeevak (12.50%) and green manures (16.67%). Many of the organic farming practices documented were also found in previous studies done by Jaganathan et. al. 2013 and 2015 and Noorjehan 2004 [3,4,5]. Only around 5.00% of the farmers are following all the recommended practices in addition to some of their indigenous practices who were either well trained or well awared. Many of the recommended organic farming practices were not followed by the farmers either due to lack of knowledge of using them or lack of time or non-availability or might be due to cost issues.

4. CONCLUSION

Although a number of recommended and indigenous organic farming practices were followed in organic wheat cultivation in the district yet the number of farmers following most of the practices is below average. Unavailability of various components of the organic material or lack of knowledge of preparing the organic material or low number of livestock in the house and nearby households limits the maximum use of inputs available with the farmers. Many of them were either producing for self-reliance or for selling among the neighbourhood also added to less adoption of organic farming practices. More trainings and demonstrations to enrich the pre-existing knowledge and skills to develop limited available resources into an effective inputs is needed to achieve cent percent organic farming in the area.

REFERENCES

1. Aulakh CS and Ravisankar N. Organic farming in Indian context: A perspective. Agric. Res. J. 2017;54(2): 149-164.
2. Jaganathan D. A multidimensional analysis of organic farming in Tamil Nadu. PhD Thesis, Indian Agricultural Research Institute, New Delhi; 2009.
3. Jaganathan D, Thamban C, Jose CT, Jayasekhar S and Anithakumari P. Analysis of organic farming practices in coconut in South India. Journal of Plantation Crops. 2013;41(1): 71-79.
4. Jaganathan D, Thamban C, Jose CT and Jayasekhar S. Analysis of organic farming practices in cocoa in India. Journal of Plantation Crops. 2015;43(2): 131-138.
5. Noorjehan AKA Hanif. Organic farming in Tamil Nadu: A multidimensional analysis. PhD Thesis, Tamil Nadu Agricultural University, Coimbatore; 2004.

ABBREVIATIONS

Fig.: Figure