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Agronomic Practices of Wheat Production under Certified Organic Farm

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Abstract **– The experiment was conducted in *rabi* season during 2019-20, at certified organic farm, SHIATS Model Organic Farm (SMOF). SMOF was developed under the National Project on Organic Farming (NPOF) by the department of Agronomy, with Dr. Thomas Abraham, Professor (Agronomy) as its Principal Investigator. Sam Higginbottom University of Agricultural Technology and Sciences, Allahabad. India's rank in terms of World's Organic Agricultural land was 9th and in terms of total number of producers was 1st as per 2018 data. (Source: FIBL & IFOAM Year Book 2018). In India, Area as on 31st March 2018, total area under organic certification process (registered under National Programme for Organic Production) is 3.56 million Hectare (2017-18). This includes 1.78 million ha (50%) cultivable area and another 1.78 million Hectare (50%) for wild harvest collection. Among all the states, Madhya Pradesh has covered largest area under organic certification followed by Rajasthan, Maharashtra and Uttar Pradesh. During 2016, Sikkim has achieved a remarkable distinction of converting its entire cultivable land (more than 76000 ha) under organic certification. Production, India produced around 1.70 million MT (2017-18) of certified organic products which includes all varieties of food products namely Oil Seeds, Sugar cane, Cereals & Millets, Cotton, Pulses, etc. (APEDA, 2018).**

Keywords **– Organic Wheat, Sustainable Farming, ITK, Bokashi Manure, Vermicompost, Beejamrutha, Fish Amino Acid.**

I. INTRODUCTION

Organic Agriculture is based On:

They are composed as ethical principles to inspire to action.

1. Principle of Health: Organic Agriculture should sustain and enhance the health of soil, plant, animal, human and planet as one and indivisible.
2. Principle of Ecology: Organic Agriculture should be based on living ecological systems and cycles, work with them, emulate them and help sustain them.
3. Principle of Fairness: Organic Agriculture should build on relationships that ensure fairness with regard to the common environment and life opportunities.
4. Principle of Care: Organic Agriculture should be managed in a precautionary and responsible manner to protect the health and well-being of current and future generations and the environment, (IFOAM, 2020).

II. LAND PREPARATION

1. Primary cultivation: deep penetration of the soil up to 15cm to 75cm depth, using harrow leaving a rough s-

-urface. The epitome of this operation is to prepare the land for secondary cultivation.

2. Secondary cultivation: To pulverize level and firm the top layer 5cm to 15cm of the soil by using rotavator. This process aerates the soil, which enables it to gain warmth quicker so plants can grow.

3. Land preparation and field layout done on 22 December 2019.

II. CULTURAL PRACTICES

1. *Seed and Seed Treatment*

I. Beejamrutha: a mixture of cow dung, cow urine, water, lime and a handful of soil. It is a totally organic product, protects the crop from both soil and seed-borne pathogens and also helps for the growth of plant. In SMOF (SHIATS Model Organic Farm), even a single plant didn't show any symptom of loose smut, So I clarify that certified organic farm + beejamrutha treatment suppress the seed and soil borne diseases.

NOTE: Three trails were conducted with same variety (K 7903(Halna)) in conventional farm of SHUATS, CRF, all the three trails are heavily affected by Loose smut.

II. Seed rate and variety: 120-140 kg/ha and K 7903(Halna).

III. Spacing (row X plant) cm: 20x5.

2. *Sowing*

- In my research trail 92% germination is observed.
- Sowing done on 24 Dec, 2019, after sowing major problem in Organic farm is birds attack, to protect my Crop and Environment, I used Indigenous Technical Knowledge (ITK).
- Temperature requirement may slightly differ from one variety to another at the time of germination. The critical minimum temperature for wheat crop is from 3.5 to 5.5 C, optimum 20- 25 ^{0}C and the maximum is around 35 ^{0}C. If temperature is more than 30 ^{0}C at the time of maturity, it leads to forced maturity and yield loss.
- **Reason for choosing K 7903**: It is tolerant to high temperature and to save yield losses from higher temperature. If temperature is increases crop approaches to maturity.
- It requires cool temperature during early period of growth. The tillering is favoured by cool conditions. Cool nights at seedling stage helps in utilizing the carbohydrates of the seed which results in better growth of the plant.

3. *Basal Application*

- Farm yard manure - 12 t/ha.
- Vermicompost - 4.5 t/ha.

I. Organic manures increase the water, nutrient holding capacity of soil and minimize the effect of toxicants and make the soil biologically active for soil micro-organisms, bring them non-available nutrients to available form (Nishant *et al.*,).

II. It enhances smell, taste, flavour and keeping quality of flowers, fruits, vegetables and food grains and helps the growers to sell their products at a higher price in the market. (CRIDA, Hyderabad).

III. Dhama and Sinha, 1985, reported that increase of protein in seed with increasing levels of Phosphorus (through Vermicompost).

IV. Patel *et al.* (2014) studied the effect of integrated nutrient management on wheat (*Triticum aestivum* L.) and its residual effect on succeeding crop where they reported that among three combination of organic manure treatments, application of FYM at 10 t/ha and vermicompost 5 t/ha with 60 kg/ha of P_2O_5 or 40 kg/ha of P_2O_5 + PSB and 40 kg/ha of S produced maximum wheat grain and straw yield as compared to inorganics.

4. *Top Dressing of Organic Manures*

Liquid Manures

a. Panchagavya @2% application.

b. Vermiwash @5% application.

c. Fish amino acid.

Source: M. Shiva Kumar, 2020 (http: //www.agrifoodmagazine.co.in/ (2(7): 774-77)

Bokashi Manure (BM) – 2.5-3 t/ha.

- Bokashi manure should be applied (2.5 to 3 t/ha) over the root zone of established plants or mixed into the soil where new plants are being established(fig.3).
- Bokashi manure, boost up or activate the beneficial microorganisms commonly occurring in soil.
- Main disadvantage: Bokashi manure contain high amount EC level, it leads to poor crop performance or results, sometimes crop may burn.
- **NOTE:** Producers or farmers has to be aware of EC levels and to exercise caution in the amounts applied to nourish crops.

5. *Irrigation Practices*

- Four irrigations are given: 1. CRI (crown root initiation) 2. Tillering 3. Jointing stage 4. Grain development stage. Depth of irrigation (cm) 5.
- **NOTE:** In Wheat, the time of irrigation is more important than number of irrigations.

6. *Major Weeds*

- *Phalaris minor*, *Chenopodium album*, *Convolvulus arvensis*, Phyllanthus niruri, *Cynodon dactylon*, and *Cyprus rotundus.*
- As per recommendation of **ICAR -Indian Institute of Farming Systems Research, Modipuram, Meerut** at least 2 hand Weedings has to be done in organic wheat i.e. 30DAS, 45DAS.

III. ORGANIC PLANT PROTECTION PRACTICES

1. Soil application of *Beauveria bassiana*- 5kg/ha.

2. Spray of neem oil @ 3%.

Important Observations Recorded

1. Plant height (cm).
2. Dry matter accumulation.
3. Number of tillers/ hills.
4. Number of grains per panicle.
5. 1000 seed weight (g).
6. Grain yield (t/ha).
7. Straw yield (t/ha).

NOTE: All applications (including irrigations, organic manures) are provided based on closer monitoring of disease, deficiency, pest population in my research work.

Problems Faced During CRI and Grain Flowering Stages (Termites):

Serious pest in wheat, they feed on roots, stem of growing plants, even dead tissues of plant feeding on cellulose. The damaged plants dry up completely and are easily pulled out. The plants damaged at later stages give rise to white ears. Infestation is heavy under unirrigated condition.

- At this stage maintaining the adequate moisture is important.
- Termites attack at early stage (CRI) of crop, termites attack at flowering stage.

Control:

i. **Beauveria bassiana @**40-50 gm/15 liters of water (soil application or through irrigation).

ii. Application of **Neem oil @ 3%** through irrigation.

Yield and Economic

Economic yield (t/ha**)**	3.29
Price (Rs/5kg)	175
Cost of Cultivation	57730
Gross returns	122062
Net returns	64332
B:C ratio	2.11

Source: Price of organic Wheat, Ministry of Agriculture and Farmers, Welfare (Jaivik Kheti portal) 2019-202.

Research Work Photographs

Fig. 1. Line Sowing of organic wheat in SMOF.

Fig. 2. Field inspection at vegetative stage of wheat by Dr. Rajesh Singh.

Fig. 3. Field inspection at reproductive stage (spikes) of wheat by **Prof. Dr. Thomas Abraham.**

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