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Organic Seed Basic input in Organic Agriculture

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Organic farming is agricultural system that uses ecologically based pest controls and biological fertilizers derived largely from animal and plant wastes and nitrogen-fixing cover crops. Organic seed production refers to the cultivation of seed crops without the use of synthetic products or chemicals. In general, various chemicals, such as herbicides, pesticides, and fungicides are used in seed production. Because seeds are essential inputs for crop production, organic agriculture necessitates the use of organic seeds. The most appropriate reason for using organic seeds when growing organic crops is that organic seed has a lower chemical impact on the environment and the crop is purely organic to organic. Soil fertility and pest management are achieved during organic seed production through a variety of sources such as cropping patterns, organic manure, bio fertilizers, cultural practices and bio pesticides, including plant derived products.

Introduction

Crop production begins with soil preparation and seed sowing. The term "organic seed" refers to seed grown without the use of synthetic chemicals in an organic system that has been certified. While organic seed production is a highly specialized activity, it can also be an appealing source of income diversification for organic farmers. Organic seed production is more difficult than conventional seed production because it requires a higher level of technical skill, more labour and specific risks that increase production costs and failure risks. More time is required to plant seed crops in the field and the seed is more susceptible to insect, pest and disease attack at that time, so special care should be taken.

Different Organic Farming Techniques

Green Manure: Refers to the dying plants that are uprooted and stuffed into the soil in order to make them act as a nutrient for the soil to increase its quality

Crop Rotation: A technique to grow various kinds of crops in the same area, according to different seasons, in a sequential manner.

Vermicomposting: Earthworms are preparing vermicompost. It has an adequate amount of nitrogen and other nutrients. Organic waste that is biodegradable and decomposable is used as earthworm feed.

Organic manure: FYM, sheep manure, crop residues, poultry manure, oil cakes, composts-coir pith compost and other farm waste Manures are plant and animal wastes that are used as a source of plant nutrients.

Biological Pest Control: A method in which living organisms are used to control pests, without or with limited use of chemicals.

Biofertilizer: Some microorganisms have the ability to fix atmospheric nitrogen in order to release and mobilize phosphorous and other nutrients for plant use. *Rhizobium*, *Azotobacter*, *Azospirillum*, *Blue Green Algae*, *Mycorrhizae and Phosphobacteria* are among them.

Plant products (botanicals): Garlic extract, leaf extracts of Prosopis, Pungam, Acacia, Calotropis and other plants were used to harden the seeds. Plant extracts that have decayed can be used as liquid manure to promote plant growth.

Mulching: It is the process of covering the soil surface with a layer of some external materials and that material which is used for covering is known as 'Mulch'. Organic mulches can suppress annual weeds while also providing other important benefits such as organic matter, nutrients, moisture conservation, soil protection and temperature regulation.

Panchmukhi: The panchmukhi farming process for increasing agricultural yield consists of five factors of agricultural treatments used by natural farmers: seed treatment, soil treatment, water treatment, environmental treatment and crop treatment.

Panchagavya: It's a foliar spray made by organic farmers with the following ingredients and methods:

Ingredients include 5 kg of biogas slurry/cow dung, 3 litres of cow urine, 2 litres of cow milk, 2 litres of curd, 1 litre of clarified butter/ghee, 3 litres of sugarcane juice, 1 kg of palm sugar, 3 litres of tender coconut water and a banana. After thoroughly stirring the ingredients, they are combined in a mud pot. The mixture is then fermented for one week in a shade. Then it is then diluted in 100 litres of water. This mixture is enough to spray four acres. Before spraying, the diluted mixture must be thoroughly mixed for 20 minutes. It can be kept for a month. It inhibits vegetative growth, promotes rapid flowering, and provides resistance to pests and diseases.

Organic Seed Production Practices

Land selection: Land that has already been certified for organic agriculture should be chosen. It should be levelled and well-drained. It should be weed-free and at least 3 metres away from the conventional field. Crops should be rotated to reduce pest incidence and the possibility of seed contamination from open pollination with similar species types. Soil should be fertile and have a high water retention capacity.

Land preparation: Formed fine seed beds for improved germination and vegetative growth. Get rid of all the weed plants. Depending on the amount of rain the beds should be raised and shaped. Because seeds are frequently precision planted, uniform emergence and seedling development are required for optimum management.

Soil fertilization: Crop rotation, the use of a cover crop, green manure crops, mulch, animal compost and plant material compost can all be used to ensure good soil fertility and fewer soil-borne diseases. There are numerous commercial organic manures and fertilizers available the most important of which are listed below:

- Compost manure
- Inoculation of beneficial fungi for nitrogen fixation
- Green manure and crop residues
- Mulches and straw
- Bio fertilizers
- Vermicompost
- Rock phosphate, often crushed rock that contains elevated levels of phosphate.
- Plant preparation and botanicals extract.
- Wood ashes to increase potassium.

Choice of crop and varieties: Any crop of variety/hybrid that is suitable for the location shall be grown except genetically modified organisms/crop. Most pest and disease resistant varieties are preferred.

Seeds and planting material: Organically certified seeds and planting material must be used. In the absence of organic seed, untreated seeds from conventional farms shall be used for the first year and organic seeds shall be used for subsequent years. Other varieties that are

not grown in the first year must be grown with chemically untreated conventional material. Genetically modified seeds, pollen, transgenic plants or plant materials are prohibited.

Planting techniques: Seeds are typically planted directly in the field by drilling or transplanting from a greenhouse-grown seedling. These seedlings should be grown organically. The seeds must be planted in such a way that proper vegetative development occurs allowing for fruit and seed development with adequate spacing and depth in the bed.

Rouging: Rouging at regular intervals during hybrid seed production to remove off types from both male and female lines.

Weed, pest and disease management: Weed and pest control is critical for ensuring high yield and quality of organically grown seeds. Mulching with plant residues and other fully biodegradable materials, livestock grazing and hand weeding combined with mechanical cultivation can all be used to control weeds. Because the seed crop is in the field for an extended period of time, multiple pathogens have numerous opportunities to interact with a single crop. Organically controlling these pathogens is difficult and necessitates proper growing conditions.

1. **Biological pest control:** This method is completely compatible with organic seed production. Biological pest control employs three natural enemies that can be used to control harmful pests while reducing the use of organic pesticides. Parasitoid insects which lay their eggs inside another insect are included in the first group. *Aphidius colemani*, a wasp that lays its eggs in aphid adults is an example. The second type of beneficial insect is predators which eat other insects. The lady beetle which feeds on insects and mites is a common predator. Weed feeders make up the third group. Certain weeds including purple loosestrife are consumed by insects such as the weevil *Hylobius transversovittatus*. The following practices are included in the brief biological methods.
    - Biocontrol agents like *Pseudomonas, Trichodorma*
    - Green manure and crop residues
    - Mulches and straw
    - Bio fertilizers
    - Vermicompost
    - Rock phosphate, often crushed rock that contains elevated levels of phosphate.
    - Plant preparation and botanicals extract.
    - Wood ashes to increase potassium.
2. **Physical method:** Human efforts are used in this method to control insect pests and diseases. The various physical methods are as follows:

Regulation of temperature: applicable for stored place

- Regulation of light: applicable for field crop
- Regulation of moisture: Use for stored insect pest control
- Use of sound waves

3. **Mechanical method:**

The mechanical method of insect pest management includes: Hand picking, Sieving and winnowing, Shaking and beating, Netting, Wrapping, Painting, banding.

Harvesting, threshing and drying: The male parent line should be harvested first. The method of harvesting is determined by the type of seed produced. Seed shattering must be avoided when harvesting dry-seeded crops because seed harvest occurs after the crop reaches physiological maturity. To reduce shattering, the plant's stalks must be cut while still green and field dried to allow for uniform seed maturation.

Cleaning and Storage: After the seeds have been harvested, threshed and extracted. They must be evaluated in order to determine their physical purity. All seeds should be stored in

single units and according to their specific temperature/humidity requirements. For storage the moisture content should be less than 12%.

Seed treatment: The organic seed are treated normally with materials from organic sources. They are:

Botanicals	Biofertilizers	Cow's product	Biocontrol agent	other
Neem leaf extract	*Rhizobium*	Panchagavya	*Pseudomonas spp.*	Coconut milk
Sarani leaf extract	*Phosphobacteria*	Curd	*Trichoderma spp.*	Tender coconut
Mint leaf extract	*Azatobactor*	Cow milk		Vermicompost
Arappu leaf extract	*Azospirillum*	Cow urine		Vermiwash
Prosopis leaf extract		Cowdung		

Because it is not always possible to produce disease-free seed because conventional effective seed treatment with synthetic compounds is not always possible much research into alternative seed treatments has been conducted and continues to be conducted. The various treatments that have been tested can be divided into several categories:

1. **Thermal treatment:** Hot water seed treatments are effective on a variety of crops but they must be used with caution to avoid killing the seed. The limitation is that the seed must be dried quickly after treatment which is difficult to do on an industrial scale. An aerated steam method has been proposed to avoid this problem. Drying is no longer an issue because the seed is not immersed in water but is instead exposed to hot moist air. Temperature selection and control are critical in this treatment.
2. **Use of antagonists:** Several antagonists have been tested and the list is long. Some non-exhaustive results are as follows:
   - *Bacillus subtilis* against *Tilletia* caries on wheat.
   - *Trichoderma viride* against *Fusarium spp* and *Bipolaris sorokiniana* on wheat and barley.
   - *Pseudomonas chlororaphis*, *Bacillus subtilis*, *Fusarium oxyporum*, *Streptomyces uytwrqfds0spp* against *Alternaria spp* on *Brassica* seed.
   - *Trichoderma viride* against *Fusarium spp* and *Bipolaris sorokiniana* on wheat and barley.
   - *Trichoderma spp* against collar rot (*Aspergillus niger*) on groundnut.
   - Several antagonists against *Rhizoctnia solani*.
3. **Natural compounds:** Essential oils have been tested sometimes in conjunction with chelators and natural detergents. Oils of thyme and oregano have been shown to be effective against *Xanthomonas campestris* pv. *campestris*, *Clavibacter michiganensis* pv. *michiganensis*, *Botritis aclada* and *Alternaria dauci*. Tellecur, a yellow mustard flour-based product has been shown to be effective against a variety of pathogens including *Telletia* caries in wheat. Chitosan has been shown to be effective against *Fusarium spp.* and *Bipolaris sorokiniana* on wheat and barley. Biokal (57 percent medicinal herb extracts, 38 percent bio-humus extracts, 5 percent volatile oil, metal and trace elements) is a complex product that has been shown to be effective against *Ascochyta pisi* on pea seed.
4. **Other products:** Organic acids (lactic, acetic, citric, propionic and ascorbic) and antiseptic products such as KMnO4 and CuSO4 are also under tests at the moment.

Organic Seed Certification

In simplified terms, the National Organic Program Standards require for crop farms:

- 3 years (36 months prior to harvest) with no use of prohibited materials (no synthetic fertilizers, pesticides or genetically modified organisms) prior to certification
- Distinct defined boundaries for the operation
- Proactive steps to prevent contamination from adjoining land uses

- Adoption of an organic system plan including proactive fertility management systems, conservation measures and environmentally sound manure, weed, disease and pest management practices.
- Monitoring of the operation's management practices to assure compliance
- Use of natural inputs and/or approved synthetic substances on the National List provided that proactive management practices are implemented prior to use of approved inputs
- No use of prohibited substances
- With out of genetically engineered organisms (GMOs) defined in the rule as "excluded methods"
- With out of sewage sludge or irradiation
- Use of organic seeds when commercially available (must not use seeds treated with prohibited synthetic materials such as fungicides)
- Use of organic seedlings for annual crops
- Restrictions on the use of raw manure and compost
- Must maintain or improve the physical, chemical and biological condition of the soil, minimize soil erosion and implement soil building crop rotations
- Fertility management must not contaminate crops, soil or water with plant nutrients, pathogens, heavy metals or prohibited substances
- Maintenance of buffer zones depending on risk of contamination
- Prevent commingling on split operations (the entire farm does not have to be converted to organic production provided that sufficient measures are in place to segregate organic from non-organic crops and production inputs)
- No field burning to dispose of crop residues (may only burn to suppress disease or stimulate seed germination flame weeding is allowed)
- No residues of prohibited substances exceeding 5% of the EPA tolerance (certifier may require residue analysis if there is reason to believe that a crop has come in contact with prohibited substances or was produced using GMOs)

Advantages of Organic Seed

- Nutrition
- Poison free
- Food taste better
- Food keeps longer

Conclusion

Organic agriculture with organic seed involves the cultivation of crops in accordance with a set of guidelines that forbid the use of synthetic products/chemicals such as fertilizer, pesticides and herbicides. Cropping patterns (rotations, inter/mix-crops, pest and disease-resistant genotypes), manure (green manure, organic manures, and compost), bio fertilizers, cultural practices (weeding, planting, conventional tillage) and bio pesticides, including plant derived products are thus used to improve soil fertility and pest management. At the moment, this system appears to be an ideal and viable solution for producing seeds in addition to agriculture production. The excessive use of plant growth regulators, pesticides and fertilizer to accelerate the growth of agricultural produce is harmful to human health and the environment as a whole. Furthermore, consumers are becoming more aware and critical of the quality of food and by-products that affect their health, even though toxicity varies depending on the type of food consumed.