



Need of Organic Plant Breeding System in Organic Farming

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The organic farming has gained success day by day. It benefits to consumer, the environment and rural communities. The cultivar used in organic farming are immersed in the organic condition, hence it would be a challenge for the breeding sector to develop cultivar for that condition. Organic plant breeding is to develop plants, which enhance the potential of organic farming and biodiversity. Organic plant breeding is a holistic approach, which respects natural crossing barriers and based on fertile plants that can establish a viable relationship with the living soil. Organic agriculture challenges itself and researchers to develop new approaches within the framework of the principles of naturalness to gain the desired progress for organic production by new or additional breeding and propagation concepts.

Introduction

India is depending on modern agriculture, that utilizes higher quantity of fertilizers and pesticides, but this trend has not been reflected in the crop production. More use of pesticides and fertilizers, increased the risk of environment and human health but organic food products are beneficial. Organic agriculture is a sustainable and environment friendly production system that offers cultural benefits. Presently, organic farmers depends greatly on conventionally bred and produced varieties, but there is need of varieties, better adapted to organic farming systems for further optimization of organic agriculture production. The plant breeding system should gives importance to organic farming for improvement of plant ideotype suitable for the condition (Patil and Pawar, 2013). Organic farmers are currently growing less adaptable varieties, because there is little interest of private sector in developing varieties for organic agriculture growing in diverse environment (Desclaux, 2005). Organic production is also described as the natural way of production. Some researchers reported that the naturalness of organic agriculture should not be limited to refraining from chemical inputs and replacing them by natural and organic compounds in the conversion from conventional to

organic farming. There are various statements about naturalness of organic agriculture as given by Lammerts van Bueren, (2002). Some of the important statements are:

1. A widely accepted characteristic of organic agriculture compared with conventional agriculture is its naturalness.
2. Control of the production process is not directed at becoming independent of nature. It is controlled with respect of nature of nature and natural processes, thus organic agriculture is closer to nature than conventional agriculture.
3. Organic agriculture integrates culture and nature.
4. Genetic manipulation is seen as unnatural and in conflict with important values of organic agriculture, related to respect for life and species barriers.
5. Biotechnology can have effects that are positive for the environment, but it is not a technology that is 'green' in the ecological sense.
6. The naturalness of organic agriculture is not always a guarantee, that it will be good for the environment.
7. In organic agriculture the characteristic nature and integrity of plant species are respected.

Needs for Organic Plant Breeding

Organic plant breeding is new concept for crop improvement and most of the farmers are depend on the seed and other propagules developed by conventional breeding methods and management practices. If, the efficiency of organic production is to be maintained, the planting material used should be of organic origin. There are various reasons (George Acquaaah, 2007), why organic breeding needed to the service of organic production industry. These are as follows:

1. Genetically modified (GM) crop varieties are not allowed in organic crop production. Since GM varieties having transgenic origin and will affect the principle of wholeness, therefore, there is need to develop non GM varieties for organic production.
2. Variety suitable for organic production used to be different in many aspects from those suited for conventional production. Successful variety should be adapted to wide range of soil moisture and fertility conditions, resistance to diseases, insect pests and competitive of weeds for nutrient.
3. Conventional plant breeding methods sometimes violet natural barrier (genetic engineering/wide crosses) and consequently integrity of plants not maintained.

Plant Breeding Techniques for Organic Agriculture

There are some breeding techniques which are utilized for development of organic variety. Several techniques such as genetic engineering, cytoplasm male sterile hybrids without restorer genes, protoplasm fusion, radiated mentor pollen and induced mutations would be

banned, then possibly in the future, embryo culture, ovary culture and *in-vitro* pollination could be used. Some of the permitted techniques for organic agriculture as given by Patil and Pawar, (2013), are:

1. **Hybrids:** From the definition of the concept behind organic breeding, hybridization as such can be permitted, provided that the F1-offspring is fertile and the parent lines can be propagated under organic conditions.
2. **DNA marker assisted selection:** It can be permitted in an organic breeding programme, if DNA screening is performed without enzymes originating from Genetically Modified Organisms (GMOs) and without radiation.
3. **Meristem culture:** It can be used in certified organic breeding programmes, because it is considered as being close to classical breeding techniques.

Quality Aspects of Organic Breeding

The organic breeding focuses on following quality aspects. These are:

1. **Ecological:** Organic farmers require varieties with characteristics which are better adapted under this kind of farming system. The desired variety traits include adaptation of to organic soil fertility management, implying lower and organic inputs, better root system, ability to suppress weeds, high yield level and yield stability. The natural reproductive ability of the plants to be retained, which thus ensures the sustainable use of the cultivar.
2. **Ethical:** Organic breeding techniques and strategies should be compatible with the principles of organic agriculture, respecting the intrinsic value and integrity of living organisms, including plants.
3. **Edible:** Positive quality aspect of the organic variety includes the inner quality of products, such as good taste, good structure and vitality. In these varieties, taste, colour, aroma, form, nutritional value and keeping quality must be retained and improved.

The Future of Organic Plant Breeding

The need for organic seed production and breeding will continue to grow as organic production increases. There is now growing interest in breeding for organics, what remains to emerge is the form or forms, this breeding may take. There are three distinct forms of plant breeding, formal, farmer and participatory (Don Burgett, 2004).

1. **Formal breeding:** It can be either public or private and is conducted by professional scientists with goal of releasing new varieties for the market. Here farmers may or may

not be involved in the evaluation of these varieties, they have no real decision making power.

2. **Farmer breeding:** This form is often referred to as seed saving, wherein the farmer select plants from crops in production that possess desirable qualities and then collects seed from those plants for future planting. The essential makeup of the variety is maintained through mass population selection, although occasional selections for variation may occur.
3. **Participatory breeding:** It is a combination of formal and farmer breeding. The process involves collection and conservation of germplasm, design, data collection, evaluation and eventual distribution. The distinct advantages to participatory breeding or organics comes in the ability to adapt varieties to whole farming systems and regional conditions and where the farmers are involved in shaping the germplasm based on their experiences with both the crops and consumer markets.

Conclusion

Organic agriculture challenges itself and researches to develop new approaches within the framework of the principles of naturalness to gain the desired progress for organic production by new or additional breeding and propagation concepts. This includes multidisciplinary approaches from a non-chemical, agro-ecological and an integrity approach in which variety improvement can play an important role for organic production. Organic crop breeding is rising from its infancy, has been maturing as a business, and is becoming a scientific discipline. It is contributing not only to the needs of organic farmers who require cultivars better adapted to their farming systems, but also to the development of sustainable agriculture aiming to reduce external inputs.

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