Steadily growing public concerns about soil health, crop quality, productivity, pesticides residues, food safety and security, environmental quality and groundwater contamination, directs for a primary objective of comparing conventional, low-input, and organic farming systems with respect to the following factors:

1. The abundance and diversity of weed, pathogen, arthropod and nematode populations.
2. Differences in soil biology, physical and chemical properties and water relations.
4. Economic viability.

Following are some of the researchable issues for future consideration:

The organic sector is heading for further improvement of organic farming systems by developing organic seed and planting material. Problems regarding soil fertility, weeds, pest and diseases can be adequately controlled in organic systems, although further work for optimization of various parameters is required.

- The ability to produce healthy seed without chemical protection is the first aspect that needs reconsideration. This addition to the organic crop ideotype requires more attention in future breeding programmes.
- The second aspect which needs attention is improving a sound cultural practice for organic production of seed and planting material and to keep the disease pressure as low as possible.
- Selecting and developing varieties with sufficient tolerance or resistance against diseases during organic seed production is crucial.
- Further practical and research work is needed to improve and adopt cultural practices for sound organic seed and plant stock production.
- Seed producers should identify the best locations with low disease pressure.
- Adjusted threshold values for marketing organic seed should be developed.
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- Practical seed health tests and standards should be developed for crops with a high risk of seed-borne diseases.
- Adequate, alternative seed treatments need to be developed, and permitted.
- For successful development of organic seed production, good communication and mutual commitment from farmers, traders, breeders and government is necessary.

- **Selection, introduction and breeding of tomatoes varieties suitable for organic cultivation**

  It is estimated that over 90 per cent of tomato varieties grown by the farmers under conventional system are hybrids which lack important traits required under organic and low input production conditions. There are number of open pollinated varieties which need to be tested under organic system of cultivation. Because tomato is highly self-pollinated, it is possible to develop and release pure lines that can be propagated by seed. Even though, the non-chemical and agro-ecological approaches have been established already for many years, main stream science has paid little attention to the organic sector until lately. Many research questions have come up in this study for optimising the yield stability of organic varieties. So far breeding efforts and variety testing have only targeted conventional agriculture. As most of the constraints in organic production are not so much an issue in conventional agriculture, current varieties are not selected to cope up with these constraints and hence considerable advances are to be expected with breeding efforts and variety evaluation for organic growing conditions. There will be a need for both types of varieties, depending on market demands and needs of the grower. Apart from the question that which crop suits best in the given farm context, in which sequence and in what frequency, a farmer makes use of the possibility of choosing among available varieties. The availability of resistant and otherwise organically adapted varieties is an important factor in designing a possible composition of the rotation. Because an organic farmer has hardly any curative means, he in contrast to his conventional colleague, will have to give more priority to varietal disease resistance, even if this is associated with a lower productivity.
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Because in many cases, organic farmers can keep the disease pressure low with ample rotation and low nitrogen input, the focus is not merely on absolute resistance, in many cases tolerant or field resistant varieties can be sufficient. The priorities go more in the direction of resistance against fungal, air-borne diseases and not of soil-borne diseases and pests. As there are no varieties available that are fully resistant against these diseases they specifically challenge researchers to look for multifactorial solutions and require interdisciplinary research, including genetic, epidemiological and agronomic strategies. The strategies in this case focus on crop and farm sanitary measures, different cultural practices and avoidance strategies with early maturing varieties, higher disease tolerance and exploiting differences in resistance components to delay the infection and sporulation rate.

It is a great challenge for the seed sector to supply the organic market with sufficient quantities and adequate quality of organically produced seed of current varieties. At the moment, only a few of these seed companies consider also breeding for organic agriculture. With the step of producing organic seed on a larger scale, the commercial seed sector has now become economically involved and needs support not only from the organic sector defining their desired variety characteristics, but also from research to remove several obstacles to enable further improvement of organic propagation and breeding strategies. Breeding for organic agriculture, therefore, deserves significantly more attention and support.

7.1 Product quality

Varietal characteristics should not only suit and optimize the non-chemical and agro-ecological cultural practices of organic farming systems and benefit the quality of the environment, but should also lead to optimal product quality for traders, processors and consumers. Part of the quality (negatively formulated) concept is the absence of chemical residues. An important strategy to further improve performance and product quality parameters in organic and low-input production systems is to integrate the development of novel genotypes and agronomic approaches, the development of genetic diversity focused crop breeding approaches may, therefore, be essential to improve yield and quality parameters in foods from organic and low-input farming systems, especially in the context of challenges expected due to global climate change (Ostergard, 2009).
7.2 Suitable and right combination of crops

Studies needs to be conducted on working out suitable combinations of crops for different microfarming situations.

7.3 Standardization of organic packages

Agrotechnology needs to be standardized for organic system of cultivation with appropriate package of practices.

7.4 Sustainable crop production

A major focus in the coming decades would be on safe and eco-friendly methods by exploiting the beneficial micro-organisms in sustainable crop production. Such microorganisms in general consists of diverse naturally occurring microbes whose inoculation to the soil ecosystem advances soil physiochemical properties, soil microbes biodiversity, soil health, plant growth and development and crop productivity. Many traits desired for varieties for organic and low-input farming systems are required to provide overall yield stability and include morphological and physiological characteristics, such as plant and root architecture and vigour. Furthermore, the organic sector demands breeding to focus on optimizing soil processes relevant for plant nutrition, soil fertility and crop disease resistance.

7.5 Yields

Tomato yields are important because of the economic role the crop plays in whole-farm sustainability. Therefore, significantly lower yields of low-input organic tomatoes are matter of concern, indicating that these systems may not be economically viable during the transition phase. So more research is needed for stabilizing the system during conversion phases.

7.6 Disease and pest management

The consequences of losses due to pests and diseases in organic farming systems differ considerably, depending on region, crop, farm structure or market demands. In general, yields in organic agriculture are 20 per cent lower due to a lower nitrogen-input and in some cases due to pests and diseases (Tamm, 2000; Mader et al, 2002). Further growth of the organic sector can be supported if the
yield stability can be raised by a better control of diseases and pests. As in weed management, disease and pest management in organic farming systems is interwoven with the total ecological layout of the farming system and the sophisticated use of agro-ecological knowledge, and aims at enhancing the self-regulatory capacity and building up high tolerance to pests and diseases instead of regulation with chemical protectants. The central concept of plant health in organic farming is good growing conditions and avoidance of stress which will enhance the natural tolerance of plants against plant competitors.

7.7 Soil-borne diseases
In organic agriculture, most soil-borne diseases and pests can be controlled by stimulating biodiversity in and above the soil, by feeding soil life with organic soil amendments and good soil management and by choosing site-specific crops in a balanced rotation. Although the power of disease suppressive ability of (organic) soils and soil life is known, more research is needed to use soil life as a management tool to increase the power of soil defenses in a more controlled way (Hoitink et al., 1997). More research needs to be carried out on and more experience gained with rotations. Although the need for crop rotation is also being recognized in conventional farming, organic farming is simply not possible without adequate crop rotation. Success is intimately related to the choice of the right crops in the right sequence and in the right frequency suppressing not only populations of soil-borne pests and diseases, but also of weeds and creating a diverse soil life where beneficial organisms also flourish (Francis and Clegg, 1990; Altieri, 1999; Mader et al., 2002).

7.8 Improving nutrient efficiency
Improving the different compounds of nutrient-use efficiency like maintenance of photosynthesis under nutrient stress, nutrient uptake capacity, nutrient-utilization capacity and translocation efficiency, will contribute to higher yield and quality under low input conditions. For organic farming, the adaptation of varieties to efficient nutrient use derived from slow-nutrient-releasing organic fertilizer is of special importance, which is not addressed in conventional selection programmes with no or less inorganic fertilizer (Dawson et al., 2008).
Nutrient uptake efficiency of plants can be improved by the capacity of crops to establish and sustain efficient (1) plant growth promoting-rhizosphere (PGPR) bacterial communities (Gosling et al., 2006) and (2) arbuscular mycorrhizas (AMs), a trait that has been described as “rhizosphere competence”. PGPR bacteria promote N-uptake efficiency since they (1) protect root systems against attack by soil-borne pathogens (Cook, 2007), (2) maintain efficient mineralization driven nutrient supplies to plant roots (Rengel et al., 2005), and (3) support the establishment of active AM associations (Dawson et al., 2008). AMs are essential for efficient phosphorus, micronutrient and water uptake in plants grown under organic (Gosling et al., 2006) and low-input conditions (Mader et al., 2000). Also, significant efforts are needed to elucidate the potential of improving crop health and nutrition via beneficial plant × soil × microbe interactions before breeding programmes targeting traits associated with such interactions for organic farming can be developed (Wissuwa et al., 2009).

7.9 Tolerance to abiotic stresses

Tolerance to abiotic stresses is important not only for organic but also for conventional agriculture. In some cases such as drought stress, organic farmers may give higher priority to such traits as they want to build a system that is less dependent on inputs. Although flavor is one of the most difficult traits to breed for, tomato breeding programmes often include selection steps designed to improve flavor.

7.10 Extending organic markets

In some cases, the size of the organic market is too small to be economically attractive for professional breeding companies. Participatory approaches could represent an efficient alternative to develop new varieties for organic farming and should be further developed to reduce the reliance on commercial conventional farming focused breeding companies, farmers and other supply chain stakeholder should also be encouraged to utilize commercial breeding expertise and facilities where this is possible. This is an important opportunity not only to integrate farmers’ and breeders’ knowledge but also the farmers’ and breeders’ eye.
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7.11 Promote the development and integration of organic markets.

Certified farmers and organic cooperatives often have problems selling all their organic produce despite high demand in international markets. Small farmers require improved access to international markets if organic agriculture is to become a viable option for them. A better integration of local producers with international markets and a better coordination of local cooperatives and organic extension services with national legislation and international certification standards are needed.

7.12 Support research on organic agriculture in developing countries.

Organic agriculture in developing countries is not well studied and thus not very well understood. The productivity and the environmental performance of organic agriculture in developing countries especially require further investigation. Research on improvement of organic management practices under tropical and subtropical conditions is also needed. Organic agriculture research in developing countries should be centered on farmer’s field and conducted with and for farmers, identifying and taking into consideration their problems, needs and perceptions.