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Why organic farms do not give potential yield?

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From the time immemorial, humans are growing food crops, presumably in the organic manner. The yield so produced sufficed the needs of the population, however, during and after both first and second world war, we needed additional food to overcome the need and we have gone for green revolution with new varieties, chemical fertilizers and monoculture of crops. The need was to multiply food produce; does that mean organic method was inefficient? Does that mean that yield from the organic farming cannot be at par or higher than the inorganic (intensive) form of cultivation? Is there no way that we still can consume the quality and healthy produce, unaffected by the chemicals? This article discussed why we are not getting the desired yield form our organic farms although we use the best cultivars.

In recent times, the market has changed enormously; there is a sudden rise in the demand of organically produced products with an annual growth rate of 20-25 per cent in developing and developed countries. However, the quantity is not sufficient to feed the rising demand and thus the products are fetching premium prices. The prices were not the same the way they were before green revolution took place in the world or in India. A lot has changed since then; the way we produce our food to the way we breed. This change has resulted to make many of us believe that organic farming is not a viable option to feed the population of 9 billion in the year 2050.

A major change that has taken place is the introduction of high yielding varieties; it was one the major pillars to make green revolution viable.If we look among the traits of new high yielding varieties, we will find a common character, we are using higher input material (fertilizers) compared to the earlier cultivars. This is what we can call as intensive form of cultivation, where we are cultivating the crop under high nutrient availability to generate the maximum yield potential of the crop. However, if we grow the same high yielding cultivar under organic condition, we are getting a poor performance of the crop; this is the condition present in 95 per cent of the total organically cropped area.

Interestingly, the local cultivars, the ones which used to grow before the new improved varieties were introduced perform well under the organic condition than the high yielding varieties. It is so because; the high yielding variety so breed is tested under the high nutrient condition and not under the organic condition.

The whole phenomenon lies between the nutrient uptake by plant and nutrient available in the media (soil), *i.e.* the rhizosphere zone of the plants. Among practices followed in intensive method of cultivation, we split the nutrient doses in multiple splits based on its time and amount needed. Say, nitrogen is applied in the initial growth stage and potassium is applied during the fruit development stage. The crops were breed by utilizing similar cultivation practices where the nutrients are present in readily available form. However, in organic farming the availability of nutrient is not the way it is in the intensive cultivation. The manure applied, gets breakdown by soil micro-organisms, these mineralize in the available form. The availability is also doesn't happen at a time, and are released slowly over time. So when the varieties selected for the intensive cultivation are tried on the organic farm, they didn't get there required nutrients at the peak time and thus fail to give their potential yield. However, such is not the case for the local types which were once used to be grown under organic condition before the high yielding cultivars were introduced. So, it is not actually the failure of the organic method of cultivation, rather, it is the failure of the cultivars chosen to cultivate in the organic farm.

The need is to start selecting and breedplants which are suitable for organic farming (preferably from the local cultivars). With respect to adaptability to soil fertility, it should be adapted to lower input zone and able to cope the fluctuating nitrogen levels; should have efficient root zone for capturing water and nutrients; having

competitiveness withsoil microbes and have high nutrient use efficiency. They should be capable to suppress weeds by their plant architecture, allele-chemical ability or resisting mechanical weed control. They should be tolerant to disease and pest; should have a better seed health and crop quality and have ability to maximize yield level at low input condition.

Now a question rises "Should we use any local races to grow in our organic farm?" The answer is "No". It is true that local races can serve better for organic farming, however, all races don't have the same quality. Other than nutrient use, the crops face problem of competition, infestation and crop yield, quality and yes, economy. Any grower plan well in advance and if the crop grown became non-efficient in other traits, the cropping may even get a total failure or the grower may fail to market it due to poor quality. Thus, the selection of mentioned trait before cultivation is a necessity. Both breeder as well as the grower plays a vital role in such cultivation.

In recent times, natural farming has again come into existence with the very idea. They are getting good response with quality produce and quantitative yield. To take such farming in the next step a framed breeding programme for organic farming is to be set up. Currently, only a very few centers are working exclusively on organic breeding, present at Austria, France, Switzerland and USA.

However, with the pace of development after green revolution, a series of varieties have emerged. Almost all of them are suitable for intensive cultivation. It is not possible to replace the existence of such breeding unit with organic centers and the way the intensive cultivation is expanding is remarkable. This has resulted in replacement of the existing local traits, suitable for the local zone, local climatic or soil condition and availing natural benefits of both soil and climate. Replacement so created new cultivars for intensive cultivation has become a threat for the local types, which may serve as a cultivar for organic farming. Apparently, if such a condition arise and a time comes when humans go extinct, the crops which are most cultivated by the humans are the ones which are going to get extinct along with us. For the better future, the best thing to today is act now.

Conclusion : The horror of food scarcity of pre-green revolution has been overcome. The food demand is on rise, so is our production capacity. New improved varieties, new agro-chemicals and new techniques acted as pillars to produce high. This improvement somehow misses sustainability, for a sustainable future, we need to look back to the nature, we need to think organic.

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