



## Roof-top Micro Organic Farm: A Promising Initiative to Enhance the Vegetable Production

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### ABSTRACT

The growth of the population and simultaneous reduction of agricultural farm create a big challenge to fulfill the demand of food in the world. The utilization of available unutilized/underutilized space of the roof-top on every house for growing of different types vegetables is a scope to increase vegetable production. There are several advantages of this technique such as utilization of free space of the roof, production of healthy and fresh vegetables, harvesting of rain water in an efficient manner, better saving to the family, utilization of kitchen waste and reduction of solid waste as well as air pollution in the environment.

**Key words:** Roof-top, Organic farm, Space, Vegetables, Sustainable

The geometric growth of population in the world creates high pressure on farm-lands. Lands for production of crops scale down, continuously. It has also been observed that villagers migrate towards urban area in search of employment, education, medication, electricity and transportation, which result in either rapid reduction or scarcity of farm lands in urban area. The migration of villagers towards urban area results in reduction in the number of farmers and labour for agriculture in village level and scarcity of farmland in urban level. These became the major hindrances for increasing the production of crops. The rapid growth of the population and reduction of agricultural land as well as farming practice create a big challenge to fulfil the demand of food in the world. Therefore, there is an immediate need to search a best idea to produce large quantity of food from the small available space with maximum utilization of all human resources at low a cost of production.

The utilization of available unutilized/underutilized space of the roof-top on every house for growing of different types vegetables has vast scope to increase farm-land in village as well as urban level. If each house involves in producing its required vegetable through organic farming, it not only help to

increase the production of vegetable, but also provide the chance to produce healthy and fresh vegetables. We had undergone a field visit at Narakkal village of Ernakulam, Kerala. One of the successful roof-top vegetable cultivation was practiced by Mrs. Sriji with the technological assistance of Krishi Vigyan Kendra, Narakkal, Ernakulam under Central Marine Fisheries Research Institute. She was awarded as the best integrated farmer of Ernakulam by the District Agriculture Department in 2014.

#### *Roof-top vegetable production.*

Roof-top vegetable production is a technique of utilization of available space on the top of roof by growing various types of vegetables in an efficient and sustainable manner. Vegetables were grown in the container having small amount of high fertile soil. She prepared high fertile soil by mixing of different type of components such as sand, coir-pith, neem cake and bone meal in the ratio of 3:1:1:1, respectively. All these ingredients were mixed manually and filled in the container. Plastic bag, polyvinyl bag and earthen pot were used as the container for growing vegetables. There were two types of container such as grow-bag and flat-bag, but grow-bag was better than flat-bag due

to easy in handling. These bags were collected either from Krishi Vigyan Kendra or local market. Containers were arranged on the top of roof at a gap of 3–3.5 feet between adjacent containers. The transplantation of seedling of vegetables was done after proper arrangement of all containers on the roof.

A huge amount of inorganic fertilizers and pesticides are applied in the conventional technique of vegetable production. The application of inorganic fertilizer and pesticide in the food production is neither healthy nor environmentally safe. She was able to substitute hazardous inorganic fertilizer and pesticide by applying organic manure, vermi-compost, egg amino and fish amino acid as growth promoter in the vegetables in this technique. She produced organic manure and vermi-compost by utilization of kitchen wastes. She got technological help for preparation and application of egg amino and fish amino from Krishi Vigyan Kendra. Egg amino was prepared by keeping 5 raw intact chicken/duck eggs in the juice of 15 lemons for 15 days. All materials of eggs were leached out into lemon juice during the course of time. Similarly, she prepared fish amino acid by mixing of sugarcane molasses and chopped fish e.g. Indian oil sardine (*Sardinella longiceps*) with the ratio of 1:1 and this mixture was kept for 25 days. Egg amino and fish amino acid were used as foliar spray after thoroughly mixing all the ingredients, at the rate of 5 ml per litre water in an interval of 10–15 days.

She produced vegetables like cauliflower (*Brassica oleracea*), cabbage (*Brassica oleracea*), brinjal (*Solanum melongena*), tomato (*Solanum lycopersicum*), chilli (*Capsicum annuum*), lady's finger (*Abelmoschus esculentus*) and amaranth (*Amaranthus* spp.) on the top of roof. She collected high quality seed of all these vegetable at an affordable price from Krishi Vigyan Kendra, which were able to start flowering at early stage and produced a good quantity of vegetable within a short period of time. Foliar application of fish amino acid was also effective against insects attack on vegetables. She also used an eco-friendly fruit fly trap to control insects, which was developed by Krishi Vigyan Kendra. The utilization of high quality seed, foliar spray of fish amino acid and fruit fly trap were found very useful to restrict the application of pesticides in this farming.

#### *Advantages*

There are several advantages of roof-top vegetable production technique:

#### *Utilization of free space of the roof*

There are large numbers of well constructed house in urban area. Roof-top of these houses get sufficient sun light throughout the year, but these space and solar energy become unutilized in absence of any crop production. Therefore, roof-top technique of vegetable production may provide a better opportunity to grow several type vegetables for efficient and sustainable utilization of free space and solar energy of roof.

#### *Production of healthy vegetables*

The application of pesticide may cause accumulation of toxic chemicals in the food, which is highly dangerous for human consumption. This technique promotes the organic farming of vegetable production by avoiding the application of pesticide, and provides pesticide free vegetable to grower, which is the demand among public at present scenario.

#### *Increase vegetable production of fresh vegetables*

Utilization of free roof-top can increase the vegetable production area. The increment in vegetable growing area definitely increases vegetable production of our country. Growers can produce different type of vegetable according to season and can have vegetable for the home throughout the year. Therefore, growers need not to depend for vegetable on the local market only. The increased production and easily availability of vegetable may helps to increase the per capita vegetable consumption among the citizen of our county.

#### *Harvesting of rain water in efficient manner*

It is well known that maximum rain water utilization in agriculture sector is highly profitable, because it makes availability of sufficient amount of water for good growth of crop without any cost. Rain water on the roof-top become unutilized in absence of vegetable plants. This technique can help to vegetable grower to utilize the rain water in an effective way, especially during rainy season. Therefore, the harvesting of rain water through roof-top farming may prove worthy enough for farmers and may also help to achieve our present prime-minister's goal 'one drop more crop' for maximum utilization and conservation of water.

#### *Empowerment of women / family members*

In India, maximum women are restricted in household activity. There are large quanta of human resources as women, who cannot offer their participation in any productive activities in spite of being strong and having desire of employment due to the traditional Indian culture, which restrict women

## **Promising Initiative to Enhance the Vegetable Production**

within the periphery of house. This technique gives the chance to women to engage themselves in the production of vegetable without any hindrance of house-hold activities, which not only increase self employment among women, but also make them able to produce the healthy vegetable for the family. This will help to increase family saving by reducing the expenditure on vegetables.

Senior citizen in the family and retired person from the government service can be involved happily to manipulate their free time in the roof-top garden of vegetables, which would be considered as maximum utilization of man power of family member in a productive way without having any stress. It may also provide the opportunity to school children to spend their summer vacation for gardening. Therefore, it does not only give them a beautiful place for recreation, but also give the chance to gain knowledge about agriculture.

### *Increase the saving of the family*

Grower reduces his dependency on high priced market vegetables. Grower can also increase his saving by selling his/her surplus organic and healthy vegetables in the local area. This technique reduces the application of high priced inorganic fertilizer, pesticide and insecticide. This reduction of the application of inorganic fertilizer and chemical also helps to growers to increase of their saving.

### *Utilization of kitchen waste*

Huge amount of kitchen wastes are generated through all urban populations, which degrades environment in absence of proper treatment and management. The roof-top technique of farming may be proved as very easiest and cheapest method to reduce the kitchen waste in the environment, because it utilizes this waste to produce beneficial substances as organic manure and vermi-compost. The utilization of kitchen waste in the production of organic manure and vermicompost helps to manage and reduce a huge quantity of organic pollution in an eco-friendly and economically viable way. Therefore, it can be said that roof-top technique also helps to achieve our prime-minister's mission, 'Swachh Bharat' by ensuring food

security through healthy vegetable production in the nation.

### *Reduction of environmental pollution*

Recycle, reduce and reuse are the best idea to minimize the solid waste. The management of plastic waste is a global debate at the present time. But, large and used plastic bag can be utilized as grow-bag in this technique, which helps in minimizing the dumping of plastic in open environment. In addition to plastic waste, household-generated organic solid wastes are also reduced by adopting this technique. The utilization of organic manure in vegetables farming minimizes the application of inorganic fertilizers; otherwise it becomes hazardous pollutant in the environment. Green plant of roof-top can also sequester the harmful green house gas carbon-dioxide from air, which helps to mitigate a major world concern 'global warming' and also providing sufficient quantum of oxygen.

## **CONCLUSION**

Roof-top production of vegetables may prove to enhance the area of vegetable, which will be able to cope of with the demand of vegetables in the urban region in environmentally sustainable manner. It will also increase the floral area in the urban area for reduction of carbon-di-oxide load by photosynthesis, where heavy pressure of automobile and transportation create a big problem for public health. Since, vegetable plants do not produce strong root and shoot system, it can be grown in small container having little soil without creating any damage in the roof. Therefore, roof-top vegetable should be promoted in all possible areas through organic farming to produce good quality and healthy vegetables to meet the public demand.

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