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A Complete Guide: Kitchen Gardening

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Abstract— *With the help of technology, we can cultivate nutritious vegetables at home using clay pots, empty tins, and discarded utensils. This is known as kitchen gardening. It has been discovered that kitchen/home gardens significantly contribute to the improvement of food security for rural, resource-poor households in developing nations. It is essential for people to keep their health to eat a nutritious diet. Grains, breads, legumes, fruits, vegetables, herbs, and so forth make up a balanced diet. Vegetables are a vital part of a balanced diet since they offer a range of nutrients required for many body functions. About 300 g of vegetables and 100 g of fresh fruits are needed each day (50 g of green leafy vegetables, 200 g of other vegetables, and 50 g of roots and tubers). Growing a variety of crops in your home garden is one of the simplest methods to guarantee that you have access to a balanced diet with enough macro- and micronutrients.*

Keywords— ***kitchen gardening, nutritious vegetables, food security, balanced diet, home cultivation.***

I. INTRODUCTION

India ranks 111th out of 125 countries in global hunger Index and suffers from a serious level of hunger with a score of 28.7 on a 100 scale where 0 (zero) is the best score (no hunger) and 100 is the worst. (GHI, 2023).One of the most crucial areas to concentrate on in developing countries like India is food security and nutritional diversity. Many strategies are required to address the problems of food production and food security. The current social, political, and economic landscape as well as the resources available to plan and carry out the intervention will determine which workable strategies are best. Using home labour in the kitchen garden can increase the household's nutritional diversity and food security. Even in the tiny regions surrounding the house when land resources are limited, a difference in life can be made. Small towns and households make use of vacant land to supply their own food needs as well as the needs of the city in which they live. (Dresche, 2000). A kitchen garden is a garden that is grown in the backyard of a home using the waste water from the kitchen. Also known as a "home garden," "nutrition garden," "kitchen garden," or "vegetable garden," these spaces are used to grow herbs and vegetables for domestic use. A small plot of land next to the house has been used for seasonal vegetable gardening since ancient times. In the kitchen garden, local varieties are grown, including radish, broad leaf mustard, chilli, beans, pumpkins, tomatoes, etc. It is common knowledge that we ought to consume our vegetables. That is the path to health, and we will be happy and healthy if we grow our own greens. You will always be content if you engage in creative endeavours, and gardening is no exception. Cooking in the kitchen brings so much flavour to life. Many of our elders stressed the value of garden produce for a healthy diet long before doctors began prescribing vitamins, minerals, and fiber. Vegetables grown in gardens without the use of pesticides are increasingly becoming popular hobbies. It is inexpensive and requires little space to grow food in the kitchen. You can even grow food in your kitchen by using your window sills or balconies.

Importance of kitchen garden:

A healthy diet is crucial for people to maintain their health. A balanced diet consists of grains, breads, pulses, fruits, vegetables, herbs, and so on. The daily requirement of vegetable is around 300 g vegetables and 100 g fresh

fruits/day (green leafy vegetables 50 g, other vegetables 200 g, roots and tubers 50 g) (Singh et al., 2018). As they provide a variety of nutrients necessary for numerous bodily processes, vegetables are an essential component of a healthy diet. Vegetables are vital for development, energy, and illness prevention. Particularly for the young and for women who are pregnant or nursing, vegetables are important. Vegetables are widely acknowledged for their importance in terms of human nutrition, the national economy, and health standards. They are an excellent source of minerals, proteins, and vitamins. Compared to other crops, vegetables yield a significantly higher income per unit area and time. Due to their short growing seasons and year-round availability, they make excellent choices for home gardens. Fruits, vegetables, and other food crops are grown in the nutrient-dense home garden, which is typically close to the house. It is the area of ground in the backyard that family members cultivate a variety of fruits, vegetables, and spices to augment what is immediately needed in the kitchen. This practice not only ensures a healthy diet but also lowers living expenses and increases family income. Home gardens can aid in the recycling of leftover materials, particularly if a compost pit is established.

Benefits of the kitchen garden

- ❖ To reduce the expense of purchasing herbs and vegetables.
- ❖ Grow your own vegetables for health benefits.
- ❖ There are ways to turn household waste into something useful.
- ❖ Supply fresh fruits and vegetables high in nutritive value.
- ❖ Provide a diverse range of fresh produce that is high in nutrients and devoid of harmful chemicals.
- ❖ Vegetables from your home garden have a better flavour than those you buy at the store.
- ❖ Making efficient use of kitchen garbage materials and wastewater.
- ❖ To increase health for both the mind and body.
- ❖ This will only make it easier for us to successfully produce the vegetables we need.
- ❖ Developing a garden yields two benefits: producing food and revenue.
- ❖ Additionally, to providing fuel wood, furniture, crafts, baskets, and other household necessities, gardens also serve as a source of food for domestic animals.

How to make a kitchen garden?

Many people are unable to cultivate the vegetables necessary for a healthy diet because there is frequently no tradition of kitchen gardening. Alternatively, they overspend on vegetables, or the deficiency in vegetables negatively impacts their health. It is possible that you have failed to establish a kitchen garden. There are several reasons why starting a kitchen garden can be challenging, or why starting one will not work out.

For example:

- The crop was damaged by livestock disease s, or pests.
- No good seed or seedlings
- Lack of space
- Lack of water
- Lack of fertility
- No spare time
- Lack of the right skills

In order to create and maintain a kitchen garden with ease and optimal yield, the following elements are critical:

1) **Site selection**: Backyard of house

The backyard of the home; ideally, this should be an open space with lots of sunlight close to the water source. Vegetable garden dimensions and design are determined by

- Availability of land
- The number of family members and
- Spare time available for its care
- For a household of five, around five cents of land (200 m2) is enough to produce vegetables all year long.
- Rather than a square plot or a lengthy stretch of ground, a rectangle garden is preferred.

Table 1: Crops suitable for kitchen garden

Fruits	Vegetables	Spices	Medicinal Plants	Flowers	Trees
Mango Banana Sapota Guava Papaya Acid lime Amla	Tomato Brinjal Chilli Onion Okra Cabbage	Turmeric Coriander Fenugreek Garlic Ginger	Aloe Mint Basil Vetiver Ashwagandha sarpgandha	Rose Jasmine Nerium Marigold Chrysanthemum	Bottle brush Pagoda tree Gulmohor

Pomegranate Anona Date Pam Jamun Fig Dragon fruit Jackfruit Ber Karonda	Bitter gourd Snake gourd Rigde gourd Bottle gourd Pointed gourd Amaranthus Lab lab Pea Beetroot Carrot Radish Curry leaf Moringa Spinach Cluster bean Cowpea Tapioca Agati Pumpkin Taro Cucumber		Adulsa Sadaphulli Gulvel Hirda Behada Shatavari Lemmon grass	Tuberose Sunflower Hibiscus Periwinkle Night Jasmine	

2) Garden design:

When seeds and seedlings are placed too far apart, a large portion of the interstice is wasted and becomes home to weed growth. In addition to taking up valuable water and compost, weeds require more work to keep free. Additionally, you must put in more effort to replenish the water and compost that the weeds steal. For this reason, dense vegetable planting is ideal. However, if a single variety of vegetable is planted in large quantities, it will fight with itself for resources both above and below ground, making it a poor crop. Therefore, it is preferable to grow a variety of small and large varieties to create distinct layers of crops on one bed. Additionally, the soil's root layers for these will change.

3) Edge planting:

Edge planting helps to make maintenance work easy in the kitchen garden. Edge planting means the growing of support crops or companion crops in the edges around the garden and its beds. These plants help support the garden by providing mulch, protection from weeds, wind breaks, repelling pests and producing other useful resources. Plants such as marigold, lemongrass, mulberry, basil, and many others are good for edge planting. Edge planting helps to protect the garden and produces fodder, fuel, nectar for bees, herbs for medicines, soil conservation, habitat for pest predators, etc. Edge plants take nutrients from deep in the soil and cycle them to the surface, where they are used as mulch, and then returned to the soil.

4) Land preparation

1. Stones, stubbles, bushes and perennial weeds should be removed.
2. Soil should be porous that is why through spade digging is made to a depth up to 30-40cm
3. Well decomposed at about 100 Kg farmyard manure or vermicompost is applied and mixed with the soil
4. Flat nursery bed, raised seedbed, ridge seedbed, should formed as per the requirement.

5) Sowing and planting

1. Direct sown crop like okra, cluster beans and cowpeas can be sown on one side of the ridges at a spacing of 30 cm. Amaranthus can be sown after mixing 1 part of seeds with 20 parts of fine sand by broadcasting in the plots.
2. Small onion, mint and coriander can be planted/ sown along the bunds of plots.
3. Seeds of transplanted crops like tomato, brinjal and chilli can be sown in nursery beds or pots one month in advance by drawing lines.
4. Flat bed- Vegetables such as beet leaf, coriander, fenugreek, spinach and root vegetables like carrot, radish, turnip, beetroot are sown by broadcasting or line sowing. Peas beans are sown

in lines are facilitates ease in intercultural operations and harvesting.

5. Raised seedbed- These beds are prepared for raising cucurbitaceous crops like bitter gourd, bottle gourd, round gourd, smooth gourd, pumpkin, watermelon during rainy season where stagnation of water becomes problematic, beds of required size depending on crop to be grown are raised 15-25 cm high from the ground level with furrows of 30-45 cm width on either side for irrigation. The objective using such raised beds in rainy season is to provide protection to the fruits against rotting.
6. The perennial plants should be located on one side of the garden, usually on the rear end of the garden so that they may not shade other crops, compete for nutrition with the other vegetable crops.

Table 2: Crop calendar: Recommended vegetables, tuber crops and fruits for kitchen gardening.

Recommended Crop	**Season**		**Transplanting (Pot or field)**	**Seedrate (g/Marla)**	**Duration (Days)**	**Availability period**
Vegetables	**Winter**	**Summer**				
Tomato	Oct.-Nov.	---	After 25-30 Days	0.789g	135-150	April- July
Peas	Oct.-Nov	---	---	1875g	90	Nov-Dec.
Okra	---	March	---	62.5g	45-50	April-Sept.
Onion	Oct.-Nov	---	After 40-45 Days	25g	145-150	May
Brinjal	Sept.-Oct.	June- July	After 30-35 Days	1.25g	160-165	April- June
Cucumber	Feb-March	July- Aug	---	6.25g	120	April- May Sept.-Oct.
Chili/peppers	Oct-Nov	May- June	After 40-45Days	3.12g	210-240	May- July
Pumpkin	Oct- Nov	----	---	12.5g	135-180	April-May

6) Seeds and seedlings

A kitchen garden can provide very good food from local, traditional vegetables and its importance not to lose these local varieties. However, sometimes farmers are also interested to try new varieties. So, it is very important to save and protect any good seed- this is the farmer's responsibility. From good seed, it is important to be able to raise good, healthy seedlings for transplanting into kitchen garden. Good quality seed can recommend that gardeners should emphasis on high yielding and hybrid seeds along with local varieties. Cultivated crops for kitchen gardening are generally- tomato, brinjal, chilli, capsicum, cauliflower, cabbage, broccoli, knol-khol, radish, carrot, peas, bottle gourd, bitter gourd, cucumber, okra, French bean, palak, sweetpotato, ginger, turmeric, dolichos bean and Colocasia.

Table 3: Cropping pattern, which may prove helpful for kitchen under Indian conditions.

Vegetable	Sowing time	Spacing rows (cm)	Plants (cm)
Carrot	August-September	45	7.5
Radish	Mid-September to October	45	7.5
Coriander	October-November	30	Inrows
Spinach	September-October	20	Inrows

Metha	October-November	22.5	Inrows
Methi	September-October	20	Inrows
Peas	Mid-October to mid-November	30	10
Okra	February-March and June-July	45	15
Bottle gourd	February-March and June-July	250	60
Bitter gourd	February-March and June-July	150	45
Cucumber	February-March	250	60
Cowpea	February-March and June-July	45	15
Pumpkin	February-March	300	60
Sponge gourd	February-March and June-July	300	75
Round gourd	February-March and June-July	150	45

7) Layout of Kitchen Garden

- Fence: a live fence with agati or a fence with barbed wire.
- The kitchen garden's periphery should be planted with perennial crops (mango, sapota, acid lime, amla, and morniga); avoid shading them.
- On one corner, there can be one or two compost pits.
- Use cucurbitaceous vegetables (bottle, bitter, snake, and ridge gourds) to train fences on all sides.
- Certain vegetables, like amaranthus, bottle gourds, bitter gourds, and snake gourds, are sown directly.
- Certain veggies (onion, tomato, brinjal, and chilies) are transplanted from nurseries.
- Create equal-sized plots in the region to be used for growing annual vegetable crops.
- In a kitchen garden, where cropping is done continuously and intensively.
- The soil's texture and fertility can be preserved by regularly adding enough organic manures.
- Every plot has ridges and furrows created in it.
- Planting season: June–July and September–October
- A bee hive can be provided for purposes other than honey production to guarantee sufficient crop pollination.
- On the other hand, chemical fertilizers are also necessary for a decent crop to be harvested.
- Remove and remove any larvae that are on fruits or vegetables, and then apply 4 milliliters of neem oil or 3 percent neem seed kernel extract per liter of water.
- Steer clear of harmful chemical spraying.

Fig. 1. Layout of Kitchen Garden

<table>
<tr><td>Goose Berry</td><td>Drumstick</td><td rowspan="2">Papaya</td><td rowspan="6">ENTRANCE</td><td colspan="2">Manure pit</td><td rowspan="2">Coccinea</td></tr>
<tr><td>Acid lime</td><td>Pomegranate</td><td colspan="2" rowspan="2">Nursery beds</td></tr>
<tr><td rowspan="3">Lab lab</td><td colspan="2">Curry leaf</td><td rowspan="3">Bitter Gourd</td></tr>
<tr><td colspan="2">Checkurrminas</td><td colspan="2" rowspan="2">Herbal plants (Vetivar, Aloe, mint, Lemmon grass, Tulsi)</td></tr>
<tr><td>Mint</td><td>Amaranthus</td></tr>
<tr><td rowspan="2">Snake gourd</td><td>Spinach</td><td>Bhendi</td><td>Green pepper</td><td>Elephant foot yam</td><td rowspan="2">Ridge Gourd</td></tr>
<tr><td>Coriander</td><td>Chillies</td><td>Peas</td><td>Cluster bean</td></tr>
</table>

	Fenugreek	Brinjal		Carrot	Cow pea	
Small Onion	Bellary Onion	Tomato		Tapioca	Radish	Beet root

8) Maintenance of Kitchen Garden

- Place all kitchen trash in the manure pits and keep them moist;
- Train the plants to grow on the fence.
- Take care of your food plants: For direct-sown plants, thinning or stalking the plants is a crucial step towards maintaining a healthy vegetable garden. Vegetables that grew tall and climbed needed to be trellised or stalked in some way. If the plants' suckers are allowed to grow and begin to compete with the original plants for nutrients, remove them.

9) Irrigation:

When and if required. Even with drip irrigation, you cannot always rely on rain. for water to be delivered to the plant roots directly.

10) Manures and Fertilizers:

- **Fertility:**It is common knowledge among farmers that crops cannot flourish in unfertile soil. However, fertility might be as scarce as water. Compost cannot be taken and used for the kitchen garden if there is not enough for the field crops. For this reason, the fertility of our kitchen garden must be self-sufficient. Below are some ideas for fertility sources:
- **Liquid manure**:Produced in a pit or a drum, liquid manure provides nutrients to plants while shielding them from illnesses and pests.
- **Sweepings pit**:You can create enough compost for the kitchen garden by gathering daily sweepings from the house and yard in one location.
- **Legumes**:Adding additional nitrogen to the soil through the planting of legumes, such as peas, beans, sesbania, sun hemp, etc., benefits other crops.
- **Green manure:** Planting green manure seeds improves soil health and increases fertility for greater yield.
- **Other sources**:You can enrich the soil with ash, oilseed cake, and other materials to boost fertility and ward off pests and illnesses.
- **Vegetables are rich in nutrients**. Naturally, different plants have different requirements, so it is critical to pay attention to any fertilization guidelines included with your seedlings or printed on the back of your seed packets. Add the composted kitchen scraps to every crop. fertilizers with complex contents at 5 grams per plant for 30, 60, and 90 days after sowing. All season long, organic plant foods will nourish your plants because they release nutrients gradually.

11) Weeding:

As and when necessary. It is important to remove weeds from surrounding pathways and grass as well; if they are allowed to go to seed, those seeds might end up in your garden.

12) Mulching: It suppresses weeds, cools plant roots and conserve water. Seed free straw. It makes nice cover; it is easy enough to push aside for planting and it can be turned into the soil at the end of the season.

13) Provide shade*:* In the hot season trees can provide shade to the kitchen garden. A few small trees or even fruit trees in the fence or within the garden can be used for this purpose. As well as giving shade, these trees can also provide other benefits, such as firewood, fodder or mulch materials.

14) Wind break: Wind will dry out the soil, so stopping the wind helps to conserve soil moisture.

15) Plant Protection: The kitchen garden requires protection right from the beginning. Livestock should not be allowed to enter the area. The fence needs to be built permanently. Although thorny plants can be chopped and used to create a fence, planting a living fence is the most effective way to keep the garden safe. Furthermore, the crops in the garden will require protection from various pests and diseases. To do this, there are numerous methods. Crop protection techniques include mixed cropping, crop rotations, liquid manure, picking and killing fruit and vegetable larvae before spraying, avoiding the use of toxic chemical sprays, etc.

Organic method of plant protection

- Neem oil
- Neem seed kernel extract
- Panchakavya

16) Implements used in kitchen garden

- Spade
- Pick Axe
- Hoe
- Hand sprayer
- Water can
- Secateur

17) **Constraints in adoption of scientific kitchen gardening**

1. **General constraints:**
   i. High poultry and monkey menace
   ii. Problem of proper protection of local goat and cattle grazing
   iii. Less priority of kitchen gardening as compared to other farm activities
   iv. Frequent deluge of kitchen garden during rainy season.
2. **Input constraints:**
   i. Unavailability of quality planting materials for fruits and vegetables
   ii. Lack of irrigation facility due to scarcity of water in area
   iii. Unavailability of land for kitchen gardening near residential zone
   iv. Cow dung is utilized as fuel hence organics are less available
   v. Specific eco-friendly insecticides are unavailable in market.
3. **Technical constraints:**
   i. Lack of knowledge regarding sowing time, improved varieties and seed rate
   ii. Lack of knowledge regarding nutritious fruits and vegetables selection
   iii. Lack of knowledge regarding major pests, their identification and management
   iv. Lack of knowledge regarding critical growth stages of crops for irrigation
   v. Lack of knowledge about manures and fertilizers recommendation
   vi. Lack of knowledge about seed multiplication
   vii. Lack of knowledge about seed treatment.
4. **Socio-cultural constraints:**
   i. Fear of farm produce robbery
   ii. Prejudices/orthodoxy
   iii. Adoption of age- old traditional practices
   iv. Migration of rural youth towards urban area
   v. Low involvement of housewives in cultivation practices.

CONCLUSION

Therefore, growing food in one's kitchen is a sustainable and environmentally friendly way to boost economic growth and food security. Considering the current global food crisis and skyrocketing food costs, kitchen gardening appears to be a more effective means of strengthening and constructing local food systems. We placed a lot of emphasis on food grain production during and after the green revolution to meet the growing food needs of our nation's population. Food ingredients include carbohydrates, proteins, fats, fibers, vitamins, and minerals. Food grains are adequate to supply the body with the necessary amounts of fat, protein, and carbohydrates, but not the necessary amounts of vitamins, minerals, or fiber. Our countrymen—especially the impoverished and landless—are victims of malnutrition, which results in child mortality, morbidity, anemia, and other problems—because they do not consume enough vitamins, minerals, or fiber in their meals over an extended period. It is now necessary to figure out how to include vitamins, minerals, and fiber in our diets. It has been noted that fruits and vegetables provide an adequate amount of vitamins, minerals, and fiber to the human diet.

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