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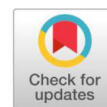
# Kitchen Gardens for Home Grown Vegetables to Provide Nutrition Security among Tribals

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## Abstract

*The concept of cultivation of vegetables is not new to tribal communities of India but is decreased due to climate vagaries, monkey menace and changing lifestyle preferences. Hence, the idea of a kitchen garden encouraged tribals to cultivate natural produce in their backyards or farm bunds. A kitchen garden ensures a cost-effective model for a regular and handy supply of fresh vegetables to provide essential nutrients as tribals have access to resources like land and water but they lack scientific knowledge on the nutritional value of vegetables and easily-cultivable nutritious foods. As part of this, tribal communities in Enkoor (M), Khammam district were provided with seeds for year-round cultivation of vegetables like bhendi, cucumber, ridge gourd, bottle gourd, radish, carrot along with green leafy vegetables like palak, methi and coriander leaves. Also, the farmers were encouraged to grow perennial trees like drum sticks, amla and acid lime as they provide much-needed antioxidants to the body. The consumption of home-grown vegetables was very much felt during COVID-19 as these areas are far of places with minimal access to markets. The farmers were able to save about Rs. 5200 to 6800 per household during a year with the harvest. The consumption of green leafy and other vegetables increased by 2 to 3 times plus roots and tubers by 1 to 2 times per week as they are readily harvested at homes. The consumption of eggs, non-vegetarian foods and snacks also improved by 2 to 3 times per week due to income saved on the purchase of vegetables.*

**Keywords:** Kitchen Garden, Homegrown vegetables, Bhendi, Cucumber, Ridge gourd, Bottle gourd, Radish, Carrot, Green leafy vegetables, Hidden hunger and Nutrition security

## Introduction

Guaranteeing food security to the nation is a major policy area and can be defined as “when all people, at all times, have physical and economic access to adequate, safe and nutritious food to meet the dietary needs and food preferences for a vigorous and hearty life” [1]

Presently the world is dealing with agrarian and nutritional challenges as agricultural lands with

irrigation facilities were over-exploited [2]. Balanced nutrition is very important during all the stage of life for a hale and healthy life which cannot be sustained without adequate nourishment. Nutritional deficiencies are most prevalent in rural areas where habitual diets lack variety and they cannot afford to diversify their diets due to lower purchasing power. The sustainable solution to their problem lies in the improvement and diversification of household diet by growing kitchen gardening [3].

The role of agriculture in enhancing nutrition is highly recognized although the evidence of its contribution remains weak and mixed. Increasing on-farm production diversity is perceived as an effective approach towards improving smallholders’ diet diversity and nutrition [4,5].

Scientists argue that the current global population

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expansion and the accompanying increase in resource consumption is threatening the world's ecosystem and straining humanity's ability to feed itself. Research shows that growing populations, falling energy reserves and food shortages can create a 'perfect storm' by 2030. It was estimated that food reserves in 2009 were at a fifty-year low and that the world would require 50% more energy, food and water by 2030. According to a 2009 report by the FAO, the world will have to produce 70% more food by 2050 to feed a projected extra 2.3 billion people. This shortage in meeting food them showing signs of one or the other form of malnutrition. Undernutrition is generally observed amongst rural communities and is a major challenge to human and economic development. It is estimated that almost one billion people globally face hunger and are unable to get enough food to meet their dietary needs [6].

Increasing urbanization and food security are among the key issues of the present era [1]. In recent decades, the safe and regular access of food to many rural and poor urban households has become uncertain, creating concerns of food security in many developing countries. Millions of the people around the globe are unable to purchase or have the access to sufficient food for themselves and their families [7]. Therefore, safe food production and secure food supply are critical issues for low-income countries ([8,9]. Vegetables and fruits are considered vital for the rapidly increasing populations of developing countries and in this context, kitchen gardens or home-based gardens can play a pivotal role to alleviating problems of hunger and malnutrition in these countries. Kitchen gardens have already proven to be an important subsidiary source of food in India and Sri Lanka [10,11].

Literally, 'Kitchen gardens' refer to food grown in or around the house for household use [12]. Home gardens may be a kitchen garden, mixed gardens, or backyards, farmyard and compound gardens or homestead gardens. Kitchen or home gardening is the earliest and most extensive food production system found throughout the world [13].

The practice of collective community gardens is useful and frequently adopted in many developed countries like Australia as a useful activity but less applicable in south Asian countries like India where land ownership patterns and utilization highly differ from these countries in terms of individual preferences and existing land uses. In these countries, people

grow vegetables individually or on a household basis in spaces within their possession rather in a collective effort on allotted space. Hence, encouraging vegetable gardening at home plays a significant role in improving food security to resource-poor rural and urban households in developing countries for providing additional sources of fresh and nutritionally rich foods [14,11]. In low-income housing areas of urban Penang, Malaysia, kitchen gardens have proved a symbol of place, identity and a sense of belonging for local low-cost flat residents [15].

The various social benefits that have emerged from kitchen gardening practices are health and nutrition, enhanced income, self-employment, food security within the household and community social life [16]. Fruits and vegetable production gives households direct access to important nutrition that might not be within their budget to purchase [17, 18]. Kitchen gardening has also proved cost-effective and sustainable methods for producing organic vegetables such as cauliflower, radish and turnip [19, 20].

## Methodology

The current study was conducted using a multistage random sampling method adopted in the scheming sampling frame. In the initial phase, Telangana state was selected purposively, in the next stage, Khammam district was selected and in finally tribal villages were chosen randomly based on potentiality and interest for homegrown vegetables as tribals have access to resources like land and water but are lacking in scientific knowledge on dietary value of vegetables that are easily grown. The data was composed through a pre-tested questionnaire by personal interview method. Total 30 tribal families were selected with different types of soils in the area under study from sandy to sandy loam with low to medium fertility status to encourage taking up the age-old practice of growing our vegetables at household levels for year-round vegetable availability. The seeds of greens and other vegetables along with saplings of perennials were provided to be grown on backyards and farm bunds.

## Results and Discussion

The selected tribal family's socio factors and their practices, details of vegetables / greens / perennials grown under the kitchen garden and food consumption patterns were discussed below in the following tables. The family size of tribals selected

had 3 to 5 members (60%) and more than 5 members in 40% of families. The majority of families had an education of less than 10<sup>th</sup> class and were using bottled drinking water. The vegetables were grown in the backyard and farm bunds. The families were not cleaning vegetables with soaking in water and they cut the green leafy vegetables and then wash them due to which there is loss of nutrient content. The families were given training on the need for properly washing vegetables before cutting as well as that greens also should be first washed and then cut.

**Table 1:** Socio factors and practices followed by selected tribal families

Factors		Percentage
Family size	3 to 5 members	60.00
	More than 5 members	40.00
Education	10 <sup>th</sup> and below classes	80.00
	Inter	20.00
	Degree and above	0.00
Growing of veg- etables	Backyard	40.00
	Farm bunds	60.00
Drinking water	Municipal water	20.00
	Bottled water	80.00
Cleaning of fruits and vegetables by soaking in water	Yes	60.00
	No	40.00
Washing of leafy vegetables after cutting	Yes	100.00
	No	0.00

The details of vegetables/greens/perennials grown under the kitchen garden are given in Table 2. Seeds of bhendi, cluster beans, gourds like ridge gourd, bitter gourd, bottle gourd, cucumber, tubers like carrot and radish, greens like palak, methi, drum stick leaves along with drum sticks and lime.

The consumption of home-grown vegetables was very much felt during COVID-19 as these areas are far of places with minimal access to markets. The farmers were able to save about Rs. 5200 to 6800 per household during a year with a harvest from their kitchen gardens. Also, the commercially available vegetables are contaminated with pesticides beyond MRL and continued excess intake of it can lead to neurological effects, persistent developmental disorders and autoimmune disorders as shown in figure 1 below.



[21]

**Figure1:** Contamination of vegetables with chlorpyrifos

The food consumption patterns of these tribals before and after growing the kitchen garden are discussed. It was observed their staple diet had rice on daily basis with consuming them 2 to 3 times daily. The intake of rice for breakfast was observed than opting for consuming traditional breakfast items. The growing of vegetables improved the intake of pulses, millets, roots and tubers, green leafy and other regular vegetables like bhindi, beans, gourds, drum stick, lime and bobbarlu also. The tribals were educated to include drum stick leaves in their diets as they are rich in antioxidants such as vitamin C and β-carotene, which protect from chronic oxidative diseases like heart disease, diabetes, cancers and Alzheimer’s disease. Also, they are rich in minerals like magnesium, calcium, zinc, iron and phosphorus with calcium and phosphorus being crucial for bone health.

The intake of eggs and non-vegetarian items increased from 1 – 2 times and 0 – 1 time to 3 – 4 times and 2 – 3 times. The frequency of consuming fried items, baked and processed snacks increased to 1 – 2, 3 – 4 and 1 – 2 times from 0 – 1, 2 – 3 and 0 – 1 time respectively. Carbonated beverages were also being consumed by these families. The farmers were able to save about Rs. 5200 to 6800 per household during a year with harvest from their kitchen gardens.

To create greater awareness on the importance of including 2 to 3 servings of vegetables including greens in diets and about the seasonality of various vegetables, KVK, Wyrā organized the number of training programs and group discussions at its



**Table 2:** Details of vegetables/greens / perennials grown under the kitchen garden

Name of crop	No. of plants grown	Duration of crop in months	No. of harvests / cuttings	Duration of crop harvesting in days	Quantity obtained in Kg	Income in Rs.
Bhindi	20 – 25	4 – 5	10 – 12	50 – 60	10 – 12	500 – 600
Cluster beans	20 – 30	3 – 4	5 – 6	60 – 90	2 – 3	120 – 180
Ridge gourd	17 – 20	4 – 4½	6 – 8	45 – 50	5 – 7½	300 – 450
Bitter gourd	10 – 15	4 – 4¼	6 – 8	55 – 60	5 – 8	200 – 320
Bottle gourd	3 – 5	4 – 5	8 – 10	65 – 70	10 – 15	450 – 650
Cucumber	15 – 20	3 – 4	8 – 10	60 – 70	15 – 18	650 – 820
Palak	25 – 30	2½ – 3	5 – 6	30 – 40	2 – 2½	260 – 320
Coriander	150 – 200	2 – 3	5 – 6	30 – 60	0.80 – 1.0	160 – 180
Carrot	10 – 12	3 – 4	01	NA	2 – 3	120 – 180
Radish	8 – 10	1½ – 2	01	NA	2 – 3	80 – 100
Drum stick (perennial)	4 – 5 plants	24 – 36	Throughout year	8 months after sowing	22 – 25 (88 – 100 No.)	440 – 500
Amla (perennial)	1 plant	120 – 180	Throughout year	4 <sup>th</sup> or 5 <sup>th</sup> year of planting	20 – 22	1000 – 1100
Acid lime (perennial)	1 plant	120 – 180	Throughout year	3 <sup>th</sup> year of planting	150 – 160 No.	300 – 400
Bobbarlu	25 – 30	4 – 5	5 – 6	45 – 60	2 – 3	120 – 180

**Table 3:** Food consumption patterns of tribal families before and after growing home-grown vegetables in kitchen gardens

Food groups	Frequency of consumption	
	Before growing of kitchen garden	After growing of kitchen garden
Cereals	Daily	Daily
Pulses	2 – 3 times in a week	3 – 4 times in a week
Millets	Rarely	6 – 8 in a month
Roots and tubers	0 – 1 time in a week	1 – 2 times in a week
Green leafy vegetables	0 – 1 time in a week	2 – 3 times in a week
Other vegetables	2 – 3 times in a week	4 – 5 in a week
Seasonal fruits	1 – 2 times in a week	3 – 4 times in a week
Milk and milk products	Daily	Daily
Nuts and oil seeds	0 – 1 time in a week	0 – 1 time in a week
Oil	Daily	Daily
Eggs	1 – 2 times in a week	3 – 4 times in a week
Non vegetarian foods	0 – 1 time in a week	2 – 3 time in a week
Fried snacks like bhaji, bonda, vada, baked items, etc.	0 – 1 time in a week	3 – 4 time in a week
Baked items	0 – 1 time in a week	1 – 2 time in a week
Processed snacks like Kurkure, biscuits, chocolates, etc.	2 – 3 times in a week	3 – 4 times in a week
Carbonated beverages	0 – 1 time in a week	1 – 2 times in a week

premises and in the villages in Khammam district too. Field days on “Importance of kitchen garden” were celebrated at KVK demo units to sensitize the benefits of home-grown vegetables at a time when high incidence of pesticidal residues is observed in market-purchased vegetables. The training conducted on imparting knowledge regarding the benefits of consuming more vegetables in diet helped in increasing their millet intake as they were sensitized on them also.

## Conclusion

The age-old idea of growing our vegetables through kitchen gardens is being encouraged post COVID – 19 as awareness on including more vegetables in the diets is rising. The farmers were able to save about Rs. 5200 to 6800 per household in a year thereby spending them on other food items which is bring slight diversity to their diets. Monotonous diets can increase the incidence of hidden hunger due to lack of essential vitamins and minerals. The inclusion of vegetables, pulses and eggs in diet can help in providing nutritional security to a certain extent.

**Conflict of interest:** All the authors have read the manuscript and approved the submitted final manuscript. Authors have declared that no competing interests exist.

**Authors contribution:** Author JSW has designed, carried out the work and drafted the manuscript. Author JHK has monitored and corrected the manuscript. Authors VC, KRK and PSMP have helped in collecting primary data for writing this manuscript. RUR, JVP and AB overviewed the writing of the manuscript with timely suggestions.

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**Future scope of study:** The study can help in helping rural communities to switch back to age old home-growing of vegetables thereby helping them to combat the micronutrient deficiencies and hidden hunger. It also brings in diversity to the monotonous u.

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