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Impact of demonstration of Nutri garden on nutrition security to enhance the livelihoods in farm families

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Abstract
The demonstration was conducted to know the impact of Nutri garden in farm families. The study was conducted for two years in Nimbegondi village of Shikaripura taluk, Shivamogga district during 2019-20 and 2020-21. The 25 farm families were randomly selected and study was carried out. The farm families were provided with the vegetable seed kits includes perennials, fruit crops and medicinal plants. The farm families were introduced to the concept of organically growing nutrition garden on balanced diet and importance of nutrients through capacity development programmes. From the study the results revealed that, the average production of leafy vegetables, roots and tuber production, pulses production and other vegetables production of rural farm families were 24.30 kilograms, 18.50 kilograms, 8.50 kilograms and 119 kilograms, respectively. While, after the intervention of nutri garden the average mean production (kgs), purchase (kgs), distribution (kgs) and consumption (kgs) were 175.80, 21, 30 and 175, respectively. The average mean nutrient uptake such as energy (Kcal), protein (g), fat (g), fibre (g), calcium (mg), iron (mg) and vitamin (mg) after intervention of nutri garden were 2040.70, 46.20, 20.89, 20.38, 495.20, 18.30 and 37.76, respectively. Hence, after introduction of nutri garden, the consumption of fresh vegetables increased in the daily diet which contributed towards the upliftment of the nutritional and health status of the farm families.

Keywords: Farm families, Nutri garden, nutritional status, food and nutrients intake

1. Introduction
India has a rich heritage of indigenous fruits and vegetables. They are not only rich in minerals and vitamins but also contribute in a big way in maintaining health and overcoming hunger and malnutrition. Among the rural community, consumption of vegetable and fruits is very low due to lack of purchasing power, ignorance and other factors including unavailability. Over the recent years there has been growing interest to strengthen and intensify the local food production to mitigate the adverse effect of global food shocks and food price volatility. Consequently, there is much attention towards the establishment of nutri garden as a strategy to enhance the household food and nutrition security. Cultivation of fruits and vegetables by gardening in a systematic manner in small piece of land available in household is known as "Nutrition Garden". The nutrition garden ensures to have a healthy diet with adequate macro and micro-nutrients at door steps. A scientifically laid out nutrition garden helps to meet the entire requirements of fruits and vegetables for a family all the year round**.** Establishment of nutrition garden is found to be low cost sustainable approach for reducing malnutrition, increasing awareness of vegetable production, increasing working hours and achieving food, nutrition and economic security for rural families (Nandal, 2016) [5]. The concept of nutrition garden aims at continuous supply of vegetables to cater the daily needs of the family from the available source, utilizing household wastes including water and other organic matters (Indumathi *et al.*, 2012) [3]. Nutrition garden can be described as a mixed cropping system that encompasses vegetables, fruits, plantation crops and herbs that can serve as a supplementary source of food and income.

Nutrition awareness programmes stress the need for inclusion of locally available fruits and vegetables like papaya, mango, guava, leafy and other vegetables in their daily diet. Hence, every farm women or every citizen has a vital role in converting their surrounding vacant land into nutri garden, where location specific seasonal vegetables and fruits can be grown. The main purpose of a nutrition garden is to provide the family daily with fresh vegetables rich in nutrients and energy. The rural people especially women of operational areas are severely malnourished along with multiple nutrient deficiency disorders due to ignorance about importance of fruits and vegetables in their diets.

Rural families used to broad cast the seeds of okra, ridge gourd, bottle gourd, muskmelon and water melon in between rows of cereal crops during *Kharif* season for their home consumption. But the small and marginal household families suffer from more malnutrition as they have no or very less crop field. Considering the importance of vegetables in overcoming the problem of nutrients deficiencies and in view of the need to increase the production of vegetables by all possible means some research activities were initiated by KVK during last few years to find out the ways for vegetables production in rural family houses. The idea was to develop an intensive system of vegetable production by which small families can get sufficient nutritious vegetable throughout the year and thereby ensure the supply of needed nutrients for the family members. The concept of nutrition garden was popularized along with the cultivation of horticultural crops among the poor rural farmers by integrated production of required seasonal vegetables for continuous supply round the year. So, the study was designed with following specific objectives:

- To estimate the average production of vegetables of farm families
- To estimate the changes occurred by intervention of nutri garden in rural families
- To estimate the impact of nutrition education on food consumption pattern towards knowledge, attitude and practice of farm women
- To identify the impact of nutri garden vegetable production on food and nutritional security of rural families.

2. Material and Methods

The purpose of the study was to determine the food security and nutritional status of rural families by establishing nutri garden vegetable production unit. The study was conducted at Nimbegondi village of Shikaripura Taluk, Shivamogga district during 2019-20 and 2020-21 by Krishi Vigyan Kendra, Shivamogga for establishment of nutritional garden under Front Line Demonstration programme by distributing the required seeds, saplings, plants and technologies (Table 1). Firstly a list/count of rural house of the study area was prepared for the selection of the population for nutri garden demonstration study.

From the listed 50 rural houses, 25 rural houses were selected as a sample through randomized sampling technique. The data was collected by face-to-face interaction by regular visits to the village. For this study a well-designed questionnaire was developed and pre-tested. The primary data was collected with the help of questionnaire as well as other data such as average production of vegetables from nutri garden, change occurred by intervention of nutri garden in rural families, impact of nutrition education on food consumption pattern towards knowledge, attitude and practice of farm women and impact of nutri garden intervention on food uptake and nutrient intake of farm women were also recorded. The interaction was done both in open and closed form of questions. Nutritional value of different vegetables was calculated according to ICMR (2011) with the help of nutritional value index.

A keen monitoring during the cultivation of nutri garden was under taken. At the time of harvesting of each season yield procured, food consumption pattern and nutrient intake was tabulated. Statistical analysis included percentage, per cent adequacy and per cent increase was analysed for the collected data.

Table 1: Availability of different crops on nutrition garden

Groups	Details
Leafy vegetables	Amaranthus, spinach, coriander, moringa leaves, methi and dill
Roots and tubers	Onion, radish and beet root
Other vegetables	Ridge guard, pumpkin, okra, tomato, sponge guard, cucumber, bitter guard, brinjal, cluster bean and chilli
Pulses	Chickpea and pigeon pea (tender)
Fruits	Acid lime, guava and mango

3. Results and Discussion

Nutri garden demonstration was implemented all round the year and yield of vegetables which were consisted of green leafy vegetables, roots and tubers and other vegetables were obtained in all the three seasons (Summer, *Kharif* and *Rabi*). As per recommended dietary allowance, 300 grams vegetables should be consumed daily by an adult. On that basis requirement of vegetables for a family having 4-6 members is 36-54 kg and 108-162 kg for three months. Generally vegetable crops are of 90 to 120 months duration. Hence, 3 months for every season was taken as standard. From the present study, the analysis of data in Table 2 revealed that, the average production of leafy vegetables, roots & tubers production, pulses production and other vegetables production of rural farm families were 24.30 kilograms, 18.50 kilograms, 8.50 kilograms and 119 kilograms, respectively. Hence, by establishment of nutri-garden in the backyard of rural families will provides a diversity of fresh vegetables for consumption that improves the quantity and quality of nutrients available to the family which can be done with less economic resources, using locally available planting materials, green manures, fencing and indigenous methods of pest and disease management. Similar results were also reported by Mendenz *et al.* (2001) [4]; Shastri *et al.* (2002) [6] and Bhardwaj (2013) [1]. In the study, the change occurred by the intervention of nutri garden in rural families were also investigated (Table 3). The result revealed that, before the interventions of nutri garden the average mean production, purchase, distribution and consumption of rural families were 38, 125, 00 and 98.40, respectively. While, after the intervention of nutri garden the average means production (kgs), purchase (kgs), distribution (kgs) and consumption (kgs) were 175.80, 21, 30 and 175, respectively. This might be due to the nutri-garden vegetable production contributes to the household food security by providing direct access to fresh vegetables and fruits that can be harvested, consumed and fed to family members often daily, along with that, the per cent of vegetables purchase from the market will be reduced as well as remaining vegetables can be distributed among the neighbors. These findings are in line with Bhavana *et al.* (2021) [2]

Table 2: Average production of vegetables of farm families

SI. No.	Name of the vegetables	Vegetables production (kgs)
Leafy vegetables		
1	Methi	5.50
2	Spinach	5.00
3	Amaranthus	3.50
4	Coriander	6.00
5	Dill	4.30
Roots & tubes		
6	Onion	9.50
7	Radish	4.00
8	Beet root	5.00
Other vegetables		
9	Ridge gouard	12.00
10	Sponge gouard	15.00
11	Pumpkin	18.00
12	Ladies finger	8.00
13	Tomato	15.00
14	Bitter gouard	12.00
15	Brinjal	15.00
16	Cluster bean	8.00
17	Cucumber	12.50
18	Chilli	4.00
Pulses		
19	Chickpea	3.50
20	Pigeon pea (Tender)	5.00
	Total	175.8

Table 3: Change occurrence by intervention of nutri garden in rural families

Particulars	Production (kgs)	Purchase (kgs)	Distribution (kgs)	Consumption (kgs)
Before intervention	38	125	--	98.4
After intervention	175.8	21	30	175.0
Change	+137.8	-104	+30	76.6
Per cent change	362.6 ↑	82.5 ↓	100	77.8

The result on impact of nutrition education on food consumption pattern towards knowledge, attitude and practice of farm women revealed that, the pre test knowledge, attitude and practice per cent of rural families were 23.80, 22.60 and 25.50, respectively. While, in the post test the values were 81.20, 80.50 and 83.80 per cent, respectively (Table 4). This might be due to the nutri-garden helps to enhance the knowledge on production of vegetables and improves the self-independent level of attitude in rural families by practicing own nutri-garden and utilizing it for their own family benefits. Also nutri garden and nutrition education has also reduced the junk food and street foods uptake by the farm families. Similar results were also reported by Sunwar *et al.* (2006) [8]. The findings on impact of nutri garden intervention on food intake of rural families indicated that, before the intervention the average mean intake of cereals, pulses, roots and tubers, green leafy vegetables and other vegetables were 358.80, 39.57, 40.80, 42.17 and 36.47, respectively. While, after the intervention of nutri garden the average mean food intake was 364.70, 47.60, 65.33, 86.60 and 68.50, respectively (Table 5). The nutrients intake has a drastic change when compared to before nutri garden to the after nutri garden demonstration. While, the study data on impact of nutri garden on nutrient uptake of rural families revealed that, before the intervention of nutri garden the average mean nutrient uptake such as energy (K cal), protein (g), fat (g), fibre (g), calcium (mg), iron (mg) and vitamin (mg) were 1844.5, 44.15, 18.63, 15.13, 385.50, 12.30, 1432.05 and 23.15, respectively. While, after the intervention the average mean nutrient uptake were 2040.70, 46.20, 20.89, 20.38, 495.20, 18.30 and 37.76, respectively (Table 6). The increase in food intake and nutrient uptake in rural families might be due to the establishment of nutri-garden has improved the consumption level of the families from their own grown vegetable garden thereby which helped to improve their daily optimum food intake level, along with that by consuming organically grown fresh vegetables have helped in increasing the nutritional level and health status of the family. These findings are in line with Sumner *et al.* (2010) [7].

Table 4: Impact of nutrition education on food consumption pattern towards knowledge, attitude and practice of farm women (N=25)

Variables	Pre-test (%)	Post-test (%)
Knowledge	23.8	81.2
Attitude	22.6	80.5
Practice	25.5	83.8

Table 5: Impact of nutri garden intervention on food intake of farm women

Food groups	RDA	Before		After	
		Mean	% Adequacy	Mean	% Adequacy
Cereals	330	358.8	108.75	364.70	110.5
Pulses	75	39.57	52.76	47.60	63.47
Milk & Milk products	300	71.60	23.8	103.97	34.66
Roots and tubers	200	40.80	20.4	65.33	32.66
Green leafy vegetables	100	42.17	42.17	86.6	86.6
Other vegetables	200	36.47	18.23	68.5	34.25
Fruits	100	17.33	17.33	32.33	32.33
Sugar	30	19.80	66.00	18.67	62.22
Fat	25	17.70	70.80	18.33	73.33

***Source*:** National Institute of Nutrition (NIN) dietary guidelines for Indians (2010)

Table 6: Impact of nutri garden on nutrient intake of farm women

Nutrients	RDA	Before		After	
		Mean	% Adequacy	Mean	% Adequacy
Energy (Kcal)	2230	1844.5	82.7	2040.7	91.5
Protein (g)	55	44.15	30.38	46.20	84.0
Fat (g)	25	18.63	74.5	20.89	83.5
Fibre (g)	30	15.13	20.5	20.38	67.93
Calcium (mg)	600	385.5	64.25	495.2	82.5
Iron (mg)	21	12.30	58.5	18.3	87.1
β- carotene (I.U)	4800	1432.05	29.83	2216.3	46.1
Vitamin (mg)	40	23.15	57.8	37.76	94.41

***Source*:** National Institute of Nutrition (NIN) dietary guidelines for Indians (2010)

4. Conclusion

Nutri garden is considered to be an important not only as a source of vegetables but also to access healthy chemical free fresh vegetables that are useful to maintain the good health status. In more recent times their significance is seen to be growing in the context of the efforts to combat nutrient deficiencies, hidden hunger and malnutrition. Nutrition garden is one of the key intervention strategies that aims at food security and nutrition enhancement of rural families. Hence, establishment of nutri garden should be promoted and motivate the rural woman to go for scientific and advance techniques for cultivation of vegetables and other crops in the backyard or farmyard.

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