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Impact of demonstration of nutri garden in farm families

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Abstract

The main objective of the study was to assess the impact of nutrition garden in farmer's field. The study was conducted for two years in Gidnahalli village, Chikkaballapura taluk and Marinayakanahalli village, Chintamani taluk, Chikkaballapur district. The farm families of 30 were randomly selected and made into three groups based on their family size; Large (6-8), Medium (4-6) and Small (2-4) where the total families were 5, 10 and 15 respectively. The total number of participants were 180, where males were 97 and 83 were females. *BMI classification showed that, malnourishment was most prevalent both in females and males (85.00%) respectively. Forty one females were suffering from nutritional anaemia followed by 24 suffered from iron deficiency. Clinical symptoms like scaly skin, angular stomatitis, skin lesions were observed among 37 children due to micro nutrient deficiencies. About 53 adults were suffering from Osteomalacia and Osteoporosis. Cross sectional design was inculcated and farm families were selected on the availability of the area, water and willingness of farm women to maintain the garden in all the seasons. Along with the vegetable seed kits perennials, fruit crops, super foods and medicinal plants were also supplied. Farm families were introduced to the concept of organically growing nutrition garden through on campus training programs on balanced diet and importance of micro-nutrients. The nutritional composition of Recommended Dietary Allowance (RDA) was computed using Nutritive Value of Indian Foods and compared the same with the nutrients intake. The percentage adequacy determined revealed that there was an increase in per cent of quantity of nutrients intake like proteins (21.82%), fibre (13.83%), vitamin A (23.87%), vitamin C (15%), Iron (14.29) and Calcium (18.34%). After introduction of nutrition garden, the consumption of fresh vegetables increased in the daily diet which contributed towards the upliftment of the nutritional status of the farm families.

Keywords: farm families, nutri garden, nutritional status and nutrients intake

Introduction

Agriculture is the primary livelihood of a majority of the population in South Asia. The region also houses a large population of undernourished people. The nutrition garden envisages developing and demonstrating a sustainable framework to improve nutritional outcomes that can be used for up scaling and wider adoption in rural population. India ranks 102 out of 117 countries in the 2019 Global Hunger Index, and suffers from a serious level of hunger with a score of 30.3. Indeed, the country continues to with a high rate of malnutrition, and managing it continues to be a biggest challenge. The stunting levels are 38.4 percent and underweight numbers are 35.8 percent as reported in the National Family Health Survey 4 (NFHS-4). There has been only a marginal betterment over the years. Under nutrition leads to long-term effects, including cognitive and growth deficits and reduced immunity to infections. It is the underlying cause of nearly half of all deaths amongst children under five years of age in India. Food security proceeds to be a subject of grave concern for India. In spite of being the second largest producer of food, India is home to the world's second largest undernourished population (195.9 million). A review of studies examining the link between food security and malnutrition reveals a direct association with under nutrition in children in middle-income countries and concludes that under nutrition/stunting is a consequence of household food insecurity. To add to the burden of malnutrition, more than half (53.1 percent) of women (15-49 years) in India are anaemic, which has lasting effects on future pregnancies, and is also one of the causes for the high rate of low-birth weight babies (Aparna, 2010) [1]. The situation worsens when infants are fed inadequate diets. According to the World Health Organization (WHO), an unbalanced diet and lack of food (other than mother's milk), is directly linked to high rates of stunting, excessive weight, and death in children under five years of age. It is therefore important to break this inter generational cycle of malnutrition. A deterioration in minimum adequacy of diet is observed, which is a cause of interest. There is a need to look at

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multiple strategies to combat the issue of food security in the context of the ever-growing demand. Community gardens can play an important role in providing national food security by supplementing rations and providing essential nutrients. Nutrition gardens enhance dietary diversity by providing micro nutrients through constant supply of fruits and vegetables sufficient to meet the family's requirements. Thus, nutrition gardens can prove to be a sustainable model for providing food security and diversity to combat malnutrition at the household or community level. Hence, a demonstration of nutrition garden in farmers field was taken up by KVK Chintamani, Chikkaballapura, Karnataka. This paper investigates the impact of nutrition garden established in farm fields and on the nutrient intake of farm families, per individual nutrient requirement of nutrients met by nutrition garden and also improved health conditions with the following objectives.

1. To assess the socio economic status of the farm families
2. To analyse the impact nutritional status of the farm families

Materials and Methods

The study was conducted for two years from 2018 to 2020 in Gidnahalli, Marinayakanahalli and Neralemaradahalli of Chikkaballapur district, Karnataka constituting of 5,15 and 10 farm families. The farm families of 30 were randomly selected and made into three groups based on their family size; Large (6-8), Medium (4-6) and Small (2-4) respectively. The total number of participants were 180, where males were 97 and 83 were females. Initially, an awareness program on health and nutrition was conducted.

The structured questionnaire was used to collect the information on their nutritional status which included their socio economic status and their dietary habits by 24 hr dietary

recall method for 7 consecutive days before the implementation of nutri garden later cross sectional design was inculcated and based on the availability of the area, water, nutritional requirements of the families and willingness of farm women to maintain the garden in all the seasons, vegetable seed kits comprising of 10 vegetable seeds (4 types of green leafy vegetables, 3 roots and tubers and 3 other vegetables), perennials (drumstick, curry leaves, chakramuni), medicinal (Brahmi, Ashwagandha, Madhunashini, Amruthaballi, Stevia and Stevia), super foods like grain amaranth and chia seeds to grow on bunds and fruit plants (papaya, sapota, guava, lemon, pomelo, pomegranate and jamun) which were rich in vitamin A, C, B and in minerals like iron, calcium, phosphorus and zinc and a folder was developed which contained information on the importance of nutrigarden and the scientific designing of nutrigarden layout for all the seasons were distributed along with the seed kits by KVK, Chintamani.

A keen monitoring during the cultivation of nutrigarden was under taken. During the harvesting of each season yield procured, food consumption pattern and nutrient take was tabulated. Statistical analysis included percentage, percent adequacy and percent increase was analysed for the collected data. Then a field day program was conducted in the respective villages to create awareness on nutritional importance and nutri garden for the upliftment of the family health and in nutrition intervention nutrition education was provided.

Family category	Family size	Dimensions (m)	*Area required (Sq. mt)
Large (5)	6-8	21*8	168
Medium (10)	4-6	16*7	112
Small (15)	2-4	14*6	84

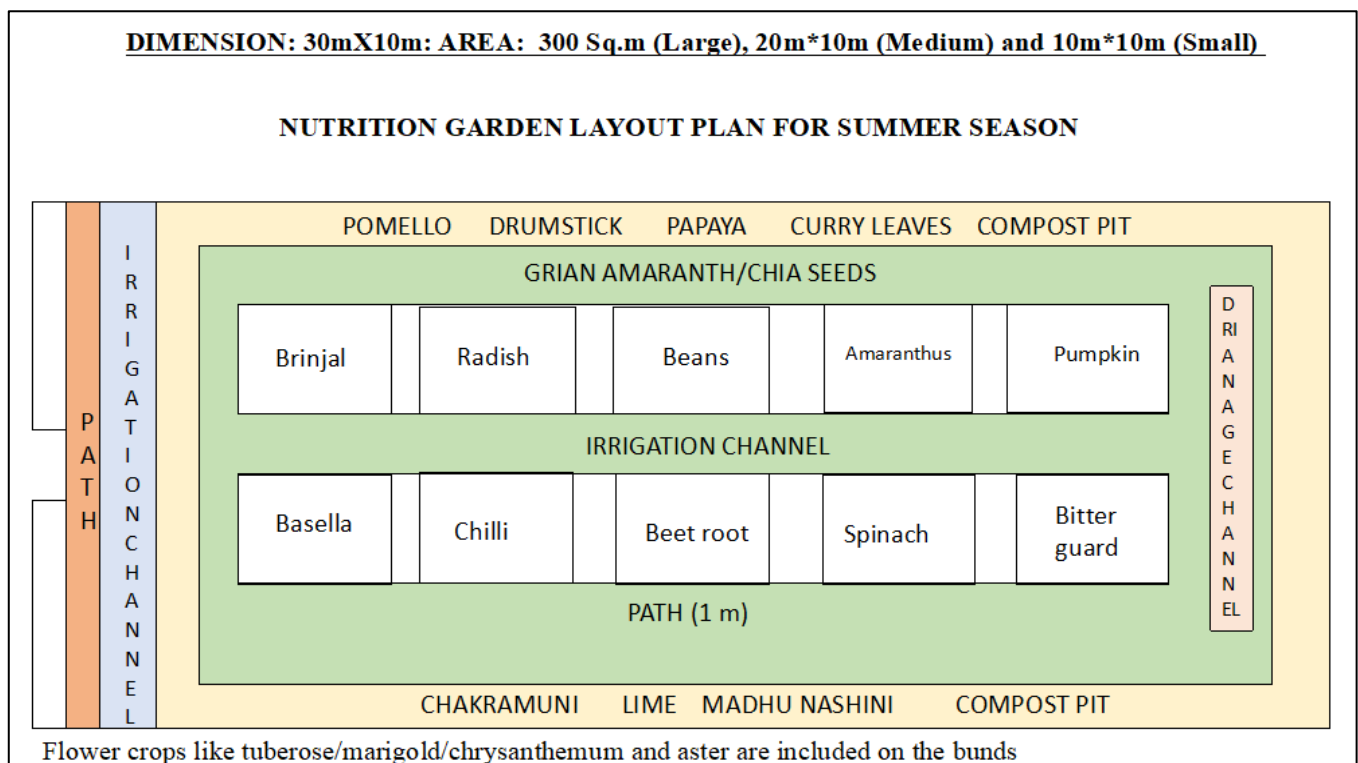


Fig 1: Nutri garden layout for summer season based on size of the family

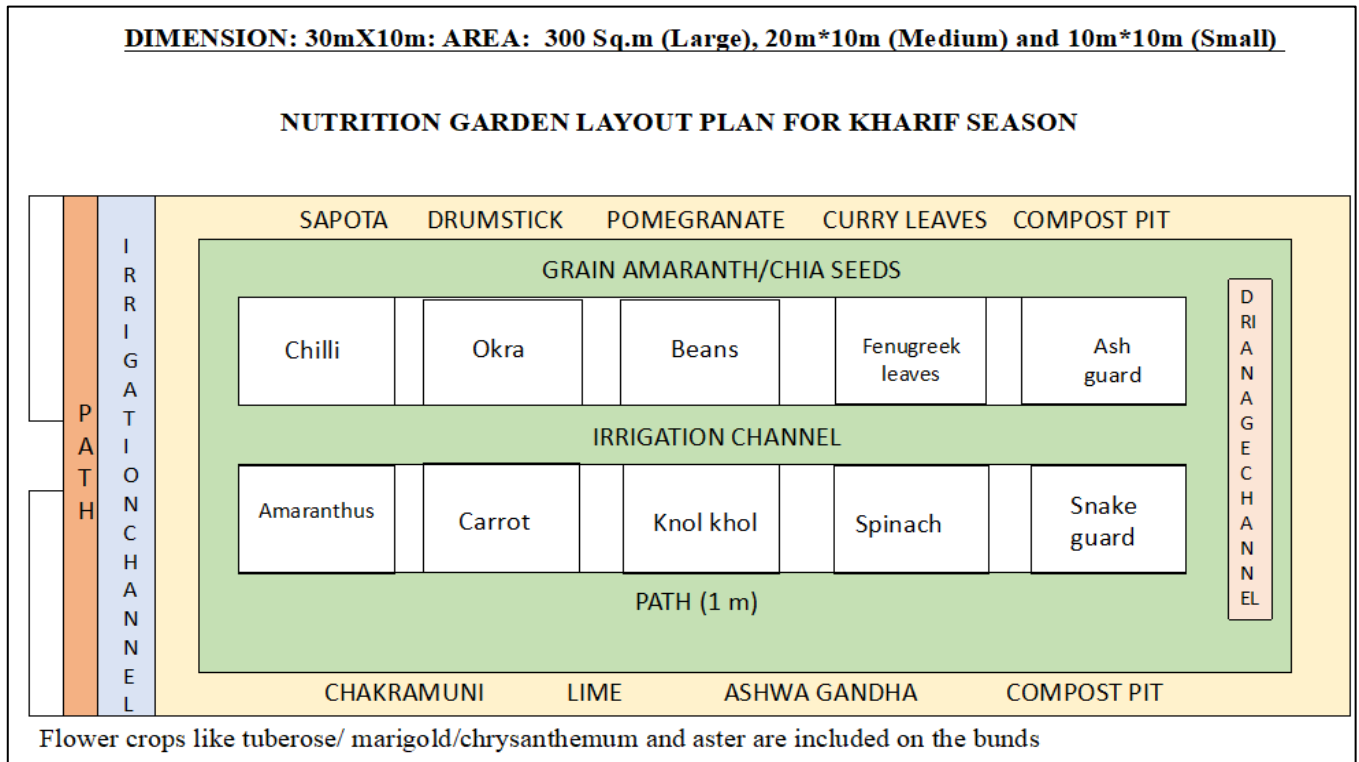


Fig 2: Nutri garden layout for Kharif season based on size of the family

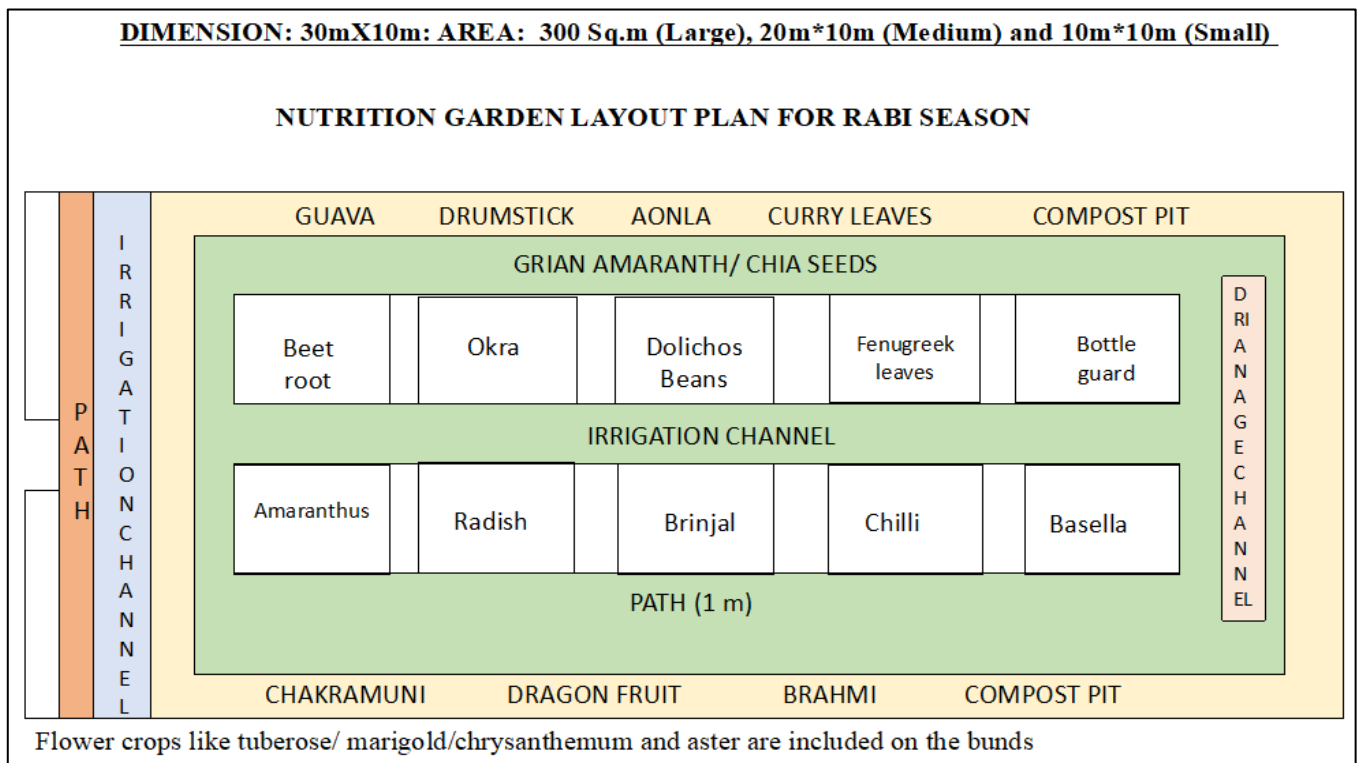


Fig 3: Nutri garden layout for rabi season based on size of the family

Results

Table 1: Socio demographic characteristics of the respondents

Parameters	Respondents=30	
	N=180	%
Age(years)		
0-19	77	42.77
20-39	31	17.62
40-59	43	23.90
60 and above	29	15.71
Caste		
SC/ST	47	26.12
Others	133	73.88
Education		
Illiterate	71	39.44
Primary	55	30.56
Middle and secondary	43	23.88
PUC and graduation	11	6.12
Family income (per annum) (n=50)		
11,000-50,000	23	76.67
51,000-90,000	3	10
91,000 and above	4	13.33
Experience in Nutri garden		
More than 3 years	8	26.77
Less than 3 years	22	73.33
Purpose		
Financial benefits	5	16.67
Family health	20	66.66
Social/ recreational	5	16.67

Table 2: Family expenditure pattern of the respondents (n=30)

Family Expenditure (per month)	Mean value (Rs.)	Percentage
Food	1900	6.12
Education	3600	11.61
Health and Medicine	1200	3.87
Fruits and vegetables	700	2.25
Others (savings, loans and debts)	19,000	61.29
Miscellaneous	4600	14.83

Average income (31,000)

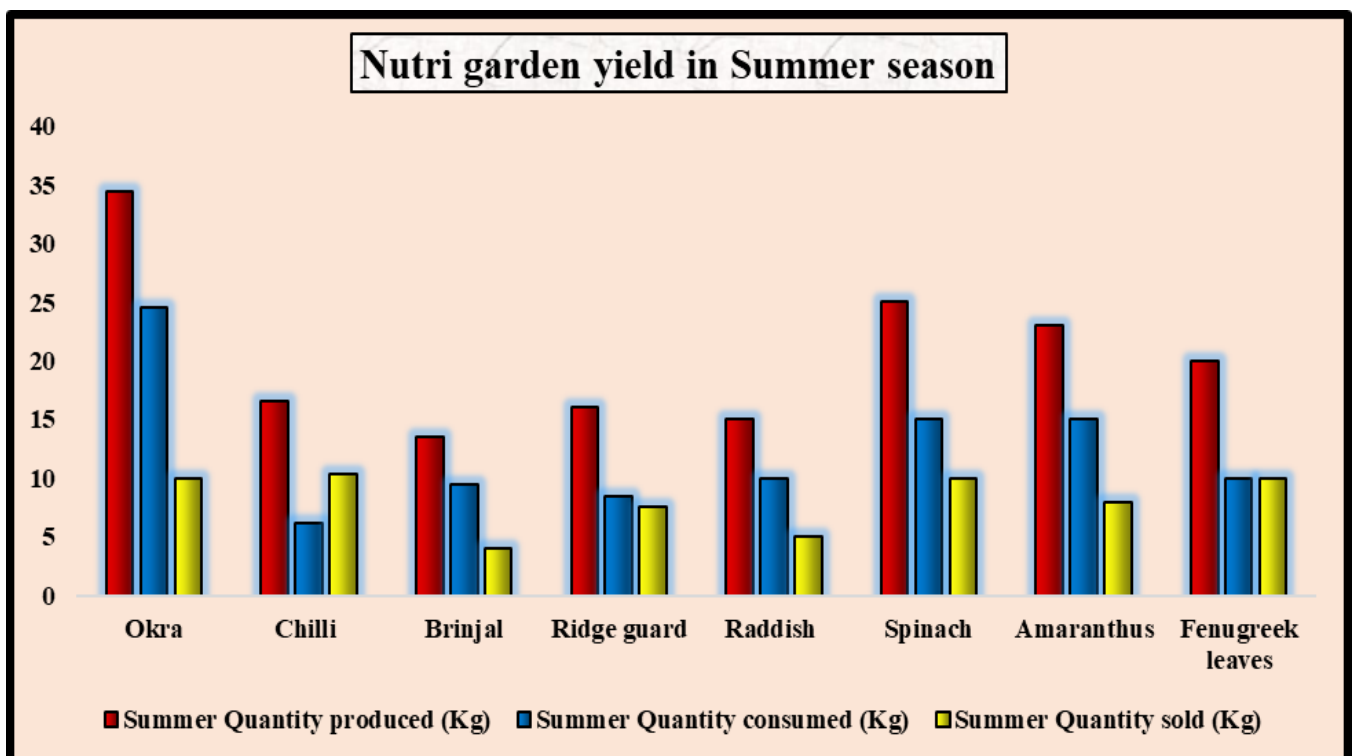


Fig 4(a): Nutri garden yield in summer season

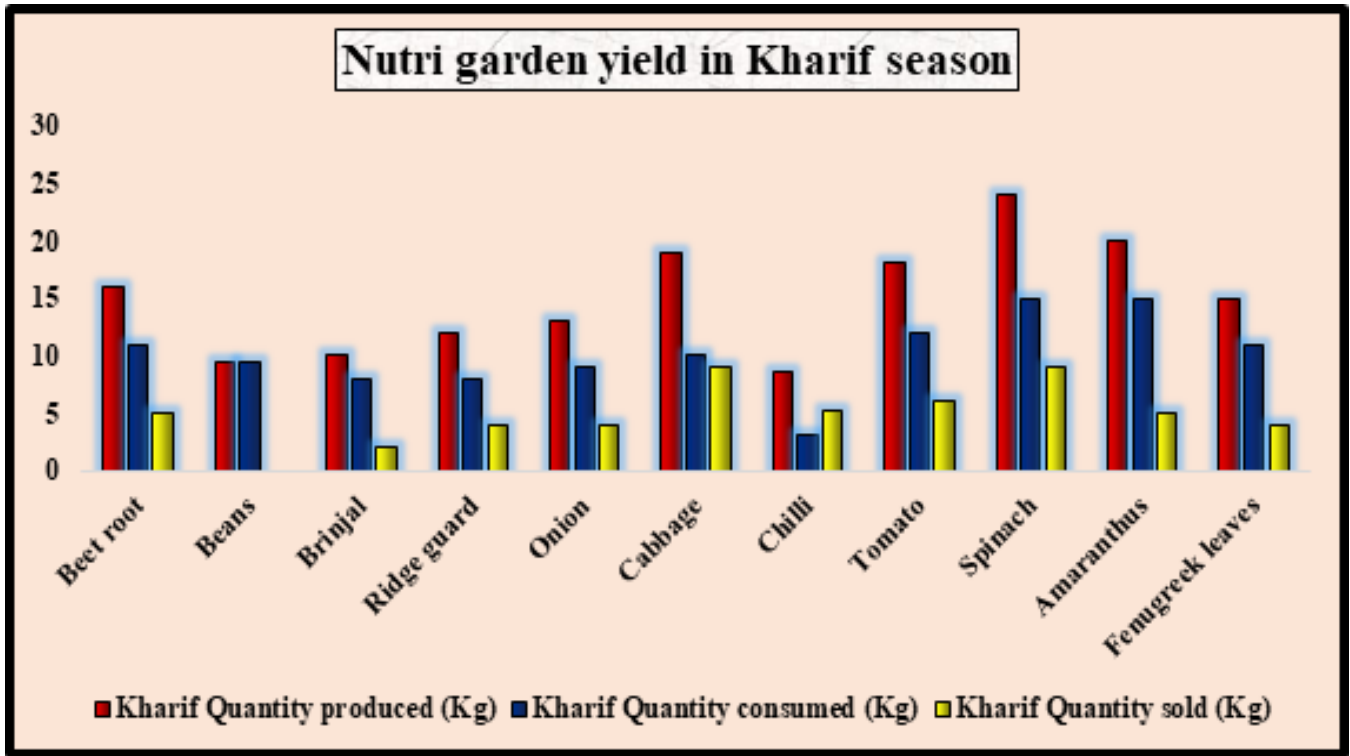


Fig 4(b): Nutri garden yield in Kharif season

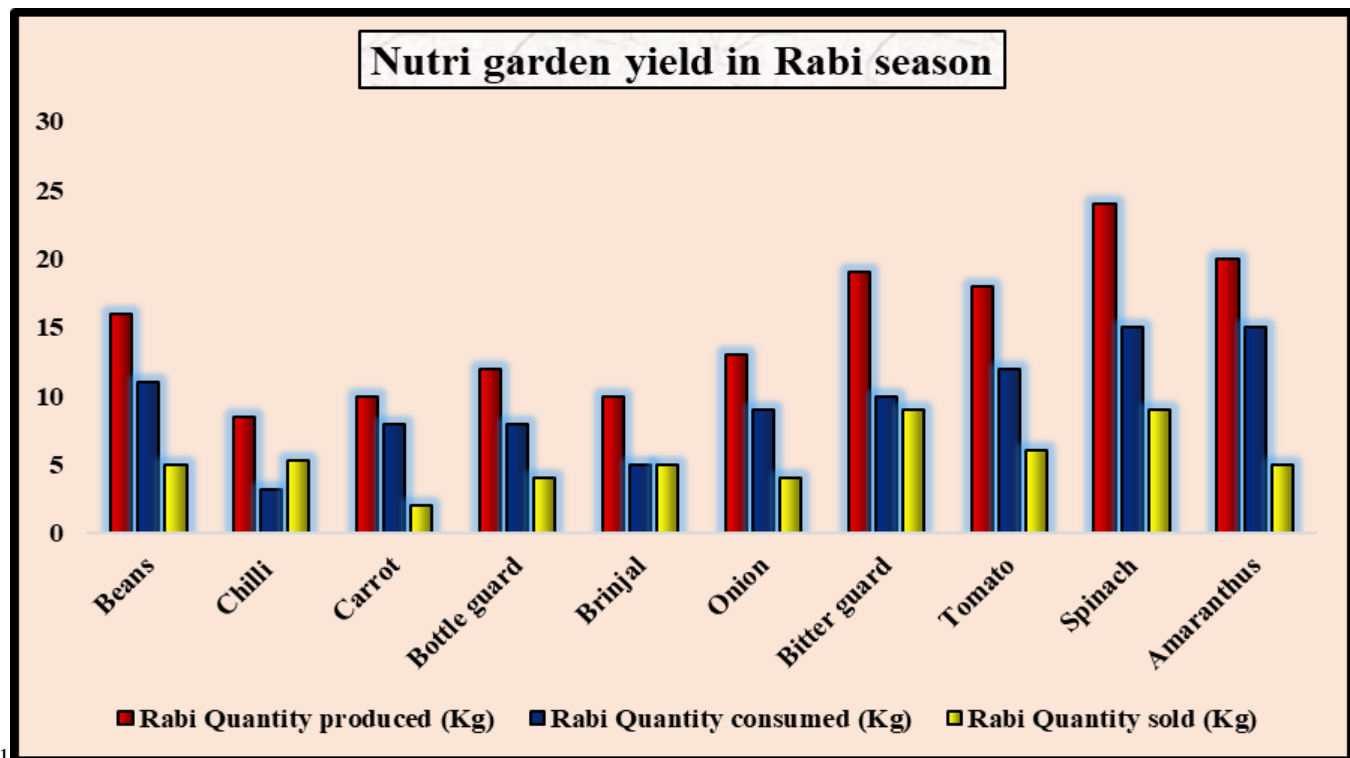


Fig 4(c): Nutri garden yield in rabi season

Table 3: Anthropometric Assessment of the farm families

*BMI	Category	Before nutri garden		After nutri garden	
		(N =180)	%	(N =180)	%
<18.5	Underweight	65	36.11	53	29.44
18.5 -22.9	Normal	27	15.00	62	34.45
23.0 - 24.9	Over weight	20	11.12	17	9.44
25.0 - 29.9	Obese grade I	26	14.44	23	12.77
>29.9	Obese grade II	42	23.33	25	13.9

Table 4: Morbidity status assessment of the farm women

Parameters	Before nutri-garden	After nutri-garden	Before nutri-garden	After nutri-garden
	(n=30)	%	(n=30)	%
Giddiness	17	56.66	12	40.00
Back ache	21	70.00	17	56.66
Head ache	15	50.00	14	46.66
Body ache	16	53.33	15	50.00
Fatigue	17	56.66	10	33.33
Fever	03	10.00	02	6.66
Breathlessness	09	30.00	07	23.33
Eye strain	19	63.33	13	43.33
Cold	12	40.00	10	33.33
Caugh	16	53.33	14	46.66
Acidity	23	76.66	20	66.66
Tooth ache	24	80.00	17	56.66
Shoulder pain	27	90.00	22	73.33
Respiratory problem	18	60.00	14	46.66

Table 5: Impact of nutri garden on food consumption pattern of the respondents

Sl. No.	Food Group	Quantity cooked (cup)		Expenditure (Rs. / year)	
		Before nutri-garden	After nutri-garden	Before nutri-garden	After nutri-garden
01	Cereals	2.525	2.525	3000	3000
02	Millets	2.313	2.313	5000	5000
03	Pulses	1.056	2.056	5000	5000
04	Pumpkin, papaya ...etc.	0.56	1.112	2000	2200
05	Green leafy vegetables	1.489	2.217	1500	380
06	Roots and Tubers	2.894	4.567	3500	1300
07	Other vegetables	3.235	5.319	2000	670
08	Milk and milk products	2.098	2.098	3000	3000
09	*Meat	2.544	1.899	4800	3600
10	*Eggs	2.226	3.745	1200	1200
11	*Fish and sea foods	0.652	1.475	1800	1800
12	Sprouted grains	1.231	1.231	1000	1000
13	Oils/ fats	1.157	1.157	4500	3900
14	Nuts/ seeds	1.311	1.569	2500	2500
15	Any others (processed foods and bakery items)	1.776	0.541	2000	1200
	Total	21.68	28.18	42,800	35,750

Table 6: Impact of nutri garden on nutrient intake of farm women (n=30)

Nutrients	RDA	Before		After		Impact % increase
		Mean	% adequacy	Mean	% adequacy	
Energy (Kcal)	2230	1814.5	81.34	1970.35	88.34	7
Protein (g)	55	35.95	63.63	47.53	85.45	21.82
Fat (g)	25	19.51	76.03	20.89	83.56	7.53
Fibre (g)	30	21.48	71.60	25.63	85.43	13.83
Calcium (mg)	600	430.46	71.66	480.16	80.00	8.34
Iron (mg)	21	15.52	71.42	18.24	85.71	14.29
Carotene (mg)	4800	3513.6	73.18	3923.41	81.72	8.54
Vitamin C (mg)	40	29.85	72.50	35.808	87.50	15

Discussion

Socio demographic characteristics of respondents is been represented in the Table 1. The results indicate that majority of the population 42.77 per cent comes under the age group of 0-19 years followed by 23.90 per cent of 40-59 years, 17.62 per cent belong to the age group of 20-39 years and 15.71 per cent are elderly who are classified under the age group of 60 years and above. The diversification of castes in farm families indicates that majority of them are others 73.88 per cent followed by 26.12 per cent were belonged to SC/ST category. When the criteria of qualification is taken into consideration most of them are illiterates 39.44 per cent followed by individuals attained primary education comprised of 30.96 per cent, few of them have completed middle and secondary school of education that is 23.88 per cent and the least were

6.12 per cent of the population are done with pre university course and graduation. Kumar *et al.*, 1994 [2] has enumerated the similar results revealing the demographic characteristics of farm families in few districts of Kerala state.

The majority of the annual income 76.67 per cent of the farm families obtained from different sectors of occupations like agriculture, day labor, poultry, bee keeping and cattle rearing ranges from Rs. 11,000 to 50,000 and followed by 13.33 per cent obtain income of Rs. 51,000 to 90,000. The main purpose of this study is to implement nutria garden in farmers field based on the data compelled reveals that majority 73.33 per cent of them had less than three years of experience in cultivation of nutria garden and followed by least of 27.77 per cent had more than three years of experience in nutria garden. As the need of implementing nutri garden in farm families

was analyzed indicated that most 66.66 per cent of them focused on health condition followed by financial benefits as the additional income to the family were 16.67 per cent and creating an activity for recreation purpose remained the same per cent.

An average income of Rs. 30,000/- is earned by the farm families every month from seasonal crops harvested, dairy and sericulture. The family expenditure is based on their requirements and it is been represented in the Table 2. The major investment is based on the loans, debts and savings by the farm families 61.29 per cent followed by miscellaneous like festivals, ceremonies, pantries and education of children 14.83 per cent and least 11.61 per cent was spent of food stuffs purchased.

Nutri garden was implemented all round the year and yield of vegetables which were consisted of green leafy vegetables, roots and tubers and other vegetables (okra beet root carrot, bottle guard beans chilli tomato brinjal onion ridge guard raddish cabbage spinach amaranthus fenugreek leaves) was obtained in all the three seasons (Summer, Kharif and Rabi). On an average 55.7 Kg of vegetables was procured by the farm families for consumption. Perennials like curry leaves, drumstick, chakramuni, jamoon papaya, sapota, guava, amla, pomegranate were bearing just few months before as they took long time to grow. The relevant data has been indicated in Figs 4 (a), 4(b) and 4 (c) respectively which reveals that all kinds of vegetables were produced in their backyard or farmyard as suitable in particular seasons like summer, kharif and rabi. Mendenz *et al.*, 2001^[3] and Shastri *et al.*, 2002^[4] made a interdisciplinary study of crops in home garden which included variety of fruit plants, veggies and perennials benefiting the farming families health conditions.

Anthropometric assessment are a set of quantitative body measurements which is used to assess growth, development and health conditions. Anthropometric measurements includes height and weight which helps in classifying subjects into different Body Mass Index (BMI) categories as underweight, normal, overweight, obese grade I and obese grade II. Body mass index (BMI) is a measure of body fat based on height and weight. The assessment was carried on all the 180 subjects before and after the nutri garden implementation and the results showed that majority of the individuals before the nutri garden establishment were malnourished classification like under weight 36.11 per cent, over weight 11.12 per cent, obese grade I 14.44 and 23.33 were belonged to obese grade II and the total was 85 per cent of the population was malnourished which is a indirect indication that the subjects had improper dietary pattern of food consumption and only 15 per cent fell under normal category. After the introduction of nutri garden and repeated creating of awareness on proper dietary management, good eating habits and importance of healthy diet in our day to day life helped to increase the BMI value by 19 per cent when compared to earlier that is it was 34 per cent of the subjects were belonged to normal category which is an indicative of nutri garden intervention which has been entailed in Table 3. Nutritional status assessment of the humans is assessed by various methods like anthropometric, dietary habits, biochemical and through vital statistics, where the morbidity conditions can be analyzed and in mild conditions can be well treated through proper dietary management. Table 4 indicates the morbidity status of the 30 farm women assessed by questionnaire method. The results described that shoulder pain (90%), tooth ache (80%), acidity (76.66%), back ache

(70%) and eye strain (63.33%) are found to be major morbidity conditions suffered by the farm women and rest of them like fever, breathlessness, cold and cough are noticed as minor health conditions. After the introduction of nutri garden all the morbidity parameters analyzed proved as indicating reduced by 10 to 15 per cent in each case approximately.

Adoption of nutri garden has a good impact on the food consumption pattern. As the food consumption pattern of the farm families were taken into consideration before nutri garden it indicated that the families had low consumption essential food groups measured cooked quantity in cups (21.68) like pumpkin, papaya, green leafy vegetables, roots and tubers and also other vegetables which were not grown and not even consumed regularly as they had monotype cropping of vegetables. Sunwar *et al.*, 2006 describes that many challenges and opportunities were made to create awareness among rural public on importance of proportionate consumption of food groups in day to day life, this study made by him holds similar result in the present study Later after the demonstration and by having awareness through nutri garden intervention improved their food consumption pattern compared by measuring cooked quantity in cups (28.18). Nutri garden also reduced the cost of vegetables procurement nearly Rs. 7,500/- and even chemicals free vegetables enhanced their health conditions (Table 5).

An overall nutrient intake of the farm women is the mirror image of the nutrient intake of the farm families which is revealed in Table 6. Vijayalakshmi *et al.*, 2012^[7] in her study suggests that the impact of nutri garden holds high the empowerment of women. The nutrients intake has a drastic change when compared to before nutri garden to the after nutri garden demonstration. The nutrition intervention through nutri garden has increased the per cent of important nutrients uptake like protein (21.82%), fibre (13.83%), Iron (14.29%) and Vitamin C (15%). This increase in nutrients intake is the clear indicator of the improvised health condition of the farm families. Nutri garden and nutrition education has also reduced the junk food and street foods uptake by the farm families. An adjoining study made by Sumner *et al.*, 2010^[5], indicated that the local food diversity gained tremendous health benefits and healed many of the minor health issues the farming community.

Conclusion

Nutri gardens are seen to be important not only as a source of vegetables but also to access herbs that are useful in medicinal values. In more recent times their significance is seen to be growing in the context of the efforts to combat micro nutrient deficiencies. These deficiencies are widely prevalent in areas where the normal diet of the population has low diversity and particularly where they are dependent on a single staple food such as cereal based diets or monotype cropping system is in practice. Such deficiencies occur when people cannot diversify their diets by including fruits and vegetables. These may result in severe consequences such as blindness, disability, increased maternal and infant mortality rates, depressed functioning of the immune system or low levels of energy. In this situation the approaches that are being recommended are fortification, supplementation or dietary diversification. Nutri gardens can play a crucial role in this to combat hidden hunger.

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