

Original Research Article

Nutrition Gardens for Improved Food Security and Enhanced Livelihoods in Gaya District of Bihar

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ABSTRACT

India is a rich heritage to indigenous fruits and vegetables. Cultivation of these crops by gardening in a systematic manner in small piece of land available in household is known as “Nutrition Garden”. Study was conducted in the five villages of Bodhgaya block of Gaya district. Diagnostic survey was conducted for determining effect of nutrition garden. One hundred respondents (50 have nutrition garden and 50 have no nutrition garden) were randomly selected from the beneficiaries of KVK front line demonstration programme on nutrition security. Data collected with the help of interview schedule. The 250 m² area was found appropriate for the family of 4-6 members. The total vegetable production, consumption and calorie intake of respondents were increased by 100 per cent and 53 per cent respectively after implementation of demonstration. Majority of the respondents (40%) earned handsome annual income through nutrition garden. Inadequate access to water supply, limited access to input supply and high input cost were identified as the major problem faced by the farmer’s/farm women in management of nutrition garden.

Keywords

Nutrition gardens,
food security,
enhanced
livelihoods

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 their consumption 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 local food production to mitigate the adverse effect of global food shocks and food price volatility, consequently, there is much attention towards home garden as a strategy

to enhance 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 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 (Sheela at al 1998). Establishment of nutrition garden is found that it is a 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 2012). 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 other organic matters (Indumathi *et al.*, 2012). Nutrition garden can be described as a mixed cropping system that encompasses vegetables, fruits, plantation crops, herbs that can serve as a supplementary source of food and income. Promotion of local plants is an appropriate strategy for increasing vegetable consumption. Nutrition awareness programmes stress the need for inclusion of locally available fruits and vegetables like papaya, mango, guava and leafy vegetables in their daily diet. Hence every housewife or every citizen has a vital role in converting his surrounding vacant land into alive kitchen garden, where location specific seasonal vegetables and fruits are 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 seeds of okra, ridge gourd, bottle gourd, Muskmelon, water melon in between rows of cereal crops during kharif season for their home-Consumption. Small and marginal household suffer more malnutrition as have no or very small crop field. Considering the importance of vegetables in overcoming the problem of micro 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 ways to vegetables production in rural homes. The idea was to develop an intensive system of production by which small families can get sufficient nutritious vegetable though out the year and thereby ensure the supply of needed micro nutrients for the family members.

The concept of nutrition garden was popularized along with cultivation of horticultural crops among the poor rural farmers by integrating production of required seasonal vegetables for continuous supply round the year. So, the study was designed with following specific objectives:

To Assess the appropriate area required for establishment of nutrition garden.

To estimate per day vegetable consumption & caloric distribution of individuals having nutrition garden.

To identify the impact of homestead vegetable production in food and nutritional security.

To identify the problems faced by the farm women in management of nutrition garden.

Materials and Methods

The purpose of study was to determine food security through homestead vegetable production. The study was conducted in five villages (Khazichak Babhani, Bakrore, Shivrajpur, Mocharim) of Bodhgaya block of Gaya district of Bihar, during 2015-2016. These villages were selected by KVK for establishment of nutritional garden under Front Line Demonstration program me by distributing required seeds, Saplings, plants and technologies. A List of nutrition garden demonstration farmers of study area was prepared for selection of the population of the study. From the listed 110 farm women

50 farm women were selected as sample through random sampling technique. Further for comparative study another 50 farm women were also selected by simple selection method those who had no nutrition garden. Data were collected by face-to-face interview with the help of interview schedule. For this study a well-designed questionnaire was developed and per-tested. Primary data was collected with the help of questionnaire. The interview schedule contained both open and closed form of questions and was designed in Hindi. Nutritional value of different vegetables was calculated according to ICMR (2011) with the help of nutritional value index.

Results and Discussion

Appropriate area required for establishment of nutrition garden for family of 4-6 members

As per RDA 300gm vegetables should be consumed daily by an adult on that basis requirement for vegetables of family having 4-6 members is 36-54 kg and 108-162 kg for three months generally vegetable crops are of 90 to 120 years duration so 3 months taken as standard. Analysis of Data in table revealed that average vegetable production from 150 Sq.m was 325.00 kg whereas 360.00 kg production was achieved from 200 Sq.m and About 425.00 kg production was achieved from 250 Sq.m area. As per RDA daily vegetable consumption of a person should be 300 gm. Based on the finding it can be concluded that although 150 Sq.m area is sufficient to full fill the minimum requirement of vegetable for a family of 6 members and the extra vegetable produce from rest of the area may be used for selling out or for economic security of rural families. The size of each nutrition garden is unique in structure, functionality, composition and appearance as they depend

on the natural ecology of location, available family resources such as labor and the skills, preferences and enthusiasm of family members.

Access to planting materials and social capital are noted as an important attribute to species diversity in garden. As the families became economically stable their cultivation shifted from staple to horticultural crops.

Economic Evaluation of Nutrition Garden planned in 250 square meter area

The nutrition gardens contribute to income generation, improved livelihoods, and household economic welfare as well as entrepreneurship and rural development. Table envisage that vegetable production can be a profitable venture as the B:C ratio for each vegetable is nearly 1:2 cost of cultivation including cost of labor no matter the farming is done by the family members himself or with the help of labour.

The economic evaluation clearly shows that nutrition gardens were also contributed towards enhancement of social participation among rural folks as more than 50-60 kg vegetables were been gifted to neighbors for their use. The sale of produced from nutrition garden improves the financial status of the family providing additional income, while contributing social and cultural amelioration.

Contribution of vegetables produced from nutrition garden to food & Nutrition Security

Reviews of studies reveals that the most fundamental social benefit of nutrition gardens stems from their direct contributions to household food security by increasing availability, access ability and utilization of food products (FAO, 2003).

Table.1 Appropriate area required for nutrition garden for the family of 4-6 members

Crop Area	Spinach	Okra	Bottle gourd	Brinjal	Ridge Gourd	Round Gourd	Radish	Tomato	Coriander	Peas	Lal Sag	Total season.
150 Sq.m	35.6	33.1	36.2	34.6	32.0	34.2	31.5	32.2	18.8	8.2	28.6	325kg
200 Sq.m	40.5	38.2	40.5	38.0	36.6	34.8	32.0	36.2	22.5	10.5	30.2	360kg
250 Sq.m	48.4	49.6	46.5	44.9	49.5	38.5	34.6	44.3	25.5	15.5	35.5	425kg

Table.2 Economic Evaluation of Nutrition Garden planned in 250 square meter area

Sl. No.	Crop	Yield/Bed (5*4m)	Gross cost	Gross Return	Net Return	B:C Ratio
1	Spinach	48.4	236.00	563.00	227.00	1:2.3
2	Okra	49.6	350.00	992.00	642.00	1:2.8
3	Bottle Gourd	46.5	320.00	558.00	238.00	1:1.7
4	Brinjal	44.9	450.00	898.00	448.00	1:1.9
5	Ridge Gourd	49.5	280.00	495.00	215.00	1:1.7
6	Round Gourd	38.5	280.00	520.00	240.00	1:1.8
7	Radish	34.6	310.00	540.00	230.00	1:1.7
8	Tomato	44.3	475.00	1550.00	1075.00	1:3.2
9	Coriander	25.7	255.00	771.00	516.00	1:3.0
10	Peas	15.5	450.00	542.5	92.00	1:1.2
11	Lal Sag	35.5	240.00	355.00	115.00	1:1.4
Total-		425.0 Kg.				

Table.3 Contribution of vegetables produced from nutrition garden to food & Nutrition Security

Name of Vegetables	Average Production	Market Value(Rs)	Average Consumption	Average Consumption	Nutritional Status
Spinach, Okra, Brinjal, Ridge gourd, Bottle Gourd, Round gourd, Radish, Lal Sag Tomato, Peas and Coriander etc	425.00 kg	6375.00	250.00 kg	120.00 kg	130.00 Kg Additional Consumption Improved

Table.4 Average Per Day Vegetable production, consumption from nutrition garden and Their calorie distribution

Category	Production (Kg/day)	Consumption (Kg/day)	Calorie intake (Kcal)
Nutrition garden establish-er	4.75	2.77 per family 0.462	314.9
Non-Nutrition garden establish-er	0.0	1.3 per family 0.222	147.7
Differences	4.75	1.47 per family 0.240	167.2
Percent increase	100	53.0	53.0

Table.5 Identification of the problems faced by the farm women in management of nutrition garden

Problems in nutrition Gardening	Greatly	Moderately	Partially	Not at all.
Inadequate access to water	68.7	20.3	7.3	3.7
Damage duo to insect pest	16.5	42.2	28.2	13.1
Lack of quality seeds	50.6	34.4	8.2	6.8
Limited marketing opportunity	48.5	32.6	12.2	17.7
High input cost	54.5	38.2	20.2	7.1
Excessive Post-Harvest losses	45.5	44.5	5.6	4.4
Lack of information, Knowledge	30.4	35.5	20.0	14.1
Social and cultural barriers	25.0	36.6	25.0	24.4
Improper storage facilities	32.6	34.6	15.4	17.4
Limited access to agricultural inputs	58.6	38.2	20.0	3.2

Food availability refers to the supply of food made available through domestic production, Accessibility is ensured when an individual is able to obtain food without any physical, social or economic barriers. Food adequacy or utilization is achieved through various biological and non-biological process that ensure sufficient energy and nutrient intake. Homestead vegetable production contributes to household food security by providing direct access to food that can be harvested, prepared and feed to family members, often daily.

Gardening may be done with virtually no economic resources, using locally available planting materials, green manures, fencing and indigenous methods of pest control. It provides a diversity of fresh foods that improve the quantity and quality of nutrients available to the family.

Average vegetable production in nutrition garden was 425.00 kg and 60 kg respectively in a family established nutrition garden and the family having no nutrition garden. The families consumed their originally grown vegetable which help to improve their nutrition and further surplus produce was sold in the village market fetching small income of Rs. 1000-15000

per Annam. The combined value of garden production, including sale of surplus vegetables produce and animal products combined with savings in food and medical expenses constitutes a considerable proportion of total income. Similar result was also reported by Galhena *et al.*, 2013 and Bhardwaj *et al.*, 2013.

Average Per Day Vegetable production, consumption from nutrition garden and Their calorie distribution

The National Nutrition Council of India has proposed for the country a balanced diet in the recommended quantity of 300 grams per head per day. The respondents mainly produced leafy vegetables in their nutrition garden consumed maximum amount of vegetable for improvement of their food and nutrition status. The Calculated amount of calorie intake from different vegetables is presented in table below. Respondents having no nutrition garden produces 0.0 kg and respondents having nutrition garden produces 4.75 kg of vegetables per day and consumption was 2.7 kg of producer and 1.3 kg of non-producers respectively. It was observed that production and consumption increases in both cases. Total calorie intake was 147.7 Kcal and 314.9 Kcal in person

having no nutrition garden and the person having nutrition garden. Calorie intake was also increased by 167.2 Kcal. Similar result was also reported by Marsh, (1998) and Bhardwaj (2013).

Identification of the problems faced by the farm women in management of nutrition garden

While there are multiple benefits of nutrition gardening the Literature also reveals the key constrains to the sustainability of nutrition garden and makes recommendations for improvement and making gardening more viable and sustainable enterprise. Among several constraints the access to suitable and sufficient land to establish a home garden along with lack of ownership and usage rights of some form as the most important limiting factors.

Table shows the inadequate accesses to water is the biggest problem identified in the process of managing kitchen garden. In the study area most of the respondents' household is high land resulted in drop down of water level in the area and ultimately affecting the supply of water through tube well also. People face severe problem of irrigation.

Limited access to agricultural inputs and unavailability of quality seed were identified as another significant problem, Limited accesses to agricultural input and unavailability of quality seeds may sometimes causes heavy loss to the farmers. High input cost was also identified as another major problem. Sometimes input dealers and agencies cheat the farmers by taking high price of inputs. Limited marketing opportunity, excessive post-harvest loss, improper storage facilities were also some of the major problems identified by the nutrition garden establishing.

Some farm women also found social and cultural barriers as one of the problem in functioning and management of nutrition garden.

The 250 Sq.m area was sufficient and appropriate for establishment of nutrition garden for a family of 4-6 members which provides daily requirement of the family as well as some earning also to them. The Average Vegetable production in a cropping season is about 425 kg from the nutrition garden of 250 Sq.m area. That's improved the calorie intake of individuals in farm families. So, it is recommended that each KVK should promote establishment of nutrition garden and motivate rural woman to go for scientific and advance techniques for cultivation of more profit. Thus, nutrition garden is one of the key intervention strategies that aims to nutrition enhancement of food and nutrition security for the poor. Nutrition garden provides direct access to food through self-reliance rather than dependence on externally supported programs like subsidies and supplementation scheme.

In the wake of a global food crisis and the soaring food prices, there has been increased emphasis on enhancing and building local food systems. In this context, there is renewed attention required to food production and livelihood enhancement through nutrition gardens.

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