NUTRIGARDEN

FOR FOOD SECURITY AND DIET DIVERSITY

ICAR-Agricultural Technology Application
Research Institute, Zone-I, PAU Campus,
Ludhiana-141 004, Punjab.

भाकृअनुप
ICAR

NUTRI GARDEN FOR FOOD SECURITY AND DIET DIVERSITY

Under

(Nutri-sensitive Agricultural Resources and Innovations Project)

ICAR-Agricultural Technology Applications Research Institute

Zone-I, PAU Campus, Ludhiana-141004

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Introduction

The agricultural policies and interventions in India are mainly aimed at improving total production and productivity of farmers. More than 80 per cent farmers fall under small and marginal farmer's category in India. Thus the increase in overall production and overall income may not be sufficient to deal with the nutritional level in the rural India. It has been realized by the agri scientists that increasing food production alone while ignoring nutritional issues, is not sufficient to eradicate malnutrition in India unless large number of poor population living in the rural areas is given access to nutritious food. The major share of the net income by the poor farmers is spent for meeting demands for food and clothing of the family. Low income and less purchasing power of rural people leads to low intake of protective foods in the diet and this lack of nutrition causes various health issues, whether short term or long term. Also due to ignorance and low literacy levels the major community is eating whatever is available leading to poor health.

Globalization has lead to proliferation of fast food chain worldwide which in turn has led to the changes to diet of the families. The flood of advertisements of the fast food has lead to serious consequences on health of the community. The community has to be appraised regarding importance of every nutritional component in the food. The nutrition interventions have changed considerably in the understanding of the causes of malnutrition and its remedies. Malnutrition comprises of term over nutrition and under nutrition, is a largely neglected issue among the population in India that has become a national health crisis.

. Therefore it is need of the hour in meeting the requirements of nutritive food at farm level only. It not only helps to meet the nutritional benefits of the families but also contribute towards the income of the farming family through reduction in food expenditure as well on medical expenses. To ensure a healthy diet women and youth in villages must be educated and trained about role of macro and micronutrients, importance of cultivating variety of vegetables and fruits in nutri- garden to have diet diversity.

Division of Agricultural Extension, New Delhi has initiated special programmes like NARI (Nutri Sensitive Agri-resources& Innovations) program through KVKs across the country which aimed to sensitize farm women and others stakeholders on various aspects of nutrition to address malnutrition by bringing change in the food systems through different interventions. The main focus of initiating this programme through KVKs in the country is reducing malnutrition

and improving the intake of quality nutrition among the farming community. This special programme of NARI has been designed keeping the following objectives in mind:

- Creation of Awareness on Nutri Sensitive Agriculture among farming community through capacity development and different level of various interfaces.
- Promotion of Nutri Garden, Nutrithali, and Nutri villages.
- Promotion of bio-fortified crop varieties for nutritional security among farm women and children.
- Development of Entrepreneurship among youth by producing nutritional products.
- Promoting Nutri Sensitive innovative practices and value chain development.

PROMOTIONS OF NUTRI GARDEN

As a part of this program major focus is establishment of nutri-garden to grow essential vegetables. The home and nutri- garden is the most ancient type of garden. The main highlight of this programme will be "Grow what you eat and eat what you grow". Further mapping of the entire food system of the adopted villages will be done by KVKs so that appropriate data could be collected about the intake of food by the community of the particular district. KVK scientists will give suggestions about nutrition rich foods to improve the dietary intake and to remove the nutritional inadequacies in diet among the community. Moreover women are the main target group of this programme as they are sole responsible for the nutrition of the family. Women will be encouraged for growing vegetables, pulses and fruit plants in their homestead garden or nutri-garden to improve their family diet. Consumption of protective foods rich in anti-oxidants, minerals and coloured pigments, and fruits and vegetables that contributes to hemoglobin synthesis must be promoted among the farm women and school children by modes of trainings and special lectures, respectively.

Vegetable based nutri-garden is the richest source of nutrition and can play an active role in eradicating under nutrition. Nutri-garden is advanced form of kitchen garden in which vegetables are grown as a source of food and income. For small and marginal farmers, nutri-garden can generate a critical contribution to the family diet and provide several other benefits, particularly for women. Currently research is focused on field-based commercial but income from the sale of these crops often is not used to buy quality food for the family. This is slowly arising as questions about agriculture's contribution to nutrition and health. This has led to introduction of nutri- gardens because they show a more clear-cut way from food production to nutritional outcomes. According to Indian Council of Medical Research (ICMR)

recommendation for vegetable consumption can be fulfilled i.e. 300 gm of vegetable per person per day in which 50 g leafy vegetable; 50 g root vegetables and 200 g other vegetables.

ICAR-ATARI, Zone-I, Ludhiana is working with KVKs of three states of Punjab, Himachal Pradesh, Uttarakhand and Union territories of Jammu & Kashmir and Ladakh. These states and Union territories have 69 KVKs. These 69 KVKs are monitored after eight State Agricultural Universities and three ICAR institutes. These KVKs fall under different agro climaticzones so the crops have to grown keeping in view the climatic conditions of the area.

The main activities of this NARI programme are

- To create awareness among women and youth about nutri sensitive agriculture
- Bio fortification of locally available crops and vegetables
- Demonstrations of naturally fortified varieties of crops
- Capacity building of women and stakeholders for balanced nutrition.

Krishi Vigyan Kendras will not only promote nutri garden in the farm families but also strengthen the existing nutri garden in KVKs to help in training the farm women and Aganwari workers. Besides the scientists will also prepare the literature and small videos of establishment of nutrition garden for the benefits of women who cannot visit the KVKs due to shortage of time or large distance of KVKs from the village.

Few points to be kept in mind for laying the nutri garden:

1. For layout, select a sunny site in the East- West direction near the residence.
2. Divide it into small plots of 2m x 3m, which can be increased or decreased depending upon the farmers need for personal use or sale of vegetables.
3. Farmers can select any crop combination as per need. In the front side, try to raise short statured vegetables followed by higher and ultimately climbers on the backside fence.
4. The perennial vegetables like Chayote (Cho-Cho), tree tomato, asparagus, greater yam etc. should be located on one side of the garden, so that they may not shade other crops, compete for nutrition with annual vegetable or come in way of proper rotation.
5. Once these perennial vegetables are established, very little care is needed and a constant supply of vegetable will be obtained year after year with little additional cost of labour. Keep one plot for raising nursery in which all seasonal seedlings can be raised as backup for plots that can be vacated after harvesting

Selection criteria for vegetable crops

- Select vegetables that are hardy, easy to grow adapted to the local climate and soil.
- Select vegetables liked by the family members, particularly women and children.
- Select a diverse range of vegetables, because all have different nutritional qualities.
- Select vegetable varieties tolerant to common pests and disease
- Quality planting materials (Seed, cutting, seedling and tubers) of the selected vegetables must be locally available and easily accessible by the family members.
- Include improved varieties but also traditional varieties to maintain agro- biodiversity and cultural heritage.

Family farming at homestead areas or nutri gardens help in making wider availability of crops dietary diversity at household level

- Availability of fresh and chemical free vegetables
- Promotion of safe and healthy eating habits among children
- Promoting nutri-garden and naturally bio fortified crops like drumsticks, amla, minor millets, enriched tubers and root etc. in government-owned land.
- Provision of balanced nutrition to address the problem of malnutrition.
- Strategy to address micronutrient deficiency
- Diet diversification
- Supplementation
- Food fortification

The nutri-garden models for the four states working under the ICAR-ATARI; Ludhiana has been prepared with the assistance of State Agricultural Universities. The list of vegetable crops for the Kharif and Rabi season which can be grown in different states and Union territories is also there and the seed rate of the vegetables is also given so that farmers can grow the vegetable in their homestead garden with minimum input and get remunerative returns out of it. These nutri-gardens can be taken up in schools so that school children can take up the interest and get enriched with the knowledge of nutrition as a part of curriculum. The list of models of different states and UTs is as follows: The quarter wise year round selection of vegetable crops, their varieties, planting/sowing and harvesting time is shown in model. The states and Union territories fall under different agro climatic regions which are as under:

Agro-climate zone wise information:

Table: 1: Different agro-climatic zones of Punjab and the nutri garden crops sown in different Season

Agro-climatic Zones	Districts under the Zone	State	Nutritional Garden Vegetable Crop		
			Kharif	**Rabi**	**Summer**
Sub-Mountainous Undulating Zone	Parts of Gurdaspur, Hoshiarpur and Ropar	**Punjab(5)**	Bottle gourd, Bitter gourd, Cucumber, Squash Melon,Tinda,Okra,Pumpkin,Long Melon,Brinjal,Tomato, Lobia,Chilli,Potato,Onion ,Watermelon, Muskmelon	Cabbage, cauiflower, broccoli, radish, carrot, peas, spinach, methi, methe, chinesesarson, potato, onion, garlic, brinjal	Capsicum, Tomato, French Bean, Coriander
Undulating Plain Zone	Parts of Gurdaspur, Hoshiarpur, Ropar, Ludhiana and Patiala		Cucurbits, Bhindi, Round Gourd, Colocasia, Brinjal, Cucumber, Long melon, Chilly, Pudina, Soybean	Cauliflower, Brinjal, peas, cabbage , Brocolli, Tomato , Gram, Mustard Leaves, Fenugreek, Lobia, Palak, Radish, Carrot	Onion, Radish, Garlic, lettuce, Capsicum, Brinjal, Tomato, Long Melon
Central Plain Zone	Jalandhar, Nawanshahar and Fatehgarh Sahib; and parts of Amritsar, Patiala, Gurdaspur, Kapurthala, Ludhiana, Ferozepur and Sangrur		Bitter gourd, Cucurbits , Cucumber, Capsicum, Lotus stem, Zimmikand, Watermelon, Muskmelon	Palak, Saag, Radish, Carrot, Turnip, Methi, Cauliflower, Pea, Potato, Cabbage, Gram	Muskmelon, Moong, Mash, French Bean, Capsicum
Western Plain Zone	Moga, Mansa and Muktsar; and parts of Amritsar, Faridkot, Ferozepur and Sangrur		Bottle gourd, Bitter gourd, okra, Brinjal, Radish, long melon,wange,sponge gourd, musk melon, Pumpkin,cowpeas, Guara, Jhaarkarela, arbi	Cabbage, cauiflower, broccoli, radish, carrot, peas, spinach, methi, methe, chinesesarson, potato, onion, garlic, Gram, brinjal, cucumber	Tinda, Tomato, chilli, capsicum, brinjal, summer moong, , kachri and squash melon

Western Zone	Bathinda and parts of Faridkot and Ferozepur		Guara, Bottle gourd, Bitter gourd, okra, Brinjal, radish, long melon,wanga, sponge gourd, musk melon, pumpkin,cowpeas, Jhaarkarela, arbi, Potato, Ber, Garlic	Gram, Cucurbits, Brinjal, Palak, Coriander, carrot, Radish, Methi, Bottle Gourd, Cow Pea	Tinda, Tomato, chilli, capsicum, brinjal, summer squash, Ber

Table: 2: Different agro-climatic zones of Himachal Pradesh and the nutri garden crops sown in different season.

Agro-climatic Zones	**Districts under the Zone**	**State**	**Nutritional Garden Vegetable Crop**		
			Kharif	**Rabi**	**Summer**
Sub-Mountaine and Low Hills Sub-tropical Zone	Hamirpur, Una, Bilaspur; and parts of Sirmaur, Kangra, Solan and Chamba	**Himachal Pradesh (4)**	Okra, Capsicum, Brinjal, Tomato, Chilli, Yam, Turmeric, Colocasia, Ginger	Cauliflower, cabbage, brocolli, tomato, onion, garlic, peas, spinach, fenugreek, radish, turnip, mustard	brinjal, capsicum, tomato, chillies
Mid Hills Sub-humid Zone	Parts of Kangra, Shimla, Mandi, Solan, Kullu, Chamba, and Sirmaur		Tomato, Capsicum, French beans, Chillies, Cucumber, Bitter Gourd	cabbage, cauliflower, Peas, Radish, Spinach,	Potato, Peas, Tomato, Coriander, colocasia leaves
High Hills Temperate Wet Zone	Parts of Chamba, Kullu, Shimla, Solan, Mandi, Kangra and Sirmaur		Brinjal, Cucumber, Kharif onion, Gourds, Tomato, Lady finger, Pea, French bean, Capsicum, Cucumber, Potato, Ginger	Spinach, sarson, onion, Methi, Garlic, Peas, French bean, broccoli, Colocasia, Cauliflower, Cabbage, tomato	Radish, French bean, Capsicum, Tomato, Chilli
High Hills Temperate Dry Zone	Kinnaur, Lahaul&Spiti and parts of Chamba		Pea, cauliflower, broccoli, cabbage, lettuce		

Table: 3: Different agro-climatic zones of Jammu & Kashmir and ladakh and the nutri-garden Crops sown in different season.

Agro-climatic Zones	**Districts under the Zone**	**State**	**Nutritional Garden Vegetable Crop**		
			Kharif	**Rabi**	**Summer**

Low Altitude Sub-tropical Zone	Jammu, Kathua and Reasi	Jammu & Kashmir and Ladakh (2)	Okra, Tomato, chilli, bottle gourd, bitter gourd, summer squash, cucumber, egg plant, Beans	Pea, Radish, Carrot, Spinach, Fenugreek, Turnip, Cauliflower, Cabbage, Onion, Dhania, Beet root, knol-khol	Okra, bottle gourd, bitter gourd, summer squash, cucumber, egg plant, Bean
Mid to High Altitude Intermediate Zone	Doda, Rajouri and Poonch		Tomato, chilli, bottle gourd, cucumber, egg plant, French Beans	Pea, Radish, Spinach, Fenugreek, Turnip, Cauliflower, Cabbage, Onion, Dhania	bottle gourd , egg plant, French Bean
Mid to High Altitude Temperate Zone	Anantnag, Baramulla, Kupwara, Pulwama, Budgam and Srinagar		Cole Crops (Cabbage, Cauliflower, Knolkhol, Kale. Solanacea (chilli, Tomato, Potato, Brinjal, Capsicum) Cucurbits (Bottle gourd, Cucumber, Pumpkin, Squash, Ridge Gourd and Bitter Gourd), Coriander, Fennel, Beans, Fababean	Spinach, Garden Pea, Root/tubers Onion, Garlic, Turnip, Radish, Carrot, Leafy vegetables: Kale (G. M Dhari, KhanyariHanzHak, AnchariHak)	
Cold Arid Zone	Leh and Kargil		Cabbage, Onion, Potato, Garden Pea , onion, lettuce, Spinach, French Bean, Cucumber	Spinach & Siberian Kale(Under Protected Conditions of Green House/ Trench Structures)	Capsicum, Tomato, Muskmelon, Water Melon, Summer Squash, Brinjal, Cucumber

Table 4: Different agro-climatic zones of Uttarakhand and the nutri garden crops sown in different season.

Agro-climatic Zones	**Districts under the Zone**	**State**	**Nutritional Garden Vegetable Crop**		
			Kharif	**Rabi**	**Summer**
Valleys to 1000 m	U.S. Nagar Haridwar, and Dehradun	**Uttarakhand (4)**	Pea, French bean, Cauliflower, Lady Finger, Bottle gourd, Bitter gourd, Sponge gourd, Cucumber	Spinach, Fenugreek, Pea, Cabbage, Cauliflower, , Capsicum, Okra, Tomato, Brinjal	Okra, Garlic, French bean, bitter gourd, Arbi, Bottle gourd, Sponge gourd, Watermelon

Low Hills, 1000– 1500 m	Nainital, parts of Dehradun, TehriGarhwal and PauriGarhwal		Cucurbits, Tomato, Okra, Capsicum, French bean, Bottle Gourd	Cabbage, Turnip, ,Radish, Tomato, Chilli, Pumpkin, Spinach, Coriander	Cucumber, Tomato, chilli
High Hills, 1500– 2400 m	Champawat, Almora, Rudraprayag and Bageshwar		Beans, Tomato, Capsicum, Okra, Colocasia, Pear, Plum, PahariKheera, PahariAaloo,PahariLauki , PahariKaddu	Spinach, Lahi, Fenugreek, Radish, Corriander, Peas, Onion	Beans, Tomato, Capsicum, Okra,
Alpine Zone D, >2,400 m	Pithoragarh, Chamoli and Uttarkashi		Tomato/ French Bean/ Okra/ Brinjal/ Capsicum	Cabbage/ Cauliflower/ Rai/ Vegetable Pea/ Onion	Summer Squash/Cucurbits

The different models of nutri-garden has been proposed by different State Agricultural Universities for the farmers of the state keeping in mind the vegetables and fruits which can be grown in the nutri garden. Moreover the backyard space available with the farmers has been taken into consideration by the scientists while approving the model of the nutri garden. The nutri garden model of various states is as follows:

Nutri Garden Model, Punjab

Layout of Kitchen Garden Total Area: 36 Sq. meter. (6 X 6)

Total number of beds of vegetables growing: 5 beds (Block A - E)

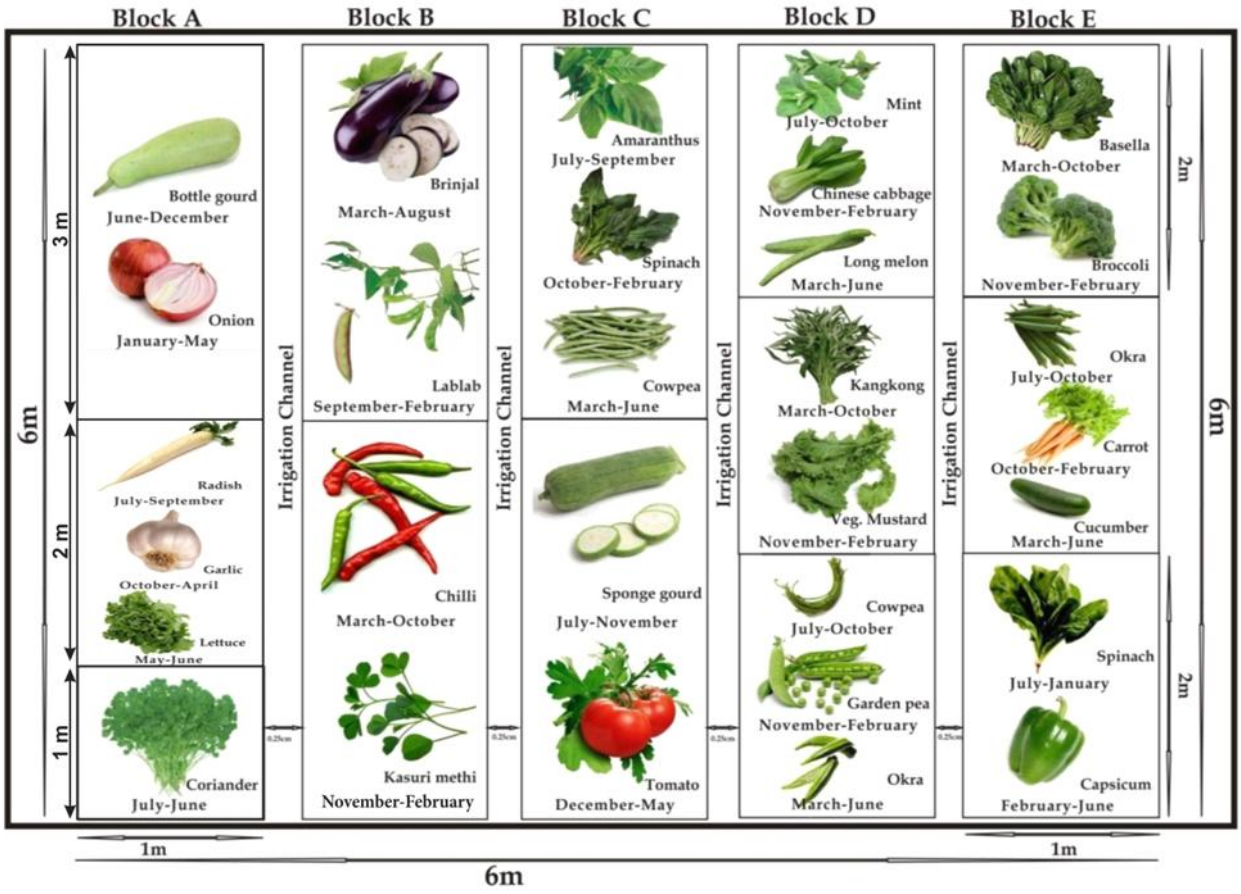


Fig 1: LAYOUT OF KITCHEN GARDE

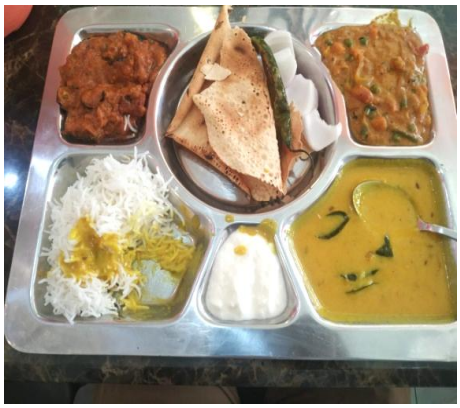
Table5: Cropping plan and agronomic practices in a 6 x 6 m nutrition garden in Punjab.

S. No.	Vegetable	Cropping span	Harvesting period	Plot size (^{2}m)	Number of sowings	Spacing (cm)	Plants per plot	Yield per plot (Kg)
1	Bottle gourd	Jun-Dec	Oct-Dec	3 x 1	1	80 x 45	12	11.05
2	Onion	Jan-May	May	3 x 1	1	15 x 7.5	267	14.07
3	Radish	July-Sept	Aug-Sept	2 x 1	1	45 x 7.5	60	10.48
4	Garlic	Sep-Apr	April	2 x 1	1	15 x 7.5	267	04.80
5	Lettuce	May-Jun	June	2 x 1	1	45 x 30	15	04.33
6	Coriander	July-Jun	Oct-Jun	1 x 1	4-5	15 x 10	67	11.37
7	Brinjal	Mar-Aug	Jun-Aug	3 x 1	1	80 x 30	20	06.38
8	Lab lab	Sept-Feb	Nov-Feb	3 x 1	1	45 x 30	22	04.43
9	Chilli	Mar-Oct	May-Oct	3 x 1	1	60 x 45	12	07.69
10	*Methi*	Nov-Feb	Dec-Feb	3 x 1	1	15 x 10	200	15.62
11	Amaranthus	July-Sept	Aug-Sept	3 x 1	1	45 x 30	22	07.20
12	*Palak*	Oct-Feb	Dec-Feb	3 x 1	1	15 x 5	400	12.46
13	Cowpea	Mar-Jun	May-Jun	3 x 1	1	30 x 15	67	03.48
14	Sponge gourd	July-Nov	Sept-Nov	3 x 1	1	80 x 45	12	10.45
15	Tomato	Dec-May	Apr-May	3 x 1	1	80 x 30	20	10.87
16	Mint	July-Oct	Sept-Oct	2 x 1	2	15 x 15	88	05.46
17	Chinese cabbage	Nov-Feb	Dec-Feb	2 x 1	1	30 x 20	33	17.17
18	Long melon	Mar-Jun	May-Jun	2 x 1	1	80 x 30	12	06.37
19	Kang kong	Mar-Oct	May-Oct	2 x 1	1	20 x 20	50	23.53
20	Vegetable mustard	Nov-Feb	Jan-Feb	2 x 1	1	15 x 10	133	04.12
21	Cowpea	July-Oct	Sept-Oct	2 x 1	1	30 x 15	44	05.68
22	Pea	Nov-Feb	Dec-Feb	2 x 1	1	30 x 7.5	88	14.62
23	Okra	Mar-Jun	Apr-Jun	2 x 1	1	45 x 15	30	06.45
24	Basella	Mar-Oct	May-Oct	2 x 1	2	20 x 20	50	15.80
25	Broccoli	Nov-Feb	Jan-Feb	2 x 1	1	45 x 30	15	11.02
26	Okra	July-Oct	Sept-Oct	2 x 1	1	45 x 15	30	08.37
27	Carrot	Oct-Feb	Jan-Feb	2 x 1	1	45 x 7.5	60	20.80
28	Cucumber	Mar-Jun	May-Jun	2 x 1	1	80 x 30	12	05.55
29	*Palak*	July-Jan	Oct-Jan	2 x 1	1	15 x 5	267	12.83
30	Capsicum	Feb-Jun	Apr-Jun	2 x 1	1	60 x 30	12	05.52

Table 6: Calculated nutritional yield of designed nutrition garden to the households in Punjab.

Vegetable	**Protein, g**	**Calcium, mg**	**Iron, mg**	**Vitamin A, IU**	**Riboflavin, mg**	**Niacin, mg**	**Vitamin C, mg**	**Calories, Kcal**
Bottle gourd	22.10	2210.00	50.83	0.00	0.00	22.10	0.00	1326.0
Onion	168.84	6612.90	98.49	0.00	1.41	56.28	1547.70	6894.3
Radish	73.36	3668.00	4.19	0.00	2.10	146.72	1572.00	1676.8
Garlic	302.40	1440.00	62.40	0.00	11.04	19.20	624.00	6960.0
Lettuce	51.96	1515.50	86.60	38970.0	2.60	17.32	346.40	909.3
Coriander	242.18	7617.90	201.25	786576.6	18.19	126.21	3069.90	2615.1
Brinjal	89.32	1148.40	57.42	7911.2	7.02	57.42	765.60	1531.2
Lab lab	168.34	9303.00	75.31	13821.6	2.66	31.01	398.70	1329.0
Chilli	223.01	2307.00	92.28	22454.8	29.99	69.21	8535.90	2383.9
Methi	687.28	61699.00	2577.30	603088.2	48.42	124.96	8122.40	5467.0
Amaranthus	288.00	28584.00	1836.00	655776.0	21.60	86.40	7128.00	1296.0
Palak	859.86	96102.00	4046.40	1482499.8	141.62	834.57	17703.00	6575.4
Cowpea	393.88	7328.00	229.00	86195.6	8.24	82.44	1190.80	4213.6
Sponge gourd	125.40	3762.00	114.95	0.00	6.27	41.80	0.00	1672.0
Tomato	119.57	1413.10	54.35	97830.0	0.00	76.09	2500.10	2174.0
Mint	179.63	10920.00	851.76	221348.4	9.56	51.76	726.18	2402.4
Chinese cabbage	206.04	7383.10	103.02	25755.0	6.87	103.02	4292.50	4635.9
Long melon	25.48	0.64	0.96	0.00	0.00	0.00	0.00	1528.8
Kang kong	705.90	19059.30	776.49	941200.0	0.00	0.00	10588.50	7059.0
Vegetable mustard	111.24	4243.60	60.15	432600.0	4.53	32.96	2884.00	1071.2
Pea	906.44	4678.40	175.44	19006.0	16.08	409.36	3947.40	13596.60
Okra	281.58	9781.20	222.30	13041.6	14.82	8.89	1926.60	4594.20
Basella	284.40	17222.00	189.60	1264000.0	23.70	0.00	16116.00	3002.00
Broccoli	396.72	11350.60	121.22	275500.0	25.35	99.18	12452.60	3746.80
Carrot	187.20	16640.00	457.60	6552.0	4.16	124.80	624.00	9984.00
Cucumber	22.20	7770.00	33.30	0.00	2.22	22.20	222.00	832.50
Capsicum	121.44	1600.80	143.52	0.00	8.28	0.00	7728.00	1711.20
Total	**7243.78**	**345360.44**	**12722.13**	**6994126.8**	**416.72**	**2643.90**	**115012.28**	**101188.**

Plate 1: Traditional recipes of state of Punjab.

LOCAL RECIPES OF PUNJAB		
		
KANAK DI ROTI+MATAR PANEER+ RAITA+ SALAD	**SPROUTED CHAAT**	**NUTRITOUS SNACKS**
		
KADI PAKODA+KADDU DI SABJI+MIX SABJI+CHAWAL+RUMALI ROTI	**ROOH AFZA LASSI**	**ALLU GOBHI +DAHI+ROTI+ACHHAR+SALAD**
		

AMRITSARI KULCHA	MAHA RAJMAH +DAHI+ALLU GAJAR+DAHI+ CHAWAL+SALAD	KHOYE DI PINNI
		
MAKKI DI ROTI +SARON DA SAAG	**MAAL POORA**	**TILL WALE LADDU**

Nutri Garden Model, Himachal Pradesh

Layout of Kitchen Garden

Total Area: 156 Sq. meter. (13*12)

Total number of beds of vegetables growing: 8 beds

Area of one bed: 8 beds (5*2)

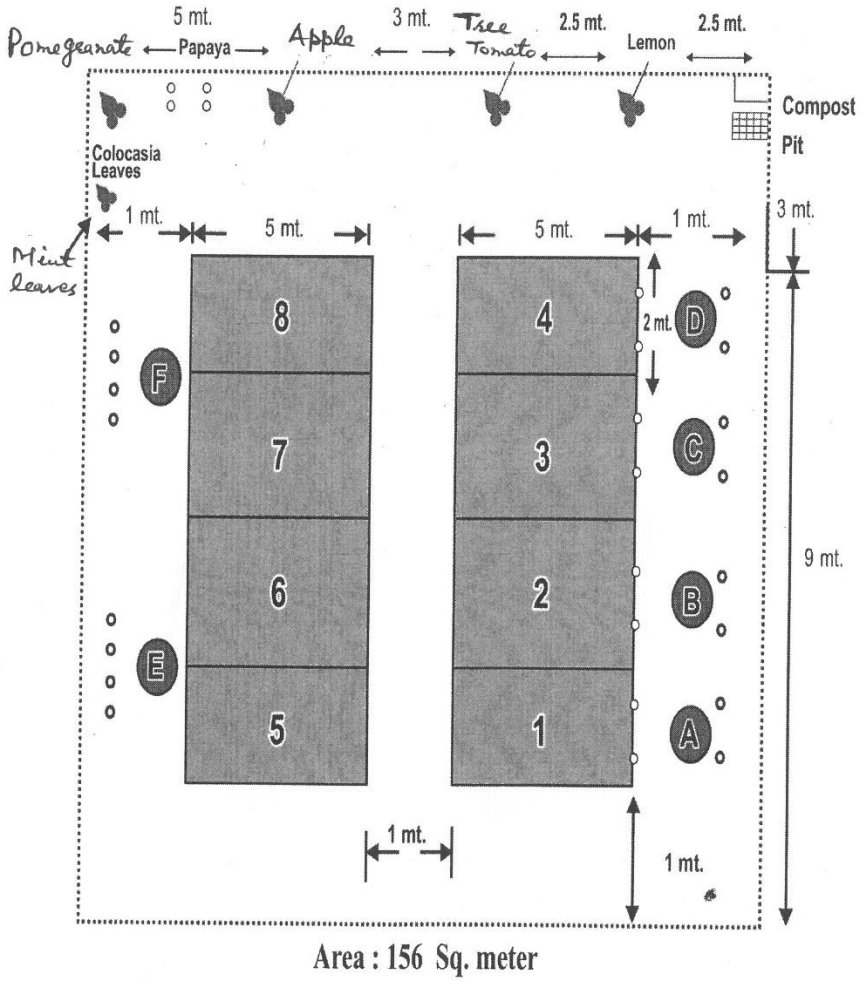


Fig2: Layout of Nutri garden Model Himachal Pradesh

Table 7: Season wise cropping plan for Nutrition Garden of HP

Plot	Kharif	Rabi	Summer
1	French bean	French bean-Peas	French bean
2	Okra	Cauliflower	-
3	Tomato	Cabbage	-
4	Capsicum	Potato	-
5	Chilli	Palak	-
6	Ginger	Onion	-
7	Brinjal	Garlic	-
8	Summer Radish	Beet root/ Turnip/Carrot/Broad bean	-
9	Summer squash	Red cabbage	-
10	Sponge gourd	Red cabbage	-
11	Bottle gourd	Red cabbage	-
12	Asparagus bean	Lettuce	-
13	Bitter gourd	Broccoli	-
14	Cucumber	Chinese cabbage	-
			Size of each plot 10 m^2

Table 8: Agronomic practices in a nutri garden in HP

Vegetables	Seed Rate (per $10m^2$)	Row to Row spacing (cm)	Plant to Plant spacing (cm)	Harvesting time	Production (kg) (per $10m^2$)	Addition income to the farmers (Rs.)
French bean	75g	45	45	April to June	10	250
Okra	20g	30-45	10-15	May to September	20	600
Tomato	0.5g	60-90	30-45	June to September	45	1350
Capsicum	1.0g	60	45	June to October	32	960
Chilli	1.0g	45	30-45	June to September	10	400
Ginger	2.0kg	30-45	20	September to November	15	600
Brinjal	0.5g	60	45	June to September	16	320
Radish	6g	25-30	7-10	April to June and October to march	25	250
Peas/ Broad bean	130g	45-60	7-10	November to December and February to April	12	360
Cauliflower	0.65g	60	45	November to April	20	500
Cabbage	0.65g	45-60	45-60	November to April	25	500
Potato	2.0kg	45-60	20	November to December and April to May	25	250
Palak	30g	30	5-10	October to February	18	360
Onion	10g	15	10	May to June	15	225
Garlic	600g	20	10	May to June	20	800
Beet root/	6g	25-30	7-10	February to April	25	250

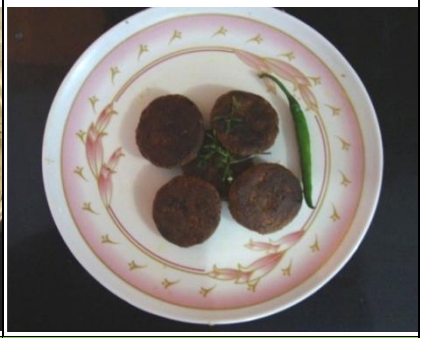
Turnip/Carrot						
Summer squash	2 seeds	30	20	April to June	15	225
Sponge gourd	2 seeds	30	20	July to October	8	160
Bottle gourd	2 seeds	30	20	July to October	15	225
Asparagus bean	2 seeds	30	20	May to August	5	150
Bitter gourd	5 seeds	30	20	July to October	10	200
Cucumber	5 seeds	30	20	May to September	15	150
Red cabbage	6 plants	30	20	February to April	10	250
Lettuce	2 plants	30	20	February to April	8	160
Broccoli	5 plants	30	20	October to November and February to April	10	400
Chinese cabbage	5 plants	30	20	November to April	15	225
Coriander (On all ridges)	15g	-	5	September to April	8	400
Fruit Crop For Kitchen Garden						
Tree tomato	1	0	0	0	0	
Papaya	1	0	0	0	0	
Apple	1	0	0	0	0	
Pomegranate	1	0	0	0	0	
Lemon	1	0	0	0	0	

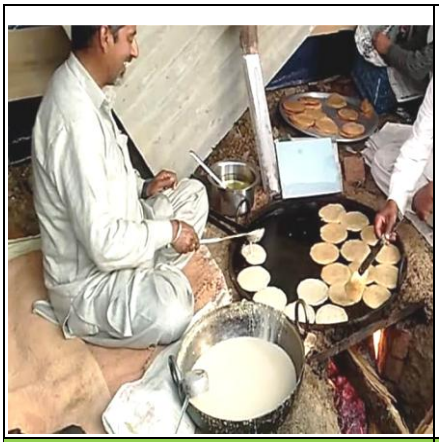
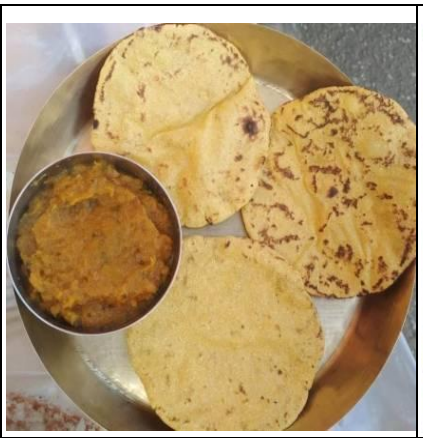
Table 9: Nutritional details from nutri garden of HP

Vegetables	**Production (kg) (per 10m^2)**	**Protein (g)**	**Energy (Kcal)**	**Calcium (mg)**	**Iron (mg)**	**Vitamin A (carotene) µg**	**Vitamin C (mg)**
French bean	10	170	2600	5000	170	22100	2400
Okra	20	380	7000	13200	300	10400	2600
Tomato	45	405	9000	21600	180	157500	12150
Capsicum	32	416	7680	2560	256	160000	46080
Chilli	10	290	2900	3000	120	17500	11100
Ginger	15	345	0	0	0	180	0
Brinjal	16	224	3840	2880	144	0	1920
Radish	25	1750	4250	8750	10	2250	3750
Peas/ Broad bean	12	864	11160	2400	180	48600	1080
Cauliflower	20	520	6000	6600	300	6000	11200
Cabbage	25	450	6750	9500	100	300000	31000
Potato	25	0	0	0	0	0	0
Palak	18	612	8280	68400	2916	1758600	12600
Onion	15	180	7480	7030	105	0	1645
Garlic	20	1260	6000	6000	260	0	2600
Beet root/ Turnip/Carrot	25	125	7250	7500	100	0	10750
Summer squash	15	75	2550	1500	90	0	2700
Sponge gourd	8	95	1425	2850	87	9504	0
Bottle gourd	15	30	1800	3000	105	0	0
Asparagus bean	5	0	0	0	0	0	0
Bitter gourd	10	160	2500	2000	180	12600	8800
Cucumber	15	60	1934	4090	225	0	1042

Red cabbage	10	0	0	0	0	0	0
Lettuce	8	168	1680	4000	192	152000	800
Broccoli	10	360	3200	1030	110	315000	11300
Chinese cabbage	15	600	5100	23250	24450	93750	4950
Coriander	8	0	0	0	0	0	0

Plate 2: Traditional recipes of state of HP

LOCAL RECIPES OF HIMACHAL PRADESH		
		
BHARWAN BATORU	**GICHHE**	**PUDE**
		
PARODE, KHEER & RAITA	**MASH NUGGETS**	**ROASTED BHALLE**
		
SEERA	**SIDDU WITH LOCAL CHATNI**	**ASKALI**

		
TRADITIONAL DISH-PUDA	**MAKKI DI ROTI WITH KADDU**	**PATRODE**
		
MUDA	**PATANDE**	**SIDKU**

Nutri Garden Model, Jammu & Kashmir& Ladakh

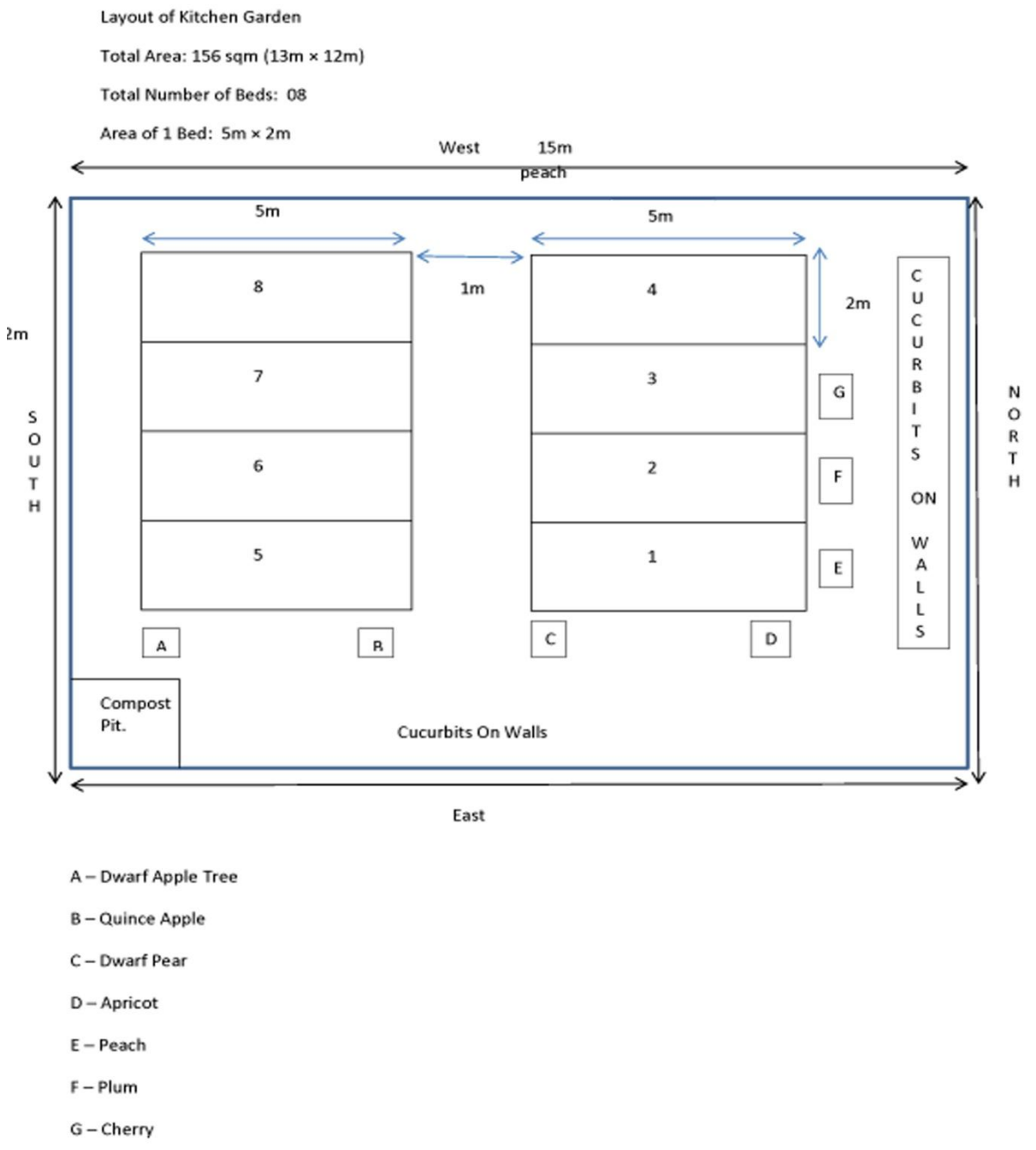


Fig.3: Lay out Plan Nutritional Garden of Jammu & Kashmir& Ladakh

Table 10: Details of Layout of vegetable in nutri garden in Jammu & Kashmir & Ladakh

Season wise cropping plan for Nutrition Garden			
Plot	**Kharif**	**Rabi**	**Spring**
1	Brinjal	Fenugreek/Coriander	Kale
2	Tomato	Knolkhol	Cabbage
3	Okra	Late Cauliflower	Table radish
4	Chilli	Carrot /Beet root/Radish/turnip	Early Cauliflower
5	Capsicum	Winter kale	Broccoli
6	Summer Kale	Palak	Orach
7	French beans	Garlic/Onion	-
8	Tomato	Peas	Potato
			Size of each plot 10 sq.m

Table 11: Details of Kharif vegetables in Jammu & Kashmir & Ladakh

Calendar for *Kharif* vegetables							
Vegetable	**Recommended varieties**	**Spacing**		**Seed Rate (per 10sq Meter)**	**Time of sowing**	**Time of transplanting**	**Harvesting time**
		Lines (cm)	**Rows (cm)**				
Tomato	Shalimar-I, Shalimar-II, Roma, Shalimar Tomato Hybrid –I, Shalimar Tomato Hybrid –I	30	45	0.5-0.6 g	March to April	May to June	July to November
		45	60				
Brinjal	Local Long, Pusa Purple long, Shalimar Improved, Shalimar Brinjal Hybrid –I & II	45	60	0.5-0.8 g	March To May	May to June	July to November
Chillies	Shalimar Long, Kashmir Long-1	30	30	1.5-2 g	April to May	May to June	July to November
Sweet pepper	California Wonder Nishat-1, Shalimar Capsicum Hybrid –I, Shalimar Capsicum Hybrid –II	45	60	1-1.5 g	April to May	May To June	July to November
		60	60				
Potato	Kufri Jyoti, Kufri Giriraj, Gulmarg Special, Shalimar Potato-I, Shalimar Potato-II	20	60	200 -250 g	March to May	--	July to Aug
Bottle gourd	Shalimar Improved	100	200-250	6 – 8 g	April to May	--	July to October
Cucumber	Japanese Long Green, Shalimar Cucumber Hybrid –I, Shalimar Cucumber Hybrid -II	30	120	6-8 g	April to May	--	July to October
		50	150				
Bitter gourd	Arka Harit	60	150-200	5-6 g	April to May	--	July to October
Ridge gourd	Pusa Nasdar	50	150	2-3 g	April to May	--	July to October

Pumpkin	Badami, Arka Chandan	75-100	300	6-6.5 g	April to May	--	July to October
Squash	Australian green bush	75-100	100	7-8 g	April to May	--	July to October
Water melon	Sugar baby, Ashai Yamato Charleston Grey	100	200	3-4 g	May	--	July to August
Musk melon	Afghan selection	100	150	4-5 g	May	--	July to August
French beans	Asparagus beans (Pole), Painted lady (Pole), Kentucky wonder (Pole), Bountiful (Bush), Master (Bush), ArkaKomal (Bush), Contender (Bush)	50	100	20-25 g	April to June	--	July to October
		10	30	80-100 g			
Bhindi	Pusa Sawani	30	45	15-20 g	May	--	July to October
Table Radish	Scarlet Globe, Scarlet Long, Rapid Red White Tip	5-10	20	7.5 – 10 g	March To June	--	July to October

Table 12: Details of rabi vegetables in Jammu & Kashmir & Ladakh

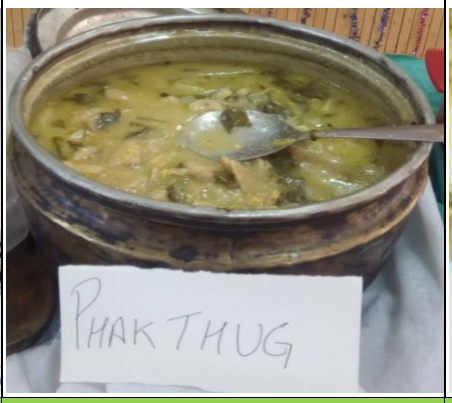
Calendar for *Rabi* vegetables							
Vegetable	**Recommended varieties**	**Spacing**		**Seed Rate (per 10sq Meter)**	**Time of sowing**	**Time of transplanting**	**Harvesting time**
		Lines (cm)	**Rows (cm)**				
Kale	Khanyari, Kawdari	0-15	30	2-3 g	March to April	April to May	July –Sept, Dec . onwards
	G.M.Dari, HaenzHaakh				August to Sep.	Sep. to Oct.	
Knolkhol	Early White Vienna Purple Vienna	15	30	1.2-1.5 g	March to April/ July to Aug.	April to May/ Aug. to Sep.	July –Sept, Dec . onwards
	King of Market						
Cabbage	Golden acre	45	45	0.5-0.8 g	March to April/ July to Aug.	April to May/ Aug. to Sep.	May to Nov.
	Pusa Drumhead	45	60				
Cauliflower	Snowball	45	60	0.5-0.6 g	July to Aug.	Aug. to Sep.	Nov-Dec. March-May
	Pusakatki	30	60		April to May	May to June	
Radish	White Round	15-20	30	7.5-10 g	August to Sep. (Direct sowing)	--	March-May
	Red Round						
	Japanese White Long						
Turnip	Purple Top White Globe Pusa Chandrima, Nageen-1	15-20	30	3.5-7 g	August to Sep.	--	March-April

Carrot	Early Nantes, Chamman Local black, Shalimar carrot-1	15	30	3.5-5 g	August to Sep.	--	March-April
Beetroot	Crimson Globe,Detroit Dark Red	15-20	30	1-1.2 g	August to Sep.	--	March-May
Onion	Red Globe, Yellow Globe	15	20	7.5-10 g	Sep. to Oct.	Nov. to Dec./ February	May - July
Garlic	Local	10	15	500-700 g	Nov. to Dec.	--	May - July
Peas	Boneville, Shalimar Matar Arkel	10	30	80-90 g	Oct. to Nov.	--	May - July
Spinach	Shalimar Green, Local Kashmiri	10	15	10-12 g	Oct. to March	--	May - July
Fenugreek	Pusa Early Bunching	--	30	20-25 g	Sep. to Nov.	--	May - July
Orach	Local Red	--	15	20-25 g	Feb. to March	--	May - July

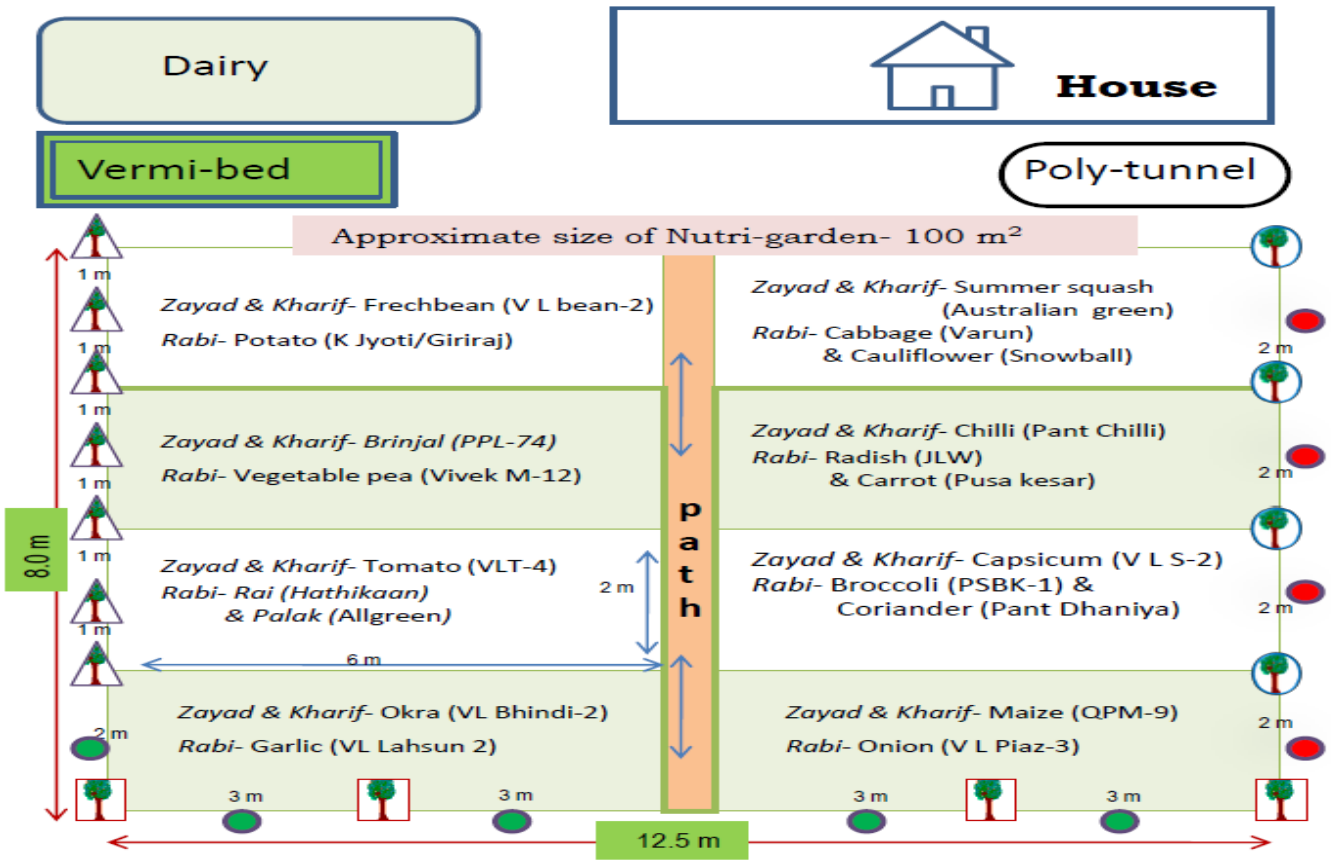
Table 13: Nutritional composition of nutri garden of Jammu & Kashmir & Ladakh

Production & Nutritional output from Vegetable garden							
Vegetables	**Production (kg) (per 10sq Meter)**	**Protein (g)**	**Energy (Kcal)**	**Calcium (mg)**	**Iron (mg)**	**Vitamin A (carotene) µg**	**Vitamin C (mg)**
Brinjal	20	420	7200	5400	270	0	3600
Kale	30			94	1.17	17,707	53.3
Tomato	27.5	288	6400	15360	128	112000	8640
Cabbage	25	360	5400	7600	80	240000	24800
Okra	8	190	3500	6600	150	5200	1300
Early Cauliflower	30	520	6000	6600	300	6000	11200
Chilli	15	435	4350	4500	180	26250	16650
Onion	25	264	11000	10340	154	0	2420
Fenugreek	6	220	2450	19750	835	117000	2600
Pumpkin	25	280	5000	2000	140	10000	400
Bottle gourd	25	60	3600	6000	210	0	0
Cucumber	60	96	3120	2400	360	0	1680
Knolkhol	25	NA	NA	NA	NA	NA	NA
Table radish	30	NA	NA	14	0.2	4	8.6
Carrot	27.5	NA	NA	23	0.27	13286	2.8
Beet root	20	NA	NA	14	0.67	30	3.1
turnip	35	NA	NA	51	0.28	NA	18.1
Capsicum	20	NA	NA	NA	NA	NA	NA
Broccoli	NA	NA	NA	31	0.52	1207	50.6
Palak	20	NA	NA	30	0.81	2813	8.4
French beans	15	2	26	50	1	5	2.1
Potato	28	NA	NA	26	1.87	17	16.6

Plate 3: Traditional recipes of state of Jammu & Kashmir and Ladakh

LOCAL RECIPES OF JAMMU & KASHMIR AND LADAKH		
		
CHUTAGI	**KHAMBIR**	**KHOLAK**
		
MEAT	**MOMOS**	**TENTEN**
		
PABA	**PHAG THUK**	**TIMOK**

Nutri Garden Model, Uttarakhand



S.N.	Legend	Name	Variety	Quantity
1		Apple	Spur (Red, Organ, Gold)	4 No.
2		Nectarine	Snow queen	4 No.
3		Lime	Kagzi	7 No.
4		Cucurbits	Bittergourd, Bottle gourd, Cucmber etc,	100 gm
5		Perennial beans	Dolichos, Sem, winged etc.	100 gm

Fig 4: Layout of Nutrition Garden model of Uttarakhand

Table 14: Season wise cropping plan for Nutri garden of Uttarakhand

S.No.	Kharif	Rabi	Summer
1	Brinjal	Cabbage	Tomato
2	Tomato	Cauliflower	Cucumber
3	Okra	Onion	Summer Squash
4	Chilli	Chilli	Bottle gourd
5	Capsicum	Coriander	Sponge gourd
6	French Bean	Rai	Ridge gourd
7		Broccoli	Pumpkin
8		Chinese cabbage	Bitter gourd
9		Fenugreek	Brinjal
10		Vegetable Pea	
11		Potato	
			Size of each plot 10 m^2

Table 15: Details of vegetable crops the nutri garden of Uttarakhand

Vegetables	Seed Rate(per 10sq Meter)	Line to line distance (cm)	Plant to Plant distance (cm)	Harvesting time	Production (kg) (per 10sq Meter)
Brinjal	2-3g(15g)	60	45	July-Aug	30
Tomato	2-3 g	60	30	Oct-Dec	32
Chilli	2-3 g	45	45	Aug-Sept	15
Okra	30	45	30	June-July	10
Cabbage	2-3g	45	45	Jan-Mar	20
Cauliflower	2g	45	45	Jan-Mar	20
Onion	20g	15	10	April-June	22
Fenugreek	50-100g	30	5	Dec-Jan	10-15
Pumpkin	5 g	100	50	March & October	20
Bottle gourd	2-3	60	45	July-Sept	30-40
Bitter gourd	2-3	180	90	June-July	25
Sponge gourd	3-4	120	90	July-August	36
Cucumber	3-4	120	90	June-August	15-20
Ridge gourd	3-4	120	90	July-August	28

Table 16: Nutritional output from nutri garden of Uttrakhand

Vegetables	Production (kg) (per 10sq Meter)	Protein (g)	Energy (Kcal)	Calcium (mg)	Iron (mg)	Vitamin A (carotene) µg	Vitamin C (mg)
Brinjal	30	420	7200	5400	270	0	3600
Tomato	32	288	6400	15360	128	112000	8640
Cabbage	20	360	5400	7600	80	240000	24800
Okra	10	190	3500	6600	150	5200	1300
Cauliflower	20	520	6000	6600	300	6000	11200
Chilli	15	435	4350	4500	180	26250	16650
Onion	22	264	11000	10340	154	0	2420
Fenugreek	5	220	2450	19750	835	117000	2600
Pumpkin	20	280	5000	2000	140	10000	400
Bottle gourd	30	60	3600	6000	210	0	0
Bitter gourd	25	400	6250	5000	450	31500	22000
Sponge gourd	36	432	6480	12960	396	43200	0
Cucumber	24	96	3120	2400	360	0	1680
Ridge gourd	28	140	4760	5040	140	9240	1400

Plate 4: Traditional recipes of state of Uttrakhand

LOCAL RECIPES OF UTTARAKHAND

MANDUA KI ROTI+SAMAK KE CHAWAL KI KHEER+PUDINE KI CHUTNI+PATOD

BHATT CHUNKANI+CHAINSU+MANDUA ROTI+BADEE+ JHANGORA KHEER+KONI BHAT+KHATAI

LOCAL FOOD THAALI

		
GHUGHUT	**KAPHAL**	**KHEERA BADI**
		
AALU KE GUTKEY	**PALAK KI KAFULI**	**PUDINE KI CHUTNEY**
		
THALI - RAJMA KI DAAL +LOCAL RICE+MANDUE KI ROTI ETC	**LOCAL DISH MANDUA ROTI AND JHANGORE KA CHAWAL**	**MADUE KI ROTI**

Conclusion:

Nutri gardens are cornerstone in traditional farming systems, in every culture since time immemorial but with time, it has lost its importance. Concept of "Eating a rainbow" in the plate must be popularized among the rural fraternity, as colors are the indicators of wide range in vitamins and pigments and myriad coloured vegetables into the daily diet will enhance the individual's ability to fight diseases & improve immunity. Increasing variability in diet and improving fruits and vegetable consumption is one of the few dietary strategies that can help in improving both situations of undernourished and overweight.

Government of India has launched National Nutrition Mission on Poshan Abhiyan with an objective of convergence of various Ministries to ensure malnutrition free India by 2022. It is urgent need for Indians that different departments should work together for achieving the common goal. The Abhiyaan is focusing on converting the agenda of improving nutrition into a "Jan Andolan" through involvement of Panchayati Raj Institutions/ Village Organizations/SHGs etc. and ensuring wide public participation. National Rural Livelihood Mission is also working to combat malnutrition among rural households to improve the nutrition level of farming community. During 2021 the Ministry of Agriculture and Farmers' welfare alongwith the IFFCO distributed lakhs of packets of vegetable kits during Poshan Maah to create awareness among the people to nutri garden. Even the aganwari workers were involved in the programme as these workers are working with pregnant women and lactating mothers at grass root level. So the Government of India is pushing various strategies of improving nutrition among individuals to combat the malnutrition.

WHICH VEGETABLE TO GROW IN WHICH MONTH

हर कदम, हर डगर
किसानों का हमसफर
भारतीय कृषि अनुसंधान परिषद

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