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Vegetable based nutri-garden for household food and nutrition security

THERE is widespread poverty, food insecurity and under-nutrition in India. The household level data on calorie intake indicates that the average calorie consumption among population in India is declining over the last twenty years. Considering the parameters of economic and social development, India's undernourished population is continually on the rise and the situation has worsened with the spiralling inflation witnessed with regard to food prices. Even though with the government effort India is in a row towards achieving food security but still there is a large population suffering from undernourishment, and starvation. So the concern for nutritional security is the need of the hour.

Vegetables are recognized as the most important source of micronutrients. Vegetable consumption can play an important role for eradicating micro-nutritional deficiencies. The inadequate supply of vegetables, particularly during the off-season, higher market price and lesser awareness regarding their consumption are key factors that limit the vegetable consumption rate in India. The per capita vegetable consumption in India (86 g/day) is far below the FAO's recommendation (200 g/day). One way to achieve this goal is through nutri-garden or kitchen garden. Home gardens are a part of agriculture and food production systems in many developing countries and are extensively used as an answer to ensure food and nutritional security in the circumstances of a global food crisis. Vegetable based nutri-gardening is important especially in rural areas where people have limited income-earning opportunities and poor access to markets. Nutri-gardens are an important source of food and income for poor households in rural and peri-urban areas. Thus it helps in increasing the nutritional status and income of people.

According to FAO the home based nutri-gardens can enhance food and nutritional security in many ways, most importantly through Direct access to a diversity of nutritionally rich foods; access to healthy diet that contains adequate macro and micro nutrients; food provision during seasonal lean periods. It will help in conservation of the local species of vegetables besides savings on food bills an income from sales of garden products.

Apart from these, nutri-garden provide multiple social benefits such as enhancing food and nutritional security, empowering women, promoting social justice and equity, and preserving indigenous knowledge and culture.

Studies reported that due to inadequate consumption of vegetables, micro-nutrients deficiency especially iron, vitamin A and iodine are prevalent in the developing world. The challenge of rising vegetables consumption is a major concern for health professionals. Vegetables are rich in nutrient and vitamins hence help combat malnutrition through dietary diversity. Dietary diversification balances the diet by enhancing the supply of essential micro-nutrients leading to improved health, such as improving functions of the whole body, disease prevention, and delayed disease progression, enhanced thinking ability and increased efficiency. Intake of vegetable can enhance in micro-vascular reactivity, better cognitive performance, decreased risk of colorectal cancer, reduce the risk of overweight, coronary heart disease, and reduced risk of kidney disease. In cities, the vegetables reaching the market contain high amount of pesticide residues, it is of special interest to the consumers to grow their own vegetables for domestic consumption. of Pesticides applications for disease and insect-pest management is discouraged in the nutrition gardens.

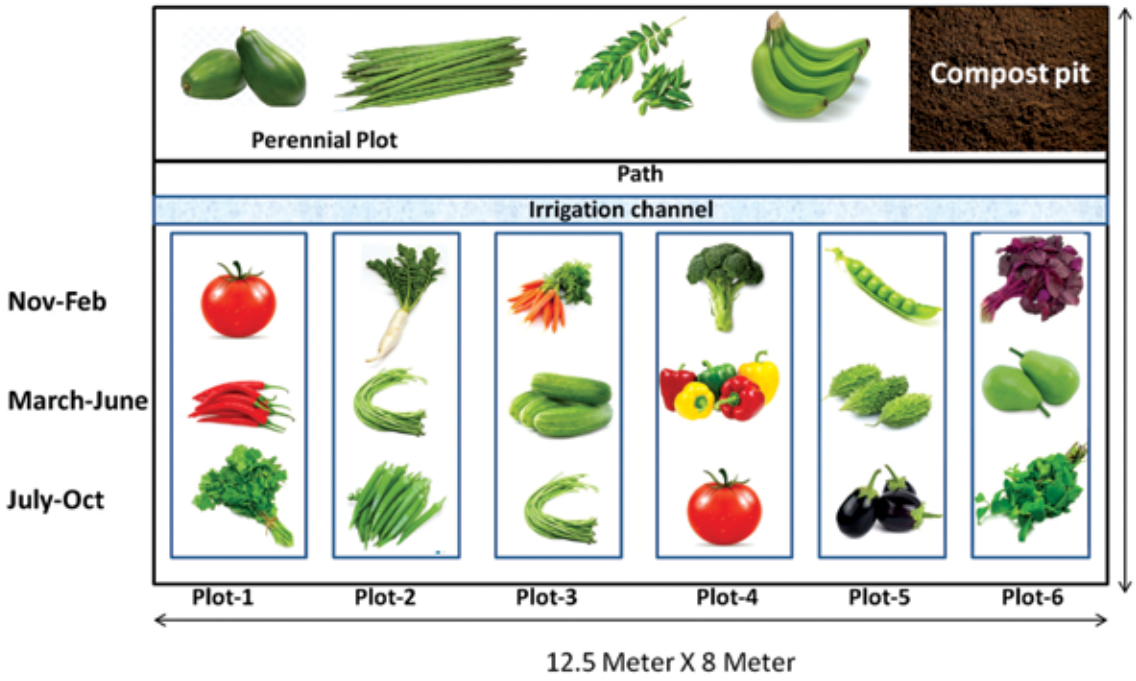
Site selection and size

Choice for selection of site for a kitchen garden is limited due to scarcity of land in homestead. Usually a kitchen garden is established in backyard of house, near water source in an open area receiving ample of sunlight. Size and shape of vegetable garden depends on availability of land, number of persons in family and spare time available for its care. A rectangular garden shape is preferred for nutrition garden. Nearly 200 m^2 is sufficient to provide vegetables throughout year for a family consisting of five members.

Layout

Layout of kitchen/ nutrient garden and selection of crops suited to each season depends on agro-climatic conditions prevailing in the area and likes and dislikes of family members. General features / principles to be followed in the layout are follows:

1. In a kitchen garden, preference should be given to long duration and steady yielding varieties of different crops rather than high yielding ones, which require constant care.
2. Beds can be laid out at soil level or raised, and should be no more than 3 to 4 feet wide to make it easy to reach into the centre without stepping on the soil.
3. One or two compost pits may be provided on one corner of kitchen garden for effective utilization of farm / kitchen waste.
4. Make access paths between beds at least 2 feet wide to enable easy access for weeding and harvesting.
5. By following scientific crop rotation which is necessary



Model of Vegetable based nutri-garden (100 m² area)

to help prevent diseases and avoid plant-hungry pests that overwinter in the soil, three annual crops can be raised in the same plot.

6. Companion cropping or accession cropping, inter cropping and mixed cropping can be followed for effective utilization of space.
7. While allotting or arranging crops in each sub-plot, care should be taken to plant varieties / crops at ideal time of planting or season.

A layout for 80 m² vegetable based nutri-garden has been depicted in Fig 1. Over the year one household can plan diversified vegetable crop for consumption. As for example from the plot 1, the household can produce three crops per year. During November to February Tomato followed by Chilli in March to June and Coriander during July to October can be grown. Similarly, from the other plots diversified crops can be harvested for household consumption. A perennial plot should be there for production of perennial vegetables like green papaya, moringa, curry leaves and banana. The perennial plot should be placed at the northern side of the garden for better utilisation of sunlight. A compost pit should also be there at the corner of perennial plots so that the crop residues and household green waste can be composted.

Positioning vegetables in beds

a. *All season vegetable crops*
Tomatoes, onion and garlic are require all round the year and can grow in more than one season so these crops should added first in plan.

b. *Vine vegetables*
Cucurbits require a lot of space due to sprawling nature. These crops should grow near the edges of beds so they don't asphyxiate neighbouring plants.

c. *Fast Access vegetables*
Plants that are regularly harvested and which do not need to be included in crop rotation, such as chilli and salad leaves should be positioned in beds nearest to the kitchen.

d. *Pollination and companion planting*
Pollination requirement varies in different crops. Pollinator plants and plenty of flowers should be included in garden and help improve pollination kitchen garden crops.

e. *Thirsty vegetables*
Thirsty plants such as salad leaves are likely to need regular watering. These plants should be cluster together in a damper part of the garden or where irrigation can easily be supplied.

f. *Perennial vegetables*
Perennial vegetables like drumstick, curry leaf and bilimbi should be allotted to one side of the garden so that they may neither shade remaining plants nor they interfere with intercultural operations.

Nutrition gardening is important especially in rural areas where people have limited income-earning opportunities and poor access to markets. It provides multiple social benefits such as enhancing food and nutritional security, empowering women, promoting social justice and equity, and preserving indigenous knowledge and culture and so on. It is also becoming an increasingly important source of food and income for poor households in peri-urban and urban areas. Nutrition gardening can be a profitable proposition in a country like India which is predominantly vegetarian and, as such, a large number of nutrients are obtained from vegetables for a balanced diet.

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VL Sabji Matar 13: Early garden pea cultivar

'VL Sabji Matar 13' (*Pisum sativum* L. var. *hortense*) is new garden pea cultivar released for Agro-ecological Zone I (Uttarakhand) of India. The cultivar was developed by hybridization between VP 272 × Arkel followed by selection using pedigree method. Being early in maturity, therefore, it escapes powdery mildew. In addition, it also possesses resistance against white rot, wilt and leaf blight diseases under field conditions. It has less incidence of pests like pod borer under mid hills conditions. It has attractive green longer curved pods (high consumer liking), more seeds/pod and high shelling per cent. The average green pod yield is 11-13 t/ha. It is suitable for cultivation under both organic and inorganic conditions.

GARDEN pea (*Pisum sativum* L. var. *hortense*) is an economically important annual herbaceous legume vegetable being widely cultivated from foothills to higher hills (north-western Himalayan regions) and North Indian plains (Sub tropical zone) at different seasons in the country. Therefore, varietal diversification is the key for early and medium maturity groups of garden pea. 'VL Sabji Matar 13' was developed by hybridization between VP 272 X Arkel followed by selection using pedigree method. Early maturity, dark green pod coupled with resistance to wilt, white rot & leaf blight were the major breeding objectives for the development of the cultivar. 'VL Sabji Matar 13' was tested in the name of VP 907 in multi-location trials. On the basis of its performance in State Varietal Trials, Uttarakhand, 'VL Sabji Matar 13' was identified and recommended for release for Uttarakhand. Later, in February 2019, 'VL Sabji Matar 13' was released and notified during the meeting of Central Sub-Committee on Crop Standard Notification and release for Horticultural Crops (The Gazette of India, 2019).

VL Sabji Matar 13

The plants of VL Sabji Matar 13 are quite distinct in both growth and yield attributes. It is characterized by 65-75 cm plant height, 2-3 branches, first flower appears at 9-11th node, green foliage, leaf normal, one/two white flowers/peduncle, green curved pod as shown in Fig. 1, single & double pods/peduncle, 12-20 pods/ plant, 175-190 pods/kg, 8-10 cm pod length, 8-10 sweet seeds/pod, 48-50% shelling and greenish-yellow wrinkled bold seeds. It exhibited 50% flowering in 70-80 days (Mid hills 1250 m above sea level), early maturity, 120-125 days (First picking) in hills.

Cultivation

The garden peas thrive best in a relatively cool weather. The flowers and young pods are badly affected by frost. Hot dry weather interferes with the setting of seed and lower the quality of pod produced. Peas grow best in those sections where there is a low transition from cool to warm weather. The seeds can germinate

Pods of VL Sabji Matar 13 (VP 907)

even at a minimum temperature of 5°C and the optimum temperature for germination is about 22°C. Garden pea can be grown on light sandy soil, silt loam or clay soil. Light soil is better for growing early varieties. The soil should be well drained and waterlogging should be avoided. Soil with excess moisture is harmful to the plant. The most favorable range of *p*H is between 6.5 to 7 and if it falls below 6.0, the land will receive adequate dressing of lime. Pea does not require much nitrogen as it is a leguminous crop. At time of land preparation 10-15 tonnes farmyard manure and 20 N, 60 P_2O_5 and 40 K_2O kg per hectare should be applied in the soil for successful cultivation of VL Sabji Matar 13. The seed rate is 100 kg seeds per hectare with the spacing of 30 cm between row and 10 cm between plants within row. 'VL Sabji Matar 13' is recommended for sowing from 15th August- last week of August (1,800-2,000m amsl altitude). Hoeing should be done after 30 DAS and 60 DAS.

SUMMARY

VL Sabji Matar 13 is a new addition to the list of early maturity varieties of garden pea for Uttarakhand hills. This will help to improve the productivity of garden pea in hilly regions of Uttarakhand and to gain strength in varietal diversification of these areas. Being off-season produce certainly it will also help to improve the socio-economic status of the hill farmers, especially in remote hilly areas.

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