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Nutrition garden: an essential component of diversification for sustainable agriculture

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Abstract

Agriculture sector is facing a serious trouble and new challenges. Increasing pressure of population explosion, decline of profitability in farming, degradation of land and water resources, ecological and environmental imbalances, health hazards, present production pattern, existing cropping system has threaten the sustainability of agricultural growth. In view of these compelling factors diversification in agriculture has becomes the need of the hour. In the present paper the authors from Punjab Agricultural University, Ludhiana advocated a Nutrition garden model of approx. 1500 m^2 area which can help in diversification of agriculture and food security of the people. It was concluded that if all the farming families adopt nutrition garden model in Punjab then 3.97 percent land can be diversified forever. Moreover this much area will be pesticide free, using meager quantity of fertilizers and without any marketing problems.

Keywords: Diversification, food security, health hazards, nutrition garden, pesticides, sustainability

Introduction

Agriculture is soul of the India; economy of each state predominantly depends upon agriculture but, now days this sector is in serious trouble. Punjab state, the torchbearer of green revolution in the country, is currently facing its ill effects. Productivity has achieved its maximum limits and moreover we have not achieved food security despite the huge production of food grains.Food security exists where all people, at all time, have physical and economical access to sufficient safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life.The four pillars of food security are availability, access, utilization and stability. The nutritional dimension is integral to the concept of food security (Anonymous, 2009). Although availability of wheat and rice is in abundance at cheaper prices, but there is shortage of other food items like pulses, vegetables, oilseeds (Chand and Paul, 2003). As a result these are available at high prices. Crop diversification is the only option in conventional cropping system to bridge the gap between increasing demands and supply of cereals, pulses, oilseeds, fibers, fodders etc. and to make balance cropping system with the aim of improvement in soil health and agro-ecosystem.

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Material and Methods

The present study is confined to Punjab state**.** The data pertaining to the land holdings and number of farming families was obtained from the Punjab Agricultural Handbook (2013). There was a total of 10, 58,000 farm families out of which 8, 94,000 own more than 1ha (2.5acre) of land who can easily spare 1500 m^2 area for the suggested nutritional garden model. Number of these families was multiplied by 1500 m^2 area to get the projected area under diversification by means of nutritional garden.

Results and Discussion

Need for Diversification

The need for diversification has arisen due to various alarming factors viz. sharp decline of profitability in farming, degradation of land, water and environment because of present production pattern has reached the levels that threaten the sustainability of agricultural growth, the existing cropping system and technology are of no help in arresting the deteriorating condition of the farmers.

The excess pumping of ground water, imbalanced use of fertilizers, excess use of pesticides, higher energy consumptions and over mechanization has led to the degradation of resources like land and water and has caused environmental and ecological hazards.

Avenues for diversification

There are various avenues which can be explored for diversification in agriculture like intercropping, multiple cropping systems, substitution of wheat by pulses / oilseeds/winter maize, substitution of rice by pulses / oilseeds/cotton, utilization of geo-symbolic commodities like doon basmati and Nagori ashvagandha, diversification through horticultural crops (off season vegetables), high diversity plantation of fruit trees, processing and pest harvest technology, diversification through medicinal and aromatic plants, organic products (Sharma *et al*. (2004)). However, despite the availability of these avenues, practically it is very difficult to switchover to these instantly. Because marketing is the major concern for all these diversification avenues, so we have to suggestthem some practical solution which can fulfill needs of environment, nutritional security and income concerns. In the light of the above mentioned factors and also keeping in view the nutritional intake of rural families, PAU (Punjab Agriculture University), Ludhiana has developed a nutritional garden model.

Nutrition garden as an important component of diversification:

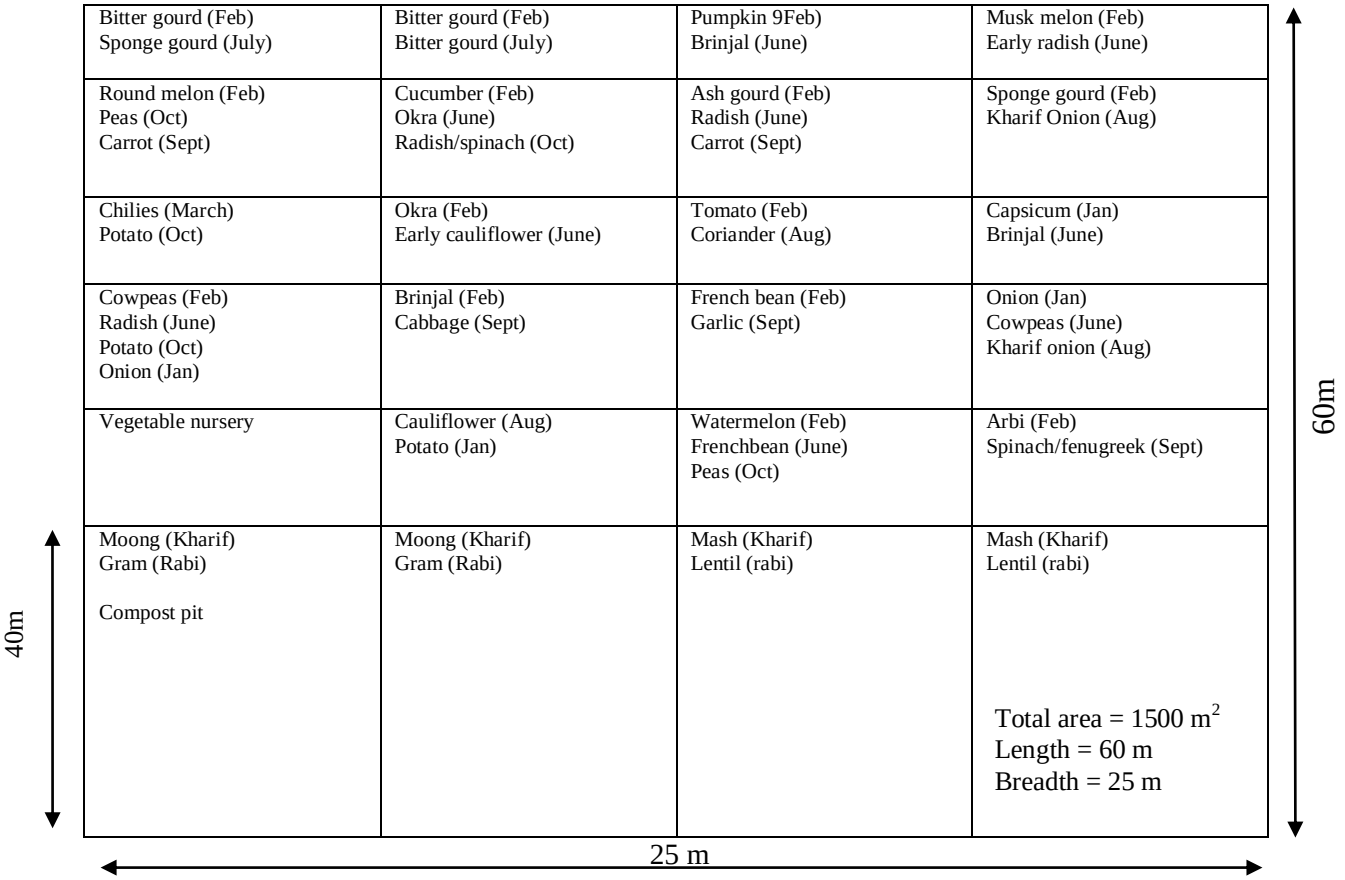
It is recommended that a healthy person should consume 300g vegetables, 85g pulses and 50g fruits per day, whereas in the rural areas there is average consumption of 180g vegetables, 40g pulses and negligible quantity of fruits per person per day (Romana and Singh, 2007). A study cited by Pandher (2006) revealed that half of the number of children below the age of four year was mal nourished and 60 percent women were anemic. This malnutrition can be due to less availability and costliness of pulses and vegetables. Majority of the farmers failed to fulfill their family requirements of pulses and vegetables from their own farm and they have to purchase these from the market. Due to high prices they compromise most of the times with daily consumption. Taking these facts in mind, a model for nutritional garden was suggested by Punjab Agricultural University, Ludhiana in which a total of 1500 sq. m. area was required for nutrition garden (Fig 1). In one third of the required area, vegetables were cultivated and the remaining area was utilized for growing pulses, in the different seasons of the year. Fruit plants were grown around the boundary of the nutrition garden. This model fulfilled the dietary requirements of a family comprised of eight members. If family size is big, then this model can be extended to larger area proportionately. There are 10.58 lakh operational land holdings cultivating the 3996000 ha of land in Punjab (table 1). If all these families adopt this nutrition garden model then 158700 ha land will be diversified. If the marginal farmers who couldn't spare their land for the suggested model of nutrition garden excluded, even then 1, 34,100 ha area can be diversified. But for maintaining health through nutritious food, families who were having less than 1 ha land should also adopt this model by reducing the area according to their ease. However, it is strongly recommended that they should also adopt the model as whole to ensure their nutritional security. So in this way around 158700 ha land will be diversified. Punjab state has a total of 3996000ha land under cultivation (Anonymous, 2013). Nutrition garden become 3.97 percent of the total cultivated area. Hence 3.97 percent area will be diversified forever. Kumar and Singh (2008) worked out the economics of 50 nutrition gardens in Jalandhar district of Punjab and reported that an average income of Rs 25388/- per nutrition garden can be obtained. They further reported that consumption pattern of vegetables and pulses are also changed. Earlier the consumption of vegetables and pulses was 180 g/person/day and 40 g/person/day which had increased to 290 g/person/day and 57 g/person/day respectively. If we look at the average income from the prevalent paddy-wheat rotation in the mentioned area it comes out to be Rs 15858/- from 1500 m^2 area (Singh *et .al*, 2011). In comparison income from nutritional garden is much more. In addition to this, pulses being a leguminous crop improve the soil fertility and will reduce the consumption of fertilizers. Moreover no or very less insecticidal sprays will be taken up, thus reducing the release of toxicants in soil and preventing environmental and health hazards. Precisely, we can say that 158700 ha area will be devoid of pesticide use and also very less quantity of fertilizers will be consumed.

Table: 1 Number of Operational Holdings

Category	Number (000)	Area (000 ha)
Marginal (less than 1 ha)	164	101
Small (1-2 ha)	196	270
Semi-medium (2-4 ha)	327	862
Medium (4-10 ha)	301	1728
Large (10 ha and above)	70	1035
Total	1058	3996

(Anonymous, 2013)

Fig.1: Lay out of nutrition garden model



Evans (2009) reported that less pest and disease, less weeding, less need to irrigate, many types of vegetable in the same place, no space is wasted, vegetables can be harvested over a longer time and high production in a small area were the major benefits from the vegetable gardens. A study revealed that homestead vegetable gardening can play a significant role in improving food security for the resource poor rural households indeveloping country like Bangladesh. Further developed gardening has better performances in terms of calorie intake and economic performances over traditional but the optimal calorie intake with least-cost technology could be a feasible livelihood strategy for resource poor people. The occupation and family size are also positively associated with food security. (Asaduzzaman *et al*, 2011) It was reported that that at all levels, national, household and individual, the amounts of fruits and vegetables available and consumed were about half the recommendations of at least 400g per day.

Evaluation of an intervention which combined production of vitamin A rich crops in home gardens with nutrition education and growth monitoring, showed vitamin A intakes increased above required levels. (Maunder and Meaker, 2007). Savio and Borel (2011) found that Los Angeles County faces enormous challenges related to poverty and hunger. Local food pantries struggle to cope with a demand for food that's risen by 48% in just two years. At the same time, with cheap fast food, and limited access to affordable healthy food such as fruits and vegetables, childhood obesity is an increasingly critical problem. There are many actions that can help to solve these problems, and one simple step is planning a vegetable garden.

Research shows that eating more vegetables improves health, reduces obesity and cuts down on the risk of chronic diseases such as diabetes and cancer. Having a garden helps save on grocery bills when economic times are tough. Gardening with vegetables can be fun and provide delicious and highly nutritious fresh food (Oebker and Call, 2008). Similarly Marsh (1998) reported that home gardening was only one of the possible interventions for enhancing food security for the poor, and it should be considered in the context of a broader national food security strategy. Home gardening has a special role in providing direct access to food through self-reliance rather than dependence on externally supported programmes such as food-for-work, targeted subsidies and supplementation and fortification schemes, none of which can be counted on for sustained support. Robert and Tim (2004) found that home gardens represent an especially useful strategy for promoting sustainable livelihood objectives of the poor, including secure access to land and water, improved financial security, improved leverage in wage bargaining, improved nutrition, improved social status and political status and better access to basic infrastructure. Recent research in the indigenous community of Saraguro, Ecuador, reveal that, the natural history of home gardens mirrors transformations within the family, and that Saraguro women (Ruthbeth and Ross, 2003). The main benefits of vegetable gardening as safe, fresh, nutritious, no pesticide residues in food, better nutrition, better health, better taste, better garden performance, less environmental impact, less dependency on non-renewable resources and food security. (Reynolds, 2008)

Conclusion

Nutrition garden can help in diversification of agriculture and food security of the people. If all the farming families in Punjab adopt nutrition garden model then around 158700 ha, which comes out to be 3.97 percent of the total cultivated land can be diversified besides their food security, as the easy availability of vegetables and pulses increases its consumption. This also enriches the soil and helps in reduction of pesticide use. Marketing is also not a problem here as produce from 1500 m^2 area can be consumed within the family of 8 members. If there is any surplus produce it can be sold within the village or nearby without any labourious efforts. So in the present scenario of agriculture, nutrition garden concept needs more attention of the policy makers, researchers, extension workers and the farmers.

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