

Horticulture and nutrition: Two sides of the coin

'There is a horticultural remedy for every nutritional malady' says Prof. M.S. Swaminathan, the Father of Green Revolution in India. Horticulture forms an integral and important component in the economy of a nation. Horticultural crops constitute a significant segment of the total agricultural production of a country. The importance of horticulture can be substantiated by its benefits like high export value, high per unit area yield, high returns per unit area, best utilization of wasteland, provision of raw materials for industries, whole engagement by a grower/labourer, production of more food energy per unit area than that of field crops, better use of undulating lands, and stabilization of women's empowerment by providing employment opportunities through processing, floriculture, seed production, mushroom cultivation, nursery preparation, etc. In addition, fruits and vegetables constitute the important energy-giving material to the human body. It also improves the economic condition of many farmers, and it has become a means of improving livelihood for many unprivileged classes too. Flower harvesting, nursery maintenance, hybrid seed production and tissue culture, propagation of fruits and flowers, and food processing are highly remunerative employment options for women in rural areas.

Wide range of horticulture

India has been bestowed with wide range of climate and physio-geographical conditions and as such is most suitable for growing various kinds of horticultural crops such as fruits, vegetables, flowers, nuts, spices, medicinal plants, orchids and plantation crops (coconut, cashew nut and cocoa). Horticulture production has increased by 13% in the last five years. This has placed India among the foremost countries in horticulture production, just behind China. During 2015-16, its contribution in the world production of fruits and vegetables was 12.6 and 14%, respectively. Total horticulture production during 2015-16 was 283.3 million tonnes which increased to 320.77 million tonnes in 2019-20 (Table 1). It is projected to be 330 million tonnes by 2021-22. The increased production was because of the farmer-friendly policies of the government, tireless efforts of farmers and research of scientists.

Dietary benefits of fruits and vegetables

How many food groups a person routinely eats can be used as a proxy for the nutritional adequacy of a diet. Eating a variety of fruits and vegetables (Figs. 1 and 2) is key to achieving dietary diversity and meeting daily micronutrient needs.

Eating fruits and vegetables is part of a healthy diet. Fruits and vegetables are not only sources of many

vitamins and minerals, but eating them reduces the risk of diseases. In fact, the World Health Organization has identified low fruit and vegetable intake as a top risk factor for global mortality. Specific fruits or vegetables can be used to target particular nutrient deficiencies, for example, orange-fleshed sweet potatoes have been proven effective for alleviating vitamin A deficiencies. Perhaps more importantly, these whole foods also provide an array of phytonutrients and antioxidants that have a variety of beneficial health impacts. A diet rich in fruits and vegetables provides necessary micronutrients that cannot be found in staple grains, meat or dairy.

Fruits and vegetables, especially, are a good source of fibre, selected minerals, vitamins and antioxidants. Most fruits and vegetables are available almost year-round in a wide variety and they not only taste good, but they also have favourable attributes of texture, colour, flavour and ease of use. They can be fresh, cooked, hot or cold, canned, pickled, frozen or dried. Fruits and vegetables are consumed at all times, and due to their convenient size; they are an excellent between-meal snack. They are relatively low in calories and fat (avocado and olives being the exceptions), they have no cholesterol, they are rich in carbohydrates and fibre, they contain vitamin C and carotene, and some are a good source of vitamin B₆. Fruits and vegetables are relatively low in sodium and high in potassium. Ascorbic acid in fruits and vegetables enhances

the bioavailability of iron in the diet. Because of all these characteristics, fruits and vegetables have a unique role in a healthy diet. A growing body of research has shown that fruits and vegetable consumption is associated with reduced risk of major diseases, and possibly delayed onset of age-related disorders, promoting good health. However, in many cases fruit and vegetable consumption is still below the dietary guideline goal of consuming 5–10 servings each day. The nutritional value of fruits and vegetables depends on their composition, which shows a wide range of variation depending on the species, cultivar and maturity stage. The composition of fruits, vegetables, leafy green leaves and medicinal herbs (Fig. 2, 3 and 4) includes a great number of metabolites however, it could be predicted that no single commodity might be rich in all these constituents.

Trends in horticulture production and present status

The production of fruits has touched at 100 MT, while that of vegetables at about 197 MT (2020-21). It is indeed a matter of accomplishment that horticulture production of the Country has crossed 320 million MT during 2019-20 continuously outpacing food grain production which is 3.7 % higher than the previous year and 13% higher than the past five years' average production (Fig. 1). The spices production has touched at 10 MT (2019-20) and plantation crops at 16.0 MT. India retains its position as the second largest producer of fruits and vegetables globally. The current production of fruits (101 Million MT) and vegetables (197 million MT) not only meet the ICMR EAC 2008 recommended dietary allowance for the country with respect to fruits and vegetables (400 g/person/day) but also the current production is near achievement of projected demand of fruits and vegetables by ICAR in its vision 2030 (110 million MT of fruits and 180 Million MT of vegetables) much in advance. This demonstrates willingness and risk taking entrepreneurship of Indian farmers to accomplish task of production to meet food and nutritional security of the nation. Over a period, it is heartening to note that horticulture sectors' contribution to overall agriculture sector is growing very sharply.

How horticultural crops can improve nutrition

There is no doubt that horticultural crops can improve nutrition. Farmers who grow fruits and vegetables often eat some of what they are growing and they may also have more money to buy food. A tremendous sense has

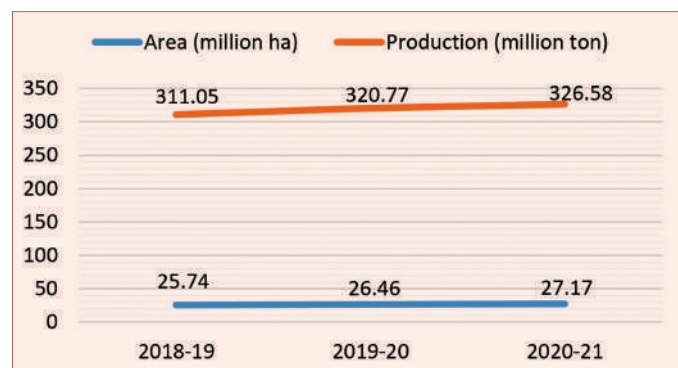


Fig.1. Horticultural production increased with very minor increase in area.

prevailed over a period of time to consume fruits and vegetables to accomplish the dietary requirement. Because fruits and vegetables are high-value crops, farmers who grow them can earn significant income even from small plots and consistently higher prices than those growing cereal crops. That additional income can allow farmers to spend more on food purchases.

Women make up a majority of horticultural farmers in many countries. Because they are often responsible for feeding their households and making nutritional choices, reducing women's workload including time and energy spent growing and selling crops can increase their capacity to provide for their households' nutritional needs. Women are also more likely to spend their available income on improving their families' health. Regions and communities where farmers grow and sell horticultural crops have greater access to fruits and vegetables for purchase. As more fruits and vegetables enter the market, prices may decrease which can make these nutritious crops more available and more enticing to shoppers.

Double burden of malnutrition

As diets shift in developing countries, malnutrition can include both people who are undernourished and people who are overweight. Undernutrition and overnutrition can co-exist, even in the same household. Increasing fruit and vegetable consumption is one of the few dietary strategies that can help improve both situations.

A nutritious and varied diet is a critical means by which good health can be maintained. Consumption of less than 200 g of vegetables per person per day in many countries today is common and this low amount, often in conjunction with poverty and poor medical services, is associated with unacceptable levels of mortality and malnutrition in preschool children and other vulnerable groups. An increase in the availability, affordability and consumption of nutrient-dense vegetables and pulses is one way malnutrition which may be substantially reversed yet nutritional security appears to be less valued than food security by key decision makers, and vegetable crops thus receive inadequate research investment. Opportunities exist for the poor to improve their access to vegetables, particularly if they are willing to grow home gardens. Research continues on defining appropriate nutrient-dense vegetables for such activities, but these efforts may be compromised by failure to adopt good agricultural practices, resulting in contamination and unhealthy produce for producers and consumers. The scientific community is ready to play its role in battling malnutrition and hunger, but unless the political resolve can be found to support the causes of both food and nutritional security together, it is unlikely that the Millennium Development Goals will be achieved in a timely fashion. Redressing the current imbalance in agricultural investment can improve efficiency in food production and ensured-nutritious diets can be a reality for all people.

Food groups

'My Plate for the Day' developed by ICMR-NIN illustrates the proportion of foods from different food groups to be sourced for a 2000 Kcal Indian



Fig. 2. High value fruits for dietary purpose



Fig. 3. High value vegetables for dietary purpose



Fig. 4. High value green leafy vegetables for dietary purpose

diet. It recommends sourcing of macronutrients and micronutrients from minimum of eight food groups per day with vegetables, fruits, green leafy vegetables (Fig. 4), tubers forming essentially half the plate of the recommended foods per day. The other major portion consists of cereals and millets, followed by pulses and milk/curd. Vegetables/tubers (excluding potato) intake should be 350 g, while ideal consumption of fruit and nuts should be 150 g and 20 g per day, respectively.

Diets rich in fruits and vegetables have been shown to reduce the incidence of cardiovascular disease and some chronic and degenerative diseases associated with oxidative stress. The incorporation of fruits and vegetables in the diet may also help eliminate certain toxins. The protective effects have been associated with the presence of antioxidant compounds. Antioxidants are present in all horticultural crops and include ascorbic acid, carotenoids, vitamin E and phenolic compounds, among others.

Food safety

Food safety and quality are also becoming important considerations for consumers. A study done indicates that one-third of food expenditure towards 2050 will be for quality traits. Food safety, especially before sale of produce by the farmers, is not monitored and inspected effectively. Food Safety and Standard Authority of India (FSSAI) which is entrusted with the responsibility of food safety, covers only post-harvest stage of food chain. The need for quality and safety monitoring is equally important in pre-harvest stage.

Transformation to nutrition-sensitive investment

We must look throughout the food system to address the factors that are driving up the cost of nutritious foods. This means supporting food producers especially small-scale producers to get nutritious foods to markets at low cost, making sure people have access to these food markets, and making food supply chains work for vulnerable people from small-scale producers to the billions of consumers whose income is simply insufficient to afford healthy diets.

Whatever recommendations we make or made, once tailored to our context, will help government to reduce the cost of nutritious foods, make healthy diets affordable for everyone and enable vulnerable people working in food systems to earn decent incomes that enhance their own food security. This will set in motion a transformation of existing

food systems that makes them resilient and sustainable. Areas of policy emphasis should include following:

- Rebalancing of agricultural policies,
- Incentives towards more nutrition-sensitive investment,
- Policy actions all along food supply chains, with a focus on nutritious foods for healthy diets, to reduce food losses,
- Create opportunities for vulnerable small-scale producers and others working in food systems, and
- Enhance efficiencies.

There should be nutrition-sensitive social protection policies to increase the purchasing power and affordability of healthy diets including fruits and vegetables by the most vulnerable populations. An enabling environment should also be promoted by policies that, more generally, improve the nutritional quality of the food produced and available on the market, support the marketing of diverse and nutritious food, and provide education and information for fostering individual and social behaviour change towards healthy diets.

Way forward

- A continuous effort to promote research and development structures and alliances to enable innovation within the fruit and vegetable sector, which could reduce food loss and waste.
- Coupling research with conservation of indigenous fruit and vegetables to contribute to improving diet quality by providing nutrient dense foods while supporting climate-change adaptation.
- Encouraging public-private sector collaboration for systematic market approach and consumption, generating new knowledge on fruits and vegetables, and promoting absolute change.
- Adequate distribution and utilization of fresh fruits and vegetables by making supply chain a viable component for furthering dietary control.
- Formulation of food-based dietary guidelines that promote the consumption of fruits and vegetables as part of a diverse and healthy diet.
- Encouraging innovation and investments in the sector to transform fruit and vegetable food systems in ways that could sustainably boost productivity and enable more equitable consumption.
- Use of public procurement policies that promote healthy diets.



farms to consumers. Fruits and vegetables can generate high returns per hectare, making it possible to reduce poverty if the right investment, capacities and services are in place. Improving nutrition across many regions of the globe hinges upon increasing fruits and vegetable intake as key constituents of healthy diets. Increasing consumption could lead to a win-win scenario for the health of both people and the planet if it is accompanied by concerted efforts and investments to increase production and productivity in the sector. At the same time, however, such efforts need to decrease the environmental footprint, improve harvesting, handling, storage and distribution to reduce loss and waste, maintain quality (particularly nutritive) and increase shelf-life, and educate consumers on the health benefits to be derived from increased consumption of fruits and vegetables.

Conclusion

The fruit and vegetable sector plays an important role in providing fresh and nutritious food to consumers around the world, especially in growing towns and cities. The sector generates income not only for producers but also for the actors along the value chain that links

For further interaction, please write to:

Manish Das and A K Singh, Horticultural Science Division, Indian Council of Agricultural Research, Krishi Anusandhan Bhawan-II, New Delhi 110 012, India.

SUSTAINABLE DEVELOPMENT GOALS RELATED TO FRUITS AND VEGETABLES



SDGs 2 3
Health benefits of fruit and vegetables
Harness the goodness

Fruit and vegetables have multiple health benefits. They strengthen the immune system, combat malnutrition and help prevent non-communicable diseases.



SDGs 2 3
Diversified diet and a healthy lifestyle
Live by it, a diverse diet

Adequate amounts of fruit and vegetables should be consumed daily as part of a diversified and healthy diet.



SDGs 2 8 12 13 14 15
Food loss and waste
Respect food from farm to table

Fruit and vegetables are worth more than their price. Maintaining their quality and assuring their safety across the supply chain, from production to consumption, reduces losses and waste and increases their availability for consumption.

Innovate, cultivate, reduce food loss and waste

Innovation, improved technologies and infrastructure are critical to increase the

efficiency and productivity within fruit and vegetable supply chains to reduce loss and waste.

SDGs 1 2 12 15
Sustainable value chains
Foster sustainability

Sustainable and inclusive value chains can help increase production, and help to enhance the availability, safety, affordability and equitable access to fruit and vegetables to foster economic, social, and environmental sustainability.

SDGs 1 2 3 4 5 8 11 12 15
Highlighting the role of family farmers
Growing prosperity

Cultivating fruit and vegetables contributes to a better quality of life for family farmers and their communities. It generates income, creates livelihoods, improves food security and nutrition, and enhances resilience through sustainably managed local resources and increased agrobiodiversity.

Source: Fruit and vegetables – your dietary essentials, FAO background paper, FAO, Rome







