



Nutritional Feasibility through Horticultural Crops

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Horticulture serves as an avenue for sustainable nutrition production, horticultural crops play an important role in overcoming vitamins and minerals deficiency. Nutritional feasibility comprises of production of nutrient enriched fruits, vegetables, medicinal plants and their processed products. India is second largest producer of fruits and vegetable in the world India is currently producing about 334.6mt of horticultural produce, at present productivity of horticultural produce is much more as compared to productivity of food grains but loss of horticultural produce due to insufficient storage capacity measure about 10-40% and loss due to lack of post-harvest processing is also high, post-harvest losses are very high in fruit and vegetable because they are highly perishable due to the presence of high moisture and plant metabolites.

Total storage capacity in India is 300 lakh tonnes and an additional requirement of cold storage is about 370 lakh tonnes for storing of fruit & vegetable & Majority of cold storage is occupied by potatoes. Nutritional sustainability relies on economic viability, social acceptability, and environmental soundness for its success. Also growing horticultural crops of short duration act as a supplement source of income to farmers and also ensure regular supply of fruit and vegetables in the market. Horticultural crops are main component of a healthy nutritional diet. Human body require constituents such as water, carbohydrates, fats, proteins, fibers, minerals, organic acid, pigments, vitamins and antioxidant for efficient working whereas fruit and vegetable are a good source of antioxidant, minerals, fibers, vitamins, water, and proteins etc. Therefore horticultural crops are complete package of a healthy diet to deal with food and nutritional insecurity.

Micronutrients

Micronutrient consist of vitamin and minerals although they are required in small quantity but play an important role in the proper growth and development of the body, and their deficiency causes serious impact on body, health and often lead to life threatening condition. Micronutrient help to produce enzymes, hormones and other substance needed for normal growth and development of human body. Micronutrient deficiency also referred to as hidden hunger. And hidden hunger is silently spreading in whole part of the world because majority of the population are accepting junk food such as pizza, burger, fries, chips and many carbonated beverages as their daily diet which does not contain any beneficial vitamins and minerals. Alone in USA, majority of the population is suffering from obesity due to higher consumption of junk foods.

Consequences of micronutrient deficiency

Everyday more than 6000 children below the age of five die in India, more than half of the death is caused by malnutrition, mainly due to deficiency of protein, vitamin A, iron, iodine,

zinc and folic acid. Malnutrition and lack of micronutrients are affecting the growth of children in their early age which results that every third child in the country is stunted. In a recent study conducted by NFHS-5 it has revealed that situation is getting even more worse. Lack of proper nutrients is a major concern among the population because it reduces working efficiency of humans providing nutrition in an effective way can boost the productivity and reduce down the infant mortality rate

About 57% of preschooler and their mother have subclinical vitamin A deficiency. More the 70% preschool children consume less than 50% RDA of iron, vitamin A, and riboflavin.

Diseases caused by micronutrient deficiency

1. **Goiter:**– Goiter is one of the most prevalent disease caused by deficiency of iodine, deficiency of iodine reduces fertility rate, increase risk of infant mortality, and also causes mental retardation and obesity. Iodine deficiency can be control by consuming banana, cabbage, cauliflower, fish, yogurt etc.
2. **Anemia:**–It refers to reduction of red blood cells due to deficiency of iron, main cause of anemia is inadequate intake of iron, multiple pregnancies and mensuration. Pregnant women and young girls are often prone to anemia, often anemia increases the risk of fetal and maternal mortality. Iron deficiency causes dizziness, reduce overall work profile and causes fatigue. Iron deficiency can be control by consuming dates, fig, pomegranate, apples, spinach, amaranthus, chekurmanis, etc.
3. **Night blindness:**–Vitamin A helps to maintain proper vision, prevent night blindness, fights dry eye and keep skin, lungs & urinary tract healthy. In fruits and vegetable vitamin A is found in the form of carotenoid and in animals it is found in the form of retinol. RDA for vitamin is 900 mg per day. Night blindness can be control by consuming mango, papaya, carrot, broccoli, spinach, etc.
4. **Scurvy:**– Vitamin C improve absorption of non heme iron, vitamin C help in development & and repair of all body tissues, enhance immune system, increase wound healing capacity and avoid scurvy disease. It is one of the important water soluble vitamins which are not synthesized by our body so its need is fulfill through daily diet, RDA for vitamin C is 80 mg per day. Scurvy disease can be control by consuming Barbados cherry, guava, citrus, aonla, strawberry, etc.

Minerals

Our body needs dietary minerals, such as iron, potassium, calcium, magnesium, and sodium to develop and function normally these all comes in the category of macrominerals. And our body also require small amount of trace minerals which comprises of iron, manganese, copper, iodine, zinc, selenium etc. In most cases, a varied and balanced diet will provide the minerals a person needs. If a deficiency persist for a longer period of time, a doctor may recommend supplements. Here are some of the minerals that our body require to function well.

Potassium: It is an electrolyte mineral. It enables the kidneys, the heart, the muscles, and the nerves to work properly. The *2015–2020 Dietary Guidelines for Americans* recommend that adults should consume 4,700 (mg) of potassium each day. Deficiency of potassium lead to high blood pressure, stroke, and kidney stones. Avocados, coconut water, bananas, dried fruit, squash, beans, and lentils are good sources of potassium.

Sodium: Sodium also act as an electrolyte which maintain nerve and muscle function and regulate fluid levels in the body, Deficiency of sodium can lead to Hyponatremia. Symptoms include lethargy, confusion, and fatigue. Whereas excess of sodium can lead to high blood pressure, which increases the risk of cardiovascular disease and stroke. That's why doctors reduces salt in daily diet of a person suffering from high blood pressure. Table salt, which is made up of sodium and chloride, is a popular condiment. However, most people consume too

much sodium, as it already occurs naturally in most foods. Experts urge people not to add table salt to their diet after completing of the cooking process. Current guidelines recommend consuming no more than 2,300 mg of sodium a day, or around one teaspoon. This recommendation includes both naturally-occurring sources, as well as salt a person adds to their food. People with high blood pressure or kidney disease should avoid having salt in their diet

Calcium: The body require calcium to form bones and teeth. It also supports the nervous system, cardiovascular health, and other functions. Deficiency of calcium can cause bones and teeth to weaken. Symptoms of a severe deficiency include tingling in the fingers and changes in heart rhythm, which can be life-threatening. Too much can lead to constipation, kidney stones, and reduced absorption of other minerals. Current guidelines for adults recommend consuming 1,000 mg a day, and 1,200 mg for women aged 51 and over.

Good sources include dairy products, tofu, legumes, and green, leafy vegetables.

Phosphorus: Phosphorus is present in all body cells and contributes to the health of the bones and teeth. Deficiency of phosphorus can lead to bone diseases, affect appetite, muscle strength, and coordination. It can also result in anemia, a higher risk of infection, burning or prickling sensations in the skin, and confusion. Too much in the diet is unlikely to cause health problems though toxicity is possible from supplements, medications, and phosphorus metabolism problems. Adults should aim to consume around 700 mg of phosphorus each day. Good sources include dairy products, salmon, lentils, and cashews.

Magnesium: Magnesium contributes to muscle and nerve function. It helps regulate blood pressure and blood sugar levels, and it enables the body to produce proteins, bone, and DNA. Deficiency of magnesium can eventually lead to weakness, nausea, tiredness, restless legs, sleep conditions, and other symptoms. Excessive magnesium can result in digestive and, eventually, heart problems. Nuts, spinach, and beans are good sources of magnesium. Adult females need 320 mg of magnesium each day, and adult males need 420 mg.

Iron: Iron is crucial for the formation of red blood cells, which carry oxygen to all parts of the body. It also plays a role in forming connective tissue and creating hormones. Deficiency of iron results in anemia, including digestive issues, weakness, and difficulty thinking. Too much can lead to digestive problems, and very high levels can be fatal. Good sources include fortified cereals, beef liver, lentils, spinach, and tofu. Adults need 8 mg of iron a day, but females need 18 mg during their reproductive years.

Some of the essential vitamins and minerals provided by fruits and vegetables

S.N.	Vitamins/Minerals	Fruits	Vegetables	Deficiency
1	Vitamin A	Mango (4800 IU) Papaya (2020 IU)	Bathua (11300 IU) Colocassia (10278 IU)	Night blindness
2	Vitamin B 1	Cashew (630 mg) Walnut (450 mg)	Chilli (0.55)	Beri-beri
3	Vitamin B 2	Bael (1191 mg) Papaya (250 mg)	Radish leaf (0.38)	Riboflavin
4	Vitamin C	Barbados cherry (1000 – 4000 mg) Aonla (600 mg) Guava (300 mg)	Drumstick leaf (220 mg) Coriander leaf (135 mg) Chilli (111 mg)	Scurvy
5	Vitamin E	Avocado (2.07 mg) Mango (1.5 mg)	Spinach (2.03 mg) Kale (1.9 mg)	Sterility
6	Vitamin K	Avocado (50 mg)	Kale (176 mg)	Delayed blood clotting

7	Iron	Dry Karonda (39.1 %) Date (10.6 %)	Amaranthus (22.9 %)	Anemia
8	Calcium	Litchi (0.21 %)	Agathi (1130 mg)	Rickets
9	Phosphorus	Almond (0.49 %)	Amaranthus (800 mg)	Osteomalacia
10	Potassium	Banana (358 mg)	Lima beans (508 mg)	Low blood pressure
11	Magnesium	Banana (27 mg) Avocado (58 mg) Guava (22 mg)	Kale (47 mg) Spinach (79 mg)	Weakness, muscle twitches

Source : National Institute of Nutrition, Hyderabad

Encouraging sustainable production on family farms

Due to rising population demand for food is growing while land and water resource are becoming more scarce, if the societies are to flourish in the long term they must produce sustainably. Productivity growth must be achieved through sustainable intensification by adopting:-

Bio fortified varieties, conserving protecting and enhancing natural resources & ecosystem, growing of iron fortified varieties,

fortification of cereals with folic acid, adopting high yielding varieties and organic fertilizers, use of stress tolerant rootstock, use of degraded land for cultivation on aonla, ber and bael, focus on production of low cost nutrient rich fruits and vegetables so that they are available throughout the year at a reasonable price, focus on multiple cropping system so if one crops fails other crop can mitigate the loss of farmers.



Nutrients enriched diet

Conclusion

There is a widespread poverty, food insecurity and under nutrition population in India. The household level data on calorie intake indicates that the average calorie consumption among the population is declining over the last twenty five 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 spiraling inflation affecting the food prices. Even though with the government effort India is in a row towards achieving food security but stills there is a large population which is suffering from under nutrition and starvation.

Fruits and vegetables are recognized as most important source of micronutrients so consumption of it can play an important role in eradicating micro nutrient deficiency. If we mitigate inadequate supply of fruit and vegetables during off season, lower down their market prices and spread awareness among the population regarding importance of micronutrient consumption we can achieved nutritional security in India and can reduce the cases of infant mortality and malnutrition. Several schemes such as Integrated Child Development Services (ICDS), Mid-Day Meal Programs, National Iron Plus Initiative (NIPI), National Iodine Deficiency Disorder Control Programs (NIDDCP) and National Prophylaxis Programs have launched over the year to overcome the problem of micronutrient deficiency and improve overall health status of the population.