Chapter 1

Introductory Chapter: Quality Vegetable Production and Human Health Benefits

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Additional information is available at the end of the chapter

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1. Introduction

Vegetables are the important sources of vitamins, minerals, and antioxidants providing human health benefits. Regular intake of recommended amount of vegetables leads to sound health. On the contrary, insufficient intake of quality vegetables causes several mineral deficiency disease symptoms. Quality of vegetables greatly depends on the production system and handling procedures after harvest. In this case, hydroponic systems are now popularly used for producing quality vegetables. In these managed culture techniques, plants are grown in water or soilless substrates through artificial supply of plant nutrition. In this chapter, the importance of quality vegetables to human health will be discussed. Use of hydroponic systems and soilless culture techniques for the production of quality vegetables will also be discussed briefly.

2. Human health benefits of quality vegetables

The fresh and edible portions of herbaceous plants are generally termed as vegetables, which are important component of a healthy diet. They are the important source of vitamins and minerals, dietary fibers, and antioxidants. Regular and adequate intake of different kinds of vegetables such as edible roots, stems, leaves, fruits, or seeds helps us maintain good health. On the other hand, reduced consumption of quality vegetables often causes noncommunicable diseases including cardiovascular diseases and certain types of cancer. It is estimated that about 5.2 million deaths reported worldwide were due to inadequate consumption of fruits and vegetables in 2013 [1–3]. Research results recommended increased consumption of fruits and vegetables for the prevention of these chronic diseases [4, 5]. Vegetables contain low

fats, less sugars, and sodium ions, which are the main focus of healthy diets. In this regards, WHO recommended consumption of more than 400 grams of fruits and vegetables per day to maintain good health and also reduce the risk of noncommunicable diseases [6].

Vegetables provide mineral nutrients that are vital for good health and maintenance of our body. Most of the vegetables have low fat and calories, many mineral nutrients including potassium, dietary fiber, folic acid, vitamin A, and vitamin C. Dietary potassium may help to maintain healthy blood pressure. In this case, vegetables such as sweet potatoes, white potatoes, white beans, tomato products, beet greens, soybeans, lima beans, spinach, lentils, and kidney beans are rich in potassium. Dietary fiber from vegetables helps to reduce blood cholesterol levels and to lower risk of cardiovascular disease. Vegetables containing vitamin A keeps eyes and skin healthy and helps to protect against infections, while vitamin C helps heal cuts and wounds and keeps teeth and gums healthy and it aids in iron absorption.

Vegetable rich diets are attributed to overall good health and reduce the risk of cardiovascular diseases including heart attack and stroke [7]. Colored vegetables are reported to play protective roles against certain types of cancer [8, 9]. Dietary fiber from vegetables such as leafy greens reduces the risk of heart diseases, obesity and diabetes mellitus, and metabolic syndromes [10].

In the following chapter, different types of vegetables such as leafy greens, root, bulb and tubers, legumes, stalks, fruit and flower vegetables are discussed along with their role on prevention of diabetes, obesity, metabolic syndrome, cardiovascular disease, and cancer. Preparation and cooking methods greatly affect the nutritional quality of vegetables. Thus, research results on these preparing and cooking methods will be also discussed in another chapter. Health benefits of common fruits and vegetables in the sub-Saharan Africa with their consumption status will be reviewed in one of chapter of this book.

3. Production techniques of quality vegetables

Quality of vegetable greatly depends on the horticultural production systems [11], environmental factors [12], and management practices used [13]. Climatic conditions such as mainly temperature and light intensity have strong influence on the nutritional quality of vegetables. It was reported that, soil type, rootstock used for fruit trees, mulching, irrigation, fertilization, and other cultural practices influence composition and quality attributes of the harvested plant [14]. Hydroponic cultivation technique ensures production of quality vegetables, as in this culture system both plant nutrition and environmental conditions are artificially managed according to the plant need. Growing quality vegetables is easier and safer in hydroponic system compared to conventional soil culture. The great advantages of this system are that plant roots are visible and root zone environment can be easily monitored [15]. In this system of cultivation, yield of vegetable crop can be maximized though efficient use of all resources, and it is believed to be the most intensive form of agricultural enterprises for commercial production of greenhouse vegetables [16–18].

Soilless culture of vegetables uses either inert organic or inorganic substrate through hydroponic nutrient application. This culture technique has also been reported to practice in the greenhouse as an alternative to conventional filed cultivation of many high-value vegetable crops [19–21].

Under these protected cultivation system, weather factors, amount and composition of nutrient solution, and also the growing medium can be managed successfully. Thus, quality of vegetable crops grown through soilless culture improves significantly compared to conventional soil culture [22, 23]. Many other researchers found better taste, uniformity, color, texture, and higher nutritional value in fruits grown in soilless culture than in soil cultivation methods [24–26].

In this book, nutritional quality and bioactive compounds in freshly grown vegetable through hydroponics will be discussed in detail. Moreover, influence of different soilless substrates on the growth, quality, and yield of Slovenian sweet potato cultivar will also be presented. In the sea, there are abundant sources of green algae that can be included in the dietary menu as it is rich in minerals. The final chapter will describe the methods of sea vegetables utilization in the food formulation.

4. Conclusion

Sufficient consumption of quality vegetables can reduce the risk of several noncommunicable diseases such as cardiovascular disease, cancers, diabetes, obesity, and metabolic syndromes. Inclusion of vegetables in the dietary constituents indicates healthy life. Vegetables provides greater amount of dietary fiber, vitamins, minerals, and also phytochemicals or antioxidants. In this regards, hydroponics and soilless culture can produce higher quality of vegetables compared to traditional soil culture techniques. It is evident that, nutrition-related health problems are increasing drastically in the world. Therefore, production of quality vegetables and their sufficient consumption should be given priority for human health promotion.

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