

## POTENTIAL OF HORTICULTURAL CROPS TO ENSURE FOOD SECURITY IN PAKISTAN

Saba Hameed<sup>1</sup> • Muhammad Azher Nawaz<sup>\*1,2</sup> • Waqar Ahmed<sup>3</sup> • Amber Shehzadi<sup>2</sup> • Fiaz Hussain<sup>2</sup> • Nigarish Munir<sup>4</sup> • Muhammad Nawaz Khan<sup>5</sup> • Faisal Hayat<sup>6</sup>

### AUTHOR'S AFFILIATION

<sup>1</sup>College of Horticulture and Forestry Sciences, Huazhong Agricultural University, Wuhan, 430070, PR China

<sup>2</sup>University College of Agriculture, University of Sargodha, Sargodha, Pakistan

<sup>3</sup>Sector Advisor Horticulture, USAID, Lahore, Pakistan

<sup>4</sup>College of Horticulture, Fujian Agriculture and Forestry University, China

<sup>5</sup>Citrus Research Institute, Sargodha, Pakistan

<sup>6</sup>Department of Pomology, College of Agronomy and Biotechnology, China Agriculture University, Beijing, China

\*Corresponding author's e-mail: azher490@hotmail.com

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### ABSTRACT

**Background** The concept of food security is prevalent wherever there is sufficient availability and public access to hygienic and nutritious food to fulfill the nutritional requirement of the population, facilitating active and vigorous lifestyle. In developing countries like Pakistan, food security is an important concern to feed the ever increasing population. The current population of the country is more than 180 million, with an annual growth rate of three percent, so the food requirement is ever increasing. Food security analysis (FSA) of Pakistan shows an alarming situation that the residents of 56 districts have extremely food concerns. The staple food of Pakistan comes from cereals, especially wheat; but at the same time the importance of horticultural crops like fruits and particularly vegetables cannot be denied to ensure food security and to overcome malnutrition problems. Currently, only six percent of total cultivated area (22 million hectare) is utilized for horticultural crops, and it needs to be increased. Horticultural crops, like vegetables are considered a cheaper source of natural supplementary food. Moreover, fruits and vegetables are rich source of carbohydrates, proteins, vitamins (A, C, E, K), minerals (Ca, Mg, K, Na, Fe), fats, dietary fiber and water, so they can be used to ensure daily dietary needs, food security and to overcome malnutrition issues.

**Conclusion** It is concluded that the nutritional importance, high yield potential, short duration crop cycle, diversity in crops and varieties, suitability to protected cultivation system, home gardening, urban agriculture and vertical farming makes the vegetables cultivation a powerful tool to ensure food security, to improve the environmental conditions and at the same time these can also be exploited to uplift the economic status of small farmers.

### INTRODUCTION

Food security is frequently elucidated in term of food availability but its four basic parts are food availability, access, utilization and stability. Food security is the condition when the entire population possesses continuous economic, social and physical access to adequate, nutritious and hygienic food which fulfills their nutritional requirements to facilitate an active lifestyle. Development and poverty elevation can occur by ensuring sufficient security of food over the entire demographic spectrums; individual, household, national, regional and global levels (FAO, 2004). In developing countries like Pakistan, food security is an important concern. The country possesses the 6<sup>th</sup> largest population in the world, with current population of more than 180 million, with an

annual growth rate of three percent. Resultantly, food requirements are ever increasing (World Population Prospect 2015). According to World Food Programme more than 48 percent of total population is food insecure. FATA observes the greatest volume of food insecurity (67.7 percent) closely followed by Baluchistan and Khyber Pakhtunkhwa, exhibiting 61.2 and 56.2 percent, respectively (Abid et al. 2009). Integrated Food Security Phase Classification (IPC) assessment conducted during October-December 2014 discovered severe food insecurity in 10 districts, warranting emergency initiatives, while 28 other districts exhibited crises level food insecurity. The drought situation observed in the Thar region of Sindh has also exhibited substantial food insecurity. Similarly, food security analysis (FSA) of Pakistan shows an alarming situation that the residents of 56

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districts have extremely low access to food. Most affected districts in Sindh: Tharparkar, Dadu, Jamshoro, Sanghar, Umerkot, Badin, Kashmore; in FATA: Mohmand Agency, Khyber Agency, FR, DI Khan, FR Tank, South Waziristan Agency, North Waziristan Agency, Orakzai Agency, FR Kohat; in Balochistan: Musakhel, Kohlu, Kacchi, Kalat, Nushki, Kharan, Washuk, Panjgur, Awaran, Lasbella, Jaffarabad Chaghai and Dera Bugti; in Khyber Pakhtunkhwa: Kohistan, Hangu, Tank Tor Ghar; in Azad Jammu and Kashmir: Neelum, Haveli, Sudhnoti and in Gilgit Baltistan Ghanche and Astore (Pakistan Food Security Bulletin 2015).

In Pakistan, wheat is a staple food. It alone constitutes nearly 50% of the nutritional consumption of most households. In 2015, wheat production was 25.6 million tons (MT), less than its demands (Pakistan Food Security Bulletin 2015). Food uptake for dietary energy of a person can be known by classifying foodstuff in 10 groups; wheat and its flour, rice, pulses, various cereals, vegetables and fruits, milk and products derived from milk, inclusive of butter and desi ghee, meat (beef, mutton, fish and poultry), edible oil, sugars and different sweeteners and miscellaneous food items (tea, condiments and spices, etc.).

WHO recommended dietary energy is 2350 calories per capita per day for adult while in Pakistan it is 2100 cal per capita per day (Food Consumption Table for Pakistan (FCTP) 2001). Wheat is used as main source of dietary energy while fruit and vegetable consumption is very low. Daily per capital intake of fruit and vegetable is 100 grams while WHO recommendation is 400 grams per capita per day (FAO/WHO 2004). Currently, the nutritional intake of Pakistani diet is poorly balanced. Primarily, the diet is constituted by cereals. The average Pakistan consumes roughly 375 gram cereals, supplemented by a mere 100 gram of vegetables and fruits on daily basis. It has been suggested by nutritionists to maintain uptake of minimum 150 grams of root vegetables and minimum 200 grams of leaf-based vegetables for effective nourishment (FAO 1998). Therefore, to improve our nutrition, we must increase vegetables and fruits consumption.

Poor vegetable and fruit intake causes many nutritional deficiencies like vitamin A, zinc and iron deficiencies, leading to higher prevalence of anemia especially in women and children. It leads to a situation called malnutrition, which translates to insufficient nutritional consumption, triggered through insufficient food consumption, consumption of unhygienic or non-diverse foods (FAO 2004). Pakistan has been observed to have high malnutrition. Almost a quarter of the population in this low income, and largely populated nation has insufficient means to

fulfill daily nutritional quotas (2,350 calories per day) of an individual. Malnutrition is considered amongst the leading cause for under-five mortality (137 for 1000 births) through accounting for over 35% of those fatalities (United Nation Children's Fund 2012). Malnutrition among women is over 47%. Women facing malnutrition are at higher risk of delivering underweight or anemic children (infants weighing lesser than 2.5 kg), these children have substantially (five times) increased vulnerability to fatal diseases and conditions within the first five years of life, and subsequently greater vulnerability to experiencing growth retardation. In Pakistan 33.3% children are underweight and 46.3 % have stunted growth, so child malnutrition results in child mortality and disability. Sindh has reported the greater number of children with malnutrition (under five year of age) (National Nutritional Survey 2011).

There are several reasons of malnutrition, during which the intake of nutritional food is insufficient, particularly fruits and vegetables. The mean caloric intake is lesser than the suggested volume and often uneven with regards to the intake of micronutrients. Wheat counts amongst the primary caloric source contain carbohydrate and fiber. Fruits and vegetables are good source of micronutrients, so they should be used more in daily diet. Poverty and insufficient resources over the household level to sustain the minimal daily intake of necessary consumption of nutrition and insufficient public knowledge regarding adequate diet and sustaining decent health are the possible reasons (Pakistan Rural Household Panel Survey 2014).

Horticultural crops constitute a fundamental section of a recommendable diet but their less use in daily diet may be due to less production in the country while vegetables are the sustainable solution for a diverse and balanced diet. At present, more than 70% of the population is somehow directly or indirectly involved with the agriculture industry over an area of 22 million hectares. Out of total cultivated area in Pakistan only 6% is under horticultural crops, 3.5% fruits, 2.0% vegetables and 0.5% ornamental plants. Out of the total area planted to vegetables; 17% is under potatoes, 15% under chilies, 12% under onions and rest of area under 30 different kinds of vegetables. Increased pressure on cash crops (wheat, rice, maize, sugarcane and cotton) has limited the area under vegetable. It is about 6 million hectares which is 3.1% of total cropped area under cultivation. Most of farmers are small land holder, less than five hectares. The number of these small farms has increased three fold since 1960, and small farms have limited diversification in agricultural crops (Agricultural Census of Pakistan 2010; Figure 1).

***Dietary importance of horticultural crops***

Horticultural crops (fruits and vegetables) yield colorful, flavored, diverse, low caloric, tasty and nutritionally-rich nourishment. Vegetables are the most inexpensive and effective vitamin sources. The vegetable-based foods enhance appetite; have great taste, high vitamins and dietary fiber contents, which results in enhanced digestion (Sandeep et al. 2013).

A fundamental role is fulfilled by vegetables regarding the neutralization of acids developed during the processing of fatty foods, and yields considerable roughages that facilitate transition of food through the intestines. Vegetables are excellent carbohydrate sources (potato, garlic, onion, fenugreek and leguminous vegetables), proteins (garlic, beans, peas and leafy vegetables), vitamin A (leafy vegetables, tomato, and carrot), vitamin B (tomato, garlic and peas), Vitamin C (radish leaves, leafy vegetables, cole crops, drumstick leaves and green chilies), minerals (drumstick pods and leafy vegetables). Moreover, a large number of vegetable crops possess substantial medicinal value for their capability to aid in the mitigation of certain diseases. For example, onion and garlic have been discovered to possess antibacterial characteristics. Several cucurbitaceous and *solanaceous* vegetables have also been discovered to hold vitamin D reserves (FAO/WHO 2004).

**Table1** Pakistan’s food basket based on 2100 calories

<b>Food items</b>	<b>Quantity (grams)</b>
Wheat(Flour)	300
Rice	60
Other Cereals	15
Pulses	30
Meat Products	40
Dairy Products	150
Fats	30
Sugar	50
Fruits and Vegetables	100

Source: FCTP (2001)

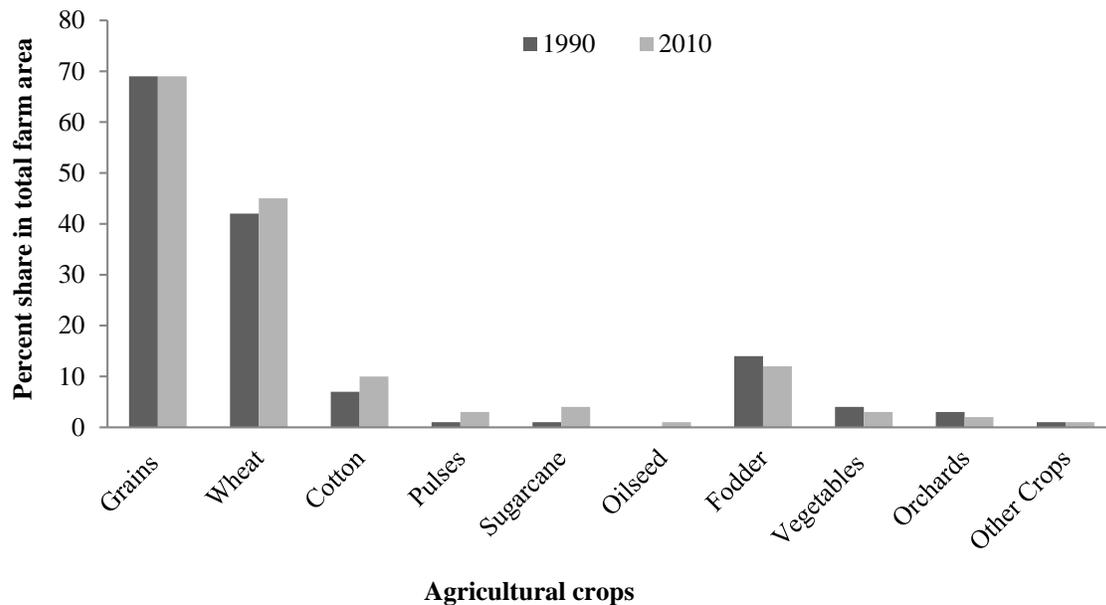
***Horticultural crops and food security***

Although food production is increasing to some extent. It is necessary to maintain enhanced production along with the nutritional standard of people. The standard can be improved through increasing vegetable production that will yield considerable support in mitigated food issues given that vegetable crops provide 4 to 10 times more product compared to cereals. Therefore, vegetables fulfill a considerable purpose towards the food front, given that they are the most inexpensive source of wholesome food, and therefore exhibit the potential to fulfill the food demand of Pakistan. Taking the fertility of Pakistani

soil into account, farmers are permitted to grow substantial volume of products throughout the year, allowing them to raise sufficient product sold at attractive prices, therefore allowing them maintain themselves financially. It takes little time to grow sufficient volume of vegetables and can be utilized as intercrops. The soil fertility will also be enhanced through the growth of vegetables; moreover, the grown produce will also provide feed for farm animals. Therefore, farmers are made available with a wide assortment of possible crops to grow, allowing them to adjust to different crops according to the demand. The soil and natural climate of Pakistan is attractive for the development of agriculture industry, facilitating the growth of a diverse range of crops. Given that vegetable cultivation requires considerable labor, beginning from initial sowing to harvesting and marketing, it acts as a consistent source of employment, especially in the rural regions. The yields of vegetables are higher compared to cereal and other agronomic crops. Generally, vegetables provide five to ten times more produce compared to cereals, while also growing over a quick basis, with lucrative returns and sustainability of growth. Thus, it is safe to suggest that vegetable cultivation should be increased (Adel 2001).

In home or kitchen gardening, vegetables, fruits and herbs are extensively cultivated for domestic use, whereas some larger plots are utilized for the production of a wide assortment of vegetables based on the season. Local produce, for example, broad leaf mustard, radish, pumpkins, chili and beans can be grown inside any household for facilitating fresh and nutritious vegetables for use in homes, sparing the owners from purchasing these products from the markets. Gardens can be used for throwing organic waste, allowing the soil to become more fertile and nutritious. It is also possible to utilize the unused space around the household for the production of vegetables. The primary objective of this sort of farming is to yield fresh crops to the household on daily basis, facilitating the mitigation of malnutrition (Farooq 2015). Similarly, urban regions have little space for the growth of vegetables; however, roof and terraces can facilitate the growth of product through small and large crop pots. Vegetable forcing is another unique procedure of growing vegetable inside urban structures, cellars, greenhouses, cold farms and other simulated settings. It is considered to be amongst the most intensive form of vegetable cultivation. These procedures provide increased yields, especially for products that grow quickly and inside small containers (Padmanabhan and Sreedaya 2004).

Vertical farming is a major constituent of the urban agriculture field, the process of cultivating vegetables on the vertical surfaces, containers or



**Figure 1** Limited diversification in crops on farm less than five hectares (Agriculture Census of Pakistan 1990-2010)

integration with other structures. Controlled environment agriculture technology is used extensively by this modern farming incarnation, under which all necessary environmental characteristics can be directly administered. The facilities make use of computer controlled lighting, climate administration (gas volumes, temperature, and humidity) fertigation. A few of these farms utilizes procedures identical to glass houses, under which natural light derived out of sun can be supplemented with artificial lighting and metal reflectors (Dickson 2009). All the above mentioned methods and techniques can be used by the farmers and the general public to produce vegetable not only for personal use but also can be implemented on commercial scale to extend the availability of vegetables in the market to ensure food security.

**CONCLUSION**

Increased production of fruits and vegetables will reduce load on cereal crops. It will uplift the economic status of small farmer through direct and indirect employment; by reducing the expenditures on food crops. Additionally, it will also reduce environmental pollution. Produce can be stored for extended periods after harvest. Native vegetables are often more hardy, drought-tolerant and resistant to pests and diseases than non-natives, making them a more resilient option for vulnerable, small-scale farmers. There is a reduced need for irrigation and expensive chemicals, making

them even more accessible to the poorest farmers. Vegetables and fruits cultivation at small and commercial levels is a powerful tool to ensure food security, to improve the environmental conditions and at the same time these can also be exploited to uplift the economic status of small farmers throughout the country, therefore it is suggested that in our country a “revolution of greens” should be launched.

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