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Effect of environmental factors on vegetables production

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Abstract
Vegetables are one of the good sources of vitamins and minerals and play important role in ensuring food and nutritional security. The main purpose of this study is to explore the effects of soil and environment on vegetable production. It also explores the factors of soil and environment responsible for yield variation of vegetables. This study is which uses a number of secondary sources including journal articles, books, scientific magazines, statistical data and internet sources. This study reveals that there is a great impact of soil and environment on vegetable production. It also explores that a number of soil factors like soil type, soil pH, soil fertility, and soil salinity and environmental factors like light, temperature, humidity, drought and flooding are accountable for the variation of the yield of vegetable production. This article suggests that a consciousness and knowledge dissemination is necessary to the farmer's level about the effects of soil and environmental factors for maximum yield of vegetables.

Keywords: Soil, environment, vegetables, production, soil factor, yield

Introduction
Soil and environment is the major part of vegetable production. Vegetables need good soil and environment for better production (Charrier *et al*. 2015) [4]. Vegetable produce in winter but all over the season vegetables can grow. In vegetables, production depends on soil and environment (Comas *et al*. 2010) [5]. Soil pH, soil moisture, soil humidity, soil texture, and soil fertility are the needs for good vegetables (Hartz, 2006) [7]. Excluding temperature, rainfall, humidity, and light intensity are also need for vegetable production. Mainly vegetable production depends on the environment. Soil and environment are good for better potato production. Maximum Cole crop grown in the north part of our country because of the environment is better for Cole vegetable production. Saline soil is not suitable for vegetable production. The vegetable cannot tolerant high rainfall, saline soil, and high temperature. Humidity and temperatures in this season are higher than the winter season. Flood decreases the production area in summer seasons (Sarker, 2016) [15]. Vegetable forms a group of specialized crops. They are essential economically and from a health point of view. They fit well in most farming systems as their maturity period from planting to harvest is short (Ben Said *et al*. 2015) [2]. With the ever-increasing human population, vegetables have played an important role in our national economy (Prodhan *et al*. 2017) [12]. Vegetables provide maximum output and more income per unit area of land to small-scale farmers, particularly when compared to cereals (Bisbis *et al*. 2018) [3]. During summer, vegetable production is affected by the flood, cyclones, and other factors associated with high temperature, humidity and rainfall (Charrier *et al*. 2015) [4]. If farmers use these technologies then internal requirement will be met up even we can export some vegetables abroad. The most important vegetables are winter vegetables. Relations of soil and environment conditions are essential for vegetable productions. Different types of soil present in our country in the different region (Sarker *et al*. 2007) [14]. Winter season also called Rabi seasons. Rabi season start from October and last week of April. In this season, temperature varies from 10 to 21 °C. The main purpose of this study is to explore the responsible factors of soil and environment for yield variation of vegetables.

Environmental factors
Light, temperature, water, and soil–greatly impact plant growth and geographic distribution. These factors determine the suitability of a crop for a particular location, cropping pattern, management practices, and levels of inputs needed (Yang *et al*. 2016) [18]. A crop is least costly to produce if it is grown under the most favourable environmental conditions. To maximize the production of any crop, it is important to understand how these environmental factors affect plant growth and development (Sanker *et al*. 2017). Light Sunlight is essential for any crop. Dry matter production often increases in direct proportion to increasing amounts of light

(Ali *et al*. 2015) [1]. The amount of sunlight expected by plants in a particular region is affected by the intensity of the incoming light and the day length.

Effects of temperature

Temperature impacts photosynthesis, water and nutrient absorption, transpiration, respiration, and enzyme activity. These factors manage germination, flowering, pollen viability, fruit set, rates of maturation and senescence, yield, quality, harvest duration, and shelf life (Montri and Biernbaum, 2009) [11]. Different plants have not the same temperature requirements. Depending on the situation and the specific crop, ambient temperatures higher or lower than the effective growth range will reduce growth and delay development, and decrease yield and quality. The extremes may be considered killing frosts at about 0 ºC and death by heat and desiccation at about 40 ºC.

Table 1: Temperature Requirement for Different Crops

Crops	Temperature Range
Tomato	21-24 ˚C
Cauliflower	15-25 ˚C
Brinjal	21-27 ˚C
Chilli	20-30 ˚C
Knol- Khol	15-25 ˚C

Table 2: Some abiotic stress tolerant varieties of vegetable crops

Crops	Varieties	Characteristics
Tomato	Arka Vikas	Drought tolerant
Onion	Arka Kalyan	Drought tolerant
Chilli	Arka Lohit	Drought tolerant
Tomato	Punjab Tropic	High temperature tolerant
Dolichos	Arka Jay Arka Vijay Arka Sambram Arka Amogh Arka Soumya	Photoinsensitive
Cowpea	Arka Garima Arka Suman Arka Samrudhi	Photoinsensitive

***Source*:** Hazra and Som (1999) and Rai and Yadav (2005)

Effects of light

The light intensity variations with elevation, latitude and season, as well as other factors such as clouds, dust, smoke or fog. The total amount of light received by a crop plant is also affected by cropping systems and crop density (Sharmin, 2015) [16]. Different plants differ in their light requirements. Sunlight is essential for any crop. Dry matter production often increases in direct proportion to increasing amounts of light (Haider *et al*. 2015) [6] The amount of sunlight received by plants in a particular region is affected by the intensity of the incoming light and the day length (Liang *et al*. 2018) [18]. Plants will produce an edible crop when grown in a shady location. However, these plants need at least 50-80% of full sun and plants thrive in 30- 50% of full sun but weaken in full sun. Shading sometimes is used to prevent pigment development in crops in which the lack of colour is an important quality factor. Due to the slope of the earth's axis and its travel around the sun, the day length varies with season and latitude. Photoperiod controls flowering or the development of storage organs in some species.

Humidity

Plants are always adjusting their leaf stomatal opening based on the VPD and the humidity in the air. High humidity is a problem because water usage by the plant is too slow and hindrance qualities even though the stomates are constantly open. Plants transpire the humidity around saturates leaves with water vapour. When humidity is too high or there is lack of air circulation a plant cannot make water evaporate or pull nutrients from soil. When this occure for a prolonged period a plant eventually rots. If the air is excessively dry and the plant is wilting the stomatal opening close, thereby reducing photosynthetic activity and ultimately plant growth. As your plant start flowering you can gradually decreases the humidity level. In this stage the roots are very mature, so the plant is able to take in the most nutrients and water. The ideal humidity depends on the growth or flowering stage in which the plant is situated.

Effects of water

Water is absolutely essential for vegetables. Vegetables can be grown according to their natural habitats with respect to water supply like Hydrophytes are plants that are improved to living in water or in soil saturated with water. The hydrophytes have large interconnected intercellular gas-filled spaces in their root and shoot tissues to facilitate air exchange. Mesophytes are the most common plants that are adapted to neither a long wet nor a long dry environment. Depending on the extension of their root systems and other plant features, however, their water requirement varies (Lam *et al*. 2018) [9]. Xerophytes is plants that can endure relatively long periods of drought. The xerophytes usually have special features such as reduced permeability to decrease water loss, swollen tissues to conserve water, or deep and extensive root systems to acquire water. Water is crucial for vegetable productivity and quality. Water needs of a plant include the water the crop uses by itself and also the losses due to evapotranspiration, water supply, land management, and water leaching at the time of the crop growth period.

Effects of drought

Drought is a period without required rainfall or soil moisture. It generally happens when the water content of the soil is fewer than 50% of field capacity. The main indicators of drought are wilting, fatigued, twisting of leaves or browning of shoot tips. Mesophytes, there is a variation of the influence of drought stress like the species, variety, extent and existing time, and the growth of vegetable.

Effects of flooding

Flooding arises when water enters soil sooner than its drainage out. Heavy rainfall, overflow of the river, enhancing run-off, extended irrigation, and poor drainage cause flooding in lowland regions (Kristiansen *et al*. 2017) [18]. Under waterlogged conditions, the plant cannot be grown as a regular basis due to delay respiration. Oxygen deficiency in the soil causes poor growth or the death of the plant. The extent of flooding damage depends upon the species or variety, stage of vegetable development, and the type of microorganisms' attendance. High temperatures usually accelerate the damaging effects.

Effects of soil factors

The soil is an important medium which supplies mineral nutrients and moisture for growth of the plant. It includes water, organic matter, mineral, and air. These elements actually show soil properties such as soil type, soil pH, and fertility (Xie *et al*. 2016) [17]. Summer season vegetable productions are less than winter. Winter season produce more

vegetables. Average production of vegetables is depending on the environment. Winter season is favourable for vegetable production.

Effects of soil pH

Soil pH is a measure of the soil acidity or alkalinity, and it disturbs the vegetables indirectly by influencing the availability of nutrients and the activity of microorganisms. Nutrients are maximum available at pH level between 6.5 and 7.5. Nutrients in the soil may be chemically tight up or bound to soil particles and unavailable to plants if the pH is outside this range. Individual vegetables have pH preferences and grow best if planted in soils that fulfill their pH requirements.

Effects of soil fertility

Soil fertility is the inherent capacity of the soil to provide nutrients in adequate amounts and in proper balance for the growth of specific vegetables. A fertile soil is usually rich in nitrogen, phosphorus, and potassium, and contains sufficient trace elements and soil organic matter that develops soil structure and soil moisture retention.

Conclusions

This study explores the soil and environmental conditions around the globe and searches literature according to the purpose of the study. The aim of this research is to explore the responsible factors of soil and environment for yield variation of vegetables. It reveals that there is a great impact of soil and environment on vegetable productions. Though fertilization has a great impact on vegetable production at a certain level but a number of soil factors such as soil type, soil pH, and soil salinity and environmental factors such as light, temperature, humidity, drought and flooding are responsible for the variation of the yield of vegetable production. Awareness and knowledge dissemination about the effects of soil and environmental factors at the farmers level is necessary for maximum yield of vegetables.

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