

Ecofriendly Management of Tea Diseases in Current Scenario of Climate Change

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Tea, *Camellia sinensis* (L.) O. Kuntze has been domesticated and grown for nearly two centuries, but the place of origin of tea plant is still a matter of speculation. The natural home of tea plant is considered to be the fan-shaped area included between the Nagaland, Manipur and Lushai (Mizoram) hills along the Assam-Burma (Myanmar) frontier to the West.

The tea plant requires a warm and humid climate. Climate influences yield, crop distribution and quality. Suitability of climatic condition of a place is very important before cultivating tea in a new area. Distribution of rainfall matters a lot for sustained productivity of tea throughout the season since adequate rainfall during winter and early spring is crucial for high yield. In general the ambient temperature with 13°C and 28-32°C is conducive for the growth of tea.

According to FAO, world tea production reached over 4.73 million tonnes in 2008. The largest producers of tea are China, India, Kenya, Sri Lanka and Turkey of which India's production in 2008 was almost 8,05,180 tonnes. In 2007, the largest producer and consumer of black tea in the world was India. The same country had earned the pride of the second largest exporter in 2007 with an export of 1, 93,459 tonnes, which was 24.4% of total global tea production by the country. In India, the major part of the produce is concentrating towards the North-Eastern part including Assam, Manipur, Meghalaya, Mizoram, Tripura, Nagaland and Arunachal Pradesh, which are the traditional areas for tea plantation and considered to be the best place for tea cultivation. Assam is the only region with native tea plants in India and second in the world after southern region of China. Assam is well known for its black tea, produced from large leaves of tea plants. The great Brahmaputra river side of this

region is considered to be the world's largest tea-growing area of 312,210 hectare with a production of 507 million kg. The favourable tropical climate with a high downfall during the monsoon of Assam gives a unique feature to its tea, a malty taste for which this tea is well known in the world. In Assam, there are 765 tea estates, more than 100,000 smaller gardens that together produce 570 million kg of tea annually, which is about 13% of global tea production. Recent publication also showed that there are 77 numbers of organic tea garden in Assam which increased by 24 numbers over 2007 with a percentage growth of 45.25%. Similarly, in 2007 the total area under organic tea was 10,208 ha and it reached to 15,726 ha in 2013 with percentage growth of 54.05% along with total production of 11.09 mkg with a percentage growth increase of 45.15 over 2007 (7.64 mkg) (Anonymous 2015).

Impact of Climate Change on Tea Production

Production and emission of green house gases in Earth's atmosphere leads to warmer environment. This warmer environment, more particularly temperature causes major environmental changes throughout the world because temperature is interrelated to the Earth's global climatic systems. Floods, droughts, frosts, hailstones and destructive storms etc., are the main impact of rise in weather related incidents, extinction of immeasurable flora and fauna; loss of farming harvests in susceptible areas; shifting of cultivating time; melting of glaciers; interruption of water supplies; increase of infectious diseases; change in mean sea levels etc. Agricultural sector is one of the important sector mostly affected by climate change is this may be due to the fact that all the agricultural activities is dependent on steadiness of environmental parameter in terms of supply of water, environmental temperatures, nutritional status of soil and occurrence of biotic factors. In countries like India, where populations have a lower resilience to climate change impacts due to limited financial and technical resources to support adaptation will face a big challenge in the coming days.

Tea is a very delicate perennial plant, sensitive to changes in temperature and precipitation. In the last 60 years in Assam, a primary tea-growing region in India, rainfall has fallen by more than a fifth and minimum temperatures have risen by one degree to 19.5°C. In tea industry, to get more productivity and to curb the rising biotic stresses that are increasing due to climate change demand for pesticides in increasing year after year. The increased pesticides along with increased use of fertilizers as well as building and maintaining irrigation systems, shade trees have significantly increased the cost of production.

Moreover, the indiscriminate use of pesticides leads to resurgence of pests and diseases. The issues that are to addressed with immediate effect are, like soil erosion caused by unpredictable and uncharacteristic heavy rainfall, increased use of critical input like fertilizer to maintain the soil fertility but it also changing the environment of rhizosphere, indiscriminate use of pesticides against emerging and remerging pest and diseases that leads to sudden decrease of natural enemies like parasite, predators,

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