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Different aspects of coffee plantation with resistance to climatic conditions

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DESCRIPTION

Coffee is the most popular beverage consumed by about one third of a world's population. The world coffee trade is based on his two varieties of coffee such as Arabica coffee and Robusta he coffee, which account for 99% of the world's coffee production. The plant is grown in about 80 tropical countries and it is estimated that about 25 million households worldwide are coffee growers, mainly smallholder farmers and families whose livelihoods depend heavily on the plant. Coffee production contributes significantly to Latin America's agricultural Gross Domestic Product (GDP) and export earnings. Coffee is known for its high quality and as a crop, has a direct impact on the country's socioeconomic development and accounting of the country's GDP. Meanwhile, thousands of people are involved in related processes such as harvesting, processing and marketing.

Intensification of extreme events in global warming scenarios will affect the quantity and quality of harvestable crops in current production areas, threatening the sustainability of agricultural production on a global scale. Coffee is no exception. Coffee is considered sensitive to climate, especially temperature. The impact of climate change on coffee production was analysed for major growing regions. General projections point to up to 88% less productive land by 2050, leaving most coffee producing countries without suitable land. Reduced yields, poor bean quality and even increased disease pressure have already been mentioned as major sources of economic losses and attributed to the inherent sensitivity of coffee physiology to changes in CO_2. Coffee, which is derived from the shade undergrowth of North African forests, is considered a shade plant, and such temperature sensitivity is to be expected.

Common strategies adopted by growers to adapt coffee crops to changing climatic conditions include introducing new cultivars, changing field layouts, and using canopy top vegetation for shade. The use of new genotypes is challenging as they must be productive without neglecting quality parameters and exhibit stability in all environments. On the other hand, traditional shading is probably better because shading mitigates microclimate and temperature fluctuations. Shading improves WUE because it modulates stomatal conductivity, protects the soil from direct sunlight, and lowers soil temperature and moisture evaporation. Although this may affect fruit yield, shade maintained at around 30% is considered beneficial, adding value to production given the additional ecosystem services involved.

To understand the effects of climate change and variability on coffee production systems, need to face the limitations by data scarcity. At this point, meteorological data used to link environmental dynamism and climatic changes to crop productivity and it is crucial to upscale the analysis include the physiological responses to environmental changes. To fill these gaps a multi-scale approach was necessary for soil plant atmosphere continuum which can be used as a framework to understand the impacts caused by climate at the crop scale, and thus to enhance crop capacity to deliver an integral model of climate smart agriculture to producers. The current information was mainly focused on a sun grown coffee field, the same setup will also implement in a shade grown coffee field in the future so that the impact of shade between plants and the atmosphere can be addressed.

CONCLUSION

The plant canopy modifies and adjusts its own microclimate. Radiation, temperature, humidity, wind speed and mass transport near the canopy surface change rapidly over short times and distances. Mass and energy transfer at the aquaculture scale is dominated by advection as convective transport is less effective and canopy effects can extend more than 10 m into the atmosphere in the form of turbulence. The thickness of this crown boundary layer varies daily depending on the physiological activity of the crown. This can be measured as heat flux, evapotranspiration and CO_2 assimilation. These changes in turn regulate crop surface flux through feedback mechanisms whose geographic influences depend on vegetation coverage and environmental considerations. The importance of mechanistic understanding of these dynamic processes also extends to hydrological and climatological models. These models require accurate methods that can determine the energy and matter balance of vegetation and plant surfaces. To achieve this goal, evapotranspiration studies must link observations at the physiological and meteorological levels through a series of hierarchical models.

(MRPFT)