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Opinion

Study on plants: Towards a reason or purpose

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Abstract

The growth of scientific studies involving plants towards matching with the ever increasing demands of development is indispensible, at which our efforts on research are aimed in line with the requirement. The interdisciplinary field that generates discussion and research between environment and plant science including human-focused themes is highlighted in this article. In particular, the strategies to wipe out the main bottleneck of studies on plants are briefed so that they could be visualised by the prospective researchers in future.

Keywords
Crops; plant research; diet-health relationship; environmental impact

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Unhealthy food habits cause increase in health problems worldwide. Extensive gaps in the research space on these areas need to be filed up, and role of plants in general health as well as the effect of genetically modified plants still stand as another challenging area of research. Plant and environmental science too can make significant contributions to human health, reducing some of the complexities of the human diet-health relationship, solving possibilities of increasing stress tolerant crops, developing new strategy towards plant protection in action, besides amalgamating these points as a whole and interpreting new scientific, environmental, pharmaceutical implications, will represent a new frontier area of research in plant and environment as a whole.

We already know that plants are responsible for producing oxygen-rich atmosphere *via* the light reactions popularly known as photosynthesis, because there is always an inherent crave of their, as that of humans and animals, for escape from an unlikeable environment towards their better growth and survival. In drought season, plants are exposed to higher temperature. Plants, sometimes, use evaporation for cooling, popularly known as transpiration, and require more water in hot environs. In natural environment, heat, drought or flood often stresses plants due to the aforesaid factors. The stress turns down the growth of plants besides lowering their productivity. The increase in irrigation is not always an alternative when crop yields are severely decreased by the drought and other environmental stresses and changes alike. In other words, the change in climate lowers the usual crop yields, precisely because of high temperatures and drought conditions in many areas of cultivation. Considering this, an onus has automatically been put upon the plant scientists to investigate as to how plants cope up with the various kinds of environmental stress, while identifying the adaptations of the plants, varieties as well as genes that are concurrent with greater tolerances to stress, mostly abiotic in nature (Langridge et al., 2006). It may be mentionable that

some of these genes lessen the rate of water loss by transpiration; others affect root growth and water uptake too. Plant yields are also affected by unseasonable water, submergence, excess heat or drought, sodicity, etc.

Stress, in plants noticeably affects yields. There are organisms that grow on plants, including viruses, fungi, insects and bacteria. Some plants have evolved genetic resistance to certain pathogens, but many of which have also developed ways around this resistance. For examples, yellow mosaic of mungbean, yellow vein mosaic of bringal, potato leaf roll symptom, etc caused widespread crop failures in India. The pathogens that cause these diseases like *Puccinia graminis, P. infestans, Synchytrium endobioticum, Plasmopara viticola,* etc, have made an extensive crop decline, contributing largely to food shortage, deaths, and migration. Farmers are trying hard to identify new varieties having resistance to these pathogens that currently threaten all the important wheat, vegetables and other fruits growing regions. However, with the rhizobacteria associating with the roots of plants, productivity seems to improve due to increase in their tolerance against heavy metal toxicity in some plants (Upadhyay, 2011) as well as, the perception that checking of the oxidative metabolism constraints in different plant species is an integral part of assessment of the effect of metal stress in the plants (Upadhyay and Panda, 2010). But then, the aforesaid problems have many contributing solutions too, in addition to better management of storage facilities, and genetic improvements in plants to minimize these losses.

Of the many ways that sustain our lives, plants act as a source of food, for which we could hardly ignore the need for a change in our attitude towards their cultivation (Eckardt *et al.*, 2009). The agricultural modernization and plant breeding methods of plants have indeed helped in increasing crop yields for feeding up our ever-growing population, and the requirement for even greater increases in agricultural yields is not going to be less for the population of tomorrow. So, some scientists are studying plants to enhance their productivity by improving the plant stress tolerance, both biotic and abiotic; growth habit, nutrient utilization, pathogen resistance and alike. Most people of the world have limited access to fresh green vegetables, important sources of iron, vitamin A, etc. High-iron-content rice, in some experiments, has shown a reducing trend of diseases in humans. Rice enhanced with Vitamin A produced by transgenic methods has been developed, but the transgenic origins have hindered its distribution. On the other hand, bio fortified crops under progress have increased the levels of zinc and iodine.

Some of the naturally occurring plant compounds have beneficial effects on humans, ranging from the simple delight to life-saving tumour-suppressive drugs. These compounds are produced by only one or a few species, as part of their chemical defence against the pathogens. It is seen that the chemical diversity of the plant kingdom is enormous and basically unknown. Bio-fortification programs, including the enriched micronutrients, such as iron, beans, etc, can be accomplished right through conventional breeding (Myer *et al*., 2008). Hence, these types of fortified food can be advantageous to those people who have limited dietary facilities due to absence of miscellaneous substitutes to them. A large deficiency in food is predominantly common in the rurally populated areas, especially in the developing countries like India where diets may exclusively be based almost on such a single starch-based crop as rice, and those extra supplements needing crops may not get them due to limitations in their distribution. Scientists are developing plants that may even have improved quality fibres for daily use as our traditional materials, which are bio-renewable alternatives to non-renewable materials. These materials are widely developed by collaborating with the various botanists, materials scientists and biochemists among themselves. These may also help in advancing the genetically modified health-promoting foods having momentous consumer rewards, besides equally contributing to a novel insight into those foods which may or can reduce the risk of human chronic diseases. Also, better understanding of the sensory world of vectors and of improvement of genetic engineering techniques would certainly brighten the prospects of controlling plant virus and disease as well in the coming decades.

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