

EDITORIAL

Special Issue on Sustainable Agriculture under Abiotic and Biotic Stress

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World poverty and hunger are closely related to environmental degradation, caused by increasing population pressure and urban expansions, soil erosion, limitation of water resources, gaseous pollution, and massive industrialization. Furthermore, climate changes and extreme weather patterns pose new challenges for crop production and food security. Sustainable agriculture for the production of food and fiber, using environmentally-conscious farming practices based on understanding plant ecological interactions, is crucial for the preservation of natural resources for future generations.

This special issue focuses on recent research progress on understanding plant interaction with abiotic and biotic stress factors for sustainable agriculture. Plant stresses inflicted by salinity, drought, floods, temperature extremes, radiation, and toxic substances deposited in the soil together with diseases and insects attacks, are the major limitations of crop cultivation incurring substantial reduction in yield and hence elevate economic losses to the farmers.

Sustainable agriculture is challenged by the losses in crop genetic diversity. Conservation of available germplasm and the efficient utilization of genetic resources are important aspects of current research. In this special issue, Yumurtaci (2015) reviewed the utilization of wild relatives for the development of abiotic and biotic stress tolerant new varieties of four major food crops including wheat, barley, maize and oat.

Modern advances in biotechnology offer innovative approaches for understanding the fundamental mechanisms of abiotic and biotic stress and the development of stress tolerant crops. On this topic, Bakhsh (2015) reviewed current research achievements towards the development of abiotic stress tolerant crops through genetic engineering. In addition, Ram and Sharma (2015) studied the molecular characterization of *TaPase* in wheat, a gene known to be involved in plant response to stress.

Plant diseases represent another major challenge

for sustainable agriculture. To illustrate the importance of integrating genetic engineering in the strategies to combat plant diseases, Elayabalan et al. (2015) reviewed relevant advances in the development of banana plants resistant to the banana bunchy top disease.

Moreover, crop plants must adapt to adverse climatic conditions, particularly those associated with the global climatic changes. Stresses due to abiotic stress factors like drought, extreme temperature and salinity and heavy metal toxicity inflict tremendous losses in crop productivity and are considered as major challenging factors for future agriculture sustainability. This topic was addressed in this special issue in several papers. Ud-Din et al. (2015) addressed drought effect on rice yield in relation to hormonal application. Siddika et al. (2015) studied the response to high temperature stress of *Basella alba*, a leaf vegetable commonly names as vine spinach.

On the topic of heavy metal toxicity, Fasahat (2015) reviewed progress made in understanding cadmium toxicity and tolerance in rice. The special issue also include studies on nutrient uptake from under saline conditions in potato (Oustani et al., 2015) and ion content in wild sage (*Lantana camara*) treated with mepiquat chloride application under shading (Matsoukis et al., 2015). In addition Ajambang et al. (2015) examined the response of oil palm to defoliation stress. Obviously, understanding abiotic and biotic stress mechanisms is essential for the development of tolerant crop cultivars under the global climate change.

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