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*Editorial*

# The next generation of Precision Horticulture Technologies

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Precision horticulture is a science where scientist or growers develop new technologies to optimize the management of crop production or increasing efficiency. This was the primary factor of the growth of US agriculture in the late 20th century. Due to its success, it is important to look at the context of how this new technology currently being developed will impact the rapidly increasing world population. The United Nation Food and Agriculture Organization forecast that a growing population of 10 Billion by 2050 may not have enough food to meet the nutritional needs. Food production experts and scientists around the world concur that an increase of at least 50% is needed in food production to address the growing population. This is a huge undertaking, as increasing food production requires increasing all farm inputs. Water, pesticides, and fertilizers are just some of the required inputs. With these requirements, problems with limited water resources will be the next thing that needs to be addressed by farmers. Moreover, aside from food, there are other equally important competing demands that also make use of these required inputs, e.g., biofuels (which requires a substantial amount of land), and other factors that farmers need to address such issues as plant diseases, longer drought periods, lack of overall precipitation, weather, etc.

The ultimate objective of precision horticulture was to optimize the use of available resources on a site-specific level. With the recent advances in sensors and technology, e.g., Small Unmanned Aerial System (sUAS), Light Emitting Diode (LED), Internet Of Things (IoT) and the miniaturization of available electronic components, new systems can be easily created to address this objective.

This special issue will focus on presenting the different technologies under development or has been used to optimize the management of crop production or increasing efficiency. Topics include but not limited to the following:

- LED Technology in Agriculture
- UAS
- Sensors
- Internet of Things
- Remote Sensing
- Automation

Four manuscripts were accepted for publication in this special edition. The four addresses important topics in precision horticulture; UAS, LED, IOT, and socio-economic impact of mechanization.

The work of Jose Pena, et al. [1] used Digital Surface Model (DSM) from the images taken by the UAV/UAS to correlate tree heights and using the same data (DSM) fused with the NDVI to correlate to crop biomass. Clearly, this is the best approach of helping farmers collect this very important information on their farm (height and biomass) which are the key variables on crop development and productivity. Moreover, using UAS to collect this information quickly will give more time for farmers to do other important aspect of their farm. Celina Gomez and Luigi Izzo's paper [2] provide a review of the critical researches which focused on increasing the efficiency of crop production with LEDs (Light Emitting Diode). Their paper showed the different application where LED is advantageous to the fluorescent lamps and its inherent energy efficiency. The uses of LED spans from applications for pest and disease management to reductions in energy consumption from plant lighting. A discussion on vertical farms is fascinating as it addresses the issue of using small plot while increasing the throughput of farming. Benedict Posadas paper [3] presented a unique perspective on determining the socioeconomic factors which influence the level of mechanization among nurseries and greenhouses. Based on this work, it is interesting to note that in the future owners or nurseries operators will be compelled to shift to labor-saving technologies and mechanized production practices due to the shortage of skilled permanent and part-time workers. In addressing the use of precision horticulture in irrigation, Joe Mari Maja and James Robbins [4] presented an irrigation controller using the internet of things technology. The design was based on a closed-loop which used the soil moisture data as feedback to control the irrigation. The platform provides real-time monitoring and control via a simplified GUI or dashboard. Their work demonstrated the value of a simple system to remotely operate an irrigation system under nursery condition.

Increasing efficiency is a never-ending goal in agriculture, and all the new technologies developed for agriculture was the primary factor of the growth of US agriculture in the 20$^{th}$ century. Precision horticulture will play an essential role in addressing the demand for food to the increasing world population.

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