

PRESENT SITUATION OF TROPICAL FRUITS IN HAINAN PROVINCE, PHENOTYPING METHOD FOR REPRESENTATIVE TROPICAL FRUITS, AND FUTURE AND OUTLOOK

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Plant phenotyping enables the quantification of plant structure, function, and environment interactions. A new era in plant phenotyping began with the increased development of sensors, automation, and computation-based tools. Hainan province is located in the tropics and is the only province in China that is all in the tropics. It has significant advantages in developing tropical agriculture. For Hainan, agriculture is the foundation of the national economy, and high-efficiency agriculture with tropical characteristics is more of a royal card of a modern economic system. However, phenotyping methods applied to tropical fruits are still scarce. In our study, multi-optical imaging and automatic image processing methods based on deep learning have been used for the high-throughput and accurate acquisition of phenotypic traits of four representative tropical fruits: coconuts, passionfruit, pitaya, and areca. Novel technical opportunities will emerge from integrating Multi-optical imaging to enhance accuracy and throughput in all aspects of plant phenotyping. At the same time, to meet the requirement of the diversity of phenotypic data, the many different forms of the data, and the variability and development of plant traits in space and time in interactions with dynamic environments, new data integration and analysis methods are crucial for integrating plant phenotypes into modern science and breeding. In the future, we will not only realize the promotion of existing technologies among different tropical fruits and crops but also focus on developing new optical technologies, multi-source information fusion technologies, and automated information processing methods to meet various requirements that may arise in plant and breeding science.

Keywords: tropical fruits, plant phenomics, Micro-CT, UAV, deep learning