

Image-Based (RBG) Technique for Estimating Phosphorus Levels of Different Crops

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Abstract : In this glasshouse study, we developed the new image-based non-destructive technique for detecting leaf P status of different crops such as cotton, tomato and lettuce. Plants were allowed to grow on nutrient media containing different P concentrations, i.e. 0%, 50% and 100% of recommended P concentration (P0 = no P, L; P1 = 2.5 mL 10 L⁻¹ of P and P2 = 5 mL 10 L⁻¹ of P as NaH₂PO₄). After 10 weeks of growth, plants were harvested and data on leaf P contents were collected using the standard destructive laboratory method and at the same time leaf images were collected by a handheld crop image sensor. We calculated leaf area, leaf perimeter and RGB (red, green and blue) values of these images. This data was further used in the linear discriminant analysis (LDA) to estimate leaf P contents, which successfully classified these plants on the basis of leaf P contents. The data indicated that P deficiency in crop plants can be predicted using the image and morphological data. Our proposed non-destructive imaging method is precise in estimating P requirements of different crop species.

Keywords : image-based techniques, leaf area, leaf P contents, linear discriminant analysis

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