NAPPN Annual Conference Abstract: Comparison of TYLCV symptom among 18 tomato varieties using image analysis

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Tomato Yellow Leaf curl virus (TYLCV) is a destructive disease in greenhouse tomatoes in South Korea. Detecting TYLCV symptoms in the early seedling stage is a challenge for breeders. Three representative symptoms of TYLCV are yellowing, curling, and stunting. In this study, we developed an automated region of interest (ROI) extracting system for precisely measuring stunt symptom. Plants grown for four weeks after germination were used for imaging. Eighteen tomato varieties used in this study were screened using PCR makers to determine whether they have TYLCV resistance genes (*Ty-1* and *Ty-3*) or not. TYLCV clone was used for infection. Plant images were generated using a depth camera and rotating optical measuring system. Plant canopy images were acquired at 0, 120, and 240 degrees. Then plant canopy images were processed and canopy convex-hull was measured using ImageJ program and house script. 73.6% of TYLCV infected plants showed reduced convex-hull area than uninfected healthy plants. Average reduction rate of convex-hull area is $11.6 \pm 10.3\%$ of uninfected healthy plants. In this study, we developed automatic system for getting convex-hull area values from tomato plant canopy images. In a further study, we will try to develop a deep-learning model to classify between resistant and susceptible plants to TYLCV based on stunting symptom.