Automated analysis of disease symptoms using LemnaTec Scanalyzer<sup>HTS</sup>

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**Background**
- Pathogens threaten crops e.g. sugar beets, and ornamental plants, e.g. roses
- Phenotyping quantifies plant responses to environmental factors
- Disease phenotyping improves our understanding of plant pathogen interactions and helps to accelerate breeding for resistant cultivars

**Phenotyping platform Scanalyzer<sup>HTS</sup>**

**Image analysis with LemnaGrid software**

A: Load images from database.
B: Discrimination of the leaf from background (binary image).
C: Brown spots are detected using two filters: (i) Adaptive ROI threshold and (ii) Color-based classification (binary image).
D: Transformation of pixels to objects, assignment of colors and shape parameters
E: The remaining, not classified green/yellow pixels are filtered.
F: A global threshold for the green intensity value is used to separate between green and yellow.
G: Saving data to database.

**Results**
- Classification of leaves/leaf discs (green tissue) and disease symptoms (yellow/brown tissue)
- Ratio of diseased leaf area
- Counting symptoms
- Size distribution of symptoms
- Symptom shape description

**Conclusion**

**Automated disease phenotyping**
- Enables quantifying disease severity
- Delivers disease-specific phenotypic data
- Applies for a range of plant – pathogen combination
- Concept applicable to whole plant assessments in greenhouse and field
- Extendable with other phenotyping modules (e.g. plant growth, chlorophyll fluorescence, thermal imaging etc.)