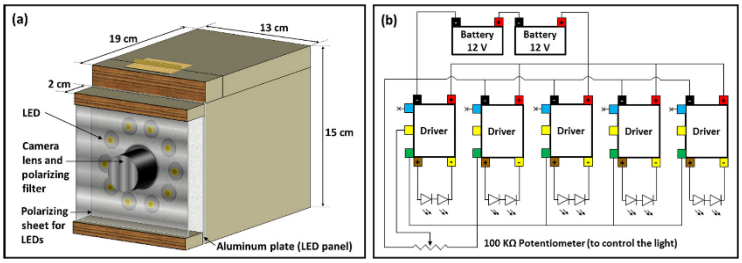
Kidum R&D Applications and Technology Transfer

Detection of Citrus Greening

Using polarized light for trees with HLB symptoms



Huanglongbing (HLB) or citrus greening is a bacterial infection which is spread by a citrus psyllid. No effective cure for this disease has been reported yet, and the infected tree must be detected and removed immediately to stop the spread of the disease. One of the symptoms of HLB is the accumulation of starch which creates blotchy mottles in an asymmetrical pattern on infected citrus leaves.

These blotchy mottles symptoms may be confused with the deficiency of certain nutrients such as zinc or magnesium. The unique capability of starch to rotate the polarization planar of light was employed to identify the HLB-infected citrus leaves and differentiate them from zinc or magnesium deficiency.

A vision sensor was developed for the purpose of real-time HLB detection for use under field conditions. The sensor includes a highly sensitive monochrome camera, narrow band high power LEDs, and polarizing filters. The sensor was tested in a citrus grove. The sensor clearly highlighted the starch accumulation in the HLB-infected leaf and differentiated it from visually analogous symptoms of zinc deficiency.

Innovation:

- It is for the first time that detection of HLB infected trees is based on polarization planer of reflected light rather than on the yellowish color of the leaves. Such approach overcome failed detection when the detection is based on leaf colors changes.
- A schematic of the vision sensor with dimensions in which the polarizing filters are highlighted to emphasize their relative perpendicular directions.

Advantages:

- The current methods used to scout HLB in citrus orchards based on trained inspectors who check each tree 4-6 times per year.
- Our technology is the only possible replacement for human scouting since it can distinguish between mineral deficit symptoms and HLB symptoms and it is a low cost technology (less than 1000$ per prototype sensor)

Development status:

- The technology was already examined under field condition.
- The results had shown detection accuracy of 95% and above.
- The current technology is under PCT together with the University of Florida.

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