A non-destructive method to assess root rot severity of *Lactuca sativa* L.

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Root rot disease caused by aquatic fungi, such as *Aphanomyces* sp. and *Pythium* sp., is prevalent in *Lactuca sativa* grown in a dynamic root floating technique (DRFT) hydroponic system in Phetchaburi College of Agriculture and Technology, Thailand. Roots of this plant have been severely infected with these fungi, and plant growth has been affected, resulting in a decline of yield over time. Symptoms of root rot are initially characterised by tissue discoloration in some parts of the root, followed by a loss of tissue integrity of the whole root. In the DRFT system, root rot symptoms of *L. sativa* range from severe (complete) root rot to a healthy-looking root (no symptoms).

This study investigated the potential for using digital images as an objective tool for assessing disease severity, with the aim of the tool being applied by assessors with no previous experience in disease assessment. *Lactuca sativa* that had been grown in DRFT for 30 days and had various degrees of root rot symptoms were selected for the study. Visual evaluation of the diseased root indicated that there were six levels of disease severity, with root colour ranging from white (healthy looking) to completely black (severe root rot).

When the diseased root samples were subjected to digital image analysis, between the black and white extremes, there was one shade of grey and three shades of brown. The images of these six levels of severity were analysed using Hunter L, a and b values. It was found that the six levels of root rot severity could be distinguished based upon the L parameters. The value of Lightness (Hunter L), which is transformed from RGB digital image (using a color calculator in <http://www.easyrgb.com>), decreased exponentially (from severity level 1 to 6) with a constant value at 0.48. This indicates that digital image analysis using this simple tool can be utilised to objectively assess root rot disease in *L. sativa*. Once this technology is thoroughly studied, developed and validated for lettuce growing in the DRFT system, there is potential for it to be a useful tool to assist lettuce growers in making a decision to implement control measures.