Abstract:

The harvest of greenhouse peppers is irregular, causing difficulties for greenhouse operators to schedule labour requirements for harvest and packing facility for shipping. The objective of this study is to evaluate whether the colouration process of pepper fruit can be modelled. If so, then daily or weekly harvests may be better planned. Our study was conducted in a commercial greenhouse in coastal British Columbia, Canada. Mature green fruit were randomly tagged, and colour development was photographed every 3-4 days or 7 days until the fruit were fully coloured and harvested (>95% surface coloured). The colour of pepper fruit was photographed by a hand-held digital camera, and an image was split into three images representing red, green and blue (R, G, B). Each value of RGB for each fruit was quantified as an average grey level of 0 to 255. In the first production year (2001), images were taken every 3-4 days, and the regression function on days to harvest by using RGB values was satisfactory (R2=0.6799) for red cv, but was less satisfactory (R2=0.5537) for yellow cv. In the second production year (2002), when images were taken every 7 days, days to harvest can be predicted by a regression with G and R/G (R2=0.3926) for red fruit, but yellow peppers were less predictable by R/G (R2=0.1829). When all parameters RGB and their ratios (R/G, R/B, G/B) were used, the regression function was improved (R2=0.4297) for red and for yellow (R2=0.2811). When weekly light was added, regression function was improved in red (R2=0.5476), but not improved in yellow cv. (R2=0.2816). In addition to regression, artificial neural networks (ANN) were employed giving superior or comparable models. These results indicated that digital image processing may be a useful tool to model the rate of colouration for red peppers, but may be of limited success for yellow cv. The influences of cultivars, growing seasons, choice of parameters, and modelling methods are discussed.