

Title Evaluation of chicory seeds maturity by chlorophyll fluorescence imaging
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Abstract

Chicory (*Cichorium intybus* L.) seed production includes sorting to remove foreign materials and non-viable seeds. A machine vision system was developed to monitor the fluorescence in order to detect the immature chicory seeds. It comprised a monochromatic light source, a highpass filter and a monochromatic CCD camera sensitive to red and infrared. With this device, blue light reflected by the seeds was blocked whilst red fluorescence was measured by the camera. A segmentation algorithm was designed to estimate separately the fluorescence intensities of the *pappus*, a crown of scales, and the main body of the pericarp. Experiments were carried out on five clones of cross-pollinated chicory plants used for seed production. Two hundred flower heads were labelled at flowering and harvested at different times during the maturation process expressed in “days after flowering” (DAF). Germination tests were performed according to the recommendations of the International Seed Testing Association to measure the germination percentage (GP) and the germination rate (GR), an indicator of seed vigour. Seed chlorophyll content diminished during maturation following a different logistic trend for the *pappus* and the pericarp. The GP increased from 18 DAF to reach its maximum value at 21 DAF, but the GR remained low until 30 DAF and increased afterwards. The potential of chlorophyll fluorescence to be used as an indicator of chicory seed vigour was the greatest between 21 and 36 DAF.