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Book of Abstracts

"Sustainable Biosystems Through Engineering"



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GENERAL INFORMATION

The Book of Abstracts contains a summary provided by authors of presentations made during the XVIIth World Congress of the International Commission of Agriculture and Biosystems Engineering (CIGR). The Congress was held under the general theme of "Sustainable Biosystems through Engineering". Several specialized symposia were organized by participating groups listed in the Table of Contents. The Canadian Society for Bioengineering (CSBE/SCGAB) is publisher of the Book of Abstracts.

EDITORS

The Editors of the Book of Abstracts are Philippe Savoie, Joey Villeneuve and René Morissette, Agriculture and Agri-Food Canada, Soils and Crops Research and Development Centre, 2560 Hochelaga Boulevard, Québec, QC, Canada G1V 2J3.

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ABSTRACTS AND FULL PAPERS

To find an abstract, first identify its CSBE number (10XXXX). Papers can be found by technical themes in the List of Abstracts by Participating Group on pages 4 to 26. Abstracts are published in numerical order in the subsequent pages. Some abstracts have been shortened for reasons of space. Complete abstracts and full papers that were submitted will be available on the CSBE/SCGAB web site after the Congress. For updates on paper availability and downloading, visit: www.bioeng.ca

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AUTOMATIC GRADING OF ANTHURIUM CUT FLOWERS USING 3D COMPUTER VISION

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CSBE100934 – Anthurium flowers, also known as “flamingo flowers”, exist in a wide range of colors, forms and sizes on the cut flower market. Nowadays each flower is graded manually which requires a high amount of manual labour and special expertise. Typically Anthurium flowers are classified according to the diameter of the spathe, the hood-like bract found along with the spadix. To be able to automate this sorting process the possibilities of computer vision were studied. Because of the cup shaped nature of the spathe it is impossible to determine the diameter accurately by means of a 2 dimensional camera image. Using stereo vision techniques three dimensional (3D) images of the flowers were recorded. Flowers passed the vision system with an arbitrary orientation and with some variation of the distance to the cameras. An algorithm was developed to determine the orientation of the flower in the image and the position where the diameter is measured. This algorithm needed to cope with the extreme high variability in color and shape of the different types of Anthurium. Shape based templates were used to analyze the 3D image and to measure the diameter of the spathe at the determined position. The results of these measurements showed good correlation with the manual measurements.

EVALUATION OF OPERATIVE ASPECTS OF A HEAT PUMP TO DRY CHESTNUTS

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CSBE100935 – The Italian chestnuts market, with a capacity of 50,000 tons per year, is in a leading position among European countries, and the fourth worldwide. The production of chestnut flour is a viable alternative to fresh consumption. The process includes a step of drying that can be done by different methods like the traditional one that uses coal, the dryer based on forced air by convection ovens and the innovative ones based on heat pumps. The last ones drying at low temperatures, allow to obtain qualitative properties of greater value. Drying is an energy intensive operation, heat pump drying allows the decrease of process costs. The research studied the efficiency of the dried plant based on a heat pump which provides a drying temperature of 30 °C and an air flow rate of about 5 m³/s. We monitored two cycles of drying of chestnuts to obtain the drying curves (from 45% to 10% humidity variation). The behavior of the process on the product (temperature and humidity levels) and the efficiency of the heat pump were analyzed. Thanks to an electric analyzer, in addition, it was possible to define the consumption of individual electric utilities and the techno-economics of the whole process. Some parameters were evaluated to characterize the final products resulting from the drying methods.

EVALUATION OF COFFEE DRYING COSTS: PRE-DRYING ON A CONCRETE TERRACE AND COMPLEMENTARY DRYING IN A CONCURRENT AND COUNTERCURRENT FLOW DRYER

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CSBE100966 – The study of drying costs is an important tool to be considered when deciding on an adequate drying system, which considers energy needed to heat the air, electrical energy needed to run the fans, energy to transport the product, labor costs, maintenance costs, depreciation, interest rates and breakdown costs. The objective of this study was to determine the total drying cost per sac of dry coffee beans, by means of the drying of processed coffee in the form of pulped cherries, with pre-drying on a cement terrace followed by complementary drying in a developed prototype dryer with concurrent and countercurrent flows. Two treatments were applied: a) Treatment 01: 12 hours of intermittent drying with intermittent rotation and 12 hours of rest, with drying air temperature of 45 °C and rotation of the grain mass at every 90 minutes of drying (for a period of 10 minutes each); b) Treatment 2: 12 hours of intermittent drying with continuous rotation and 12 hours of rest, with a drying air temperature of 70 °C. The utilized methodology was described by Young and Dickens. It was concluded that: 1. The fixed cost of the multiple flow dryer was the principal component in the total cost of drying, principally since it was treated as a prototype. 2. Increase in the drying capacity of the system with application of treatment 02 (with continuous rotation), in relation to treatment 01 (with intermittent rotation), drastically reduced total drying costs. 3. The results obtained for treatment 01 demonstrated that its not an economic feasible application, [...].

TESTING OF A NIR SYSTEM FOR THE OPTIMIZATION OF STORED APPLES MANAGEMENT

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CSBE100967 – Non destructive and rapid tools in fruit production are required to monitor fruit quality during postharvest period for a better preservation during storage. An automatic desk Vis/NIR system (QS_200, Unitec spa®) was tested to predict fruit quality during postharvest phases in the wavelength range 600-1200 nm. The aim of the work was to select homogeneous lots of apples in a non destructive way to manage cold store at best. A total of 1152 apples (Golden Delicious and Stark Red Delicious) were analyzed with Vis/NIR device in order to classify apples in two different ripeness classes (ripe and not ripe). PLS regression models were built on the samples of the two apple varieties. Models based on spectral data of Vis/NIR device show, for both varieties, good prediction skills for soluble solids content and firmness. Seven monthly samplings were done during the whole period of apples conservation in cold store with controlled atmosphere in a storage centre in Valtellina (Lombardia, Italy). TSS and firmness predictions carried out with Vis/NIR device were compared with analytical data obtained by standard destructive analysis. The 72% of the analyzed samples of Golden Delicious and the 69% of Stark Red Delicious show a difference from reference value lower than 1° Brix. Encouraging results were obtained for firmness evaluation too. [...].

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