Non-destructive quality evaluation of Litchi fruit using E-Vision and E-Nose system

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Project Objectives

- To develop standalone system for Litchi grading/classification based on external appearance and aroma quality parameters using E-vision and E-nose.
- To evaluate the performance of the developed system and develop concept for a continuous type prototype for litchi grading.

Description

Litchi is a Tropical fruit that is consumed as fresh and can be processed into different products. Though India is second largest producer of the litchi fruit its share in global export scenario is very less due to short shelf-life. There is need to pack only sorted sound fruit to have longer shelf-life in various packaged conditions. Taking this need into consideration, current study is undertaken to develop a continuous type of grader for grading Litchi fruit based on FVGMR (2004) and AGMARK criteria using E-Nose and E-Vision hybrid system.

For development of E-Nose module and selection of the sensors the volatile aromatic compounds in the litchi fruits of different grades viz. Cracked, Borer infected, fungal infected, sun burn and good samples (images shown in Fig. 1) were analyzed using GC-MS. The major differentiating volatile compounds among various categories of defected and good litchi fruit are shown in Table 1. The compounds specially present in different grades such as 15-Tetracosenoic acid, methyl ester, (Z)- for control, Ethyl 13-docosenoate(ethyl erucate) for cracked, 2,4-dimethyl-Hexane for fungal infected, 9,12-Octadecadienoic acid (Z,Z)- for borer infected and 2,2-dimethyl-l-(4-phenoxyphenyl)-1-Propanone for sun burn sample can be utilized for non-destructive way of differentiating respective class of fruit using E-Nose system. Further work is continuing to select proper sensors for E-Nose system. The same grades of fruits were imaged and algorithms are being developed for grading them. The schematic diagram of the continuous conveyorised litchi sorting machine is being finalized.