

APPLICATION OF NON-DESTRUCTIVE METHODS FOR SORTING OF RASPBERRIES

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Abstract

One of the critical points in the food chain is the machine color sorting of bio-products in industrial plants. The application of non-destructive methods for sorting agricultural products such as machine vision represents a tremendous technological advancement that is constantly advanced upon. This paper will present the methods for sorting raspberries as a representative of sensitive fruit for processing and also as one of the most important export products of Serbia.

Sorting of raspberries can be done in two ways: manually and mechanically, using modern optical sorting machines. The use of machine sorting and new technologies has a tendency to boost processing capacity and availability, while at the same time increasing profits, food quality, and food safety. Color sorters can sort by: defects, biological characteristics, shape and size, texture, structure, color, density, and foreign materials. When it comes to the industrial processing of raspberries in Serbia, we primarily mean cold processing or deep freezing of raspberries. Raspberries are sorted after freezing where sorters detect and reject: mold, stems, leaves, broken and crumbled raspberries, as other defects and foreign material. It can be concluded that in the same conditions the processing capacity with machine systems for color sorting is many times more efficient than manual sorting and that consistent quality is ensured, with possible 24h operation of capacities up to 10 t/h for raspberries. This paper also represents a summary of several review papers on the main topic - color sorting of agriculture products. The central focus was on leading journals such as Trends in Food Science & Technology, Computers and Electronics in Agriculture, and the Journal of Food Engineering. The main challenges, even after two decades of intensive research and conceptual solutions, have not been fully resolved for the needs of industrial capacities for processing agricultural products.

It can be concluded that researchers are still looking for solutions in traditional methods, but the focus is shifting to the application of machine learning algorithms, especially convolutional neural networks. Although practical applications have not yet been realized in large systems such as industrial production.

Key words: *Inspection, Raspberries, Color, Machine vision.*