WAGENINGEN
UNIVERSITY & RESEARCH

P.O. Box 17 | 6700 AA Wageningen | The Netherlands

Eosta B.V.
Postbus 348
2740 AH WADDINXVEEN
Nederland

Agrotechnology &
Food Sciences Group

DATE
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SUBJECT
laser labeling

POSTAL ADDRESS
P.O. Box 17
6700 AA Wageningen
The Netherlands

VISITORS' ADDRESS
Wageningen Campus
Building 118
Bornse Weilanden 9
6708 WG Wageningen

INTERNET
www.wur.nl

HANDLED BY
Prof. dr. Ernst J. Woltering

TELEPHONE
+31 (0)317 480116

EMAIL
ernst.woltering@wur.nl

Dear Mr. Hendriks,

At Eosta's request, the features of logos on fruit and vegetables applied by laser labeling (LaserMark™ LMS-2 system) were studied at Wageningen Food and Biobased Research. Depending on the type of product and the settings of the machine, the laser treatment may either burn a limited amount of epidermal cells (cells of the outer layer of the skin) or may leave the cells undamaged. In the case cells are damaged, the cell walls are slightly burned, an effect comparable to caramelization of sugar. In the case the cells are not damaged, the treatment apparently only modifies the wax layer whereas the epidermal cells are still intact. In all the cases studied, the effect is very superficial, is strictly confined to the treated cells and no immediate or delayed treatment effects on cells in the immediate vicinity or in cells in other cell layers was observed.

There is no reason to consider the treated products unsafe for human consumption. This holds true for both products that are peeled before consumption (e.g. kiwi, potato, citrus fruit) and for products of which the peel, including the logo, may be eaten (e.g. apple, pear, tomato, cucumber, bell pepper).

Yours sincerely,

Prof. dr. Ernst J. Woltering
Product Physiology and Quality

Dr. Ulphard Thoden van Velzen
Packaging Technology and Recycling

Background

Laser labeling is a technique that allows to mark each single piece of fruit & vegetable with individualized information. A study was done to better characterize the changes in fruit/vegetable skin evoked by the use of laser-labeling. Different products were labeled with a variety of logos using the JBT LaserMark™ LMS-2. In all the cases studied (sweet potato, ginger, apple, pear, kiwi, mango, squash, cucumber, bell pepper, eggplant) the effect of the laser treatment was only confined to the treated skin, there was no spread of effects to surrounding tissue. In addition, the effect was only observed in the outer one or two cell layers and no effects in other cell layers were observed. Depending on the settings of the machine, the laser beam may or may not damage the outer cell layer(s). If outer cell layers are damaged, the effect is still very superficial. A limited amount of cells appear empty (the contents probably vaporized during the treatment) and cell walls are slightly burned (brown coloured).

Cell walls contain polymeric sugars. The effect is comparable to the caramelization of sugar. In other cases the skin cells itself are not damaged by the laser treatment but still the logo is clearly visible. In this case the laser may only affect the waxy layer that is covering the epidermal cells. Given the extremely small amount of cells that is affected by the laser treatment and given the minimal effects on the skin (some burnt cell walls, or even only some changes in the wax layer) there is no reason to consider the treated products unsafe for human consumption. This statement holds true for both products that are peeled before consumption and for products of which the peel, including the logo, may be eaten.