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Assessment of current drying practices for South American pepper varieties (*Capsicum* spp.) with respect to final product quality

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ABSTRACT

Worldwide fresh and dried *Capsicum* products are used as a flavoring and coloring agent in food and for medicinal purposes. But even though they are high priced commodities, they are often produced in tropical countries under low input conditions. This makes the traditional drying process prone to quality losses mainly in terms of microbial infestation leading to aflatoxin contamination, but also losses of color and vitamins. To protect the consumers from harmful foodstuff, national and international groups worked out quality standards that restrict market access if a product does not fulfill certain quality criteria. As a result of these market regulations, aflatoxin contaminated products cannot be traded, leading to a financial losses for the producer.

In this study, the open-air sun drying process of *Capsicum* in Bolivia and Peru has been analyzed. Locally important cultivars were selected upon their market relevance and the drying process was observed in order to collect data for implementation of a 'Hazard Analysis and Critical Control Points" (HACCP) plan according to the Codex Alimentarius (FAO/WHO, 2001). Samples were taken during the whole drying process and analyzed for moisture content (MC), aflatoxins, vitamin C content, color characteristics and physical characteristics.

The results show the differences of the drying strategies applied in Bolivia and Peru. While Peruvian farmers harvest the fruits with a MC of approximately 78% directly when the fruits are ripened, Bolivian farmers leaf the fruits on plant for some more days in order to desiccate the fruits to a lower MC of approximately 63%. This not only allows improving the color retention, but also decreases the risk of high aflatoxin levels. All final samples were tested positive ($\geq 4\ \mu g \cdot kg^{-1}$) for aflatoxins and only one of 12 tested samples showed the quality demanded for export to the EU ($\leq 10\ \mu g \cdot kg^{-1}$). The Bolivian fruits showed an overall lower content of aflatoxins. As Peruvian fruits showed aflatoxin levels that exceeded EU thresholds tenfold already before the field drying, it's suggested that critical control points for aflatoxins are located in the pre-harvest phase. The color of fruits in general sifted in a green, yellow, orange to red pattern. The yellow fruits thereby lost remaining green pigments and gained orange pigments. Both, Bolivian and Peruvian, red fruits shifted from orange towards red coloration probable as a result of the synthesis of the *Capsicum* specific deep red pigments capsanthin and capsorubin. While the lightness (L) of

the Bolivian red and yellow fruits slightly increased during drying, the dark brown Peruvian fruits showed a decrease in L.

All investigated samples showed aflatoxin contamination. Only one out of 12 Bolivian samples had and aflatoxin content below the EU threshold. All Peruvian samples were heavily contaminated with aflatoxins already before the drying process. It is suggested that the post-harvest treatment in Peru is a main driver for aflatoxin contamination.

The vitamin C content of the samples appeared to be relatively low ranging from 10.3 to 21.2 mg/100g fresh weight and increasing slightly during drying process a result of relative enrichment by loss of water during drying.