



Diagnosis for Identification and Quantification of Pitting Injury in Fruit of Tommy Atkins Mango Grown in Mexico

Pitting or lenticel damage is identified by the development of sunken pits on the fruit's peel, which can deter consumers at the store level. Most packers do not have a clear understanding if the damage comes from the orchards or if it appears during the packing process. In addition, there is no clear cause of this disorder, which is observed at a higher degree in the Tommy Atkins cultivar.

Dr. Jorge A. Osuna Garcia, postharvest and food safety researcher at INIFAP-Santiago Ixcuintla Experimental Station, conducted a study to: 1) diagnose the presence of pitting in Tommy Atkins fruit grown in Mexico; 2) determine if pitting is associated to a field factor or a step during the packing process; and 3) based on the results, find a strategy to control pitting in Tommy Atkins fruit.

Methodology

Samples were collected during the 2013 and 2014 Mexican mango season – March through July. The fruit was harvested from four different mango producing states in Mexico: 1) Oaxaca, 2) Jalisco, 3) Nayarit, and 4) Sinaloa. Mangos were collected at random following these steps: a) arrival at packinghouse; b) after washing; c) after hot water treatment; d) after hydrocooling; e) after brushing; and f) from already packed boxes. The mangos were immediately taken to the postharvest lab where they were submitted to refrigeration (54 ± 1 °F; 90 ± 5 % HR) for seven days. The mangos in the sample were also submitted to market simulation (72 ± 2 °F; 75 ± 10 % HR) until ready to eat stage. Sampling was performed at the beginning and at the end of the refrigerated period, as well as at consumption stage. The variables measured were pitting injury, dry matter, weight loss, skin color, firmness, pulp color, total soluble solids (TSS), titratable acidity, °Bx to acidity ratio, and nutrient content (N, Ca, and B). In both years a completely randomized design was used with 20 replications for weight loss and 8 replications for all other variables.

Key Findings

- In 2013, the presence of pitting in Tommy Atkins had very low frequency and light intensity for fruit harvested from Jalisco and Nayarit. **The damage was associated with a step during the packing process.** There was no presence of fruit with pitting symptoms for fruit harvested from Oaxaca and Sinaloa.
- In 2014, pitting was present in all of the harvested states. Jalisco and Michoacán had the highest presence of pitting, **which was correlated with higher nitrogen content, lower calcium content and relatively high boron content in the skin and pulp.**
 - **Pitting presence was correlated with higher nitrogen content in stone only for fruit collected in Michoacán (2)ⁱ but not for those collected in Jalisco or Michoacán (1)ⁱⁱ.**
 - Fruit harvested in Michoacán (1) or (2) **had lower calcium content in stone and no difference in boron content.**

The presence of pitting disorder was very low throughout the experiment, thus allowing us to make a quality comparison among Tommy Atkins harvested from different regions in Mexico. In 2013, fruit harvested from Sinaloa did not show any pitting symptoms, they had the lowest weight loss, the highest TSS content and the lowest acidity. In 2014, fruit harvested from Nayarit showed the best quality characteristics for all variables except pulp color intensity.

Looking Ahead

More research is needed to identify the causes of pitting injury on mangos. The NMB approved the continuation of this project in Guatemala where severe pitting problems have been reported. Preliminary results indicate that the lenticel problem starts in the field and it is accentuated throughout the packing house. Researchers are trying to determine the role of micronutrients (B, Fe, Zn, Cu, and Mn), as well as the (K+Mg)/Ca and C/N ratios, on lenticel damage before and after the postharvest process.

ⁱ Michoacán May Harvest

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