

Effect of Shifting Practices on Performance of a Fixed-bed Convection Dryer for Longan

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Introduction

- Longan (*Dimocarpus longan* Lour.) is a seasonal fruit with a short shelf life.
- Drying reduces the longan weight by approximately 66%, adds value to the product and extends shelf life.
- Dried longan must have optimum moisture content and color in order to be exported.
- An adequate and consistent drying process is critical to achieve the international market standard.
- The present dryer design is not capable of drying the longan bulk uniformly.

Objectives

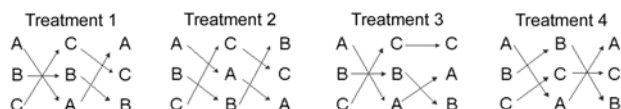
- To obtain a uniformly dried product with export quality standards by optimizing the shifting strategy without increasing labor or product damage.

Material and Methods



Taiwan-type dryer used for bulk drying of unpeeled longan, loaded with three layers of longan fruit, each 20 cm high.

- Four different treatments were evaluated in Thailand using different shifting routine the three layers: top (A), middle (B) and bottom (C).



Treatments applied, #1 is the usual treatment in the drying facility

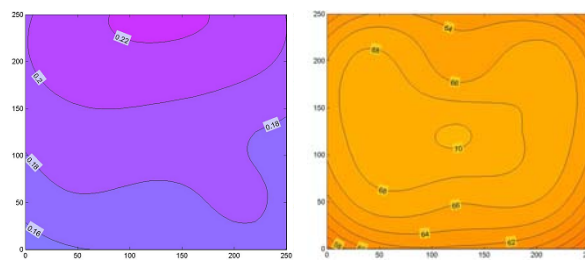
- Drying conditions (temperature, air velocity) were monitored and distributions mapped.
- Product quality was tested in terms of moisture content and color.



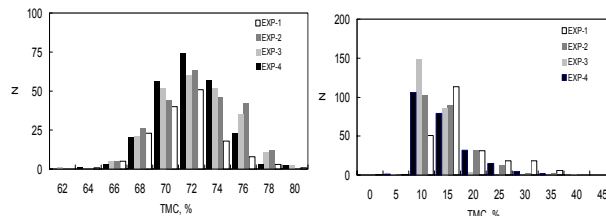
Sequential color change of longan during drying

Results

- Air velocity and temperature were heterogeneous. But, distribution patterns did not correspond.
- As temperature is highly influential in determining final color and moisture content of the fruits, product quality was affected.
- Only samples in the center positions and the side opposite the air inlet did not show significant differences when compared to a standard sample.



Air velocity distribution (left) and temperature distribution (right)



Initial (left) and final (right) moisture content distributions for all treatments

Treatment	M_f (%)	Hue (°)
1	19.53 ^a ± 6.04	71.04 ^a ± 7.68
2	16.93 ^b ± 4.81	68.06 ^b ± 6.69
3	14.71 ^c ± 2.79	63.77 ^c ± 5.41
4	17.04 ^b ± 5.04	65.28 ^c ± 6.91
Standard	14.70 ^c ± 1.15	59.42 ^c ± 6.24

Mean values for final moisture content (M_f) and hue angle (Hue) and variability of final quality as indicated by standard deviation. (Standard = 'well dried' on picture on left bottom side)

Conclusions

- Shifting configuration of Treatment 3 rendered the most uniform product throughout the bulk.
- To obtain a uniform product in the Taiwan type dryer, the main issues are to create a more uniform distribution of air velocity and temperature in the bulk.