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Two-parameter Lorentzian distribution for monitoring physical parameters of golden colored fruits during drying by application of laser light in the Vis/NIR spectrum

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Abstract

Inadequate drying conditions of tropical fruits can alter the cellular structure and chemistry, which can lead to undesirable characteristics of the final product. The purpose of this research is to test the feasibility of light scattering of three laser sources operating in the VIS/NIR range by calculating a two-parameter Lorentzian distribution (*LD*) for quality assessment of two golden-colored fruits, namely mango and litchi, during drying. Linear mixed models showed that blue light at 473 nm was the most adequate to monitor changes in browning (R^2=0.81) and moisture content (R^2=0.80) of litchi. For mango, NIR light at 785 nm was affected by the hardness ($p<0.001$), whereas moisture content showed a strong influence on the calculated *LD* functions at both 532 ($p<0.001$) and 785 ($p<0.05$) nm with a good fitting of the prediction model (R^2=0.91). Laser light can provide an economically-effective solution to obtain information from the fruit tissue non-destructively during industrial drying processes.

Keywords*: Mango, litchi, drying, hardness, browning, laser light, Lorentzian distribution.*

Nomenclature

LD	Mean of the light intensity for each optimized circular scattering band
b	Maximum light intensity corresponding to the incident point at z=0
z	Scattering distance
c	Full width at half maximum peak value
BI	Browning index
MC	Moisture content
w.b.	Wet basis
H	Hardness
h°	Hue angle
C	Chroma