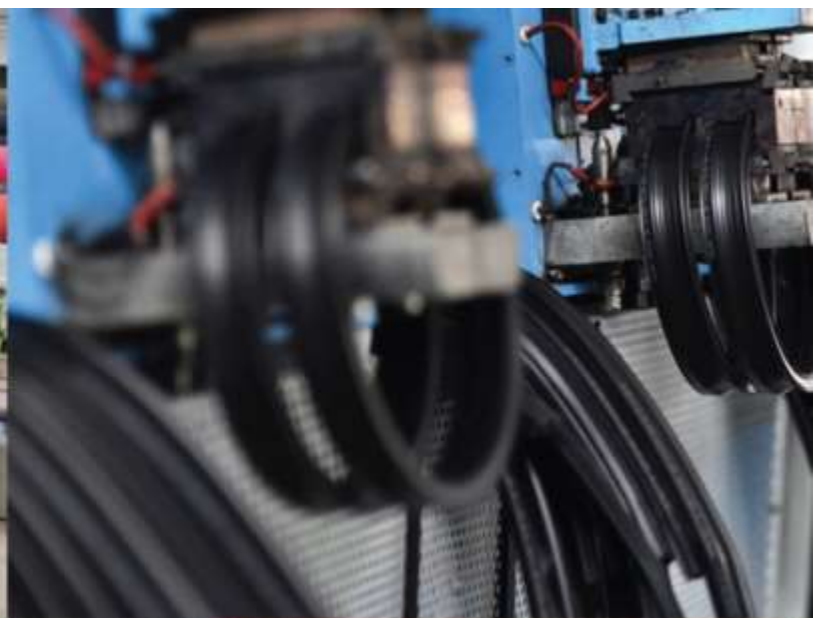


Kerone Research & Development Centre (KRDC)

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**Continuous Microwave Heat Treatment for
Drying of Banana Fig**



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Customer :	M/s. Mani Gowtham
Process :	Continuous Microwave Heat Treatment for Drying of Banana Fig

Test Report No: 173/KRDC/LAB/17 Mum 30/12/2022

Date Sample reception : 28/12/2022
ID : 173/LAB/30

Sample Description:

Sampling : As Requested
Sample Condition : Acceptable
Sampling date : 28/12/2022
Product : Banana Fig
Start Date test : 28/12/2022
End Date test : 28/12/2022

Laboratory Experimental System -



Format: F/R&D/01

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System Specifications -

Microwave Power	1.45 kW(CW)
Frequency	2450 \pm 50 MHz
Microwave Exposure Zone (Cavity)	1000 mm length wise
Product surface temp. range	Max. 120 deg cells
Conveyor width	380mm
Conveyor Speed	Variable 0.2 to 2MPM
Conveyor Motor Drive	0.5HP AC Induction with VFD
Entry Vestibule length	1200mm
Exit Vestibule Length	1200 mm
Exhaust Power	0.5 HP

Laboratory's Environmental Conditions -




Temperature (degree C)	29.4°C (\pm 5°C)
Humidity (%)	\leq 50% RH
Pressure (kN/m2 or kPa)	Not recorded

Note for recommendation: Environmental conditions have a direct impact on test results. Accuracy and consistency of test data are affected by the laboratory conditions

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Equipment Used -

Name of Equipment	Picture of Equipment	Specifications
Compact Thermal Imaging Camera		Model: FLIR E-30 Resolution: 160x 120IR Thermal sensitivity of 0.10°C
Thermo Hygrometer		Model No: HTC-2 Temperature accuracy: $\pm^{\circ}\text{C}$ (1.8°F) Temperature resolution: 0.1°C (0.2°F) Humidity range: 10%~99% RH Humidity accuracy: $\pm 5\%$ RH Humidity resolution: 1% RH
Moisture Analyzer		Make: Axis Balance Description: Moisture range: 1%(sample 0.02/0.05g), 0.1% (Sample 0.5/5g), 0.01%(Sample>5g)

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Procedure of the Experiment -

- The experiment was performed on Banana Fig to speed up the heating rate.
- For this experimental run, the given sample was placed on the conveyor of the MW heating system with suitable parameters.
- After the heating treatment, the sample was analyzed.

Analytical Results:

Trial 1 – Banana Fig

Initial Weight – 141g

Initial Moisture – 64.7 %

Cycle	Heating Zone Cycle Time	System Specification	On product temperature (°C)	Remark
C1	After 2 mins 40 sec	MW Intensity:100%;Belt Speed:1.2rpm;Set temp:70°C	45-48	Drying started
C2	After 5 mins 20 sec	MW Intensity:100%;Belt Speed:1.2rpm;Set temp:70°C	55-60	Drying Continuous
C3	After 8 mins	MW Intensity:100%;Belt Speed:1.2rpm;Set temp:70°C	53-63	Drying Variants
C4	After 10 mins 40 sec	MW Intensity:100%;Belt Speed:1.2rpm;Set temp:70°C	60-65	Drying Variants
C5	After 13 mins 20 sec	MW Intensity:100%;Belt Speed:1.2rpm;Set temp:70°C	65-70	Drying Variants
C6	After 16 mins	MW Intensity:100%;Belt Speed:1.2rpm;Set temp:70°C	70-73	Drying Variants
C7	After 18 mins 40 sec	MW Intensity:100%;Belt Speed:1.2rpm;Set temp:70°C	70-75	Drying Variants
C8	After 21 mins 20 sec	MW Intensity:100%;Belt Speed:1.2rpm;Set temp:70°C	73-76	Drying Variants
C9	After 24 mins	MW Intensity:100%;Belt Speed:0.8rpm;Set temp:70°C	75-77	Drying Variants
C10	After 29 mins	MW Power:1 kW; Set temp:70°C	90-95	Drying Variants
C11	After 34 mins	MW Power:1.5 kW; Set temp:70°C	90-98	Drying Variants
C12	After 39 mins	MW Power:1.5 kW; Set temp:70°C	100-106	Dried as desired

Total Heating Zone Cycle Time – 39 mins.

Final Weight – 25g

Final Moisture – 7.4%

Format: F/R&D/01

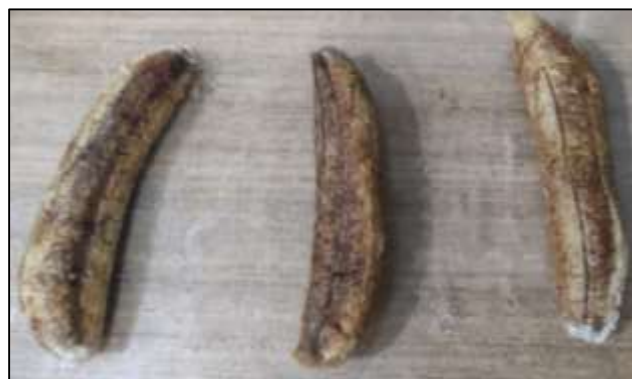
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Trials Images:



Untreated Sample



Treated Sample

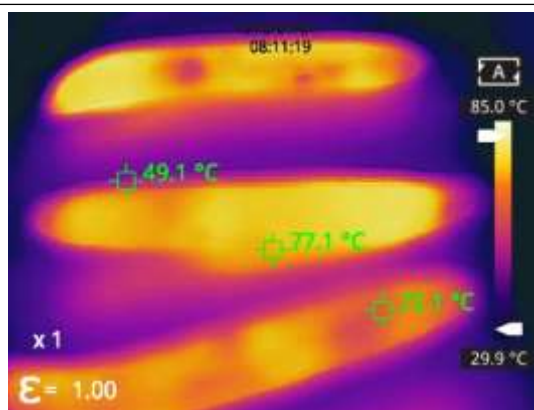
Thermal Images:

Measurements

Sp1	49.1°C
Sp2	77.1°C
Sp3	72.1°C

Parameters

Emissivity	1.00
Temp.	85.0°C

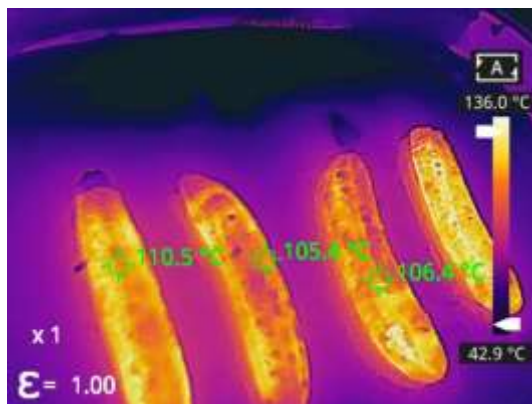


Measurements

Sp1	110.5°C
Sp2	105.4°C
Sp3	106.4°C

Parameters

Emissivity	1.00
Temp.	136.0°C



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Observations:

The heating behavior of Banana Fig was investigated under the Microwave heating system. The heating rate was found to be increasing with respect to increasing in time. As per the physical investigation, it was observed that the Drying of the product initially dried in conveyor with slow drying and then treated in Batch with high power the sample was dried as desired color and crispiness.



Ms. Sayali Asole
(Tested By)