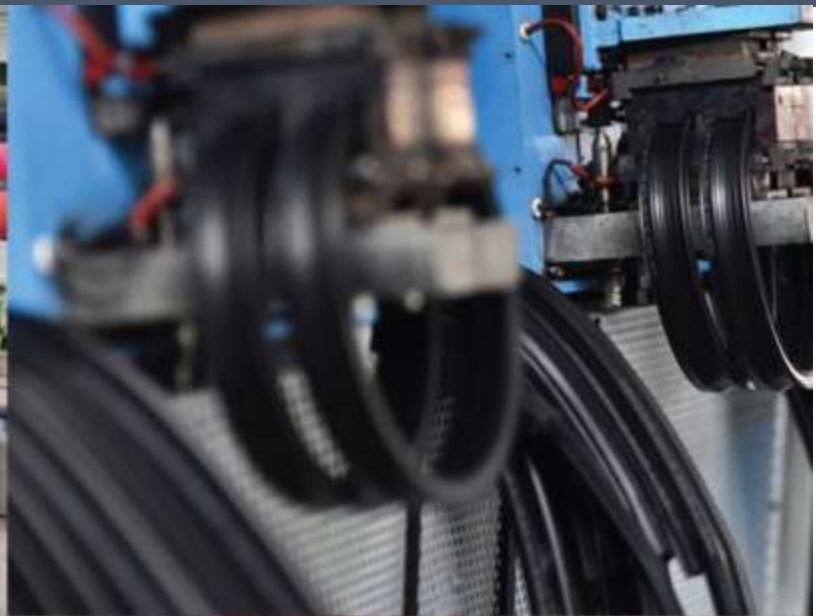


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**Batch Vacuum Microwave Heat
Treatment for Puffing of Dried Fruits**

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Customer :	M/s. Elven Agri Co. Ltd.
Process :	Batch Vacuum Microwave Heat Treatment for Puffing of Dried Fruits

Test Report No: 156/KRDC/LAB/17 Mum 18/11/2022

Date Sample reception : 03/09/2022
ID : 156/LAB/18

Sample Description:

Sampling : As Requested
Sample Condition : Acceptable
Sampling date : 17/11/2022
Product : Dried Jackfruit
Start Date test : 17/11/2022
End Date test : 17/11/2022

Laboratory Experimental System –



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System Specifications -

Magnetron Power Generator Rating	Air Cooled 1.45KW/2450+50 MHZ x 1 No.
Convection Power	1.5 KW
Total Heater Power	3 KW (MW 1.45KW + Convection 1.5KW)
Supply Voltage required	230V- 2Ph supply
MW Overall (LxWxH) in mm	620X670X640
Cavity Chamber (INNER) in mm	L-300 & Φ220
Vacuum Pump Rating	1/2HP, 1440rpm

Laboratory's Environmental Conditions –




Temperature (degree C)	29.4°C (±5°C)
Humidity (%)	≤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 Dehydrated Fruits to speed up the heating rate.
- For this experimental run, the sample was placed in the MW heating system with suitable parameters.
- After the heating treatment, the sample was analyzed.

Analytical Results:

Sample 3 – Jackfruit

Trials	Sample Wt. (gms.)	Initial Moisture (%)	Cycle Time	Specifications of Microwave	Final Moisture (%)	Remark
1	50	6.8	5 mins.	MW intensity: 100%; Set temp: 80°C; Vacuum:300mmHg	2.4	Charring Slight Puffing observed On product temp: (155-175)°C
2	50	6.8	3 mins.	MW intensity: 100%; Set temp: 60°C; Vacuum:300mmHg	2.7	Without Charring Slight Puffing observed On product temp: (150-170)°C
3	50	6.8	3 mins.	MW intensity: 100%; Set temp: 60°C; Vacuum:100mmHg	3.1	Without Charring Slight Puffing observed On product temp: (120-130)°C

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Trial images:



Untreated Sample (Jackfruit)



Treated Sample (Trial 1, Trial 2, Trial 3)

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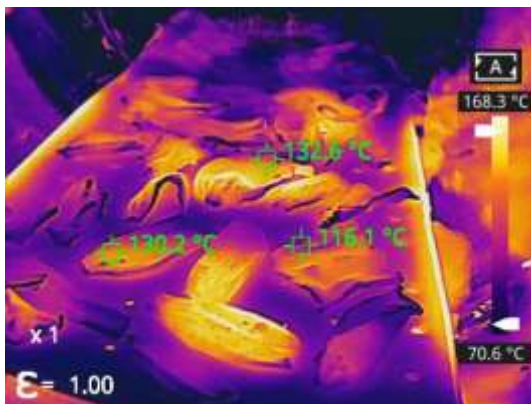
Thermal Images:

Measurements

Sp1	132.6°C
Sp2	116.1°C
Sp3	130.2°C

Parameters

Emissivity	1.00
Temp.	168.3°C

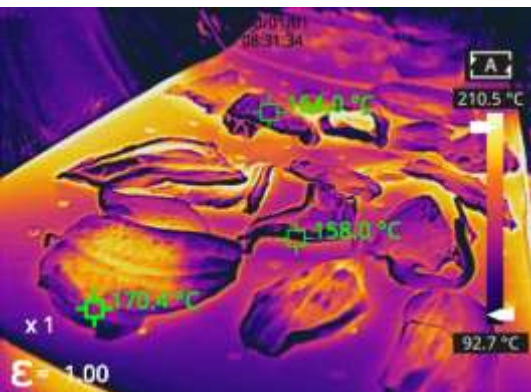


Measurements

Sp1	154.0°C
Sp2	158.0°C
Sp3	170.4°C

Parameters

Emissivity	1.00
Temp.	210.5°C

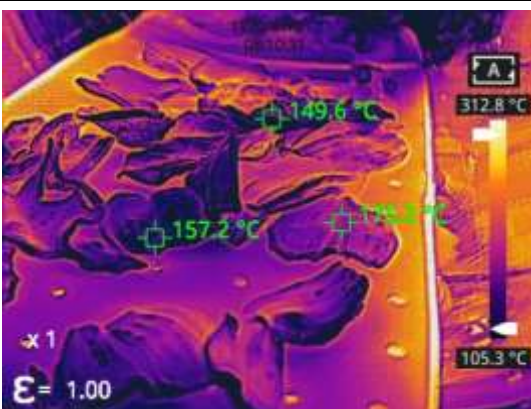


Measurements

Sp1	149.6°C
Sp2	175.2°C
Sp3	157.2°C

Parameters

Emissivity	1.00
Temp.	312.8°C



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Moisture Analysis Report:

Trial 1

Trial 2

Trial 3

Drying started	Drying started	Drying started	Drying started
Date :17-11-2022	Date :17-11-2022	Date :17-11-2022	Date :17-11-2022
Time :17:22:10	Time :17:23:43	Time :17:29:27	Time :17:34:16
Model:AG5200	Model:AG5200	Model:AG5200	Model:AG5200
Serial number : 138	Serial number : 138	Serial number : 138	Serial number : 138
Drying parameters	Drying parameters	Drying parameters	Drying parameters
Product : 0	Product : 0	Product : 0	Product : 0
Drying temperature : 105.0 °C	Drying temperature : 105.0 °C	Drying temperature : 105.0 °C	Drying temperature : 105.0 °C
Drying profile : standard	Drying profile : standard	Drying profile : standard	Drying profile : standard
Mode : Short mode	Mode : Short mode	Mode : Short mode	Mode : Short mode
Calculation : $((n0-n)/n0)*100\%$	Calculation : $((n0-n)/n0)*100\%$	Calculation : $((n0-n)/n0)*100\%$	Calculation : $((n0-n)/n0)*100\%$
Finished : 3 samples	Finished : 3 samples	Finished : 3 samples	Finished : 3 samples
Initial weight : 0.506 g	Initial weight : 0.504 g	Initial weight : 0.560 g	Initial weight : 0.510 g
Final weight : 0.565 g	Final weight : 0.492 g	Final weight : 0.545 g	Final weight : 0.494 g
Drying time : 00:08:00s	Drying time : 00:01:40s	Drying time : 00:02:20s	Drying time : 00:02:40s
Sampling interval : 20 sec	Sampling interval : 20 sec	Sampling interval : 20 sec	Sampling interval : 20 sec
Moisture : 11.1 %	Moisture : 2.4 %	Moisture : 2.7 %	Moisture : 3.1 %
NOTE Initial moisture	NOTE Final moisture	NOTE Final moisture	NOTE Final moisture
The analysis performed by:	The analysis performed by:	The analysis performed by:	The analysis performed by:
Signature: <i>Angali</i>	Signature: <i>Angali</i>	Signature: <i>Angali</i>	Signature: <i>Angali</i>

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Observations:

The heating behavior of Dehydrated fruits was investigated under the Microwave heating system. The heating rate was found to be increasing with respect to the increase in time. As per the physical investigation, it was observed that the puffing and drying of the product were obtained as desired.



Ms. Sayali Asole
(Tested By)