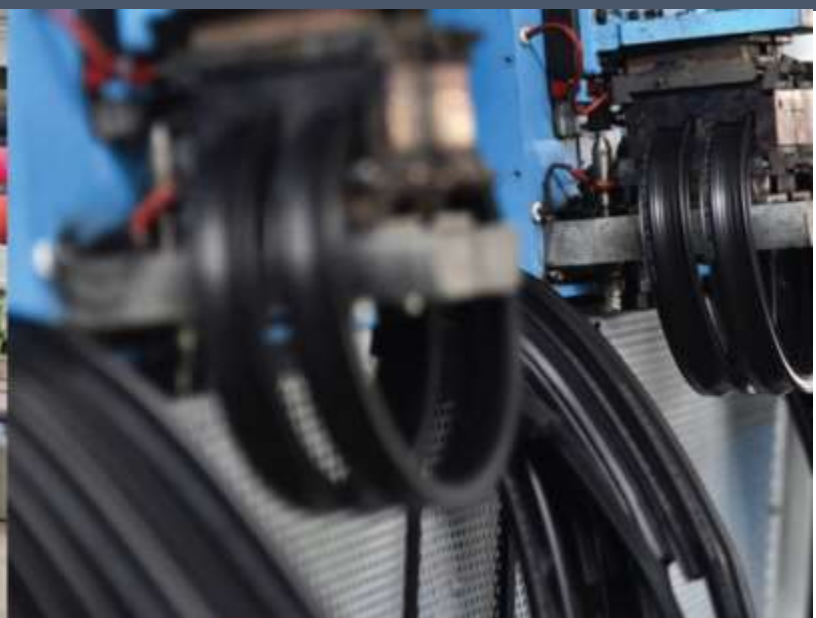


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**Batch Convection Heat Treatment for  
Dehydration of Sapota and Jackfruit**



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Customer :	M/s. Takshavi Private Limited
Process :	Batch Convection Heat Treatment for Dehydration of Sapota and Jackfruit

**Test Report No: 220/KRDC/LAB/17 Mum 20/06/2023**

Date Sample reception : 17/06/2023  
ID : KRDC/R&D/23-24/06/20

**Sample Description:**

Sampling : As Requested  
Sample Condition : Acceptable  
Sampling date : 17/06/2023  
Product : Sapota and Jackfruit  
Start Date test : 17/06/2023  
End Date test : 19/06/2023

**Laboratory Experimental System -**



Format: F/R&D/01

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### System Specifications -

<b>Heating Zone (width*height*depth)</b>	510*480*410 mm
<b>No. of Heaters</b>	6
<b>Total Heater Power</b>	6 kW
<b>Motor</b>	0.5 HP
<b>No. of trays</b>	6
<b>Tray size (width*height*depth)</b>	560 x 435 x25
<b>Centrifugal Exhaust Blower</b>	1440 rpm

### Laboratory's Environmental Conditions –

<b>Temperature (degree C)</b>	29.4°C (±5°C)
<b>Humidity (%)</b>	≤50% RH
<b>Pressure (kN/m<sup>2</sup> or kPa)</b>	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
Thermo Hygrometer		<b>Model No: HTC-2</b> <b>Temperature accuracy: <math>\pm^{\circ}\text{C}</math> (<math>1.8^{\circ}\text{F}</math>)</b> <b>Temperature resolution: <math>0.1^{\circ}\text{C}</math> (<math>0.2^{\circ}\text{F}</math>)</b> <b>Humidity range: 10%~99% RH</b> <b>Humidity accuracy: <math>\pm 5\%</math> RH</b> <b>Humidity resolution: 1% RH</b>
Moisture Analyzer		<b>Make: Axis Balance</b> <b>Description:</b> <b>Moisture range: 1%(sample 0.02/0.05g), 0.1% (Sample 0.5/5g), 0.01%(Sample&gt;5g)</b>
Weighing Balance		<b>Make: Gill</b> <b>Description:</b> <b>ISO 9001: 2008</b> <b>Model- PEWT – X</b> <b>Max- 10/20 Kg</b> <b>Min- 20g</b> <b>e. <math>\frac{1}{2}</math> g</b>
Compact Thermal Imaging Camera		<b>Model: FLIR E-30</b> <b>Resolution: 160x 120IR Thermal sensitivity of <math>0.10^{\circ}\text{C}</math></b>

Format: F/R&D/01

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### Procedure of the Experiment -

- The experiment was performed on Sapota & Jackfruit to speed up the heating rate.
- For this experimental run, the given sample was taken in the perforated tray and placed in the heating system with suitable parameters.
- After the heating treatment, the sample was analyzed.

### Analytical Results:

#### **Trials 1 (a)– Sapota**

Initial Weight – 1000g

Initial Moisture – 61.8%

Cycles	Cycle time (hours.)	Specifications of Microwave	On product Temperature	Remark
C1	4	Set temp.-55°C	(50-55) °C	Drying started
C2	6	Set temp.-55°C	(50-55) °C	Drying continuous
C3	8	Set temp.-55°C	(50-55) °C	Dried with breakable texture with some sticky substance at the skin portion and Grinded powder with lumpy texture.

Final Weight – 308g

Final Moisture – 4.6%

Cycle Time – 8 hours

Ground powder – 12.4%

#### **Trials 1 (b)– Dehydrated Sapota**

**Note: For drying the residual moisture, the sample was allowed to dry at 60 °C for 1 hours**

Initial Weight – 100g

Initial Moisture – 4.6%

Cycle	Cycle time (hours.)	Specifications of Microwave	On product Temperature	Remark
C1	1	Set temp.-60°C	(55-60) °C	Dried with Ground powder with a slightly free-flowing and grainy texture

Final Weight – 98g

Final Moisture – 0.9%

Cycle time – 1 hour

Ground powder – 10.1%

Total Cycle Time – 10 hours



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## **Trials 2 – Sapota Grinded Powder (T1-a)**

Initial Weight – 100g

Initial Moisture – 12.4%

Cycles	Cycle time (mins.)	Specifications of Microwave	On product Temperature	Remark
C1	10	Set temp.-60°C	(55-60) °C	Drying started with lumpy texture grind powder.
C2	20	Set temp.-60°C	(55-60) °C	Dried as desired with free-flowing and fine powder texture.

Final Weight – 80g

Final Moisture – 3.6%

Total Cycle Time – 20 mins.

## **Trials 3 – Jackfruit**

Initial Weight – 300g

Initial Moisture – 68.1%

Cycles	Cycle time (hours.)	Specifications of Microwave	On product Temperature	Remark
C1	4	Set temp.-55°C	(50-55) °C	Drying started
C2	6	Set temp.-55°C	(50-55) °C	Drying continuous
C3	8	Set temp.-55°C	(50-55) °C	Dried with a chewy texture. Color, aroma, and sweet taste are retained.

Final Weight – 80g

Final Moisture – 4.6%

Total Cycle Time – 8 hours

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**Images during trials:**



**Untreated Sapota**



**Treated Sapota**



**Sapota (treated at 55 °C for 8hr.)**



**Grinded sample (T1-a)**



**Dehydrated Sapota (treated at 60°C for 1hr.)**



**Grinded sample (T1-b)**



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**Grinded Sapota (T1-a)**



**Dried Grinded Sapota**



**Untreated Jackfruit**



**Treated Jackfruit**





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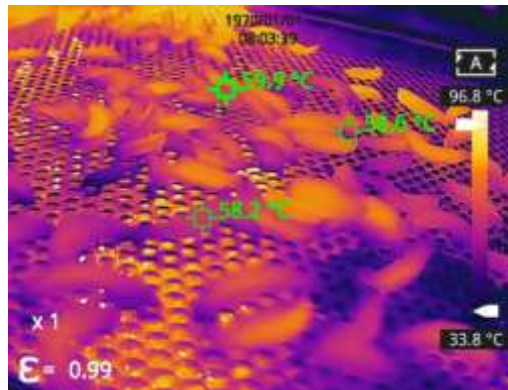
Thermal Images:

Measurements

Sp1	59.9°C
Sp2	58.2°C
Sp3	58.6°C

Parameters

Emissivity	1.00
Temp.	96.8°C

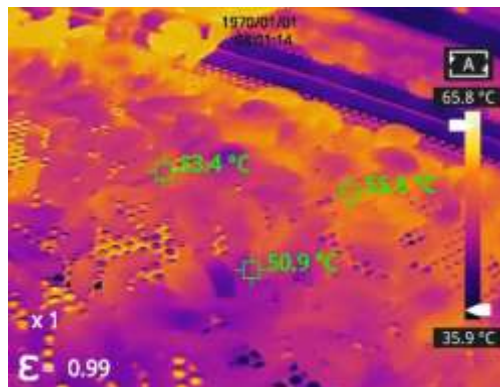


Measurements

Sp1	53.4°C
Sp2	55.5°C
Sp3	50.9°C

Parameters

Emissivity	1.00
Temp.	65.8°C

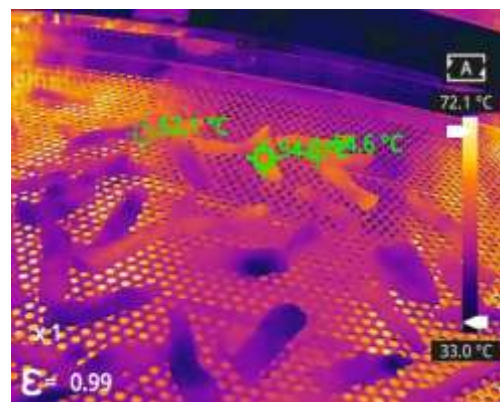


Measurements

Sp1	52.1°C
Sp2	54.6°C
Sp3	54.6°C

Parameters

Emissivity	1.00
Temp.	72.1°C





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## Moisture Analysis Report:

Drying started	
Date :	17-04-2023
Time :	13:23:25
Model :	AGS200
Serial number :	130
Drying parameters	
Product :	0
Drying temperature :	105.0 °C
Drying profile :	standard
Mode :	Short mode
Calculation :	$((m_0 - m) / m_0) \times 100\%$
Finished :	3 samples
Initial weight :	1.500 g
Final weight :	0.573 g
Drying time :	00:55:20s
Sampling interval :	20 sec
Moisture :	61.9 %
NOTE	Initial moisture Sapota.
The analysis performed by:	
Signature	<i>Anand</i>

Drying started	
Date :	19-04-2023
Time :	13:02:50
Model :	AGS200
Serial number :	130
Drying parameters	
Product :	0
Drying temperature :	105.0 °C
Drying profile :	standard
Mode :	Short mode
Calculation :	$((m_0 - m) / m_0) \times 100\%$
Finished :	3 samples
Initial weight :	1.194 g
Final weight :	1.137 g
Drying time :	00:12:20s
Sampling interval :	20 sec
Moisture :	4.6 %
NOTE	After 8 hours at 55°C final moisture Sapota (T1-a)
The analysis performed by:	
Signature	<i>Anand</i>




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Drying started	
Date :	20-06-2023
Time :	13:54:50
Model :	AGS200
Serial number :	138
Drying parameters	
Product :	0
Drying temperature :	105.0 °C
Drying profile :	standard
Mode :	Short mode
Calculation :	$((m0-m)/m0)*100\%$
Finished :	3 samples
Initial weight :	1.121 g
Final weight :	1.111 g
Drying time :	00:01:40s
Sampling interval :	20 sec
Moisture :	0.9 %
NOTE	After 1 hour at 60°C final moisture Sapota (T <sub>2</sub> -b)
The analysis performed by:	
Signature	

Drying started	
Date :	20-06-2023
Time :	14:06:47
Model :	AGS200
Serial number :	138
Drying parameters	
Product :	0
Drying temperature :	105.0 °C
Drying profile :	standard
Mode :	Short mode
Calculation :	$((m0-m)/m0)*100\%$
Finished :	3 samples
Initial weight :	1.478 g
Final weight :	1.347 g
Drying time :	00:10:00s
Sampling interval :	20 sec
Moisture :	10.1 %
NOTE	(T <sub>2</sub> -b) grind powder final moisture
The analysis performed by:	
Signature	





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Drying started	Drying started
Date : 15-06-2023	Date : 15-06-2023
Time : 13:28:43	Time : 11:51:54
Model : AGC200	Model : AGC200
Serial number : 138	Serial number : 138
Drying parameters	
Product : 0	Product : 0
Drying temperature : 105.0 °C	Drying temperature : 105.0 °C
Drying profile : standard	Drying profile : standard
Mode : Short mode	Mode : Short mode
Calculation : $((mD-m)/mD)*100\%$	Calculation : $((mD-m)/mD)*100\%$
Finished : 3 samples	Finished : 3 samples
Initial weight : 1.506 g	Initial weight : 1.158 g
Final weight : 1.320 g	Final weight : 1.116 g
Drying time : 00:03:40s	Drying time : 00:03:20s
Sampling interval : 20 sec	Sampling interval : 20 sec
Moisture : 12.4 %	Moisture : 3.6 %
NOTE After 8 hours at 55°C Grind powder sapota (T <sub>1</sub> -a)	NOTE Grind powder at 60°C for 20 mins.
The analysis performed by:	
Signature:	Signature:



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Drying started	
Date	17-06-2023
Time	14:37:30
Model	AGS200
Serial number	138
Drying parameters	
Product	0
Drying temperature	105.0 °C
Drying profile	standard
Mode	Short mode
Calculation	$((m_0 - m) / m_0) \times 100\%$
Finished	time over
Initial weight	1.636 g
Final weight	0.522 g
Drying time	01:00:00s
Sampling interval	20 sec
Moisture	68.1 %
NOTE	Initial moisture Jackfruit
The analysis performed by:	
Signature	<i>Aravali</i>

Drying started	
Date	19-06-2023
Time	13:08:33
Model	AGS200
Serial number	138
Drying parameters	
Product	0
Drying temperature	105.0 °C
Drying profile	standard
Mode	Short mode
Calculation	$((m_0 - m) / m_0) \times 100\%$
Finished	3 samples
Initial weight	1.116 g
Final weight	1.089 g
Drying time	00:05:40s
Sampling interval	20 sec
Moisture	2.4 %
NOTE	Final moisture Jackfruit
The analysis performed by:	
Signature	<i>Aravali</i>



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### Observations:

The heating behavior of Sapota & Jackfruit was investigated under the Convection 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 Sapota dried with lumpy powder formation and Jackfruit dried with a chewy texture. The grind powder treated and formed into a fine powder with desired moisture content. Also, the dehydrated sapota was treated further and a slightly free-flowing grainy texture powder was achieved.

**Ms. Sayali Asole**  
( Tested By )