KERONE

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In AssociationWith

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Kerone Research & Development Centre (KRDC),
B/47, Addl. MIDC. Anand Nagar, Ambernath (East), Thane- 421 506, India
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Batch Horizontal Convection Heat Treatment for Drying of Cardamom.

ISO 9001-2008 | ISO 9001-2015 | EMS 14001 | OHSAS 18001
In Association with SVCH-Technologii, Moscow (Russia)

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Customer :	**M/s. OOM PLANTATION**
Process :	**Batch Horizontal Convection Heat Treatment for Drying of Cardamom**

TEST REPORT No: 47/KRDC/LAB/02 Mum 02/09/2021

Date Sample reception : 29/08/2021
ID : 47/LAB/02

SAMPLE DESCRIPTION:

Sampling : As Requested
Sample Condition : Acceptable
Quantity : Around 1kg.
Samples opening date : 29/08/2021
Product : Cardamom
Start Date test : 01/09/2021
End Date test : 02/09/2021

LABORATORY EXPERIMENTAL SETUP:

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LAB BATCH CONVECTION HEATING SYSTEM SPECIFICATIONS:

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

ENVIRONMENT-LABORATORY AMBIENT CONDITIONS:

Temperature (^oC)	27.5^oC (±5^oC)
Humidity (%)	≤70% 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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EQUIPMENTS USED:

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

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SAMPLE PREPARATION AND METHOD/PROCEDURE:

The experiment has been performed on cardamom to speed up the drying rate. For this experimental run, given sample has been kept on a perforated tray and then placed in Batch Horizontal Convection Oven at certain temperature and time cycle. Observations are made on the basis of final moisture content of sample, weight and appearance of product.

ANALYTICAL RESULTS:

Initial Wt. of cardamom- 151g

Initial moisture – 86%

Setting Temperature: (45-50) °C

Sr. No	Cycle Time (Hrs.)	Process Temp. (°C)	Product Temp. (°C)	Remarks, if any
1	After 2 Hr	45°C	(40-42)°C	Drying starts
2	After 4 Hr	45°C	(40-44)°C	Drying continues
3	After 6 Hr	50°C	(44-48)°C	Drying continues
4	After 8 Hr	50°C	(44-49)°C	Dried as desired

Total Time cycle: 8Hrs.

Final Weight: 31 g

Final Moisture content: 9.3 %

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AFTER PICTURES OF TREATED SPECIMEN SAMPLE:

a) **UNTREATED**

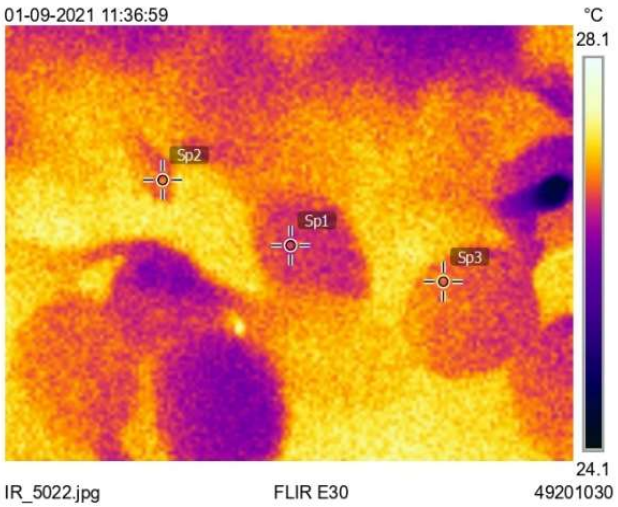
b) **TREATED**

THERMAL ANALYSIS REPORTS:

Before Treatment:

Measurements	
Sp1	26.8 °C
Sp2	27.0 °C
Sp3	26.7 °C

Parameters	
Emissivity	0.95
Refl. temp.	20 °C



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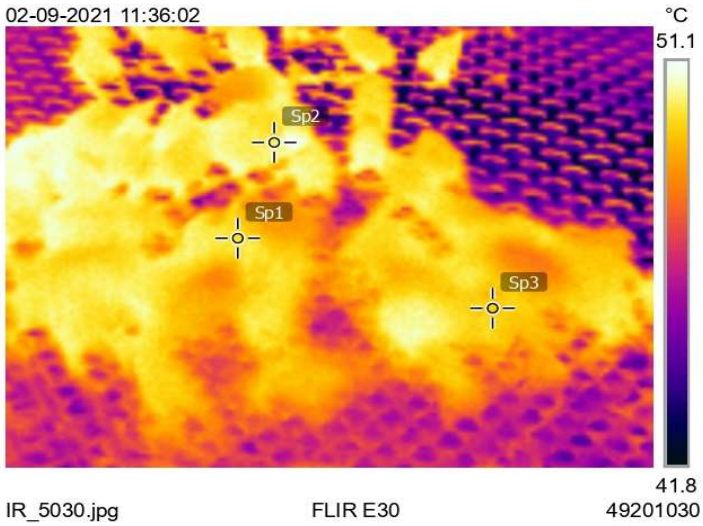
After Treatment:

Measurements	
Sp1	49.9 °C
Sp2	50.2 °C
Sp3	49.6 °C
Parameters	
Emissivity	0.95
Refl. temp.	20 °C



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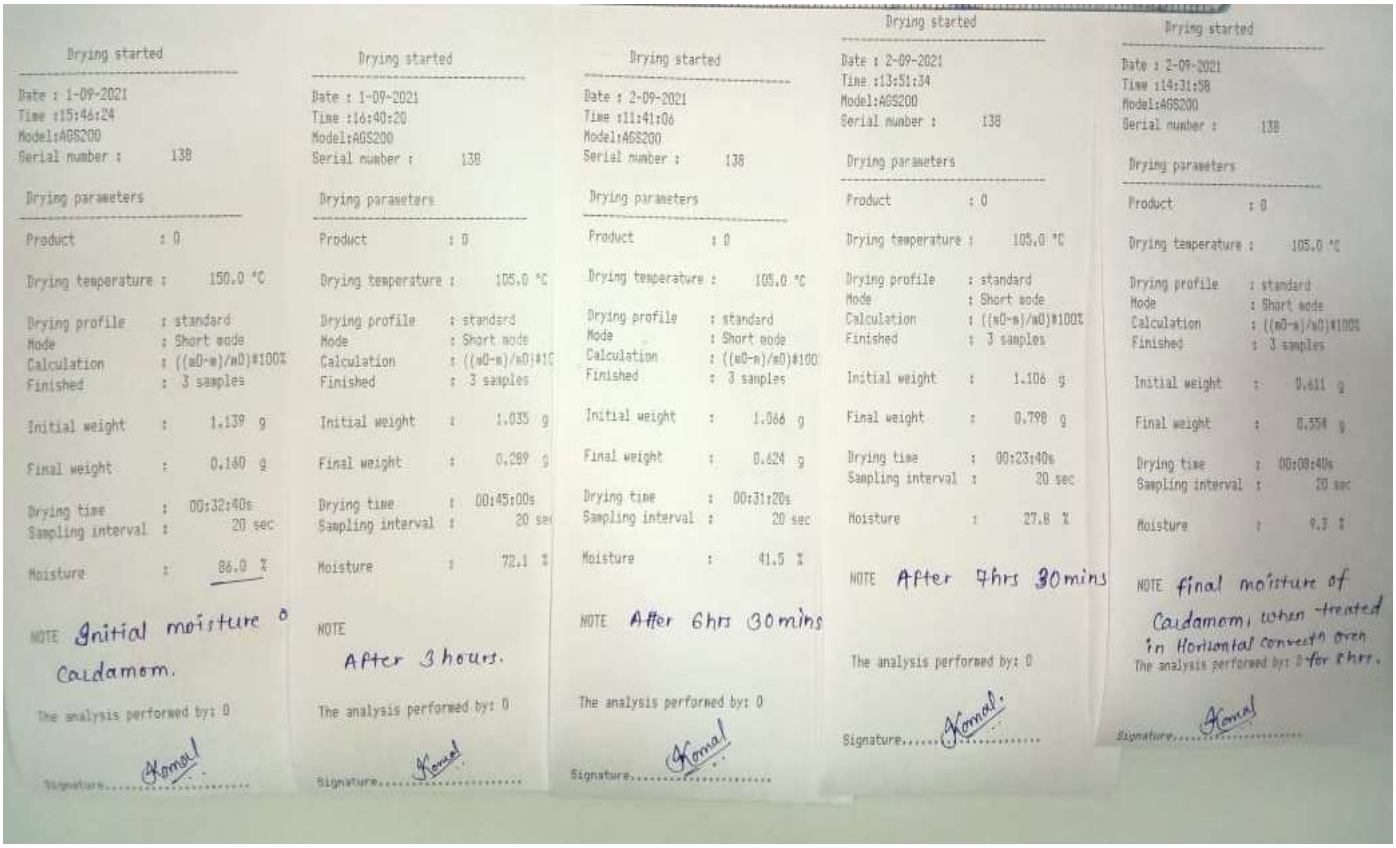
MOISTURE ANALYSIS REPORTS:



Drying started
Date : 1-09-2021
Time :15:46:24
Model:AGS200
Serial number : 138
Drying parameters
Product : 0
Drying temperature : 150.0 °C
Drying profile : standard
Mode : Short mode
Calculation : ((m0-m)/m0)*100%
Finished : 3 samples
Initial weight : 1.139 g
Final weight : 0.160 g
Drying time : 00:32:40s
Sampling interval : 20 sec
Moisture : 86.0 %
NOTE Initial moisture of Cardamom.
The analysis performed by: 0
Signature.....

Drying started
Date : 1-09-2021
Time :16:40:20
Model:AGS200
Serial number : 138
Drying parameters
Product : 0
Drying temperature : 105.0 °C
Drying profile : standard
Mode : Short mode
Calculation : ((m0-m)/m0)*10
Finished : 3 samples
Initial weight : 1.035 g
Final weight : 0.289 g
Drying time : 00:45:00s
Sampling interval : 20 sec
Moisture : 72.1 %
NOTE After 3 hours.
The analysis performed by: 0
Signature.....

Drying started
Date : 2-09-2021
Time :11:41:06
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 : 1.066 g
Final weight : 0.624 g
Drying time : 00:31:20s
Sampling interval : 20 sec
Moisture : 41.5 %
NOTE After 6hrs 30mins
The analysis performed by: 0
Signature.....

Drying started
Date : 2-09-2021
Time :13:51:34
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 : 1.106 g
Final weight : 0.798 g
Drying time : 00:23:40s
Sampling interval : 20 sec
Moisture : 27.8 %
NOTE After 4hrs 30mins
The analysis performed by: 0
Signature.....

Drying started
Date : 2-09-2021
Time :14:31:58
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 : 0.611 g
Final weight : 0.554 g
Drying time : 00:08:40s
Sampling interval : 20 sec
Moisture : 9.3 %
NOTE final moisture of Cardamom, when treated in Horizontal convection oven for 8hrs.
The analysis performed by: 0
Signature.....

OBSERVATION:

The drying of Cardamom has been investigated under the horizontal Convection heating system. The drying rate is found to be increasing with respect to increase in time. It has been found that the product's weight decreases with respect to increase in setting temperature. As per physical investigation, it has been observed that product is dried without any burns. Also, colour of the product is retained. However aroma reduced.

Komal

Ms. Komal Ingle
(Tested By)