

## TABLE OF CONTENTS

Chapter	Name	Page. No.
1	Introduction	1-3
2	Review of Literature	4-9
3	Materials and Methods	10-25
3.1	Microwave vacuum drying	10-18
3.1.1	Sample Preparation	10-11
3.1.2	Drying Equipment used	11
3.1.3	Experimental Design	11-12
3.1.4	Experimental procedure	12-18
3.2	Effective moisture diffusivity in bael ( <i>Aegle marmelos</i> ) pulp during microwave vacuum drying	19-22
3.3	Study of the adsorption isotherm of bael powder	23-24
4.	Results and Discussions	25-41
4.1	Microwave vacuum drying of bael ( <i>Aegle marmelos</i> )	25-35
4.2	Effective moisture diffusivity of bael ( <i>Aegle marmelos</i> ) pulp by microwave vacuum drying	36-38
4.3	Adsorption isotherms of bael ( <i>Aegle marmelos</i> ) powder	39-41
5	Summary and conclusions	42-43
6	References	44-48

## LIST OF TABLES

Sl.No.	Title of the Table	Page No.
1	<b>Table 3.1.1</b> Tentative values of the independent variables	12
2	<b>Table 3.2.1</b> Different combinations of power and vacuum levels for the set of drying experiments	19
3	<b>Table 3.3.1</b> Water activity of the saturated salt solutions at 40°C	23
4	<b>Table 4.1.1</b> Experimental design and data for microwave vacuum drying of bael ( <i>Aegle marmelos</i> )	26
5	<b>Table 4.1.2</b> Relative influence of the coded values of independent parameters on bulk density of bael ( <i>Aegle marmelos</i> ) powder	28
6	<b>Table 4.1.3</b> Relative influence of the coded values of independent parameters on solubility of bael ( <i>Aegle marmelos</i> ) powder	30
7	<b>Table 4.1.4</b> Relative influence of the coded values of independent parameters on hygroscopicity of bael ( <i>Aegle marmelos</i> ) powder	31
8	<b>Table 4.1.5</b> Relative influence of the coded values of independent parameters on color difference of bael ( <i>Aegle marmelos</i> ) powder	33
9	<b>Table 4.1.6</b> Optimized parameters of microwave vacuum drying for making bael ( <i>Aegle marmelos</i> )	35
9	<b>Table 4.2.1</b> Average Values of Effective moisture diffusivity for different power and vacuum levels	36
10	<b>Table 4.2.2</b> Regression coefficients of polynomial relationship between effective moisture diffusivity and average moisture content at different power and vacuum levels	37
11	<b>Table 4.3.1</b> EMC of the samples depending on different salts	39
12	<b>Table 4.3.2</b> Constants of Different Models Fitted	39

## LIST OF FIGURES

SL. No.		Page No.
1.	Fig. 3.1 Fresh Bael ( <i>Aegle marmelos</i> ) pulp	10
2.	Fig. 3.2 Bael ( <i>Aegle marmelos</i> ) pulp mixed with maltodextrin (Drying sample)	10
3.	Fig. 3.3 Dried sample	11
4.	Fig. 3.4 Bael ( <i>Aegle marmelos</i> ) powder	11
5.	Fig. 3.5 Microwave vacuum dryer	11
6.	Fig. 4.1. (a). Bulk density w.r.t. vacuum at constant power	28
7.	Fig. 4.1. (b). Bulk density w.r.t. power at constant vacuum	29
8.	Fig. 4.2 (a) Solubility w.r.t. vacuum at constant power	30
9.	Fig. 4.2(b). Solubility w.r.t. power at constant vacuum	31
10.	Fig. 4.3 (a). Hygroscopicity w.r.t. vacuum at constant power	32
11.	Fig. 4.3 (b). Hygroscopicity w.r.t. power at constant vacuum	32
12.	Fig. 4.4 (a). Color difference w.r.t. vacuum at constant power	34
13.	Fig. 4.4 (b). Color difference w.r.t. power at constant vacuum	34
14.	Fig. 4.2.1 (a) Effective moisture diffusivity against vacuum	38
15.	Fig. 4.2 .2 (b) Effective moisture diffusivity against power	38
16.	Fig. 4.3.1 a. Adsorption curve of bael powder at 40°C with Peleg model	40
17.	Fig. 4.3.1 b. Adsorption curve of bael powder at 40°C with GAB model	40
18.	Fig. 4.3.1 b. Adsorption curve of bael powder at 40°C with Anderson model	41
19.	Fig. 4.3.1 b. Adsorption curve of bael powder at 40°C with Oswin model	41

## **LIST OF ABBREVIATION**

d.b.	Dry basis
w.b.	Wet basis
ANN	Artificial neural network
GA	Genetic algorithm
R <sup>2</sup>	Regression coefficient
a <sub>w</sub>	Water activity
SEE	Standard error of estimation
u	Weight of synaptic joint between the input layer and hidden layer
w	Weight of synaptic joint between the hidden layer and output layer
Th	Threshold value of hidden layer neurons
To	Threshold value of output layer neurons
y <sub>h</sub>	Computed output values of hidden layer neurons
y <sub>o</sub>	Computed output values of output layer neurons
e <sub>h</sub>	Back propagation error at hidden layer neuron
e <sub>o</sub>	Back propagation error at output layer neuron