A STUDY OF SUITABILITY OF DIFFERENT PLASTIC FILMS IN PACKAGING OF FOODS.

BY

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M.Sc.

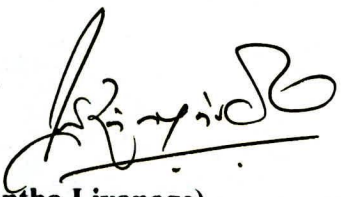
1999

DECLARATION

We certify that the above statement made by the candidate is true and that this thesis is suitable for submission to the University for the purpose of evaluation.

Supervisor  Date 17/11/99

(Prof. Arthur Bamunuararchchi)

Supervisor  Date 17/11/99.

(Dr. Sudantha Liyanage)

A study of suitability of different plastic films in packaging of foods.

R. K. Suresh

Thesis submitted to the University of Sri Jayewardenepura for the award of the degree of Master of Science in Polymer Science and Technology on November, 1999

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ACKNOWLEDGEMENT

I wish to express my sincere gratitude particularly to my supervisor,
Prof. Arthur Bamunuarachchi, the Professor of Applied science,
University of Sri Jaywardenapura for his guidance and advice given to me throughout this study.

I am grateful to my supervisor Dr.Sudantha Liyanage, Co-ordinator of Polymer science and technology for the support given to me.

I wish to express my sincere thank to my superior, Mr. Janaka Goonerwardena,
Chief Executive Officer and staff of Phoenix Aluminium Ltd, Welisara for the support & encouragement given to me to pursue this postgraduate study.

I also thank Selmo (Pvt) Ltd, Wattala for suppling the plastic films.

Finally the assistance given by Mr. Sisira Weerasinghe, Technical Officer of food science laboratory, University of Sri Jaywardenapura, is highly appreciated.

R.K.Suresh

DEDICATION

TO MY DEAREST PARENTS,

As a mark of respect to their sacrifice and life long encouragement for the education of their children.

ABSTRACT

A STUDY OF THE SUITABILITY OF DIFFERENT PLASTIC FILMS IN PACKAGING OF FOODS

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Food packaging has been a rapidly growing technology in recent decades. The greatest technological break through has been in the arena of plastic packaging. In Sri Lanka, a variety & quantity of plastic films are produced and used for packaging of food. In this research study, six plastic films were selected and analysised for suitability in packaging of spices (powdered) and bun. The plastic films selected were Cellophane, Polypropylene(PP), shrink Polypropylene, shrink Poly vinly chloride(PVC), High density polyethylene(HDPE), Low density polyethylene(LDPE).

According to this study, it was found that Cellophane (35 micron) and Polypropylene (35 micron) had a low moisture transfer rate (0.0159 &0.0131g/24h/100cm2 respectively). Even double layer shrink PP(2 x20 micron) and HDPE (2 x 20 micron) had higher moisture transfer rate than Cellophane and Polypropylene. Among the double layered, Cellophane/shrink PP and PP / shrink PVC had low moisture transfer rate.

Curry powder packets placed in air tight containers had less weight gain than packets placed in normal condition. Curry powder packed with PP film had low weight gain and curry powder packed with shrink PVC film had more weight gain comparatively. Chillie powder packets placed in accelerated conditions (100 % Rh) had more weight gain than chillie powder packets placed in normal conditions(85 % Rh). It was observed that chillie powder packet placed in 0 % Rh had weight loss. In all three condition(i.e., 85% , 100%, 0% rh), Polypropylene and Cellophane packets had very low weight gain or weight loss. In accelerated storage condition (100 % Rh), formation of fungus was observed in shrink PVC, HDPE & shrink PP film after 4 weeks of storage.

In determination of the shelf life of bun(wheat floor), it was observed that buns packed in shrink PVC film were in good condition after two weeks time of storage and PP, Cellophane packet were in good condition upto a week of storage only. There were no failures reported in drop test. So all 6 material were physically strong in package of 20g powder.

Based on the above data, it is recommend to use Polypropylene (35 micron) and cellophane (35 micron) for packaging of spices with water activity in the range of 0.60 - 0.72. (I.e., chillie powder, curry powder, turmeric, corriander, cardamon, mustard powder) and it is recommend to use shrink PVC to pack buns.

ABBREVIATION

Common Name	Abbreviation
Modified atmosphere packaging	MAP
Equilibrium relative humidity	ERH
Relative humidity	RH
Water vapour transfer	WVT
Melt index	MI
Water activity	A_w
High density polyethylene	HDPE
Low density polyethylene	LDPE
Polypropylene	PP
Polyvinyl chloride	PVC
Ethylene vinyl acetate	EVA

CHAPTER 1

1.0 INTRODUCTION

Packaging is the largest user of plastic, accounting for more than one-fourth of all plastic produced. In recent year, plastic has been used in many food-packaging applications which were once dominated by the more traditional packaging materials – glass, metals, and paper. The term plastic is used rather loosely to describe a family of extra ordinary varied and complex polymers. The raw material for synthetic plastic are petroleum, natural gas, and coal. [1]They are formed by polymerization process – creating chemical linkage between many small repeated molecular units to form very large molecules or macro molecules.

Many foods need a packaging material that will act as a barrier for the passage of gases, moisture and flavour. Plastic materials have many properties that have made them extremely useful in the field of food packaging. These include strength, flexibility, heat sealability and transparency. [1]But plastics have one limitation compared with glass or metal which has militated against their even wider use in food packaging.
They are not 100 percent barrier to moisture vapour and gases and so there have been limitations on the shelf life of products susceptible to deterioration by oxygen or flavour pick up or by flavour loss. [1]Over the years there has been a great deal of development in the area of improving barrier properties and in making the best use of improving barrier properties and in making the best use of available material by combining two or more polymers.