CHAPTER I

INTRODUCTION

1.1 General Introduction

Veneers are thin sheets or layers of wood that when glued together in successive layers form plywood. The plywood is made from odd-numbered layers of veneers placed with the grains of adjacent layers arrange at right angles; therefore, the layers reinforce each other (Baker et al., 1974). Veneers are known to exist in Egypt for more than four thousand years (Baker et al., 1974). Nowadays, they are used for adding values and beauty to less valuable woods. In order to preserve valuable woods, the rare, beautiful and expensive veneers are used only as face veneers, the inner plies and the back veneers of plywood can be of wood of less quality and beauty (Baker et al., 1974).

Due to the increasing demand for more valuable woods during the 20^{th} and 21^{st} century that lead to global deforestation, many rare and precious woods have been diminished. In Thailand, teak has been diminished without adequate reforestation as well. Thai teak has been known for its beautiful color and texture and its resistance to termites. Today beautiful teaks are rare. Commercially grown teak has helped replenished the demand for natural teak. However, teaks from different forests or tree farms are differing in their color. Unlike teak grown naturally in the northern mountain natural forest, teak raised in lower area tree farms usually have darker color and more prominent growth rings which is considered low quality and is undesirable.

The lack of good color quality in commercially grown teak has created a demand for color improvement with minimal changing or damaging in its other qualities such as texture and this has become a focus of this study.

1.2 Statement of Problem

In order to improve the color quality of teak veneer from commercially grown teak,

many research questions have been addressed as follows.

1.2.1 What type of processes should be used to improve the color quality of commercially grown teak veneer with minimal change in its texture? Tsai et al. (Tsai et al., 1998) and Mackay et al. (Mackay et al., 1997) stated that lignin is one of the major components in wood. It accounts for 18-36% of drywood weight (Mackay et al., 1997). Tolan et al. (Tolan et al., 1997) indicated that lignin must be removed from pulp to produce white paper. If the process of removal of lignin from teak veneer improves the color quality with minimal change in its texture, the next research question becomes.

1.2.2 Which components should be used to remove lignin from teak veneer? Hampp (Hampp, 1998) stated that many chemical components which include elemental chlorine, chlorine dioxide, hydrogen peroxide and enzymes have been used in lignin removal process in pulps and papers industries. The next research question becomes.

1.2.3 Which combinations and conditions of chemical component should be used to remove lignin from teak veneers?

In this study, research question number 3 is selected for further investigation to improve the color quality of teak veneer from commercially grown teak with minimal change in its texture.

1.3 Scope of Research

1.3.1 Veneers from commercially grown teak are used in this study due to the fact that it is the major supplier of teakwood. Naturally grown teakwood is excluded from this study due to its continued declining in supply in the natural forest of Thailand.

1.3.2 The combination of hydrogen peroxide and enzymes are used to improve color quality of teak veneer in this study. Elemental chlorine, chlorine containing compounds and other toxic chemical are excluded from this study despite of their high efficiency and high success in removing lignin in pulps and paper industries due to the fact that they produce toxic waste.

1.3.3 The goal of this research is not to remove all lignin in teak veneer but only the surface lignin.

1.3.4 The condition to be determined is concentrations and times.

1.3.5 Laboratory experiments are used to provide controlled environment in order to determine the combinations and conditions of hydrogen peroxide and enzymes used to remove lignin from teak veneer.

1.4 Objective

To determine the suitable combination and condition for enzymes and hydrogen peroxide in removing lignin from teak veneer.

1.5 Significance of Research

No one, to our knowledge, has yet removed lignin from teak veneer. Previous researches have concentrated on techniques that apply to pulp and paper industry. Most of the methods employ chemicals or chemical-enzymes combination in removing lignin. We modify some of these methods to apply to veneers. The most effective method in removing lignin is the use of elemental chlorine, which is both effective and economically advantageous (Hampp, 1998), but it releases toxic waste. Much effort has been put into finding a better way to remove lignin without producing or with producing less toxic waste. The purpose of using enzymes is to reduce the amount of chemicals used and pollution produced by delignification process as much as possible. Delignification process will reduce lignin content to a more desirable one. Doing so will upgrade the plywood product remarkably, thus will help our decorating plywood industry since quality plywood can then be exported which will bring income to our country. Another benefit is that when we can improve the quality of farm-raised teak to match that of natural grown one, we can then reduce the demand

for natural teak, thus will help reducing illegal logging of natural teak, our national resource.

Our research with teak can be applied to other wood species. This mean value added for many other wood species. It can also be applied to other wood products that require delignification, such as paper.

1.6 Organization of the Dissertation

This dissertation is organized into six chapters as follows.

Chapter I presents general introduction, statement of problem, scope of research, objectives and significant of this research.

Chapter II presents literature review relevant to this study.

Chapter III presents research model, defines dependent and independent variables, and presents selected research question to be studied.

Chapter IV presents research method, procedure in selecting and preparing veneer samples, experiments, experimental procedure and statistical analysis method.

Chapter V presents data analysis method and results

Chapter VI presents brief review of chapter I to IV, conclusion and recommendation.