

MINISTRY OF AGRICULTURE AND RURAL DEVELOPMENT

VIETNAM NATIONAL UNIVERSITY OF FORESTRY



STUDENT THESIS

Title:

**TAXONOMY AND CONSERVATION OF JUGLANDACEAE IN CUC
PHUONG NATIONAL PARK**

Major: Natural Resources Management

Code: D850101

Faculty: Forest Resources and Environmental Management

Supervisor: Assoc. Prof. Hoang Van Sam

Student: Dao Thi Duong

Student ID: 1453090979

Class: K59B Natural Resources Management

Course: 2014 - 2018

Advanced Education Program

Developed in collaboration with Colorado State University, USA

Ha Noi, 2018

Table of Contents

ACRONYMS

LIST OF FIGURE

LIST OF TABLE

ACKNOWLEDGMENT

ABSTRACT

I. INTRODUCTION	1
II. OVERVIEW OF THE RESEARCH	3
1.1. Worldwide research.....	3
1.2 Research in Vietnam.....	4
1.3 Research in Cuc Phuong Park	6
III. GOAL AND OBJECTIVES	8
2.1 Goal	8
2.2 Objectives	8
IV. RESEARCH AREA	9
4.1 Study area:	9
4.1.2 Natural resources	12
4.1.2 Economic - Social conditions	13
V. METHODOLOGIES	15
5.1. Secondary data collection.....	15
5.2. Field Investigation Method.....	15
5.3. Non-Field Investigation Method	19
VI. RESULTS AND DISCUSSION	23
6.1 Species composition of the family Juglandaceae at Cuc Phuong National Forest.....	23
6.2 Classification Key.....	25
6.3. Some basic biological and ecological characteristics of Junglandace in CPNP.....	27

6.3.1 <i>Pteracarya tonkinensis</i> Dode	27
6.3.2 <i>Alfaroa roxburghiana</i> (Lindl. ex Wall.) Iljinsk.....	30
6.3.3 <i>Platycarya strobilacea</i> Siebold & Zucc.....	33
6.3.4. <i>Carya sinensis</i> Dode	35
6.4 Current status of conservation and development of Juglandaceae in Cuc Phuong National Park.....	51
6.4.1 The researches	51
6.4.2 Management and conservation of resources.....	51
6.4.3 Assessment the individual's changes of Juglandaceae	53
6.5. Solution for conservation solutions for Juglandaceae species in Cuc Phuong National Park.....	55
6.5.1 Technical Solutions	55
6.5.2 Social-economic solutions.....	56
6.5.3 Solutions of mechanism and policies to attract investment.....	57
6.5.4 Completing the institution, policy, and law.....	58
VII. CONCLUSION AND RECOMMENDATION.....	59
7.1. Conclusion.....	59
7.2 Recommendations	60
REFERENCES	61
APPENDICES.....	63

ACRONYMS

CPNP	Cuc Phuong National Park
IUCN	International Union for Conservation of Nature
EN	Endangered
Carya	Carya sinensis
H_{vn}	Height
H_{dc}	Height under canopy
D_{1.3}	Diameter at breast height
D_{crown}	Crown diameter

LIST OF FIGURE

Figure 4.1: Cuc Phuong National Park.....	9
Figure 4.2: Location of Cuc Phuong National Park in the system of nature reserves of Vietnam.....	11
Figure 5.1: Plots in transect lines.....	16
Figure 6.1: Distribution of <i>Carya sinensis</i> map	24
Figure 6.2: Regeneration of <i>Carya sinensis</i>	39

LIST OF TABLE

Table 6.1: Species composition of Juglandaceae	23
Table 6.2: The distribution of <i>Carya sinensis</i> Dode	25
Table 6.3: The results of stem investigation.....	36
Table 6.4: The size of leaflet in different position in compound leaf	37
Table 6.5: The size of leaflet in different position of compound leaves	40
Table 6.6: The number of regeneration in natural and plantation forest	40
Table 6.7 Regeneration in three locations	41
Table 6.8: Some criteria's of species belong to regeneration composition	43
Table 6.9: Stand volume in nine plots	44
Table 6.10: Volume, Diameter of canopy, the number of individuals of 6 species	45
Table 6.11: Partners of <i>Carya</i> trees in plots.....	47
Table 6.12: The percentage of canopy cover in nine plots	49
Table 6.13: Investigation shrub and herb species.....	50
Table 6. 14: Assess the change level of species belong to Juglandaceae in Cuc Phuong National Park over past 3 years	54

ACKNOWLEDGMENT

First of all, I am grateful to teachers of Vietnam National University of Forestry for supporting us to complete this research. I am deeply indebted to our supervisor Assoc. Prof. Hoang Van Sam who always supported us and gave motives and suggested valuable ideas to help us to accomplish this thesis. I would like to acknowledge all the members of Experiments and Practicing Center of Forest Resource and Environment Management Faculty for facilitating necessary equipment and providing us documents. I take this opportunity to record our sincere thanks to all the members of the Faculty of Forest Resource and Environment Management for their help and encouragement. Thank Cuc Phuong National Park, Ninh Binh province management and local people for helping us during our researching time Cuc Phuong, Nho Quan, Ninh Binh.

Hanoi, September 27th, 2018

Dao Thi Duong

ABSTRACT

This study found out information about diversity and conservation status of Juglandaceae in Cuc Phuong National Park. Based on observation and measurements of general characters, results indicated that there were 4 walnut species distributed in Cuc Phuong National Park. They are *Alfaroa roxburghiana* (Lindl. ex Wall.) Iljinsk, *Carya sinensis* Dode & Zucc, *Platycarya strobilacea* Siebold, *Pteracarya tonkinensis* Dode. Of them, *Carya sinensis* Dode & Zucc listed in IUCN Red List, 2018 and Viet Nam Red Data Book, 2007. Besides, based on the morphology of each species and Dichotomous Key, I established Classification Key and species of four species of the walnut family. In addition, this research also provides the distribution, morphology and ecological character of the species. Last but not least, some solutions were proposed to preserve and develop walnut species especially *Carya sinensis* Dode & Zucc in the study site.

I. INTRODUCTION

Vietnam is one of the centers of biodiversity of the world (Phuong, 1995). From the results of scientific research on Vietnamese, many scientists at home and abroad have recognized that. This nation is one of 10 countries in Asia with high biodiversity due to the combination of many elements (Phuong, 1995).

However, forest resources in Vietnam have been seriously degraded due to various reasons such as the growing demand for forest products, the conversion of land use purpose, over-exploitation, improper planning, war (Linh, 2016). According to data published by Maurand P. in the project "Indochinese Forestry", in 1943 Vietnam had about 14.3 million ha of natural forest with 43.7% of its land area. The process of deforestation occurred continuously from 1943 to the early 1990s, especially since 1976-1990 the area of natural forest decreased sharply, in only 14 years the forest area decreased by 2.7 million ha, The annual loss of nearly 190,000 ha (1.7% / year) and the forest area decreased to the lowest level of 9.2 million ha with a coverage of 27.8% in 1990 (Tran Van Con, 2001). Deforestation also means a loss of genetic diversity in plants and animals. Forests are currently concentrated only in protected areas and national parks.

Cuc Phuong National Park belongs to the National Park system in Vietnam, was established in 1962 under decision No Dec 72/TTg of the Prime Minister, and dated 7 July 1962. This decision decreed the establishment of a 25,000 ha protected forest (MARD 1997). Cuc Phuong National Park is the first and the largest national park of Vietnam lies along the borders of three provinces of North Vietnam including Ninh Binh, Hoa Binh, Thanh Hoa. There are an estimated 2,000 different species of flora and the 450 species fauna account for 38% of national fauna (Linh, 2016). According to the survey of Cuc Phuong national park in 2008, the flora is quite a treasure with a wide variety with 2,234 species of 917 genera, 231 families of 7 orders. Many of them are of high value: 430 medicinal plant species, 229 edible plant species, 240 species can be used as medicine,

dye, 137 species can provide tannin, etc; 13 species are listed in Vietnam Red Data Book 2000 and IUCN Red List 2004. Some outstanding species are *Dalbergia tonkinensis*, *Parashorea chinensis*, *Erythrophloeum fordii*, and *Nageia ffeyri*, *Carya sinensis*.

Cuc Phuong National Park has a rich flora with tropical rainforest, and there are many studies on the area. However, studies that classify and conserve them to identify the status and distribution of non-native species, particularly those of high economic value in conservation, are limited and undesirable. Besides, the over-exploited Juglandaceae species of local peoples that lead to the decrease of walnut species in Cuc Phuong National Park. They used wood to build houses, and make the furniture. Seeds of some species are valuable foods with high nutritional contents and oil extraction (*Carya sinensis* Dode). The leaves of some species are toxic to insects and fish, so they can be used as pesticides (*Alfaroa roxburghiana* (Lindl. ex Wall.) Iljinsk, *Pterocarya tonkinensis* Dode). The peels of fruits are used to produce activated carbon. Some parts of the tree such as bark, root bark, leaf, and seed and fruit shells are used as traditional medicines. Therefore, some species are reduced due to narrow distribution, small numbers of individuals and listed Vietnam Red Data Book 2007 and IUCN Red List 2018 such as *Carya sinensis* Dode is a native species of Vietnam, facing a number of threats, including loss of habitat and distribution without focusing, overexploitation, low natural regeneration.

From the above-mentioned reality, I chose the subject ***“Taxonomy and Conservation of Juglandaceae in Cuc Phuong National Park”*** To provide databases on plant diversity, as a basis for the conservation and development of biological resources at the national park.