

**A STUDY OF PHYTOCHEMICAL CONSTITUENTS
AND COLOURING MATTER FROM THE BARK OF
Acacia leucophloea Willd.
(Hta-naun)**

Thazin Win*

Abstract

The plant *Acacia leucophloea* Willd (Hta-naun) contains the potent compounds. In this research paper, *Acacia leucophloea* Willd. was selected for chemical analysis. The sample was collected from Nyaung-Oo Township, Mandalay Region. Preliminary phytochemical screenings of the crude extract were done. The bark of Hta-naun contains alkaloid, glycoside, saponin, phenolic compound, polyphenol, flavonoid, sugar, steroid and terpene. In addition, colouring pigment present in the bark sample was studied. It was also studied by dyeing with cotton. Different colours were exhibited depending on the mordant used. The present work shows that the bark of Hta-naun can be used as dyes for colouring textiles.

Key words: phytochemical screening, colouring pigment, mordant

Introduction

Many of thousands of plant species growing throughout the world have medicinal uses, containing active constituents. Medicinal plants are the back bone of traditional medicine. They are used both in herbal and conventional medicine. Most Myanmar traditional drugs containing the traditional medicine formulations are made up of herbal crude drugs. Many of the active ingredients in chemically manufactured drugs were originally derived from plant compounds. Also, in developing countries, medicinal plants are still being used on a regular basis.

Also in Myanmar, medicinal plants are abundant. Most people use the traditional medicinal plants to cure diseases and to relieve pain. The study of the indigenous medicinal plants and their usage in therapy play a very important role. Herb plants contain a variety of chemical substances that act upon the body. Today, scientist has isolated many compounds from the large number of herbs and their healiry components have been extracted and analyzed.

Acacia leucophloea Willd., locally known as Hta-naun, belongs to the family Fabaceae. The plant Hta-naun contains the potent compounds. Hta-naun has been used for centuries as a medicinal plant. The bark is used in traditional medicine for the treatment of skin diseases (leprosy), dry cough, diabetes and fever. The stem and root produce a gum which is used for medicinal purposes. The germinated seeds are cooked and eaten as a vegetable. The wood is used for indoor construction and furniture. The leaves yield a black dye. The bark produces a reddish- brown substance used to manufacture dyes and tannins.

Aim and Objectives

Aim

- to study phytochemical constituents and colouring matter from the bark of *Acacia leucophloea* Willd. (Hta-naun).

Objectives

- To study literature survey of selected indigenous medicinal plant
- To examine the phytochemical constituents of Hta-naun
- To choose the method of dye extraction

* Lecturer, Dr, Department of Chemistry, Yadanabon University

- To extract the natural dye by using aqueous method
- To dye the cotton cloth both with and without mordants

Botanical Description

Family name	-	Fabaceae
Botanical name	-	<i>Acacia leucophloea</i> Willd.
English name	-	White-bark acacia
Myanmar name	-	Hta-naun
Part used	-	Bark



Figure (1) The tree and bark of Hta-naun

Materials and Methods

Commercial and analytical grade reagents and solvents were used in this research work. Phytochemical tests were done on crude extract by using general procedure. The dye was extracted by using three methods. There are alcoholic, aqueous and other solvents extraction methods.

Sample Collection

The bark of *Acacia leucophloea* Willd. (Hta-naun) was collected from Amarapura Township, Mandalay Region. The bark of *Acacia leucophloea* Willd. (Hta-naun) was cut into small pieces and allowed to air dry well. The air dried sample was stored in a well-stoppered bottle and used throughout the experiment.

Preliminary Phytochemical Examination of the Bark of *Acacia leucophloea* Willd.

The preliminary phytochemical tests were done on the general methods of the bark of *Acacia leucophloea* Willd.

Extraction of Crude Tannins

10 grams of sample was boiled with 50 mL of distilled water on a water bath for about ten minutes. It was cooled and filtered the solution. The filtrate was added about one gram of solid CaCO_3 and boiled till the tannic acid get precipitated and then filtered. Calcium tannate obtained is hydrolyzed by warming with 3 mL of conc: HCl. The tannic acid obtained is crystallized from water and then weighed. A reddish brown amorphous compound (1.4 g) was obtained and the yield percent was found to be 14% based upon the raw sample.

Methods of Dye Extraction

The dye was extracted by using three methods. They are alcoholic, aqueous and other solvents extraction methods. Alcohol and other solvent extraction gives solid extract and then yield pure dye. The aqueous extraction yields liquid dye. The bark of Hta-naun was slightly soluble in alcohol solution but soluble in aqueous solution. So, the aqueous extraction method was chosen for dye extraction.



Figure (2) Photograph of dye extraction methods

Dye extraction

The Hta-naun bark (10g) was placed in 100 mL distilled water and the extraction process was carried out at a temperature range of 80-85°C for 1 hour. Colouring materials from the bark was extracted for dyeing of the fabric. After the extraction procedure is completed, the bark was taken out from the liquor.

Dyeing Procedure

The extract obtained through above mentioned method was filtered and used for dyeing. Cotton cloth used for dyeing was boiled in 1% Na₂CO₃ solution for 15 minutes to remove starch from the cotton cloth, then washed with cold distilled water. The cotton cloth was then transferred in mordant for 30 minutes followed by treatment in the dye bath for one hour. Effect of dye without mordanting the fabric was also studied. The sun dried cotton cloth was further evaluated for its colour, lightness and wash fastness. Wash fastness was tested by washing with soap water (10% w/v).

Results and Discussion

Phytochemical Screenings of Hta-naun

The phytochemical constituents of the bark of Hta-naun were done and the results are tabulated in Table (1).

Table (1) Preliminary Phytochemical Screenings of the Bark of Hta-naun

No.	Test	Reagent used	Observation	Inference
1.	Alkaloid	(i) Dragendroff's reagent	(i) Orange ppt	+
		(ii) Mayer's reagent	(ii) Cream ppt	+
		(iii) Wagner's reagent	(iii) Reddish brown ppt	
2.	Glycoside	10% lead acetate	White ppt	+
3.	Saponin	H ₂ SO ₄ (conc), CHCl ₃	Frothing	+
4.	Phenolic compound	10% FeCl ₃	Deep blue colour sol ⁿ	+

5.	Polyphenol	1%FeCl ₃ , 1%K ₃ [Fe(CN) ₆]	Greenish blue colour sol ⁿ	+
6.	Flavonoid	Conc: HCl, Mg coil	Pink colour sol ⁿ	+
7.	Sugar	Benedict's solution	Reddish ppt	+
8.	Starch	I ₂ , KI	Intense blue colour sol ⁿ	-
9.	Steroid	CHCl ₃ , H ₂ SO ₄ (conc:)	Green colour sol ⁿ	+
10.	Terpene	CHCl ₃ ,H ₂ SO ₄ (conc:), (CH ₃ CO) ₂ O	Pink colour sol ⁿ	+

From the result of phytochemical tests, the bark of Hta-naun consists of alkaloid, glycoside, saponin, phenolic compound, polyphenol, flavonoid, sugar, steroid and terpene respectively.

According to the dye solution which was extracted from Hta-naun by using different solvents, there is the different colour solutions as in Figure (2). A red coloured dye was obtained from the bark of Hta-naun with the 1 hour extraction. Effect of dye colour and effect of dye both with and without the use of mordant. The dye extraction was boiled for one hour to get colour of dye, gave best colouration and was found to be best extraction method. Pure cotton showed dark yellowish brown colouration without the removal of impurities as in Figure (3). After removing the impurities, the intensity of colour produced on cotton by dyeing without mordanting was found light brown colouration. Cotton developed an attractive red colouration with mordanting (ferrous sulphate). These dyed cotton clothes were described in Figure (4). According to the Figure (3) and Figure (4), aqueous extracted dye was found to be the best colour after removing the impurities.

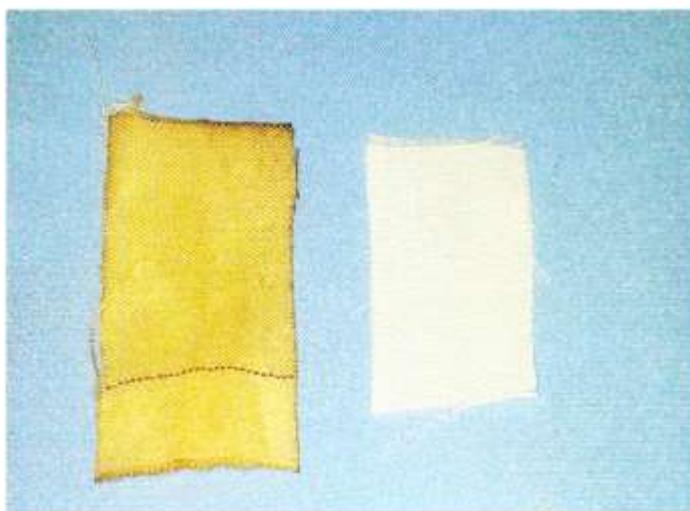
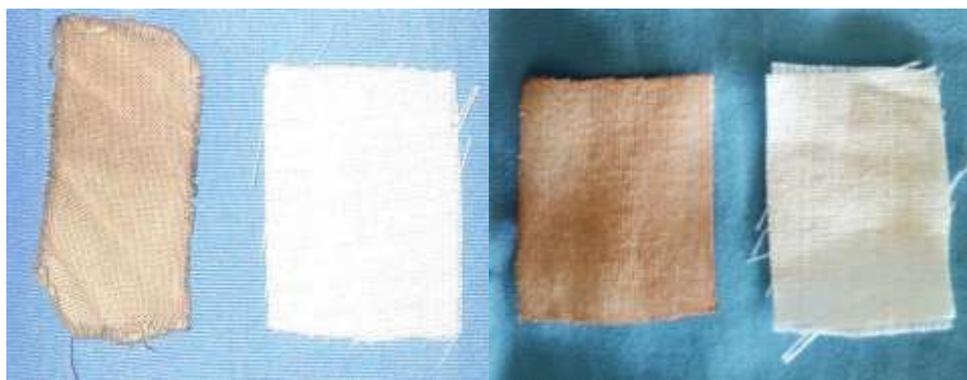


Figure (3) Dyeing without the removal of impurities



(i)

(ii)

(i) dyeing without mordanting

(ii) dyeing with mordanting (Ferrous sulphate)

Figure (4) Application of dye extracted from the bark of Hta-naun with cottons

Conclusion

In this paper, chemical constituents and other functional uses of the bark of Hta-naun were studied. Preliminary phytochemical screenings revealed that alkaloid, glycoside, saponin, sugar, phenolic compound, polyphenol, flavonoid, steroid and terpene are present in the bark of Hta-naun. In addition, crude tannin, reddish brown amorphous compound, (1.4 g, 14%) was extracted from the bark of Hta-naun. The dye solution from the bark of Hta-naun was prepared by using two methods. The aqueous extract of the bark of Hta-naun was applied on cotton clothes both with and without the use of mordant. Aqueous extracted dye was found to be the best colouration. Indigenous traditional knowledge on various resources including dye yielding plants is very essential for rural based development and future bioprospecting.

Acknowledgements

I would like to thank to Dr Mg Mg Naing, Rector, Dr Si Si Khin and Dr Tint Moe Thu Zar, Prorectors, for their kind permission for this research work. I wish to represent my sincere thanks to Dr Hlaing Hlaing Myat, Head and Professor, Department of Chemistry, Yadanabon University, for her permission, kind guidance, invaluable suggestions during my research work.

References

- Ahvenine, R. (1996), "New Approaches in Improving the Shelf Life of Minimally Processed Fruit and Vegetables.", *Trends Food Sic. Technol* , 179-187.
- Encyclopedia of Textiles, (1965), American Fabrics Magazine, Prentice-Hall, Inc.
- Harbone, J.B.,(1998), "Phytochemical Methods; A Guide to modern Techniques of Plant Analysis," 3rd Ed., pp:888
- Lewis, H. W. And Elvin-Lewis M. P. H., (1977), *Medicinal Botany: Plant effecting.*
- Medicinal Plants of Myanmar, (2000), Ministry of Health, Department of Traditional Medicine.
- Nostro A.M.P, GermanoD.,Angelo A., Marino and Cannatelli, (2000), "Extraction methods and biouotograohy for evaluation of medicinal plant antimicrobial activity." *Lett.Aool. Microbial*, 30:379
- U San Lwin, (1993), "Myanmar-English Dictionary", 1st Edition, Department of the Myanmar Language Commission, Ministry of Education, PhololotoPlic. Myanmar

Online Materials

Web-1,<http://www.brncop.org>

Web-2,<http://www.asiapharmaceties.info>

Web-3,<http://www.aiip.info>

Web-4,<http://www.wordagroforestry.org/of/treedb>