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A Study on Dyes Extracted from Natural Pigments of Some Resource Plants in Magway Township

May Than Su¹, Pa Pa Win², Kyaw Swe Lin² and Thida Than²

Abstract

A study on some resource plants in the area of Magway township has been undertaken in the life of applied botany and local need. This study aims to survey the useful plants, which can produce plant dyes. Because most of the chemical dyes are very expensive, some may be poisonous to use. Therefore the plant dyes extracted from the plants collected from our surrounding area give the beneficial interrelationship in the life of the people around the area. Some of these plants are wild and other is cultivated. The distinguished character, importance of vegetable dying plants resultant color intensity depending on the different types of mordant are studied and photograph records have been taken.

Key word: Colourants, Mordant, Natural Dyes Plants.

Introduction

The development of rural area is one of the most essential factors as well as fundamentals for the construction of a developed nation. In the new millennium, demand for the education of the people in the rural area is growing rapidly. In that dynamic situation, for the implementation of education promoting plan in Myanmar, the Ministry of Education is providing the arrangement to enhance the upgrading of socio-economic status of rural people by studying the local needs of a specific area.

In the education sector, the distribution of knowledge concerning the exploitation of plant resources near the rural population in the sustainable manner in an area is very important step in the developmental processes as well as in the practical environmental conservation. Most of the people in the remote area chiefly depend on the resource plants in their daily life with or without knowing the actual values of these resource plants. The local people utilize the plants in various ways. One of the easy usages in the commercial value is to extract the plant-dyes for clothing, cosmetics and food stuff. In the present study, we tried to find out the very basic as well as easy to use methods of extracting plant dyes and ways of application aiming

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to distribute the fundamental data of plant dyes for the local people education program.

Aims and Objectives

- To survey the dye producing plants the better quality of fabrics and clothing in our surrounding.
- To distribute the botanical knowledge for local people in the aspect of food and dyes.
- To share the knowledge concerning the extraction of different colorful dyes and pigments without complex but by easily access from the plants familiar to us.
- To enhance and increase the capacity to exploit the plant products and thereby provide extra income for people in rural area.

Materials and Methods

1. Collections of Dye plants

Dye producing plants in the present study are 28 species belonging to the 23 families. The plants to be used as dye differ according to the plants. The leaf, flower, bark, root and rhizome are used.

2. Equipments

For the extraction of plant, dyes and pigments are very simple and easily accessible kitchenware's such as rice cooker, pressure cooker, steel containers that are used in boiling of plant parts. Others are 400 ml Pyrex glass, beaker, cloth water filter, glass rods and simple laboratory utensils.

3. Extractions of dye liquid

Plant dyes and pigments are extracted by the method of Seiju Yamazak (2000) with some modifications. At times the use of fresh leaves, bark and fruit is recommended to obtain the best color results and should be used immediately after they are gathered. These materials are chopped into fine bits, placed in a pot and boiled. After boiling for 20 minutes, the extract is strained. The dye materials are again put in a pot; water is added and further boiled to obtain the second extract. To obtain the extract, the dye materials are boiled as follows: in the case of leaves, the plant materials is

boiled two times; for bark, flowers, four times, rhizome and roots, six times. The basic objective is to obtain a concentrated extract. However, depending on plant materials used the boiling process can be increased or decreased. When the extract is obtained, it is passed through a silk sieve to remove foreign matter.

Result

1. Scientific name - *Clitoria ternatea* Linn.
- English name - Butterfly Pea
- Myanmar name - Aung-mae- nyo
- Family - Fabaceae (Papilionaceae)
- Part used - Petals

Habit: Perennials, twiner, stem cylindrical.

Uses: Blue dyes obtained from the flowers are used in food processing dye.

2. Scientific name - *Tephrosia purpurea* (Linn.) Pers.
- English name - Indigo
- Myanmar name - Mae- yaing
- Family - Fabaceae (Papilionaceae)
- Part used - Petals

Habit: Annual, erect under shrub, stem cylindrical.

Uses: Indigo has long been famous for its permanency and strength of its bluish purple color, earning the name king of the dyes stuffs. However, it has now been replaced by a synthetic product. In India, indigo is used to dye cloth. The leaves of indigo are used in traditional medicines.

3. Scientific name - *Rosa indica* Linn.
- English name - Rose
- Myanmar name - Hnin-si
- Family - Rosaceae
- Part used - Petals

Habit : Perennial shrubs.

Uses : This is a common ornamental plant. Essential oil contained in petals is used in perfume and cosmetic.

4. Scientific name - *Piper betle* L.
 English name - Betel leaf vine
 Myanmar name - Kun
 Family - Piperaceae
 Part used - Leaves

Habit : Perennial herbs.

Uses : Betel leaves are very useful in traditional medicine. Oil coated leaves are useful dressing for blistered surfaces and ulcers. The essential oil extracted from the leaves is given in catarrhal and pulmonary diseases. In medicine, it is hot, bitter astringent, aromatic, carminatives, and stimulant, aphrodisiac and antiseptic. (Pandey 2000)

5. Scientific name - *Arotocarpus heterophyllus* Lam.
 English name - Jack fruit
 Myanmar name - Pein-ne
 Family - Moraceae
 Part used - Barks

Habit : Perennials, monoecious, ever green trees.

Uses : Heartwood, containing Morin, used for dyeing cotton and silk cloth yellow.

6. Scientific name - *Bauhinia purpurea* L.
 English name - Butter fly tree
 Myanmar name - Swe- daw
 Family - Caesalpiniaceae
 Part used - Flowers

Habit : Small trees.

Uses : The bark is used for extracts of tanning. The plants are used as astringent, carminative, diuretic and diarrhea.

7. Scientific name - *Nymphaea sellata* Willd.
 English name - Blue lotus of India
 Myanmar name - Kyar
 Family - Nymphaeaceae
 Part used - Petals

Habit: Aquatic herbs, the stem rhizome.

Uses : The pollen is popular used in traditional medicines.

8. Scientific name - *Hibiscus rosasinensis* L.
 English name - Rose of China
 Myanmar name - Khaung yan
 Family - Malvaceae
 Part used - Petals

Habit : Small tree.

Uses : A common ornamental shrub. The flowers are used for coloring food red; yield a dark purplish dye, which is used for making shoe-polisher.

9. Scientific name - *Tectona grandis* L.
 English name - Teak
 Myanmar name - kyun
 Family - Verbenaceae
 Part used - Leaves

Habit : Trees, quadrangular stem.

Use : The dye produced from teak is used in dyeing shoot of young bamboo. The bark is a powerful astringent, flowers and seeds are diuretic. The oil extracted from fruits is hair tonic and useful dressing for cure of skin itch.

10. Scientific name - *Lawsonia inermis* L.
 English name - Henna
 Myanmar name - Dan
 Family - Lythraceae
 Part used - Leaves.

Habit: Much branched, glabrous shrub or small tree.

Uses: Henna is one of the oldest cosmetics in the world and its leaves are used to color finger-nails, to paint or decorate the palms of the hands and the soles of the feet and to dye hair. It is of great importance in Islam; where it is used in many ceremonies, especially marriage.

11. Scientific name - *Elipta prostrate* (L.) Hassk
 English name - Trailing Eclipta
 Myanmar name - Kyeik-hman
 Family - Compositae
 Part used - Leaves

Habit : Perennial, erect or procumbent herbs, stem herbaceous.

Uses : The extract of leaves is used as dye for hair. In Ayurvedic medicine, it is to prevent ageing. The plant is employed externally for various skin problems and as a wound healer. (Chevallier, 1996)

12. Scientific name - *Allium cepa* L.
 English name - Onion
 Myanmar name - Kyet- thun- ni
 Family - Alliaceae
 Part used - Outer bark scale

Habit : Annual, herbs, stem underground.

Uses: The narrow fistula leaves (kyet-thun-mate) are used in salads and as flavoring agents in the preparation of curries, stew, soups and pickles. The onion bulbs are used as a treatment of dandruff by rubbing. It is also used in the obstruction of intestines, prolapsed of the anus and as a sedative. (Pandey, 2000)

13. Scientific name - *Annona squamosa* L.
 English name - Custard apple
 Myanmar name - Aw- za
 Family - Annonaceae
 Part used - Leaves

Habit : Perennial, erect, small, stem frequently branched, aromatic wood.

Uses : Aw- za is a traditional belief in Myanmar people that the tender shoot has a great power and successes. Therefore, a shoot of Aw-za wore in the head. The leaves are used as inhalant for dizziness.

14. Scientific name - *Mangifera indica* L. cv. L..
 English name - Mango
 Myanmar name - Tha-yet
 Family - Anacardiaceae
 Part used - Bark

Habit: Evergreen tree, stems woody, cylindrical.

Uses : The bark is used for dyeing cloth. The mango flowers are sometimes used medicinally to cure diarrhea, the seed is medicinal in India, China and Malaysia. It is bitter and acts as febrifuge.

15. Scientific name - *Delonix regia* (Hook.) Raf.
 English name - Golden Mehur
 Myanmar name - Sein-pan-gyi
 Family - Caesalpiniaceae
 Part used - Petals

Habit : Perennial tree.

Uses: It is used for beauty and screening plant. The bark is astringent, carminative, and expectorant in bronchitis, eye diseases.

16. Scientific name - *Curcuma longa* L.
 English name - Turmeric
 Myanmar name - Nanwin, Sa-nwin
 Family - Zingiberaceae
 Part used - Rhizome

Habit: Perennial herbs, rhizomes with distinctive smell and taste.

Uses: The rhizome is bitter, carminative, diuretic, stimulant, externally applied in pains and broken bones. The fresh juice is use in anathematic, aromatic and tonic. The rhizome is used as fumigation, that is, the use of smoke to drive away insects. The whole plant is used in treatment of cough and colds.

17. Scientific name - *Acacia catechu* (L.f.) Willd.
 English name - Cutch
 Myanmar name - Sha
 Family - Mimosaceae
 Part used - Barks

Habit : Perennial large deciduous trees with woody stem and brown bark with thorny branches.

Uses: Cutch is obtained from the heartwood of *Acacia catechu*. Extraction by boiling the heartwood of the tree and used as a source of dye. The purity of tannin is used for chewing with betel.

18. Scientific name - *Samanea saman* (Jacq) Merr.
 English name - Rain tree
 Myanmar name - Kala-kokko, Thinbaw- kokko
 Family - Mimosaceae
 Part used - Bark

Habit: Deciduous, unarmed large tree; with a broadly umbrella shaped, crown.

Uses: The Rain tree is widely cultivated as an ornamental and the bark is used for dyes.

19. Scientific name - *Rhoeo spathacea* (Swartz) Steam.
 English name - Oyster plant
 Myanmar name - Mi-gwin-ga-mon
 Family - Commelinaceae
 Part used - Leaves

Habit : Perennial herbs.

Uses: Fusion for chronic diarrhea such as dysentery. Toasted leaves juice for dysentery take ½ cup 3 times a day.

20. Scientific name - *Aloe vera* L.
 English name - Aloe
 Myanmar name - Sha-zaung-latpet
 Family - Aloaceae
 Part used - Fleshy leaves

Habit: Perennial, erect herbs with very short, underground stem.

Uses: Beauty treatment *Aloe vera* has a long history as a skin lotion. Cleopatra is said to have attributed her beauty to it. Western remedy in the West *Aloe vera* first became popular in the 1950s, when it is an ability to heal burns, in particular, radiation burns, was discovered.

21. Scientific name - *Tamarindus indica* L.
 English name - Tamarind
 Myanmar name - Ma-gyi
 Family - Caesalpiniaceae
 Part used - Bark

Habit : Perennials, large evergreen trees.

Uses: The mature leaves are boiled with suitable amount of water and jaggery and then used as an anemia remedy. Tartaric acid and its salts are extensively used in various foods, chemical and pharmaceutical industries.

22. Scientific name - *Terminalia catappa* L.
 English name - Almond
 Myanmar name - Ban- da
 Family - Combretaceae
 Part used - Leaves

Habit: Large trees with umbrella- shaped crown.

Uses: The plant is used for shade and scenic view. It can be utilized as the medicines such as laxative, purgative, toilet items and the engine oil. The bark, leaves, sometimes roots, and green fruits are locally used for tannin leather and provide a black dye, used for dyeing cloth and ratter.

23. Scientific name - *Zizyphus mauritiana* Lam.
 English name - Plum
 Myanmar name - Zee- chin
 Family - Rhamanaceae
 Part used - Fruits and barks

Habit : Perennial small. deciduous trees, stem woody, cylindrical.

Uses: The bark is bitter astringent, it is a household remedy for diarrhea, colic and inflammation of gums. The edible fruits are rich in sugar and vitamins and can be used raw, dried or preserved. The bark of the tree may be used for tanning leather, and the leaves as fodder.

24. Scientific name - *Lycopersicon esculentum* L.
 English name - Tomato
 Myanmar name - Khayan- gyin
 Family - Solanaceae
 Part used - Fruits

Habit: Annuals, fetid herbs, erect or trailing.

Uses: The pulp of tomato fruits can be taken as a remedy to cure sunstroke. This is now utilized and a fixed oil is expressed, which can be used for foods and soap.

25. Scientific name - *Azadiracha indica* A.Juss.
 English name - Neem
 Myanmar name - Tama- khar
 Family - Meliaceae
 Part used - Leaves and barks

Habit: Perennial large trees stem woody, cylindrical.

Uses: It is widely recognized as a forest crop with multiple uses including fuel wood, timber production, oil tannins, pesticides, organic manures and medicinal products. Almost all parts of the tree have long been used for medicinal purpose.

26. Scientific name - *Morinda angustifolia* L.
 English name - Morinda
 Myanmar name - Yee- yo
 Family - Rubiaceae
 Part used - Leaves

Habit: An ever green shrub or small crooked tree with a conical growth.

Uses: Yellow dyes are extracted from these plants. To cure Asthma

27. Scientific name - *Anisopappus chinensis* Sigt
 English name - Aster
 Myanmar name - Aster
 Family - Compositae
 Part used - Flowers

Habit: Herbs.

Uses: For landscaping, use for the pleasure of senaray.

28. Scientific name - *Salmalia malabaricum* (DC.) Merr.
 English name - Red silk cotton tree
 Myanmar name - :Let- pan
 Family - Bombacaceae
 Part used - Petals

Habit: Large deciduous trees with densely armed stems, with buttress root.

Uses: To cure insomnia.

Table 1. List of Mordant and their concentration used in the present study

No.	Name of Mordant	Concentration
1	Camella	3 %
2	Vinegar	5 %
3	Tamarind	3 %
4	Copper sulphate	3 %
5	Alum	3 %

Table 2. Nature of dyed clothes depending on the different mordant.

No.	Myanmar name	control	Observed color depending on the mordant				
			Camella	Vinegar	Tamarind	Copper sulphate	Alum
1	Aung-mae-nyo	Pale light green	Light brown	Greenish blue	Brownish green	Bluish grey	Grey
2	Mae-yaing	Violet	Brown	Bluish violet	Light brown	Light brown	Greenish blue
3	Hnin-si	Pinkish red	Light brown	Dark brown	Dark brown	Brownish black	Greenish yellow
4	Kun-ywet	Brown	dark brown	Pinkish brown	Brown	Pale brown	Light brown
5	Pein-ne	Yellow	Light brown	Yellowish red	Yellowish brown	Light yellow	Dark yellow
6	Swe-daw	Light greenish yellow	Yellow	Greenish white	Light yellow	Dark greenish yellow	Yellowish green
7	Kyar	Brown	Dark brown	Light brown	Light brown	Deep brown	Brownish black
8	Khaung-yan	Purplish pink	Pink	Light pink	Green	Pale greenish blue	Light brown
9	Kyunn	Brown yellow	Light brown	Light brown	Pale brown	Dark brownish green	Greenish brown
10	Dan	Orange	Brown	Pinkish green	Pink	Brownish green	light pink
11	Kyeik-hman	Dark brown	Yellowish brown	Pinkish brown	Dark pinkish brown	Deep brown	Light brown
12	Kyet-thun-ni	Deep brown with pale pinkish	Brown	Yellowish brown	Yellow	Deep brown	Yellow
13	Aw-za	Pale pinkish	Light yellowish brown	Light pink	Dark pink	Grey color	Pink with pale brown
14	Tha-yet	Light brown	Pale pink	Brownish red	Yellow	Yellow	Pinkish brown

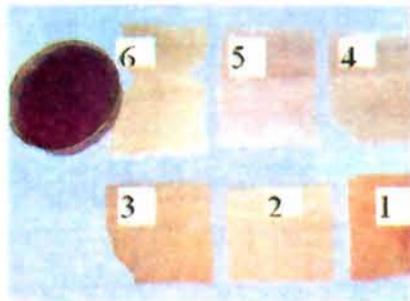
Table 2. (Continued).

No.	Myanmar name	control	Observed color depending on the mordant				
			Camella	Vinegar	Tamarind	Copper sulphate	Alum
15	Sein-ban-gyi	Light brown	Dark brown	Pinkish brown	Yellow	Deep brown	Deep brownish black
16	Na-nwin	Dark yellow	Light brown	Greenish brown	Yellowish brown	Dark greenish brown	Yellowish brown
17	Sha	Dark reddish brown	Pinkish brown	Pinkish red	Reddish brown	Dark brown	Pale brown
18	Kala-kokko	Reddish brown	Dark pinkish brown	Pale pink	Light pinkish brown	Dark brown	Coconut brown
19	Mi-gwin-ga-mon	Whitish green	Light green	Whitish green	Very light green	Light green	Light green
20	Shazaung-let-pat	Blue	Blue	Sky blue	Light blue	Greenish blue	Navy blue
21	Magyi	Pale reddish brown	Reddish brown	Brown	Dark brown	Brownish red	Light brown
22	Banda	Light green	Greenish yellow	Light green	Light brown	Pinkish light brown	Dark yellow
23	Zee- chin (fruit)	Pinkish red	Reddish brown	Pale brown	Pinkish brown	Dark brown	Pinkish brown
24	Zee- chin (bark)	Pale pinkish brown	Pale pink	Reddish brown	Pale pink	Light pinkish brown	Pale pinkish brown
25	Kha-yan- chin	Light red	Light yellow	Very light yellowish brown	Pale yellow	Pale brownish white	Pale brown
26	Tama (leaves)	Brown	Light brown	Light pinkish brown	Pink	Chestnut brown	Light brown
27	Tama (bark)	Blackish brown	Dark brown	Light brown	Pale brown	Dark brown	Very dark brown
28	Yee- yo	Pale yellow	Light green	Light green	Brownish light green	Light brown	Light brown
29	Aster	Light brown	Dark brown	Light pinkish brown	Brown	Light grey	Grey
30	Let-pan	Brown	Brownish green	Light brown	Light brown	Dark brown	Light brown

Dyed Clothes

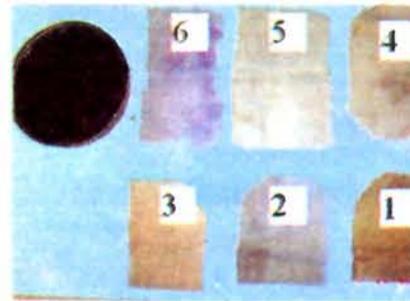
(Mordant - 1.Camella, 2.Vinegar, 3.Tamarind, 4.CuSO₄, 5.Alum, 6.Control)

Fig. I



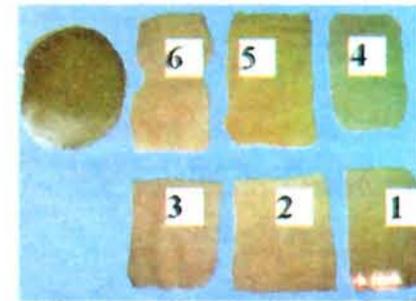
Clitoria ternatea L.
(Aung-mae-nyo)

Fig. II



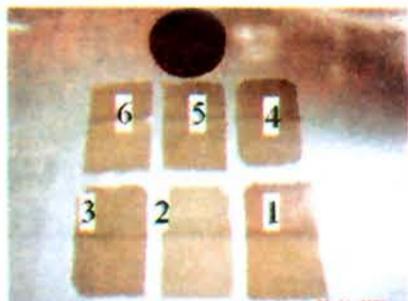
Tephrosia purpurea Pers.
(Mae-yaing)

Fig. III



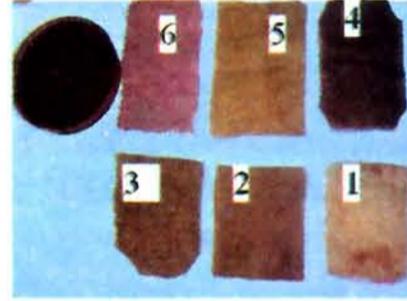
Rosa indica L.
(Hnin-si)

Fig. IV



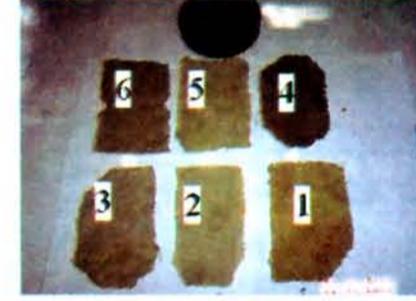
Piper betle L.
(Kun)

Fig. V



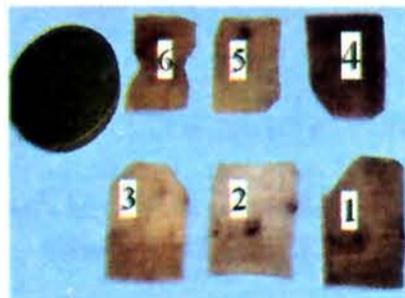
Artocarpus heterophyllus Lam.
(Pein-ne)

Fig. VI



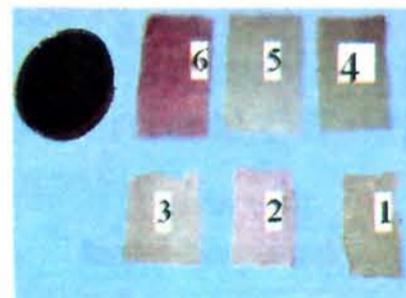
Bauhinia purpurea L.
(Swe-daw)

Fig. VII



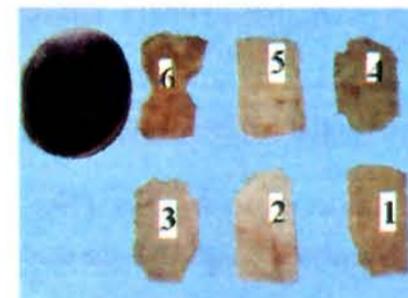
Nymphaea sellata Willd.
Kyar

Fig. VIII



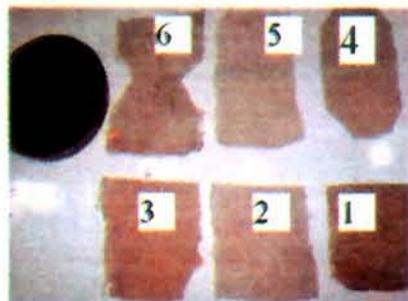
Hibiscus rosa-sinensis L.
Khaung yan

Fig. IX



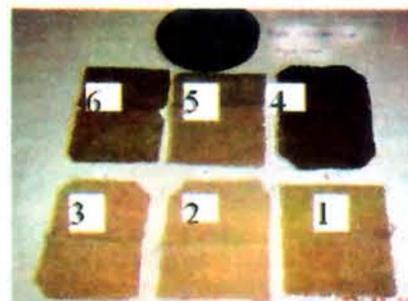
Tectona grandis L.
kyun

Fig. X



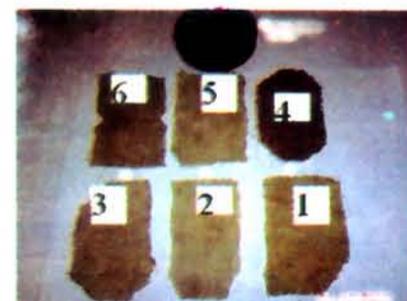
Lawsonia inermis L.
Dan

Fig. XI



Elipta prostrate (L.) Hassk.
Kyeik-hman

Fig. XII



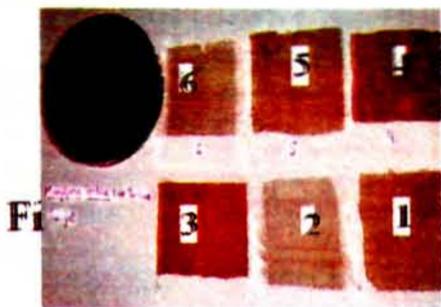
Allium cepa L.
Kyet-thun-ni

Fig. XIII



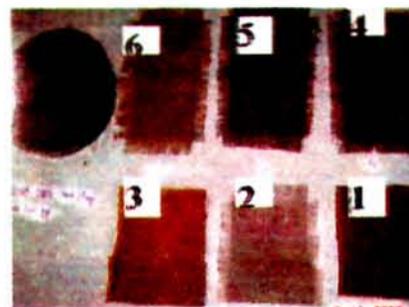
Ammonia squamosa L.
Aw-za

Fig. XIV



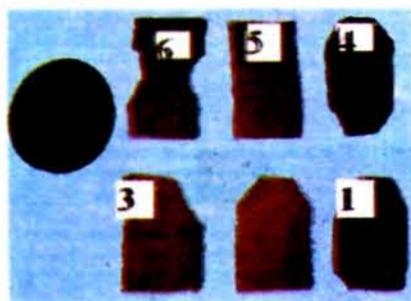
Mangifera indica L. cv.
Tha-yet

Fig. XV



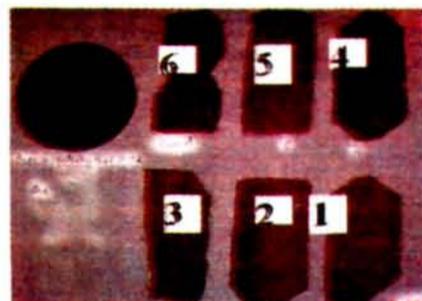
Delonix regia (Hook.) Raf.
Sein-pan-gyi

Fig. XVI



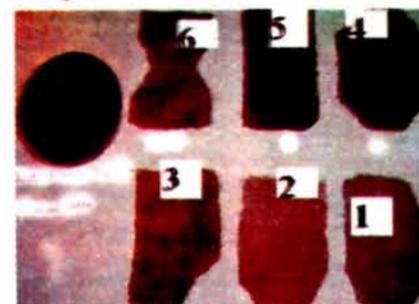
Carcuma longa L.
Nanwin

Fig. XVII



Acacia catechu Willd.
Sha

Fig. XVIII



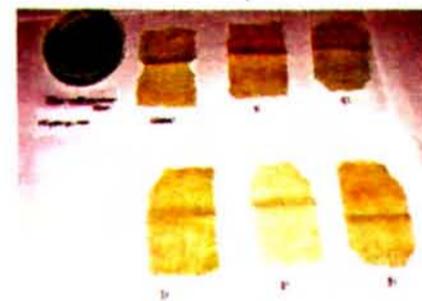
Samanea saman (Jacq) Merr.
Kala-kokko, Thinbaw-kokko

Fig. XIX



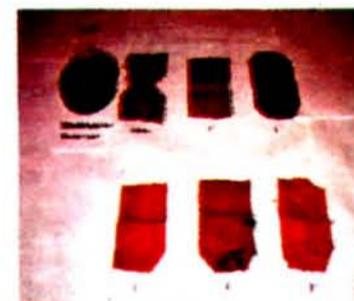
Rhoeo spathacea (Sw.)
Steam. Mi-gwin-ga-mon

Fig. XX



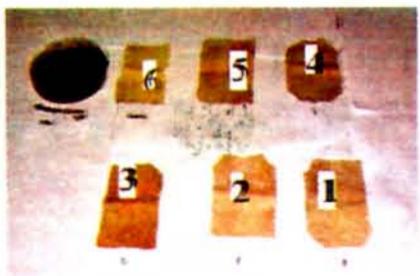
Aloe vera L.
Sha-zaung-latpet

Fig. XXI



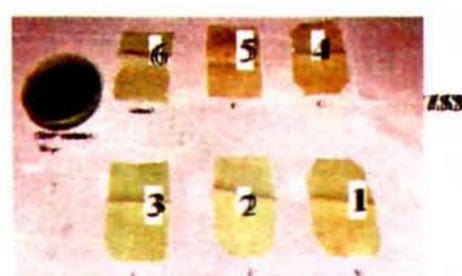
Azadirachta indica A.Juss.
Tama-khar (bark)

Fig. XXII



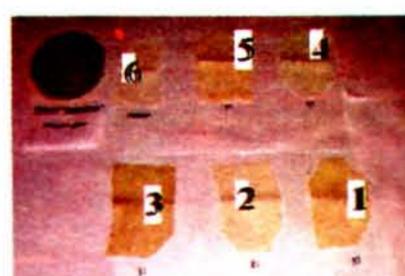
Anisopappus chinensis
Wight & Arn.
May-myo-pan

Fig. XXIII



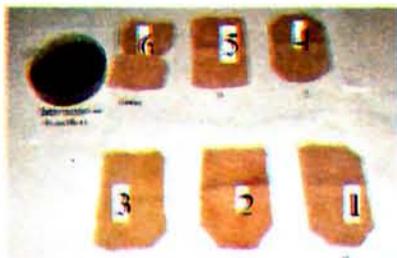
Morinda angustifolia L.
Yee-yo

Fig. XXIV



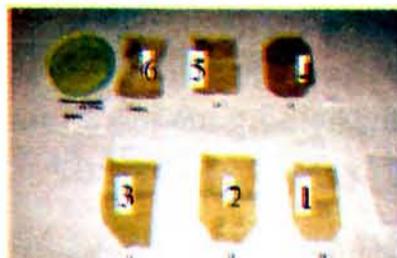
Lycopersicon esculentum L.
Khayan-gyin

Fig. XXV



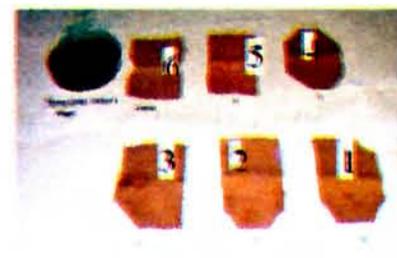
Zizyphus mauritiana
Lam. Zee- chin (bark)

Fig. XXVI



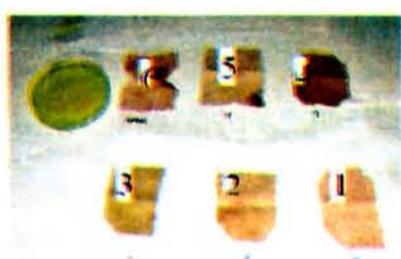
Salmalia malabaricum (DC.)
Schott& Endl. Let- pan

Fig. XXVII



Tamarindus indica L.
Ma-gyi

Fig. XXVIII



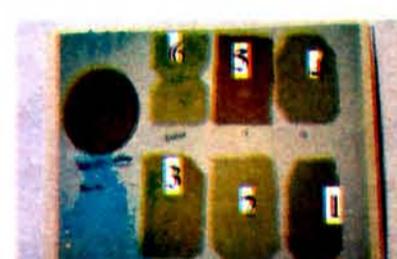
Azadirachta indica
A.Juss. Tama- khar (leaves)

Fig. XXIX



Zizyphus mauritiana Lam.
Zee- chin (fruits)

Fig. XXX



Terminalia catappa L.
Ban- da

Discussion and Conclusion

In this research, (28) species belong to (23) families, to be used as dyes are gathered from Magway Township. The parts to be used as dyes differ according to the plants. The mordant and their concentration used in the present study were shown in Table I. Table II shows the color of dyed cloth treated with different mordant.

Many of the plants used for dye extraction are classified as medicinal and *Acacia catechu* (L.f) Willd has possessed antimicrobial activity. A carotenoid pigment (lycopene) responsible for red color in tomato, is used as a color ingredient in many food formulations. It has received considerable attention in recent years because of its possible role in the prevention of chronic disease such as prostate cancers. Nowadays, fortunately, there is increasing awareness among people towards natural products. Due to their non-toxic properties, low pollution and less side effects, natural dyes are used in day-to-day food products. To conclude, there is an urgent need for proper collection, documentation, assessment and characterization of dye-yielding plants and their dyes, as well as research to overcome the limitation of natural dyes.

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