NATURAL DYES OF OKLAHOMA

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By

WATHENA TEMPLE

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APPROVED:

Sara D. Maynard
Head, Department of Household Arts

Dorothy Saville
In Charge of Thesis

D. G. McIntosh
Dean of Graduate School

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INTRODUCTION

Due to an increased amount of leisure time and the present economic status of this country, American people are returning to the handicrafts and arts practiced by their forefathers. The important homecrafts which have been revived have proved to be not only an avocation for some, but also a means of livelihood for others. The desire to recapture the subtle beauty and charm of the almost lost textile handicraft has led to a renewal of the study of natural dyes. The existing information on native dyes is so closely allied with folklore that the art of dyeing has taken on an air of magic and mysticism.

In this study an attempt has been made to investigate the possibility of using certain Oklahoma plants as sources of dyestuffs for use by the layman in textile homecraft. Simple methods and low cost of dyeing have been assumed to be essential in making possible wide use of native dyes of this region.

REVIEW OF LITERATURE

The dyeing of textiles with native dyestuffs has become almost obscure. The art of dyeing with concoctions from dye plants evolved from a picturesque background. From history, folklore, and legend interesting facts may be learned about the people who first found dyeing applicable to their mode of life. The writings of John Smith pointed out that for the most part the early American colonists learned the dyer's art from the Indians, rather than the Indians learning it from the colonists (5).

The well-meaning white men have tried to force upon the Indians a culture which has bewildered them. The Indians are not becoming identical with other Americans, but are combining white men's conventions, practices, and fashions with Indian aboriginal superstitutions, tribal customs, and ceremonials (13). Since the Indians have become wards of the Federal Government, they no longer follow the practices of tribal life. It was on such momentous occasions as tribal councils and ceremonials that the legends of the Medicine Man, who withheld the secrets of decoctions of plants, were related. The older Indians guarded these legends so well that few of them were recorded.

No handicraft is so truly Oklahoman as that of dyeing textiles with decoctions prepared from plants native to the region. Although the various peoples who populated Oklahoma already had a knowledge of dyeing fabrics, they found it necessary to resort to plant dyes native to their section of the country (23). The varied topography of the east and west sections of Oklahoma gives a range of plants from which to select dyes. The eastern section produces plants similar to those found in the mountainous regions; the western section produces flora typical of the plains.

PLAINS INDIANS

As early as 1732, the Plains Indians occupied the central and western portion of what is now Oklahoma. From a chronological standpoint they were probably the first Oklahoma craftsmen to use native dyes. The Cheyennes, Kiowas, Comanches, Caddos, Arapahos, and Apaches used native dyes only as a means of staining buckskin, feathers, and

peeled bark (16). A few dyes were employed for war paint. Members of various branches of these tribes that occupied Oklahoma did little or no weaving. Homes of the Bureau of Ethanology stated that a community well supplied with skins of animals did not need to undertake the laborious task of spinning and of weaving fabrics for bedding and garments (5). This fact accounted for the Plains Indians' lack of interest in the textile arts, for they were a nomad people and non-agricultural. The Plains Indians spent their time hunting buffalo and warring with those people who dared to encroach upon the region which they roamed. For the most part, these tribes wandered over the prairies forming encampments where they desired. These Indians depended upon the wild life of the region for subsistence. Circumstances caused the Plains Indians to become alike in what they ate, how they lived, and what they wore for clothing. With only a few exceptions these Indians used dyes from the same plant sources. Smallback (26), a Cheyenne Indian woman, related to the writer these instructions for dyeing, "When make black, take willow branches, burn, pound up, boil in water. When make yellow, take river lily root, has white flower. When make red, take poke berries; do not eat berries; make Indian go blind, or pick bugs off prickly pear cactus." The bugs referred to are cochineal. From Lily Old Camp (17) and other older members of the tribe the writer learned that the Cheyennes seldom applied their dye concoctions to textiles.

Kiowa Fanny (16) told of her people using cat-tail buds which produced a yellow dye for dyeing feathers. Various grasses were used to produce a green dye or stain on the peeled branches of cottonwood and other sapplings. This process of dyeing was known as grease dyeing. After the fresh dye was applied, the object was coated with a

grease or tallow which caused the dye to remain intact. This method of dyeing was used to decorate bows and headboards for beds. Headboards were made of small branches laced together to form a continuous piece about a yard and a half long. These ornate headboards were used to keep the wind off the bed or bunk (17).

The Apaches who resided in New Mexico did some textile weaving (13). Mildred Imach explained that the Apaches who resided in Oklahoma used vegetable dyes for the dyeing of feathers and bows. Mildred, a great-grand niece of Geranimo, last of the Apache chieftains, stated that her people were accomplished in the basketry crafts before they were molested by the Spanish and white men from the East (12).

The Poncas, Osages, and Pawnees, who occupied the northeast section of Oklahoma, used various plant dyes on textiles. The Poncas used bloodroot for dyeing materials red. It was also used as a decorative skin stain (2). The Pawnees and Poncas used the leaf buds of the cottonwood to produce a yellow dye (2). Dodder or love vine was used to produce an orange color on feathers (1). Poke berries were used to produce a red stain (3).

THE FIVE CIVILIZED TRIBES

The Five Civilized Tribes were the only Oklahoma Indian residents who practiced the textile crafts extensively (5). The Cherokee, Creek, Choctaw, Chickasaw, and Seminole tribes were moved to this state in 1830 (30). Previous to their removal to Oklahoma, these tribes had been an agricultural people. In their aboriginal state they had produced woven fabrics from various barks and from buffalo hair which was spun into yarn. These Indians are said to have produced pleasing color schemes in their carpets (4). After their trek to Oklahoma they

had to start anew in many respects. The journey to Oklahoma was a long, tedious one, and they arrived with only a few of their worldly possessions. The hardships they endured and the meagerly supplied trading-posts necessitated their taking an active interest in weaving.

The Federal Government treaties made with the Five Civilized Tribes imply that the weaving craft was an important one.

> "The spinning wheels promised in the treaty were to be furnished with steel spindles and turned iron axle, the wood well seasoned. They were not delivered for a long time, and in April, 1840, a large number of Choctaw Indians petitioned the Government to carry out the part of the treaty agreement. In forwarding the petition to Washington, Agent Armstrong said his predecessor had delivered 220 wheels and 88 looms out of 1,000 wheels and 499 looms due them (10).

Speaking of the Choctaws, Foreman (10) said,

> "This people are sowing in other respects seeds of prosperity. I have samples of cotton and woolen cloth (linsey) manufactured by them, that make very good ordinary clothing, and such as I have often seen worn in Pennsylvania."

In referring to the Creeks (10),

> "The women, who but a few years since were the tillers of the soil, are becoming skilled in the art of housewifery; indeed their 'home-spuns' are fully equal in point of texture and color to those manufactured by the ladies of the States."

An elderly Cherokee woman related (10),

> "I learned to spin when I was a very little girl and I could make cloth and jeans for dresses and such other garments as we wore. We never any of us wore store clothes and manufactured cloth until after the Civil War. To color the cloth we used different kinds of dyes. We raised our indigo which we cut in the morning while the dew was on it, then we put it in a tub and soaked it overnight and the next day we foamed it up by beating it with a gourd. We let it stand over night again, and the next day rubbed tallow on our hands to kill the foam; afterwards we poured the water off and the sediment left in the bottom we would pour into a pitcher or crock to let it dry, and

then we would put it into a poke made of cloth and then when we wanted any of it to dye with we would take the dry indigo. We raised the indigo for many years and then when I moved away from Barren Fork I lost my seed and I was never able to raise any more; we always thought the indigo we raised was better than any we could buy in later years.

"If we wanted to dye cloth black we used walnut bark and when we wanted to dye purple we used maple bark and if mixed with hickory bark it made yellow. Hickory bark by itself made green dye. To make red we mixed madder and alum. We used to find alum in the caves. We used sumac berries to make red dye. When we wanted salt we drove to a salt lick on the west side of Grand River."

WHITE PIONEERS

The white pioneers who settled Oklahoma before statehood li ved principally at forts, and most of their textiles were brought in from merchandising centers farther North and East. The people who homesteaded in Oklahoma had a knowledge of some of the handicrafts practiced in the regions from which they came. Those families who settled in eastern Oklahoma came principally from the Blue Ridge Mountain region of Tennessee and Kentucky. They possessed a rich background for weaving and dyeing because their forefathers had practiced these crafts extensi vely. At one time they had depended wholly upon native dyes as a means of staining their textiles (23). Madder and indigo had been cultivated in their gardens, (8) but upon finding themselves in a new environment it was necessary for them to resort to the use of dyes native to their region of Oklahoma (23). The writer learned from Mrs. Rogers (23) of McAlester that hickory bark, willow, sumac, and other dye materials found principally in eastern Oklahoma were used in early days.

The people who settled western Oklahoma had not practiced the textile arts. Mrs. Walter Scott (25) of Omega stated that her mother

dyed unbleached muslin with wild parsley. This material was used for quilt linings. Mrs. Lew Martz (18) of Watonga told of the use of black jack bark and walnut hulls to produce brown. The pioneers used these dyes to produce pleasing colors for rag rugs. Homecrafts in western Oklahoma were limited primarily to the making of hooked rugs and the dyeing of textiles for some minor use.

In the past few years there has been an increasing interest in the early American domestic arts. This interest has stimulated a number of persons to investigate the possibility of developing the field of textile weaving, spinning, and dyeing as homecrafts. The desire to recapture the beauty of the very old textiles and interpret them with a degree of accuracy has led to a study of methods for producing dyes from native plants.

The demand for information on the subject of dyeing in relation to handicrafts prompted Pellews (20) to edit Dyes and Dyeing, a portion of which he devoted to a review of sources of natural dyes. This author cites the fact that the earliest dyes were probably of vegetable origin, accidentally discovered when garments were stained with the juices of fruits and plants. In most cases these dyes were not fast to light and to washing.

The discovery of the Americas added several colors to the dyer's palette. Among these were fustic, logwood, cochineal, and various Indian dyes. Cochineal was one of the first dyes introduced from the new world. The cochineal is a small insect which feeds on cacti. When the bodies of these insects are dried, the extract produced is a beautiful scarlet dye which is still being used by the British

Government for the dyeing of certain military uniforms (20). Fustic is produced from the chips or bark of the commonly called yellow tree or cuba wood. The fustic extract produces a clear yellow dye. Logwood, which is native only to Central America, produces a rose tan on wool. Vegetable dyes were not the only dyes used by our ancestors. The early American colonists also used many mineral pigments, the most common of which was iron buff. This color could be cheaply produced, for the colonists saved every piece of scrap iron and steel and placed it in barrels half filled with vinegar and water.

> "Little by little the iron dissolved in the acid and, when it was strong enough, the housewife would soak her homespun cloth, or other material, in the solution, warming and stirring it, and making it absorb as much of the liquor as possible. Then she would take it out, wring it thoroughly, rinse it slightly, and dip it for a minute or two in another barrel half filled with water extract of wood ashes."(20)

Iron buff was used principally on cotton, linen, and other vegetable fibers, giving with a minimum amount of effort on the part of the dyer a pleasant reddish brown (20).

Recently there has been an endeavor to help the mountaineer people become financially independent through sale of their handicrafts. Eaton (7) relates in detail the project of a group of persons who attempted to revive the crafts which had become almost extinct. For information this group relied primarily upon the folk tales and methods used by their grandmothers. Eaton (8) defines natural or native dyes "as a group of dyes from which color ing material is produced directly from plants, animals, insects, or minerals." Berea College in Kentucky has probably done more than any other one group in actually using native dyes in textiles. An illustration (9)

in Handicrafts of the Southern Highlands shows a textile stained with 27 different dyes, all being vegetable dyes except cochineal. According to Eaton (8), indigo and madder, the most commonly used natural dyes, were not native to the United States, but were brought to this country by the early American colonists.

Furry and Viemont (11) gave actual dyeing procedures in their study which was devoted to natural dyes and their application to wool and cotton fabrics. A progress report by H. B. Parks on "Dye Plants of Texas" is limited to dye plants of that region (19). His report is of great value to the craftsman in the middle western section of the United States, for Texas has varied types of flora. The use of native dyes for the coloring of cloth for rugs and similar articles made by Indians in New Mexico has been reported in that state by the New Mexico Department of Vocational Education (24).

MATERIALS USED

FABRICS

Textile fabrics are made from various sources of raw material, but most household and clothing fabrics are made from wool, silk, linen, cotton, and rayon, either alone or in combination. Because of their different compositions and structures, fibers possess qualities of different chemical and physical natures.

The fabrics used in this study, wool, silk, linen, cotton, cellulose acetate, viscose rayon, and tin-weighted silk, were purchased from retail stores. All of the fabrics were white.

MORDANTS

Many of the native dyes will not 'take' or 'set' unless the fabric or yarn is treated with a compound called a mordant. The

mordants used were chrome (potassium dichromate), copperas (ferrous sulphate), alum (potassium aluminium sulphate), and cream of tartar (potassium acid tartrate). There are other mordants which might be used, but the above four were found to be most satisfactory and convenient to use.

Mordants not only help to 'fix' or 'set' the color, but also make possible a range of hues from the same dye concoction. The mordants, copperas, chrome, and alum have been recommended for wool (11). Mordants recommended for cotton are alum, alum-tannin-alum, (11) and alum-sodium carbonate (19).

PLANTS

Plants used in this study were sumac, goldenrod, wild grape, dock, sensitive brier, black oak, sassafras, Osage orange, and black walnut.

Curled or yellow dock is a perennial common to all sections of Oklahoma. Dock grows along ravines and waste places. The plant ranges in height from one to two feet. Dock has a long, curly, dark green leaf. Its brown blossom was the portion used to produce the dye extract. Dock is green from May until August, after which time the plant dies. The best tan color was obtained from blossoms gathered between the first and the fifteenth of July (27).

Black walnut (Julans nigra) trees occur on rich botton lands and moist fertile hillsides throughout Oklahoma. The bark is thick, dark brown in color, and divided by deep fissures into rounded edges. The fruit is a nut, borne singly or in pairs, and enclosed in a solid green husk which does not split open, even after the nut is ripe (21). It is the husk of the nut which produces the brown dye extract. The best dye is obtained after the first frost in the fall.

Osage orange (maclura pomifera), hedge apple or mock orange, is found throughout the state. The thin bark is grey, sometimes tinged with yellow. The branches are very thorny. The fruit resembles a very rough, green orange. The heart wood and roots are a bright orange. The orange bark is stripped from the roots. This bark, which produces a khaki tan dye, (22) can be collected at any time of the year, but it is best in September.

Sassafras (sassafras variifoluim), which is a small aromatic tree, growing in the eastern part of Oklahoma on dry soils, is one of the first broad leaf trees to come up on abandoned fields. The trunk bark, deeply furrowed, is red-brown, while the bark of the twigs is a bright green. Sassafras can be identified by its leaves, for it is one of the few trees having leaves of widely different shape on the same twig or tree. Some are oval; others have a lobe resembling the thumb of a mitten, while still others are divided at the outer end into three distinct lobes (22). The bark of the roots yields a red-brown dye.

Black oak (quercus velutina) is a forest tree common to all parts of Oklahoma. Evidently the name black oak refers to the color of the trunk bark which is almost pure black. The inner bark is a deep yellow. It is this inner bark which produces the dark rose tan dye (15). The black oak should not be confused with the black jack. The black oak can be identified by its leaves which are sharply indented and come to a definite point. The black oak produces acorns, but the black jack does not. The dyestuff may be prepared at any season of the year.

Goldenrod (solidago canddensis?) is a plant with a tall, stout, rough stem ranging in height from one to three feet. The leaves are lanced-shaped; the small flower-heads are clustered along the branches

which spread from the upper part of the stem. (6) (The question mark is placed after the botanical name of the plant as the identification is not a positive one.) This plant is common to all sections of Oklahoma. This specie of goldenrod starts blooming about the middle of August. The entire plant produces a yellow-green dye.

Sumac (rhus glabra) is a shrub which seldom exceeds six feet in height. The branches are a silvery grey-green. The ferny leaves are lanceolate, dark green when full grown, and orange and red in the autumn. The stems are crowned by pyramidal heads made of velvety red berries. These berries ripen from the latter part of July to the first of September. Sumac berries mature earlier in eastern Oklahoma than in the western section. The berries produce a pink dye. The sumac shrub, common to all Oklahoma, grows in sandy or gravelly soil (14).

Sensitive brier (schrankia uncinata) is a perennial common to all Oklahoma (28). It is a spiney creeper; its leaves are long-veined, elliptical, and dark green in color. The sensitive leaflets close up rapidly when touched. The blossom, about one inch in diameter, resembles a pink pompom. The bloom is very fragrant. Sensitive brier is found from May through August. The entire plant produces a bright yellow dye.

Wild grape (vitis doaniana) is a bushy or climbing woody vine with tendrils. The leaves are bluish-green, three-lobed, and coarsely toothed (29). The leaves of the wild grape resemble those of the tame grape, but they are smaller. The bark is loose, and the purplish-black berries produce blue-violet dye. They ripen from the latter part of August through the first of September. The seeds are pear-shaped.

BLACK OAK (QUERCUS VELUTINA)

SENSITIVE BRIER (SCHRANKIA UNCINATA)

BLACK WALNUT (JULANS NIGRA)

SUMAC (RHUS GLABRA)

OSAGE ORANGE (MACLURA POMIFERA)

WILD GRAPE (VITIS DOANIANA)

DOCK (RUMEX CRISPUS)

GOLDENROD (SOLIDAGO CANDDENSIS?)

SASSAFRAS (SASSAFRAS VARIFOLIUM)

METHOD OF PROCEDURE

Extraction of Dyestuffs

The dye extract may be obtained from several portions of the plant or tree. The bark, fruit, flower, stem, or leaf may produce the dyestuff. The part of the plant from which the dye is taken determines the procedure for extraction.

The bark of trees may be used either when freshly gathered or when dried. The fresh bark produces the more intense color. One peck of bark is required to prepare sufficient dye extract for one pound of fabric. The bark, cut or broken into small pieces, is placed in an enamel ware kettle. Enamel ware or earthen containers are necessary because metal containers may cause the concoction to take on a different color due to a reaction of the dyestuff with the metal. Tin ware should not be used as it rusts readily. Two gallons of distilled water or enough to cover the bark completely was added and the bark allowed to stand from 12 to 16 hours. The mixture was heated to 212° F. and kept at a slow boil for one hour in a covered container. The dye liquid was then drained from the mixture, and the solution was filtered three times.

In extracting the dyestuff from flowers, fruits, stems, or roots two gallons of chopped material was used. The dye substance was placed in an enamel ware kettle and enough distilled water added to the portion of the plant selected to completely cover it. The mixture was heated to 212° F. and kept at a slow boil for 30 minutes. The mixture was strained to remove the bulk of the plant, and the dye solution was filtered twice.

PREPARATION OF FABRIC FOR DYEING

All fabrics were carefully washed before the dyeing procedure was started. A thorough washing was necessary to free the fabric of all soluble finishing material, soil, and stains. A fabric may have a finish which interferes with the dyeing process, or the finish may not be uniform over the surface of the fabric; in such cases spotting would result.

The fabric was thoroughly wet, then agitated in a 0.5 percent solution of Dreft for a period of 30 minutes. The solution was heated to a lukewarm or 70° F. temperature. The fabric was rinsed until the soap solution was completely removed. Instead of Dreft a neutral soap might be used.

METHOD OF MORDANTING

In this study mordants were used on wool, cotton, and linen. Chrome and copperas were used on wool to give different hues from the same dye concoctions. All mordant procedures were calculated on the basis of one pound of material.

COTTON OR LINEN

4 ounces of Alum (113.40 grams)
1 ounce of Sodium Carbonate (28.35 grams)

The 4 ounces of alum and 1 ounce of sodium carbonate were dissolved in 4 gallons (17.96 liters) of distilled water and heated to 212° F. The fabric was thoroughly wet in water and treated in the mordant solution for one hour at 212° F. The fabric was left immersed in the solution for 12 hours. It was rinsed four times. Enamel ware or glassware should be used in mordanting as they do not cause rust or other discolored spots in the fabric.

WOOL

1/6 ounce of Chrome (4.73 grams)

The solution of 1/6 ounce of chrome and 1 gallon (4.24 liters) of distilled water was allowed to stand one hour. It is necessary that all of the chrome be in solution since any undissolved particles will cause spotting. Three gallons (12.72 liters) of distilled water was added to the chrome solution. The same treatment was followed for mordanting cotton or linen except the period of heating was reduced to 30 minutes.

COPPERAS

1.42 ounces of Copperas (40.28 grams)
1 quart of 4% Acetic Acid or Vinegar (1.06 liters)

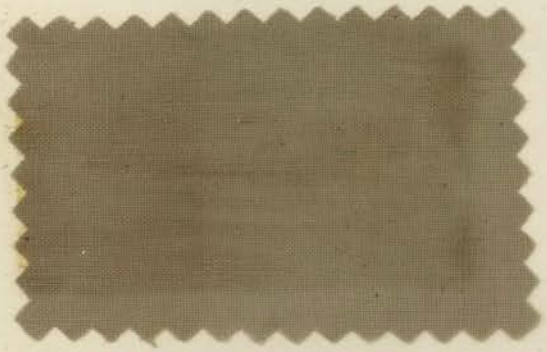
The 1.42 ounces of copperas was allowed to dissolve in one gallon (4.24 liters) of distilled water for one hour. The copperas should be crushed into a fine powder, so that the time necessary to completely dissolve it is reduced. The 1 quart (1.06 liters) of 4% acetic acid or vinegar and three gallons (12.72 liters) of distilled water were added to the copperas solution. The same treatment as that for mordanting cotton or linen was followed, except that the period of heating was reduced to 30 minutes.

METHOD OF DYEING

The same procedure was followed in the dyeing of all the textiles with the exception of the length of time of treating the fabric in the dye bath. Wool and silk absorb the dye more rapidly than do cotton and linen; therefore, it was not necessary to heat them for as long a period of time. The mordanted fabrics were thoroughly wet in water, then heated in the dye bath at 200°-212° F. Wool and silk were treated

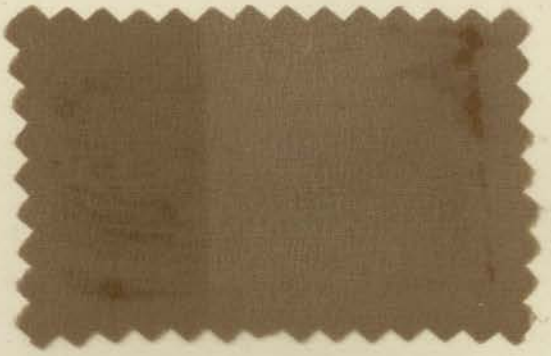
PLATE I. FABRICS DYED WITH BLACK WALNUT (JULANS NIGRA)

1. Cotton, mordanted with alum and sodium carbonate

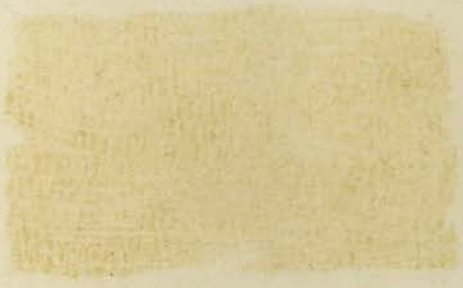


2. Linen, mordanted with alum and sodium carbonate

3. Silk



4. Silk, weighted

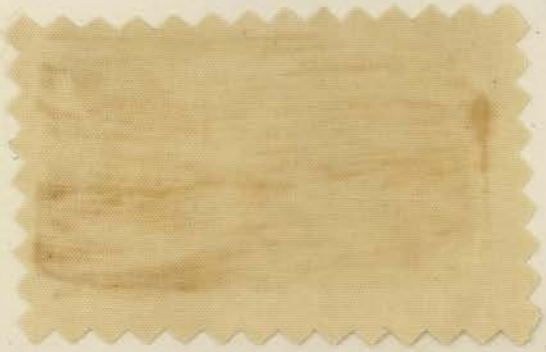


5. Wool, mordanted with copperas

6. Wool, mordanted with chrome

PLATE II. FABRIC DYED WITH OSAGE ORANGE (MACLURA POMIFERA)

1. Cotton, mordanted with alum and sodium carbonate



2. Linen, mordanted with alum and sodium carbonate

3. Silk

4. Silk, weighted

5. Wool, mordanted with copperas

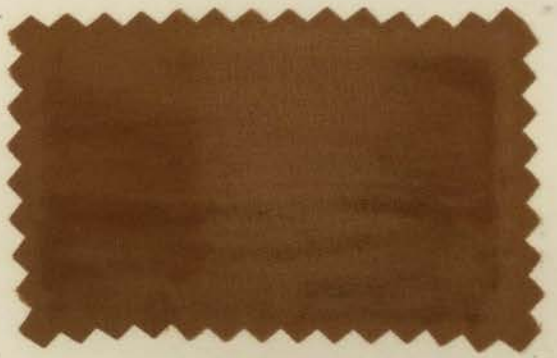
6. Wool, mordanted with chrome

PLATE III. FABRICS DYED WITH SASSAFRAS (SASSAFRAS VARIIFOLIUM)

1. Cotton, mordanted with alum and sodium carbonate

2. Linen, mordanted with alum and sodium carbonate

3. Silk



4. Silk, weighted

5. Wool, mordanted with copperas

6. Wool, mordanted with chrome

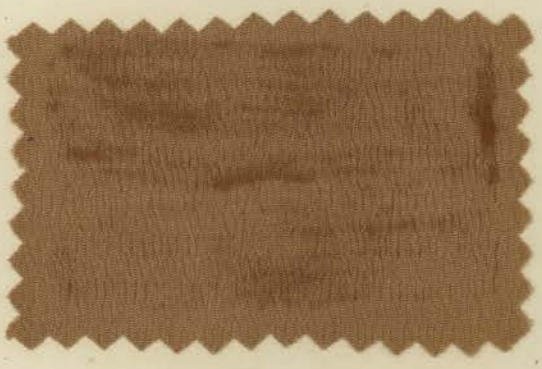
PLATE IV. FABRICS DYED WITH BLACK OAK (QUERCUS VELUTINA)

1. Cotton, mordanted with alum and sodium carbonate

2. Linen, mordanted with alum and sodium carbonate

3. Silk

4. Silk, weighted

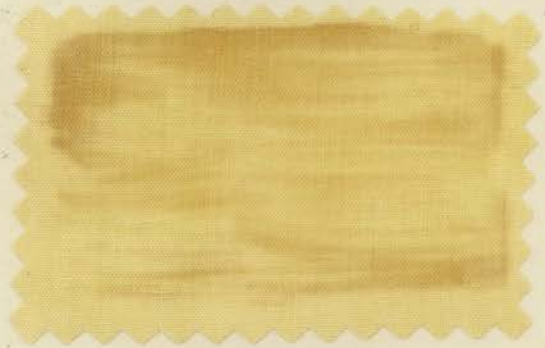


5. Wool, mordanted with copperas

6. Wool, mordanted with chrome

PLATE V. FABRIC DYED WITH SENSITIVE BRIER (SCHRANKIA UNCINATE)

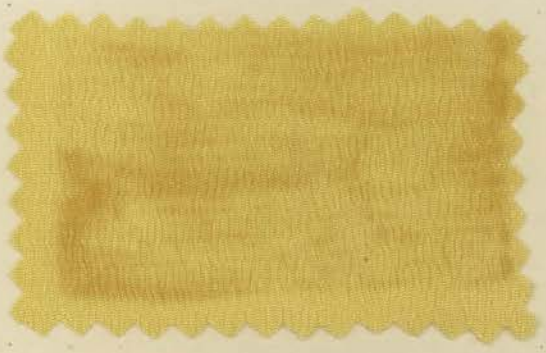
1. Cotton, mordanted with alum and sodium carbonate



2. Linen, mordanted with alum and sodium carbonate

3. Silk

4. Silk, weighted



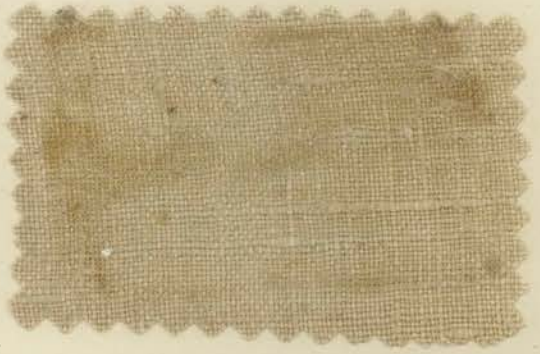
5. Wool, mordanted with copperas

6. Wool, mordanted with chrome

PLATE VI. FABRICS DYED WITH DOCK (RUMEX CRISPUS)

1. Cotton, mordanted with alum and sodium carbonate

2. Linen, mordanted with alum and sodium carbonate



3. Silk

4. Silk, weighted

5. Wool, mordanted with copperas

6. Wool, mordanted with chrome

PLATE VII. FABRICS DYED WITH WILD GRAPE (VITIS DOANIANA)

1. Cotton, mordanted with alum and sodium carbonate

2. Linen, mordanted with alum and sodium carbonate

3. Silk

4. Silk, weighted

5. Wool, mordanted with copperas

6. Wool, mordanted with chrome

PLATE VIII. FABRICS DYED WITH GOLDENROD (SOLIDAGO CANDDENSIS?)

1. Cotton, mordanted with alum and sodium carbonate

2. Linen, mordanted with alum and sodium carbonate

3. Silk

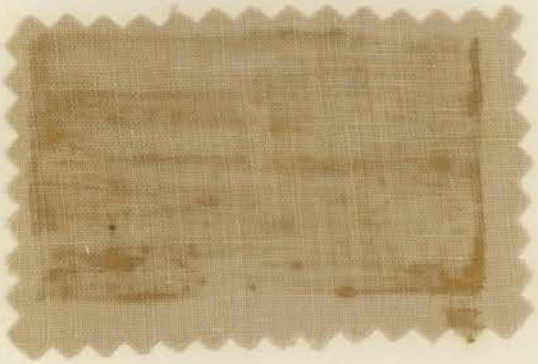
4. Silk, weighted

5. Wool, mordanted with copperas

6. Wool, mordanted with chrome

PLATE IX. FABRICS DYED WITH SUMAC (RHUS GLABRA)

1. Cotton, mordanted with alum and sodium carbonate



2. Linen, mordanted with alum and sodium carbonate

3. Silk

4. Silk, weighted

5. Wool, mordanted with copperas

6. Wool, mordanted with chrome

for 30 minutes; cotton and linen for one hour. The fabrics were rinsed until no color appeared in the water; then they were dried and pressed.

DISCUSSION

In addition to Osage orange, black oak, goldenrod, sumac, wild grape, dock, sensitive brier, sassafras, and black walnut which were used in the preparation of dyes, an attempt was made to extract coloring matter from butterfly weed, chittam bark and leaves, wild indigo, horse weed, willow bark and leaves, wild sage, sage brush, night shade, Johnson grass, button bush blossom, pig weed, geminson, wild holly vine, short bed straw, poke berries, China berries, milk weed, lambs quarter, sunflower, duck vine or wild balsam, bind weed, skunk bush berries, and wild plum bark. With only a few exceptions these plants did not produce satisfactory dye extracts. Chittam bark produced a yellow tan on wool and silk; the leaves produced a yellow color. Lambs quarter made a green concoction, but a green color was not obtained in the fabrics. The extract of poke berries was a very intense red, but the color obtained on the textile was a bright yellow. The extract of horse weed or Indian paint was a red-violet, but produced a light yellow-green. Skunk bush berries produced a light red concoction, but gave a pink tint on the fabric. Sage brush produced a drab olive green, which was not permanent to the rinsing. Willow bark concoction produced a rose tan on wool. Butterfly weed, willow leaves, wild sage, night shade, Johnson grass, button bush blossom, pig weed, geminson, wild holly vine, short bed straw, poke berries, wild parsley, China berries, milk weed, and sunflowers produced a yellow color in the fabrics.

The maturity of the plant affects the potency of the dye extract. For example, the sensitive brier, gathered the latter part of August, produced a brighter color than that gathered in June. The black walnuts gathered in June did not produce a satisfactory dye, but those gathered the latter part of October produced a darker color although a deep rich brown was not obtained. Due to the season the walnuts were late in maturing and the hulls had not ripened sufficiently to yield a dark brown dye. The dock gathered the first week of July produced a better color than that gathered the last of August. Some of the plants which were unsuccessfully used have been cited by Parks (19) as being satisfactory dye plants, but due either to maturity, season, or method of extraction did not yield good colors. Many plants produce a stain but not a dye. A stain may be obtained by the crushing of a plant to secure color. Horse weed or Indian paint produced a good stain, but did not yield a dye. A dye may be obtained by extraction of a dyestuff from the plant by boiling in water or by soaking in alcohol. The method of dye extraction is important to the success of dyeing with native dyes. Three methods were used in an attempt to extract a color from wild indigo. The first procedure was an attempt to obtain a dye extract by boiling the indigo plant; by the second procedure, the indigo plant was placed in a fermentation vat made up of wheat straw, indigo plant, and distilled water; in the third procedure, the plant was placed in absolute alcohol. The solution in the first two methods was void of any color. The wild indigo was found to be soluble in alcohol; a very good green was obtained, but this would not be practical for home use. Only dye plants which were found to produce a dye in water were used in this study since alcohol is expensive and not easily obtained.

Control of temperature in the extraction is necessary to obtain a satisfactory dye. Too rapid boiling will cause the plants or bark to decompose, thus causing the concoction to be muddy. If the extract of the plants becomes muddy the best dye qualities are destroyed. A dye concoction prepared from barks will likely contain a large amount of sediment. Because of the fact that the dye extract lies in the inner bark, this decomposition of the outer bark for liberating of the dye is desirable. It appears that the method of filtration was not entirely satisfactory. For use in the home where filter paper is not available, the dye extract should be strained through a very closely woven cloth. The dye extract of bark was filtered three times, yet the extract contained minute particles of sediment; therefore, it was difficult to dye the fabrics without some spotting or streaking.

The dyer cannot depend upon obtaining the same color from the same dye plant. It has been cited that season, maturity of the plant, and conditions under which the dye extract was prepared may affect the color of the dyestuff. It is recommended that a sufficient quantity of the dyestuff be prepared at one time and used as soon as possible. The dye extract ferments readily, and as a result the solution frequently changes color.

Chrome was selected to be used on wool in this study since alum, chrome, and cream of tartar produce only a slight variation in hue. The cream of tartar addition to chrome intensified and slightly greyed the color. Wool mordanted with alum was almost the same color as that mordanted with chrome. To secure a darker greyed color, one should mordant with copperas and acetic acid. The alum and sodium carbonate was selected because it was successfully used on cotton and linen with a minimum amount of effort. The viscose and cellulose acetate rayons

were not used as a method was not developed in the study whereby these materials would take the dye satisfactorily. Tin weighted silk absorbed more of the dyestuff than did the pure dye silk.

Native dyes would be of special value to the person who desires to create an original color combination (11). Because of the greyed colors produced by native dyes, it is easy to obtain a pleasing color scheme. No attempt was made to combine various dye extracts to produce new colors. It is probable that some interesting tones might be added to the colors obtained in this study by the combination of some of the dye extracts.

SUMMARY

Anyone who wishes to utilize native dyestuffs may find a limited season in which certain materials are available. With the exception of barks, which may be used any time, the maturity of the plant and season of the year in which it is gathered appear to influence the potency and color of the dye extract. The dye solution cannot be kept over a long period of time because it loses its best dye qualities. Due either to the method of extraction or maturity of the plant, not all of the plants suggested by Parks as sources of dyes produced usable dye extracts.

The technique of the method of extracting dyestuffs did not produce a solution entirely free of sediment. Due to this factor spotting or streaking of color resulted because of the sediment present in the dye solution. Further study might lead to a better method of dye extraction.

Mordants were found to be necessary in dyeing fabrics with native dyes. The textiles showed little affinity for dyes without the use of

mordants. No satisfactory mordant was found for viscose or cellulose acetate rayons. Wool and silk were most satisfactorily dyed with Oklahoma plant dyes. Tin-weighted silk had a greater affinity for natural dyes than did the pure dye silk and appeared to absorb more of the color extract than any of the other fabrics.

Many hours are required to gather plants and prepare extracts although the actual cost of preparing the dyestuff is very small. Native dyes would be of value to those persons who for economic reasons desire to use materials available to them at little or no cost or those who desire the satisfaction of preparing a dyestuff which is of their own creation. Native dyes may be used to produce a pleasing range of colors that are for the most part greyed tones rather than intense and pure color. Matching of color should not be undertaken in the dyeing of fabrics with native dyes because it is impossible to predict the color and intensity which will result. The dyer should not attempt to use fabrics printed or dyed intense colors and expect the native dyes to cover up the original color. Native dyes would be of special value in dyeing materials used for such homecrafts as hand-woven textiles, basketry, and hooked or braided rugs.

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Cleo Calderhead