Improving the Performance Efficiency of Cotton Youth Clothing (Poplin Fabric) in the Kingdom of Saudi Arabia Printed using Natural Dyes that are Environmentally Friendly

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Abstract

The general trend has now become towards the production of environmentally friendly materials as a result of the increase in sources of pollution around us in all fields and in the field of textiles and textiles, we find that woven products at all stages of production, but in the stages of its cultivation, many toxic and harmful chemicals are added to it, which give it some of the required properties, but at the same time cause health damage to the skin Survey studies have shown that human exposure to industrial dyes used in clothing is one of the important risks of cancer, allergies and pushing This is due to the recent trend of research to the use of natural dyes to reduce environmental pollution and preserve human life, and one of its most prominent advantages is that it is environmentally friendly due to its ability to decompose into its natural components and reduce the toxic substances resulting from it as well as not cause allergies. The aim of the current research was to study how to extract some natural dyes from plant sources available in the environment and safe used in dyeing cotton fabrics and dyeing young people's clothes in the Kingdom of Saudi Arabia with decorations and inscriptions with dye to improve the performance efficiency of young people's cotton clothes and to identify the quality of dyes in dyeing cotton fabrics and these dyes were (hibiscus - turmeric - safflower - henna - beets - cabbageRed – Sidr – sumac seeds – pomegranate peel – red sweet pepper – green tea), has been dyeing cotton fabrics 100, where the samples produced (12 samples per test), of cotton fabrics, as well as the study was interested in conducting laboratory tests to find out the change in the properties of fabrics of young clothes resulting from the treatment to lead dyeing fabrics with natural dyes intended for the highest efficiency and quality and it is clear from laboratory analysis that Dyeing the fabrics of the clothes under study with natural plant dyes improves their functional and color properties, represented in (inhibition of the growth of positive and

negative bacteria of the gram dye - color fastness to friction - color intensity - color fastness to light - color fastness to washing - color fastness to sweat), and the results were as follows There is a statistically significant relationship at the level of (0.05) between the use of natural dyes and improving the efficiency of the performance of dyed youth clothes. One of the most important recommendations is to pay attention to natural plant dyes and employ them in research in the field of plastic art and the field of textile printing to reduce environmental pollution.

Keywords: Improving performance efficiency - Youth Cotton Clothes - Poplin Fabric - Saudi Arabia - Printed - Use of Natural Dyes - Eco-friendly.

1. Introduction

The textile industry is one of the oldest industries known to man and has evolved with its development, and printing materials have been used in textile decoration since prehistoric times, which is characterized by its ability to give color to textiles.Dyeing fabrics, which uses toxic chemicals, is responsible for 17% to 20% of sewage pollution, and 72 toxic chemicals have been found in the water used in dyeing textiles..

Industrial dyeing is one of the basic stages in the manufacture and processing of textiles and clothing and in dyeing clothes and engraving and coloring clothes with dyes, which has a fundamental and significant role in environmental pollution, most textile dyes may be highly toxic, so it is associated with health deterioration and the emergence of various diseases in animals and humans according to the duration of dye concentration and exposure to dye, long-term exposure to chemicals and industrial dyes Various leads to an impact on human health, such as metal dyes that are used in dyeing fabric, survey studies have shown that industrial dyes contain in their composition the coelette, nickel, and copper, all these elements when they go out into the aquatic environment, heavy metal cations enter the body of fish through the gills, because they show a negative charge, allowing them to accumulate in certain tissues in marine organisms, and then indirectly reach the organisms humanity, leading to many diseases such as cancer, allergies and oxidative abortion, which is caused by the element chromium found in artificial dyes.

As a result of the increased environmental awareness of individual consumers, and the emergence of many legislations in the local and international markets that limit the use of harmful industrial dyes in the production and dyeing of textiles, and this has prompted recent research to the trend to the use of natural dyes.

Thus, interest in various natural dyes, whether obtained from minerals, insects, plants and animals, began to be paid for, and natural dyes have little environmental impact on animals and humans, they are renewable and sustainable products with vital sources, and have been used since ancient times in dyeing and coloring textiles, clothes, bedspreads and carpets.

The research problem stems from the negative effects of wearing clothes dyed with industrial dyes, the incidence of some diseases and the increase in environmental pollution, in addition to

the limited colors extracted from natural dyes, so the current study came to try to study the effect of mixing natural dyes and obtain different color tones for environmentally friendly dyed fabrics.

This is because the most important advantage of natural dyes is that the resulting coated product is without toxic substances and less sensitive compared to chemical dyes.

The current research tries to find new design solutions to build a balanced design composition and create a new structural structure, and in this research a new vision and mental approach are presented in building contemporary designs through the use of various natural dyes environmentally friendly in improving the performance of cotton fabrics in the Kingdom of Saudi Arabia to employ them in young clothes dyed with natural dyes, and the use of these dyes in coloring and dyeing clothes with decorations.

And formulated in a new way based on the transformation and evolution of the form, and therefore the current research has studied the types of natural dyes and the features of these dyes and the types of these dyes.

The research aims to study natural dyeing to improve the appearance of the material by giving it a homogeneous color to remain constant after normal use of exposure to light, washing, sweat, etc., and the increasing concern for the environment and the attempt to reduce environmental pollution in recent years has led to an increasing interest in the study of natural dyes, which is the most prominent advantages that they are environmentally friendly dyes, so researchers and those in charge of the clothing industry, dyeing and printing clothes began to conduct studies and research that would raise the efficiency of these dyes To match the advantages achieved by industrial dyes (wide variety of colors - a noticeable improvement in the properties of stability).

In light of the results of the study, several recommendations were made, including the intensification of studies with various objectives in the field of printing and natural dyes by benefiting from them in the production of artworks in all technical fields.

Search problem:

1- To what extent can the performance efficiency of printed youth clothing in the Kingdom of Saudi Arabia be improved using natural and environmentally friendly dyes?

The following sub-questions arise from this main question:

- What is the effect of the types of dyes and stabilizers on the color depth of cotton fabrics used in young people's clothing?

- What is the effect of the structural structure of cotton fabrics used in young people's clothing on the quality of color properties using different dyes?

- What is the effect of the types of dyes on the stability of the color properties of cotton fabrics?

- What are the best dyes used to achieve the quality of color properties with cotton fabrics?

Research Objectives:

The research aims to:

1- Identify the different types of natural dyes and their features.

2- Reaching different and multiple color tones for clothes dyed with natural dyes by extracting various dyes from different plants.

3- Identify the health damage to the individual, animals and the environment resulting from the use of industrial dyes.

4- Knowing the relationship between natural plant dyes on cotton and blended fabrics and the functional properties of these treated fabrics.

5- Studying the possibility of applying the technology of natural plant dyes, which included (beets - green tea - red pepper - sumac seeds - hibiscus - henna - red cabbage - pomegranate peel - turmeric - safflower - Sidr) in dyeing fabrics for young people clothes to improve their functional properties.

6- Study how to extract natural colors from different natural plants.

The importance of research:

The importance of the research is due to:

1- Raising awareness of the health damage resulting from the use of clothes dyed with artificial dyes on the health of the individual and the environment.

2- Obtaining multiple color tones for dyed fabrics by extracting dyes from environmental plants.

3- Improving the functional performance properties of clothing fabrics using natural plant dye technology

4- The use of different natural dyes environmentally compatible in dyeing and coloring clothes.

5- A scientific addition to the Arabic library on an important and modern topic of interest to all consumers around the world.

6- Educating the consumer about the difference between clothes dyed with natural and artificial dyes.

Research hypotheses:

1- Studying the effect of using various natural dyes and obtaining different color tones and the extent to which quality is achieved for fabrics.

2- There is a statistically significant relationship between the processing of dyes and the properties of stability.

3- There is a statistically significant relationship at the level of (0.05) between the use of natural dyes and improving the efficiency of the performance of dyed youth clothes.

4- There is a statistically significant relationship at the level of (0.05) between the natural plant dyes (beets - red cabbage - sumac seeds - turmeric - hibiscus - green tea - safflower - Sidr - henna

- red sweet pepper.) on the measured properties: (inhibition of the growth of positive and negative bacteria of the gram dye - color intensity - friction test - light fastness - sweat stability).

2. Research Methodology:-

The research follows the experimental descriptive approach to suit the objectives of the research and verify its hypotheses with the applied study.

First: the descriptive approach "theoretical framework"

The research follows the descriptive approach based on the study of the definition of dye and the different types of dye (industrial, natural), and the study of the advantages and disadvantages of natural dyes and the steps of extracting dye from plants and clarify the method of dyeing fabrics and clothes and identify the different methods of batik and molds and direct drawing with natural dyes.

Second: The experimental approach "practical framework"

Includes clarifying the relationships between the variables addressed by the research in order to achieve the objectives of the research and includes the practical part of dyeing and coloring young people's cotton clothes with natural dyes.

Search limits:

- A descriptive study of some types of natural dyes and how to extract them.
- The study is limited to the use of dyes extracted from plants in dyeing and coloring young people's cotton clothes in the Kingdom of Saudi Arabia
- Dyeing is limited to the dyeing technique with batik, molding, pouring, knotting, binding and coloring
- Print on 100% cotton fabric.

Search Tools:

The research tools include the following:

1.Fabric used: 100% cotton fabric

-2 The use of natural vegetable dyes (beets - red cabbage - safflower - Sidr - sweet pepper - sumac seeds - hibiscus - pomegranate peel) to dye cotton clothing fabrics in different concentrations of natural dyes and the dyes were prepared and the fabrics were dyed and tests were dyed at the Mahalla Al-Kubra Spinning and Weaving Company and the National Research Center, and these dyes were also used in coloring and dyeing the designs selected for the work of young people's clothes developed in the Kingdom away from harmful industrial dyes.

3- The use of natural stabilizers for the dye represented in (tannic acid - citric acid - alum)

4- **Tools and devices used in research:**

- Laboratory tools for extracting dyes from plants and for the preparation and dissolution of dyes.

- Devices used to measure the degree of color fastness properties and measure the degree of color properties.

Search terms:

Functionality:

It means the benefit carried out by clothes or textiles in addition to durability as an essential and influential element in clothing, where the benefit affects the properties of (dimensional stability, appearance stability, comfort, ease of care, safety) and durability affects the properties of (tensile strength, friction resistance, corrosion by chemicals and other environmental elements) (Mrs. Khairy Afifi, 2019).

Tints:

They are concentrated colored substances that can be absorbed by the raw material from its aqueous solutions, or from the suspension of this substance in water, and it is often from aromatic molecules, forming negative or positive ions, and if the dyes are ideal, these ions are equivalent to an inorganic ion contrary to them in charge

They are also known as colored substances capable of binding chemical or physical bonds with the material to be dyed, giving it color, and they are organic compounds capable of absorbing a beam of the visible spectrum and reflecting or spreading the rest of it (Noha Mohamed Abdo, Fawzy Saeed Sharif, 2021).

It is also known: it is one of the basic processes of processing, where color is given to the fabric using dye materials, auxiliary materials, reducing and other oxidizing materials, ...And so on depending on the type of dye. It is known that the dyeing process is one of the main sources of pollution in the textile industry as a result of many of the chemicals used, and the quantities of contaminated wastewater resulting from this process..

Color properties of the dye:

The color properties in this study mean a set of color qualities and properties that can be measured on fabrics after dyeing them with natural dyes, which are (color intensity - color fastness to friction - color fastness to sweat - color fastness to light - color fastness to washing

Cotton:

Cotton consists of cellulose in the form of units and chains arranged with each other in bundles and during this arrangement appear crystallized and amorphous parts, and it is known that cotton cellulose has 70-80% crystallized parts and raw cotton contains 90% cellulose.

Printing:

In this process, the fabrics are printed in colors and drawings using dyes, resin, acids and alkalis, adhesives, solvents, etc. The printing process is also one of the main sources of pollution..

Fabric softening with clanders:

In this process, the woven fabrics are passed between soft metal cylinders under pressure to remove the surface filaments and reduce the friction between the hairs, giving a smooth and loose texture to the fabric. This process is similar in its effect to the fabric to the process of ironing clothes.

The process of bleaching the fabric:

Bleach is a cleaning process used to remove stains and discolor fabric, it is a chemical process that uses oxygen or hydrogen peroxide to remove stains from the fabric.

It also means: the bleaching process (for natural fibers) is one of the preparation processes to obtain the white color in the fabric using bleaching materials such as hydrogen peroxide or hypochlorite..

Brokerage:

The process of liberalizing the fabric (cotton) is one of the preparation processes for cotton fabrics only, whether fabric or knitwear, to obtain a higher shine, durability and higher ability to absorb dyes, using sodium hydroxide.

3. Previous studies:

1- Study of Lamia Ibrahim Ahmed (2004): The study dealt with the effect of care processes on the properties of fabrics dyed with natural dyes, and reached an increase in the color depth of wool and cotton by increasing the concentration of dye, and wool achieved the best stability of pomegranate peel dye and stabilizer Tin and cotton highest stability of tea dye and without stabilizer. And stain remover was the highest color depth of onion peel and without fixer.

2- Amal Saber and Azza Abdel Aziz, 2002: "The response of cotton tissue structures to dyeing with natural dye (henna) compared to trough dyes and active dyes"

The study aimed to compare the different response of some textile structures to cotton fabrics. (Plain - cooler - knitting) for the Giza 83 variety of dyeing with different dyes (natural - basins - active) and the results of this study were found that the highest response was to dye basins followed by natural dye and then active dye, as well as found that knitted fabric recorded the highest response to the three dyes followed by plain fabric and then refrigerated fabric due to the nature of the textile composition and the nature of the dye composition.

3- Study of Youssef Abdel Aziz et al. (2012): The study dealt with dyeing cellulosic fibers with turmeric as a safe alternative to industrial dyes, and aimed to use turmeric to dye those fibers using samples of linen, edited and unedited cotton and various chemical stabilizers. It was proved that the properties of the fabric after five washing cycles achieved the highest values of stability against sweat for linen samples, followed by unedited cotton, then turmeric-dyed liberator and magnesium sulfate stabilizer.

4- study Ferial Mahmoud, Somaya Mustafa (2003): The study dealt with the properties of photostability of the dye onion peel and used in dyeing cotton, wool and silk, and the use of (5) stabilizers at (3) concentrations of dye, and found that wool showed the best susceptibility to

dyeing and fastness to light followed by silk and then cotton, and gave the high concentration of dye the best dyeability and fastness to light for dye onion peel with the three ores with very good stability and copper sulfate stabilizer.

5- Study of Mohammed Abdullah Al-Jamal, Ashraf Kahla (2003): The study was interested in dyeing two varieties of Egyptian cotton using onion peel, and two methods of dyeing were used, namely the method of pre-installation with mineral salts, and the use of mineral salts and dye in one basin, and reached the dyeing of cotton with onion peel. Iron salts increase the intensity of dyeing and also work on the resistance of colors to washing, light and sweat for each of the threads of the two varieties.

6- Study of Reham Mustafa Mohamed and others (2010): The study dealt with the effect of different textile structures with natural dyes on some properties of cellulosic fabrics, and aimed to study the effect of using three compositions before and after dyeing. Linen/cotton blended fabrics were used, and dyeing was done using the chamber option and concluded that the composition of the gentlemen is the deepest color while the atlas is the least comparatively, and slight changes in the properties of color fastness, and increased tensile strength and elongation.

7- Rehab Juma Ibrahim (2006): The study dealt with the effect of processing woolen and blended fabrics to resist microorganisms, and the study aimed to identify the fungi that grow on those fabrics and study their impact on the properties of fabrics and treatment to inhibit the growth of fungi using environmentally friendly materials using ketosan. Wool with the composition of Atlas 4 weaving achieved the best result of different properties, and ketosan to eliminate fungi using a concentration of 3%, a temperature of 150 degrees and 5 minutes for roasting.

Procedural steps of the research:

First: Theoretical Framework: It includes:

1- Identify natural dyes and the origin and development of dyeing.

2- Studying the history of natural dyes and dividing natural dyes.

3- Study the advantages and disadvantages of natural dyes.

4- Learn how to dye fabrics and clothes.

5- Studying the methods of coloring young people's clothes by dyeing.

6- Studying the meaning of the art of batik, as well as studying the different materials in which the method is implemented.

Second: Practical Framework:

By benefiting from the results of the study in the theoretical framework

1- Processing cotton samples under research

2- Processing plants.

3- Extraction of tinctures from plants.

4- Experimental practices carried out by researchers, to benefit from the various natural dyes extracted from plants in dyeing and coloring some of the various cotton experiments to know the degree of stability of color properties on fabrics.

5- Physical tests and measuring the degree of stability of the color properties of natural dyes on cotton fabrics.

6- Implementing and employing these applied experiments in contemporary cotton clothing to achieve artistic and aesthetic goals.

7- Providing results and recommendations in the light of the results of the research.

First: Theoretical Framework:

The origin and development of dyeing:

The use of natural dyes has begun since the Stone Age by obtaining colors from some different insects and plants, and the oldest dyed piece found so far dates back to the Stone Age, Professor (Juncker) was found in the tombs (Ramada) in Bani Salama located on the edges of the Western Delta, and in the Fayoum region, on some dyed linen fabrics dating back to the Neolithic era.Dyeing has been known in China and India since ancient times, and India had a great monopoly in the production of textiles dyed from natural fibers, and models of Indian civilization were found for some clothes dyed using blue indigo dyes that originated in India.

I moved from India to Egypt, and colorful clothes were found in the tombs of the ancient Egyptians, and they used dyes extracted from some insects or plants..

The use of environmentally friendly natural dyes remained for long periods until 1856, when the first artificial dye from coal drops was discovered by the scientist (Berkan).

The historian (Plenty) also explained the foundations on which it was built, and solved the talismans of fossils, and stated that this industry when the ancient Egyptians were advanced, and many chemicals were used, some of which are still used until now, which indicates great progress in chemistry. The development continued until industrial dyes of different types and sources reached the top until the problem of environmental pollution and the harmful effects that may be caused by industrial dyes (allergies - water pollution - toxic waste) appeared, which prompted modern scientific research to return again to return to natural dyes to reduce the environmental effects.

The concept of dye:

Dye: It is a multi-colored substance that the raw material takes from its aqueous solutions, and it has the advantage of absorption or susceptibility between the material to be dyed and the raw material.

Lamia Ibrahim (2004) states that "dye is a colored organic compound used to give a specific color to a known material such as textile dyeing, and not all organic compounds are suitable for use as dyes."

Khairallah defines dye (2007) "It is concentrated substances color can be absorbed by the raw material from its aqueous solutions or from the suspension of this substance in water, and it is often from aromatic molecules in the form of negative or positive ions and if the dyes are ideal, those ions are equivalent to an inorganic ion contrary to them in the charge. It is the discovery of pigments found in plants by chance, and this was followed by the use of extract of these plants and immersion of raw materials in them, and these processes have shown that some plants give a color of medium stability, but such dyes that have a direct relationship to the raw materials are rare.".

The art of real dyeing did not progress only after the discovery of the installation process, which was first mastered and broadcast its use in the countries of the East Egyptians, and the countries of the Romans and the Greeks, from which it moved to the countries of the West, and the ancients used dyes extracted from plants such as turmeric, indigo and others, or of mineral origin, or from animals such as the scarlet insect,.One of the important events in the history of dyeing is the discovery of America in the middle of the fifteenth century, where it was possible to obtain plant dyes that were not known before in Europe, such as: oak wood, pego wood and animal dyes such as scarlet worms and others, and they were used very ingeniously, scarlet red, for example, does not dye cotton unless it is subjected to a special fixation process, by treating the material with metal hydroxide, such as: Copper, aluminum or iron hydroxide.

It also gives different colors according to the stabilizer, giving with iron a purple-black color and with alum a crimson red color and with copper a ganzari color, as well as blue indigo, which cannot be used without being subjected to a reduction process, and despite the absence of known reducing materials at that time, the first succeeded in reducing the indigo by means of gases rising from the fermentation of organic materials..

The discovery of chemical dyes in 1856, by the scientist "William Parkin" in London, had the greatest impact on dyeing, when this scientist was looking at the composition of some materials resulting from the distillation of coal, where he noticed by chance a purple color, which was the reason for the emergence of the dyestuffs industry, and thus the distillation of coal from which he obtained the gas turned into a secondary matter for the importance of oils resulting from the distillation process to obtain dyes from it.

This discovery has opened a new page in the history of dyeing, and it has become possible to obtain dyes by industrial methods without the help of limited natural materials, and this has also led to the discovery of new dyes and to continuous progress in the dye industry and the subsequent new ways to use them, all in order to obtain dyes that are easy to use, cheaper and proven color, so the dyes used in dyeing fabric can be divided into multiple sections, including natural dyes and chemical dyes.(Industrial)

A brief history of natural dyes:

Most of the natural dyes are extracted from plant parts such as tree bark, seeds, plant leaves, fruits and flowers, many countries were able to extract saffron dye, which is yellow in color from the saffron plant, and they used this dye in dyeing textiles such as wool and silk, and extract the dye of the Indian madder plant, which grows in the continents of Asia and Europe, bright red pigments used in many fabrics such as linen and silk, while the wood of the tree grows in Mexico,

Central America and India, which is still Used so far, and extracted from this tree dyes brown and black color, and used in dyeing some fabrics such as silk, cotton and fur, and extract dye natural indigo with a dark blue color from the indigo tree that grows in India, and used in dyeing wool, cotton and some other fabrics. Henna dye is made of brown-orange from shrubs located in the Middle East and North Africa, and henna was used in the past in coloring leather, as for the dyes extracted from some animals, they include purple dye and scarlet, and the red scarlet dye is made from the dry remains of a turtle living in Central America and Mexico, while purple is a rare dye extracted from oysters in the Mediterranean Sea and the Aegean Sea.

Division of natural pigments:

Division by origin:

1- Plant origin: where the coloring material is extracted from the trunk and root, the fruits of the plant, paper, tree bark,. Among the dyes extracted from some plants such as:

Pink: can be obtained from strawberries, cherries and bloodweed roots.

Orange: extracted from onions or carrot roots and turmeric seasoning.

Red color: extracted from the beet plant (beetroot) or pomegranate fruit seeds.

Brown: Extracted from coffee beans, beetroot roots or birch tree bark.

2- Animal origin: including Alec, scarlet dye, scarlet insect, and extracting indigo from sea oysters.

3- Mineral origin: from metal oxide and inorganic mineral salts, obtained from gold and silver.

Division by part used:

1- Bark: It gives a wide range of colors ranging from brown, red, yellow, black because it contains Tannin

2- Roots: The quality of the color extracted from the roots varies according to the weather, including turmeric roots.

3- Fruits: They are a rich source of coloring and easy to assemble and prepare. Including sumac.

4- Flowers: Strong colors are obtained and give wonderful pigments more luster, including ferns and pancies.

5- Leaves and stems: They tend to produce greenish-yellow shades, including tea, lily of the valley, nettle.

6- Peel: It gives strong and stable colors, including pomegranate peels and onion peel.

Division by absorbency:

1. Direct tinctures do not need a stabilizer.
2. Pigments need a fixer

V. Breakdown by chemical composition:

Carotene-1, an orange pigment found in saffron and carrots, and the main compound is pixin.

Diaroylmethanes- 2turmeric roots and organs are among the most important plants located in this group.

flavonoids, Antho cyanines-3 which are aromatic plants forcompounds Flavonoid

Dihydropyran derivatives- 4It is used to give a dark color to cotton, wool and silk.

Anthocyanidines -5are considered one of the most important red, violet and blue colors of flowers and most fruits.

Indigoid Compounds- 6Indigo is one of the oldest natural colors used by man.

Anthraqinonoid compounds- 7The most important red pigments based on these compounds.

. Perezone Benzoquinonoid -8and its color compounds.

Naphthouinonoid -9 and its best representation is henna.

III. Color division:

·Vegetable dyes:

- 1Red pigments: such as madder, pegum, sandalwood, henna, safflower, Roman peel.

-2 yellow pigments: Persian seeds, turmeric, safflower, willow leaf, chamomile blossom.

- 3black pigments: sumac, hazelnut and walnut.

4 - Green pigments: thyme and ginster.

5- Blue pigments: Indigo.

·Animal dyes:

-1 red pigments: scarlet worm and leash.

2- Blue pigments: Indigo extracted from sea oysters

Advantages of natural dyes:

It does not result in pollution to some extent and its toxicity is low.

- Re-dealing with old dyeing methods in modern technological ways.

- Consistent colors and innovative if used wisely.

- Renewable sources and does not result in health damage or adverse environmental effects.

- The possibility that the textile product is made of completely natural products.

-Renewable, nature-compatible and safer.

Disadvantages of natural dyes:

- The lack of stability of these dyes when exposed to washing and light, so it is necessary to increase research that focuses on what are the best ways to increase the stability factor in these dyes.

- Lack of technical knowledge regarding the best ways to extract natural dyes, how to use them and the best ways to install them, and therefore it is necessary to double research and studies on these dyes to reach the highest quality in dyeing fabrics and develop new methods that will raise the efficiency of dye.

- The use of these dyes may lead to the destruction of the plant kingdom, especially those that have a pharmacological advantage, so the use must be done according to specific controls such as not using plant roots and staying away from plants that have a medicinal characteristic and encourage those in charge of agriculture to take care of such crops and increase the amount planted.

How to dye fabrics and clothes:

Dyeing cotton fabrics:

Cotton is one of the most used and widespread textile raw materials in the world, as it enjoys a distinct and unique position among fabrics because of its advantages that may not be available in jealousy, cotton hair is one of the purest types of cellulose found in nature, and the chemical composition of cotton filament varies slightly within narrow limits depending on the cotton variety and the region of its cultivation.

Cotton fabrics are characterized by their ability to dye with many industrial dyes, including direct dyes, basins, azures and sulfur and active dyes.....etc. and also for various natural dyes, because of their high ability to absorb. Dyeing fabrics and clothes goes through several stages:

First step :

First we have to clean the clothes well, before we start dyeing them: using a good washing powder, on a warm cycle of washing and we have to make sure that the stains have been completely removed, and if the clothes are white, they must be bleached.

Second: The process of institutionalization:

It is a process used to process cotton fabrics, which involves treating cotton fibers with caustic soda solution, which opens the pores of the fibers, making them more receptive to dyes and other treatments. This process results in a shinier and smoother surface, as well as increased absorption and color fastness. Processing is usually carried out before weaving or sewing the fabric into the fabric.

Step Two

Preparing for dyeing fabrics before dyeing: is very important, we can use a plastic mattress to cover the surfaces well, so as not to be damaged by the dye and there must be towels, near you to wipe the dye if spilled .

Third Step:

Stabilizers:

Metal salts are used for the purpose of fixing dyes on the fabric and to improve the properties of dyeing, and most dyes need those salts in order to improve color fastness in addition to that they may be used with fixed dyes by nature and in this case the stabilizer is not used to make the dye fixed, but to modify and change the color to a certain extent.
– The stabilizer must be placed a very important step in order to stabilize the color for as long as possible, and the choice of stabilizer depends on the color of the dye .

– When using a natural dye prepared from berries, it is necessary to use half a cup of salt, in addition to eight cups of cold water .

– If the dye relies on natural colors, other can prepare a stabilizer of white vinegar, by one cup of vinegar added to it four cups of water .

– In the case of using an artificial dye, the appropriate stabilizer must be used .
– The fixer is applied for a whole hour, after which the clothes are washed with cold water, before the start of dyeing.

Fourth Step:

How to choose the natural color of the dye :

In the beginning, in order to do the dyeing process, you have to get the plants used from the wild areas, but you have to beware of getting poisonous plants such as poison oak and poison ivy, you can pick plants early in the morning before sunrise and run out of rays on the plant, Indigo dye is one of the first dyes used in coloring textiles, and this global interest has prompted in recent years to try to return to nature again to protect the environment from pollution and use natural dyes that are more Environmentally friendly as an alternative to industrial dyes, and among the colored plants used in dyeing:
– For the manufacture of orange dye, carrot roots, onion husks and lichen plant and

Walnut seeds

- Yellow color: squash nut shells

– To make a brown dye, you can use walnut shells, tea bags, coffee deposits and gold stick sticks..
– To obtain a pink color, avocado, raspberries, strawberries and cherries can be used .
– To obtain a blue color, or violet, red cabbage, hyacinth flowers, blueberries, purple, iris or dogwood bark are used..

– To get the red color, use red onions and elderberry, beets or hibiscus .
– For yellow use bay leaf, calendula buds, dandelion flowers, daffodils and turmeric flowers .
– For green color use spinach, artichoke, snapdragon herb and yarrow flowers .

- Gold color: Red clover

Fifth Step:

First: Preparing plants to extract dye from them:

– It is necessary to bring special utensils for the manufacture of dyes and those utensils can not be used again for cooking purposes, then start cutting the plants into small pieces and placing them in a rust-resistant pot and then adding an amount of water to be twice the amount of plant added, then it is boiled on the fire well and drained, and an amount of water must be placed sufficient to dye the selected piece .

Second: Preparation of pieces of cloth:

Natural fabrics such as cotton, silk and wool accept dyes better than fabrics made of petroleum derivatives, also fabrics must be new and not worn before because they are affected by body oils, you must also use lemon, alum, soda and vinegar any of them to fix the color, then put the color stabilizer to a gallon of water (two tablespoons) and put the cloth in a saucepan and boil it on low heat for half an hour to an hour and extract it from the pot and leave it to cool and then Rinse with cold water.

– After the solution is well filtered from any plant material, we put the piece of clothing to be dyed in this solution, and it is raised over medium heat for a period of half an hour to an hour, and to obtain a richer color, the piece of clothing can be left in the solution for an additional eight hours after extinguishing the fire .

– Care must be taken to stir the piece of clothing, from time to time inside the solution until it is dyed well, to the same degree in all its aspects .

Third: Laundry of dyed clothes

When washing dyed clothes, care must be taken to, that the water used has a cold temperature, so as not to waste the color of the dye and can add a few drops of vinegar, with water and it is not recommended to use the dryer to dry these clothes, but leave it to sunlight to work on drying it .

Ways to color young people's clothes with dye:

1- **Dyeing and coloring with batik:**

Dyeing is an ancient art and an ancient industry, its spread is wide in many countries of the world and this industry has evolved according to scientific and industrial progress and increasing interest in it with the growth of civilization, and dyes are used in multiple areas, including dyeing leather and textiles, papers, wood of all kinds. It is the coverage of certain parts of the surface to be dyed with a layer of wax prevents the leakage of dye to the piece of fabric, and the raw materials used in this method (beeswax and Alexandrian wax and dyes colors, wax machine, metal molds) and dyeing is done in different ways as a way to decorate fabrics and decoration by dotting or decorative drawing or tattoo or planning as shown in Picture No. (1).

Figure (1)

Batik, which means in Javanese relative to the country of Java (drip or tattoo) and means dripping beeswax on the cloth and is part of the process of decorating fabrics manually.

There are two types of batik:

1- Cape: It is implemented by ready-made templates as in the picture (2).

2- Tulis: It is a traditional type that is drawn manually and is more expensive, as in picture (3).

Figure (2)

Figure (3)

Methods of batik art in decorating fabrics:

The art of batik is implemented on the fabric in several ways using beeswax to implement the blocking method, whether by binding or metal molds immersed in wax and transported on the fabric and defined batik in the following ways:

1- The method of linking and contracting.

2- Batik method with wax insulation.

Hot wax can be used through the following techniques:

-Heat resistant brushes - Batik wax pens - Wax cracking - Metal wax molds, as in Figure (6,5,4).

Figure (6,5,4)

Second: Practical Experiences:

Variables:

- The type of dye and the type of stabilizer, ten types of dye were chosen (safflower, Sidr - beets - red cabbage - red pepper - spinach - sumac seeds - pomegranate peel - henna - indigo plant) and three of the stabilizers, namely (citric acid (aluminum sulfate) - alum - tannic acid) each stabilizer at a concentration of (4 g / 200 ml water) per 100 grams of cloth.

Constants:

- Dyeing conditions and stabilizers have been fixed in terms of (temperature, time and concentration).

- Cotton cloth (poplin).

First: Determine the raw materials used under study:

It is cotton fabrics (poplin) 100% - the fabric under research has been produced by the dyeing and textile company in Shubra Al-Kheima - Qalyubia Governorate - Egypt, and the width of the fabric is 195 cm.

Second: The samples under research have been prepared:

The samples of the fabrics under research were prepared in three stages as follows: the first stage (boiling), the second stage (bleaching), and the third stage (mercination).

1- Boiling process:

-The boiling process takes place inside an automatic washing machine, at a temperature of 100 ° C, time 30 minutes

- Chemicals used (caustic soda concentration of 30 g / liter) - Wet materials (Specone at a concentration of 2 g / liter).

2- **Bleaching process**:

The bleaching process for dyeing is carried out without light bleaching materials.

- Temperature 100 ° C, time 30 minutes.

- Chemicals used :(sodium silicate at a concentration of 3 g / l) - (hydrogen peroxide at a concentration of 20 g / l) - (wet materials at a concentration of 1 g / l).

3. **Drying:**

The drying process was carried out inside an electric dryer at 100°C for 30 minutes

Third: Extraction of dyes:

- The yellow color of the roots of turmeric plant, and safflower, at a concentration of 50 g / 200 ml water.

- The red color of the red cabbage plant, beet plant, pomegranate peel, at a concentration of 50 g / 200 ml water.

- Black color of sumac seeds, at a concentration of 50 g / 200 ml water.

- Green color of green tea plant, at a concentration of 50 g / 200 ml water.

- Green color Pistachio from the Sidr plant, at a concentration of 50 g / 200 ml water.

- Orange color of henna, at a concentration of 50 g / 200 ml water.

- The blue color of the indigo plant of the pea family, with a concentration of 50 g / 200 ml water.

Fourth: Processing plants:

-The dry parts of the plant from which the dye will be extracted are prepared, purified from any impurities

Or dust adhered to it.

- Used plant parts are ground until they turn into powder.

- Keep in dry and closed containers until use

Dye extraction: (all colors were extracted in one way)

- The ground parts of the plant are soaked in water for a whole night, where the percentage of extract is 30%

-It is raised on the fire until the dye is extracted from it for two hours, during the hour

The first temperature is raised gradually, starting with a temperature of ◦30° C, then increasing the temperature at a rate of one degree every minute until reaching ◦95-90° C, then the temperature is fixed during the second hour of extraction in all plants used.

- After the extraction time is over, the glass containers are moved away from the flame and left to cool.

- The dye solution is filtered using a filter funnel until dyeing residues are excluded

Fourth: Dyeing fabrics:

The fabrics of the research sample were dyed with natural plant dyes such as (safflower dye - henna dye - beet dye - green tea - red cabbage dye - turmeric dye - sumac seed dye - Sidr dye - pomegranate peel dye - indigo plant dye) and natural stabilizers were used for the dye represented in (alum - tannic acid - citric acid).

The colored material that was extracted from the plants is used, and then the dyeing process of the cloth under study was done by immersion method for 60 minutes to ensure that the cloth absorbs the treated material 100% and then squeezes the cloth to get rid of the excess solution. After that, drying at 80 m for five minutes and then roasted in special ovens at 130 m for two minutes, has been using the colored material that was extracted from the previous plants in coloring and dyeing young cotton clothes (poplin) in the Kingdom of Saudi Arabia with various decorations.

Tests & Measurements:

Several tests were conducted for fabrics dyed with dyes under study, at the National Institute for Measurement and Calibration - in Cairo -, with a sample of each untreated material to find out the extent of the impact of these natural plant dyes on the fabrics under study, in order to determine their different properties and the relationship of these properties to the research variables (different mixing ratios of natural dye extracts), namely the color fastness test by friction, the test of measuring the tensile strength and elongation of fabrics in the direction of warp, color fastness tests, and color depth measurement, K/Sand tests of resistance of fabrics to the growth of microorganisms (fungi), and color fastness test for sweat.

1- **Color depth measurement test (color intensity):**

The color intensity of the dyed samples was measured according to the standard method (30) using a device

Model: S.F600+ Data color International Spectro photometer))

2- Color fastness test for washing:

The stability test for washing was performed according to the standard method (28) using a device

(Launder – meter standard instrument) and the extent of change in the color of the samples was evaluated using the (gray scale (Gray scale).).

3- Color fastness test for friction:

Then the stability of friction according to the standard method (29) using (Cork- meter).

-Wet friction test

- Dry friction test.

The samples were evaluated using a gray scale.).

4- Color fastness test for light:

Light stability was performed according to the standard method (26) and the samples were evaluated using the Blue scale.).

5- Color fastness test for sweat:

The color fastness test for sweat was performed according to the standard method (27) using the EPerspiration Tester device and in two ways:

-Alkaline sweat test

-Acid sweat test

The samples were evaluated using a gray scale.

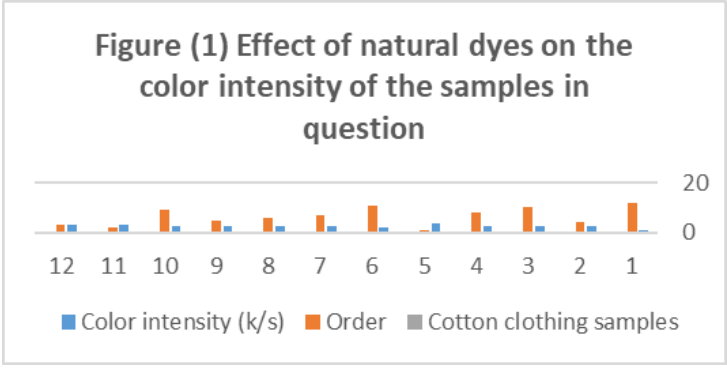
After that, statistical treatments were made for the results of quality tests of the fabrics produced under research using variance analysis to find out the significance of the effect of research variables on the properties of the study (color depth - stability properties - light - friction (dry - wet) - dry cleaning), in addition to using the multi-axis radar method, to evaluate the overall quality of dyed cotton fabrics produced under research.

Table (1) Effect of natural dyes on the color intensity of the samples in question

Color intensity (k/s)	Order	Cotton clothing samples
0.665	12	100% cotton
2.774	4	100% cotton treated with beet dye
2.600	10	100% cotton treated with red cabbage dye
2.654	8	100% cotton treated with safflower dye
3.420	1	100% cotton treated with Sidr dye
1.850	11	100% cotton treated with red pepper dye
2.700	7	100% cotton treated with hibiscus dye
2.765	6	100% cotton treated with turmeric dye
2.773	5	100% cotton treated with henna dye
2.632	9	100% cotton treated with pomegranate peel dye
3.320	2	100% cotton treated with sumac seed dye
3.00	3	100% cotton treated with indigo dye

It is clear from Table (1) that there are statistically significant differences at 0.05) between the use of the type of natural dyes and the coefficient of color intensity on cotton clothing fabrics.The different coefficients can be arranged as follows, where the largest value of color intensity for cotton fabrics and clothes is 100%.Laboratories with Sidr dye, followed by 100% for cotton fabrics and clothes, 100% laboratories with Sidr dye, followed by 100% for cotton fabrics and clothes, 100% laboratories with sumac seed dye, followed by 100% for cotton fabrics and clothes, 100% laboratories with beet dye, followed by 100% for cotton fabrics and clothes, 100% laboratories with henna dye, followed by 100% for cotton fabrics and clothes, 100% laboratories with turmeric dye, followed by 100% for cotton fabrics and clothes, 100% laboratories with hibiscus dye,It is followed by 100% cotton fabrics and clothes treated with safflower dye, followed by 100% cotton fabrics and clothes treated with pomegranate peel dye, followed by 100% cotton fabrics and clothes treated with red cabbage dye, followed by 100% cotton fabrics and clothes with red pepper dye, followed by 100% cotton fabrics and clothes without dye.

Cotton clothes dyed with natural dyes are more severe than cotton clothes that are not dyed with natural dyes



(1) The effect of natural dyes on the color intensity of the samples in question

It is clear from Figure (1) that different natural dyes have an effect on the intensity of color on 100% cotton clothes used in the current research, where the intensity of color increased using natural dyes on cotton clothes when compared to samples not treated with natural dyes, and this indicates the efficiency and effectiveness of using environmentally safe natural dyes to maintain the intensity of color on all cotton clothes 100%.

2- Color fastness test for washing:

Table (2) Effect of Natural Pigments on Color Fastness of Samples after Washing

Cotton clothing samples + dye	Color fastness after washing	Order
100% cotton	40	2
100% cotton treated with beet dye	40	2
100% cotton treated with red cabbage dye	30	3
100% cotton treated with safflower dye	40	2
100% cotton treated with Sidr dye	50	1
100% cotton treated with red pepper dye	30	3
100% cotton treated with hibiscus dye	40	2
100% cotton treated with turmeric dye	30	3
100% cotton treated with henna dye	40	2
100% cotton treated with pomegranate peel dye	30	3
100% cotton treated with sumac seed dye	50	1

100% cotton treated with indigo dye	50	1

It is clear from Table (2) that there are statistically significant differences at (0.05) between the use of the type of natural dyes and the color fastness test coefficient on cotton clothing fabrics after washing, and the different coefficients can be arranged as follows, where the largest value of color fastness to washing for cotton fabrics and clothes is 100%.Factories with Sidr dye and cotton clothing fabrics treated with indigo dye and cotton clothing fabrics treated with sumac seed dye, followed by 100% cotton fabrics and clothes treated with henna dye, cotton clothing fabrics treated with hibiscus dye, cotton clothing fabrics treated with safflower dye, cotton clothing fabrics treated with beet dye, as well as undyed cotton clothing fabrics, followed by cotton clothing fabrics treated with pomegranate peel dye, cotton clothing fabrics treated with turmeric dye, and cotton clothing fabrics treated with dye Red pepper, and cotton clothing fabrics treated with red cabbage dye.

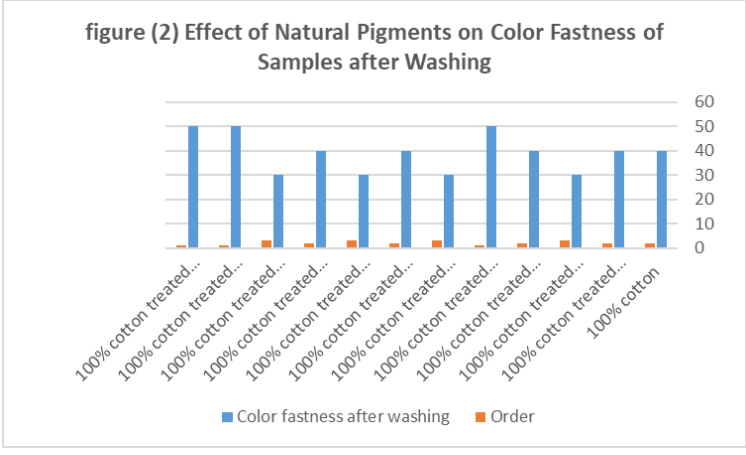


Figure (2) The effect of natural dyes on color fastness after washing of the samples in question

3- Color fastness test for friction:

Table (3) shows the results of the color fastness test for friction (wet - dry) for the samples in question dyed with different natural dyes

Friction (wet)	Friction (dry)	Samples under the influence of natural dyes
40	30	100% cotton
40	30	100% cotton treated with beet dye
40	30	100% cotton treated with red cabbage dye
40	30	100% cotton treated with safflower dye
40	30	100% cotton treated with Sidr dye
40	30	100% cotton treated with red pepper dye

40	30	100% cotton treated with hibiscus dye
40	30	100% cotton treated with turmeric dye
40	30	100% cotton treated with henna dye
40	30	100% cotton treated with pomegranate peel dye
40	30	100% cotton treated with sumac seed dye
40	30	100% cotton treated with indigo dye

It is clear from Table (3) that there are no significant differences at the level of statistical significance 0.05for testing the wet and dry friction of untreated samples and other treatments for the use of different natural dyes for the material of cotton clothes 100% used and the lack of different values for different dyes according to the material of cotton clothes used indicates the efficiency and effectiveness of natural dyes used to test wet and dry friction of cotton material 100%.

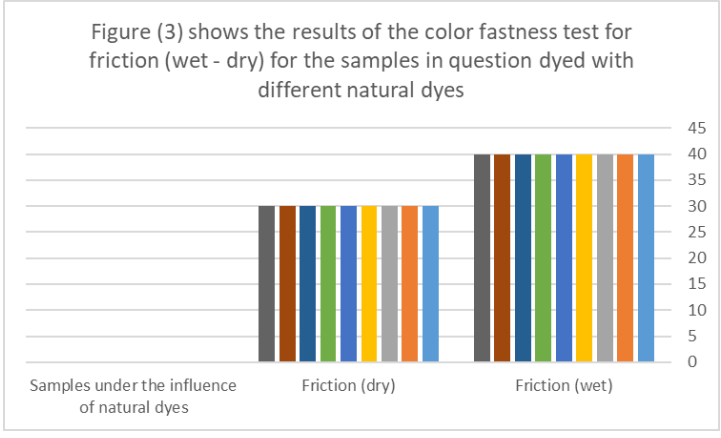


Figure (3) The effect of natural dyes on dry and wet friction of the samples in question

It is clear from Figure (3) that the different natural dyes have no effect on dry friction on the material of fabrics and cotton clothes used, when compared to samples not treated with natural dyes, and this indicates the efficiency and effectiveness of using natural dyes.

It is clear from Figure (4) that the different natural dyes have no effect on the wet friction of the cotton clothing fabrics used when compared with samples that are not treated with dyes

This indicates the efficiency and effectiveness of using various natural dyes that are environmentally safe to test wet friction on all cotton clothing fabrics used.

4- Color fastness test for light:

Table (4) Effect of natural dyes on the color fastness of light for the samples in question

Order	Color fastness to light	Samples under the influence of natural dyes
2	.375	100% cotton
1	.5	100% cotton treated with beet dye
1	.5	100% cotton treated with red cabbage dye
1	.5	100% cotton treated with safflower dye
2	.375	100% cotton treated with Sidr dye
1	.5	100% cotton treated with red pepper dye
1	.5	100% cotton treated with hibiscus dye
1	.5	100% cotton treated with turmeric dye
1	.5	100% cotton treated with henna dye
1	.5	100% cotton treated with pomegranate peel dye
2	.375	100% cotton treated with sumac seed dye
2	.375	100% cotton treated with indigo dye

It is clear from Table (4) that there are statistically significant differences at (0.05) between the use of the type of natural dyes and the coefficient of color fastness to light for cotton clothing fabrics and the different transactions can be arranged as follows, where the largest value is estimated for cotton fabrics 100%and treatment with dye of sumac seeds, and for cotton fabrics treated with Sidr dye, and for fabrics treated with indigo dye and also for cotton clothing fabrics100%of the factories with Sidr dye, and cotton fabrics without dye, followed by clothing fabrics dyed with dye (pomegranate peel, henna, beets, red cabbage, hibiscus, turmeric, safflower).

The different values of different dyes indicate the efficiency and effectiveness of natural dyes for the coefficient of color fastness to light for cotton material

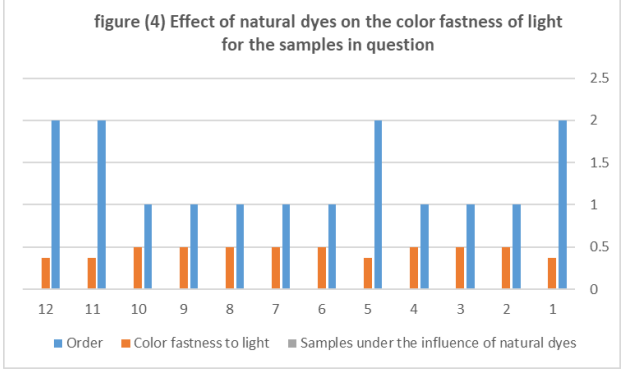


Figure (4) The effect of natural dyes on the color fastness of light for the samples in question

5- Color fastness test for sweat:

Table (5) shows the results of the color fastness test for sweat (acid - alkali)

Color fastness to sweat (acid)	Color fastness to sweat (alkaline)	Samples under the influence of natural dyes
80	80	100% cotton
60	80	100% cotton treated with beet dye
60	80	100% cotton treated with red cabbage dye
60	60	100% cotton treated with safflower dye
80	100	100% cotton treated with Sidr dye
60	80	100% cotton treated with red pepper dye
60	100	100% cotton treated with hibiscus dye
60	100	100% cotton treated with turmeric dye
60	80	100% cotton treated with henna dye
60	80	100% cotton treated with pomegranate peel dye
80	100	100% cotton treated with sumac seed dye
80	100	100% cotton treated with indigo dye

All samples under research dyed with natural and undyed dyes have a good degree of color fastness to the acid sweat solution, as the samples recorded an average evaluation score on the gray scale ranging between (100, (80) for each of the fabrics dyed with natural dyes.

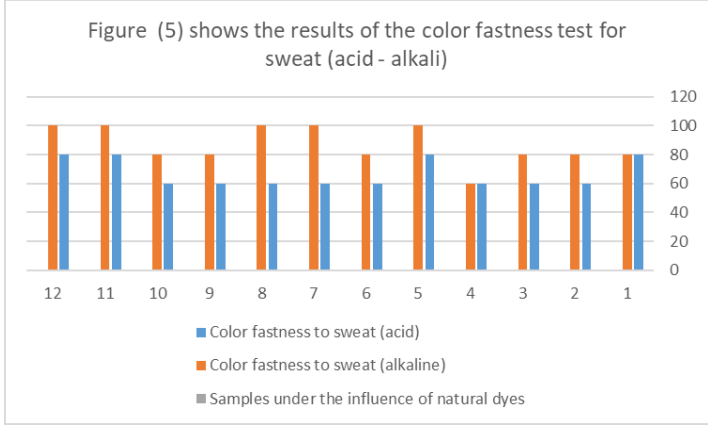


Figure (5) The effect of natural dyes on the color fastness of sweat (acid - alkali) of the samples in question.

The difference in values for different dyes indicates the efficiency and effectiveness of natural dyes for the coefficient of color fastness of sweat (acid - alkali) for cotton raw material

Employing natural dyes extracted from ecological plants:

In light of the results of the theoretical study, the research applies the experimental approach - in an attempt to benefit from the extraction of different dyes from different plants and employ these dyes in the decoration, coloring and dyeing of some cotton clothes with various decorations, with new methods of modification, abstraction, deletion and addition in the units in an abstract manner in order to achieve clothes dyed with batik techniques, linking knots, dyeing with molds and direct drawing in natural dyeing colors extracted from natural plants.

Experimentation Controls:

The controls of experimentation are determined as follows:

First – Printing materials:

Natural dyes extracted from plants, brushes, plastic pipes, batik wax (honey - Alexandrian), tools used in batik technique, tools used in knotting and tying.

Second: - Printing surfaces:

The research experiment is based on the material of cotton cloth.

Third: - Methods and methods of performance typography:

1 - dyeing with batik (basic technique)

2- Dyeing by direct drawing (added technique).

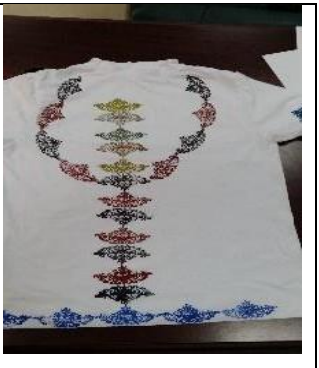
3- Mold-dyeing

4- Modulation, change, deletion and addition methods will be used

5- The application side of the research and technical analysis of cotton clothes dyed and colored in natural colors:

Clothes dyed with natural dyes:





- Materials: White cotton fabric - pigment pastes - dyes - beeswax and Alexandrian - brushes of different size - the design that is implemented - tools and materials for the implementation of printing Balbatik.

- Typographic methods and methods: batik printing, basic technology - additive technique direct drawing

4. Findings and recommendations:

First: Results :

1- There is a statistically significant relationship between the processing of dyes and the properties of stability.

2- There is a statistically significant relationship at the level of (0.05) between the use of natural dyes and improving the efficiency of the performance of dyed youth clothes.

3- There is a statistically significant relationship at the level of (0.05) between the natural plant dyes (beets - red cabbage - sumac seeds - turmeric - hibiscus - green tea - safflower - Sidr - henna - red sweet pepper.) on the measured properties: (inhibition of the growth of positive and negative bacteria of the gram dye - color intensity - friction test - light fastness - sweat stability).

4- A number of natural dyes extracted from some plants were presented and used in dyeing and drawing some cotton clothes and implemented with batik technique and direct drawing.

5- Achieving a new vision inspired by the natural environment and its natural colors in dyeing clothes

Second: Recommendations:

1- Directing attention to the use of natural dyes and working to develop them for all fabric materials.

2- Expanding the study of the effect of natural dyes and safe stabilizers on the functional properties of cotton fabrics.

3- Practicing experimentation in natural dyes and benefiting from them in the field of textile printing, as it provides the opportunity for intellectual fluency and flexibility in addressing technical problems using new technical methods.

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