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The Floral Based Natural Dyes and Its Applications-A Review

P. Dhanalakshmi¹, . Dr.R.I.Sathya²

Research scholar ¹, Department of Home Science, The Gandhigram Rural Institute -Deemed To Be University, Gandhigram, Dindigul District-624302, Tamil Nadu.

² Professor, Department of Home Science, The Gandhigram Rural Institute -Deemed To Be University, Gandhigram, Dindigul District-624302, Tamil Nadu.

Abstract

India has rich biodiversity and harbour a wealth of various natural flower resources and there is no doubt that the plant kingdom is a treasure house of diverse nature products. Plants, insects and minerals are the sources for obtained the natural dyes. Plants are the most important sources and it can be obtain from various parts includes stem, leaves, flower, fruits, seeds and pills are utilize to extract the natural colorants. Flower dyestuff/colorants are important in textile dyeing as it provides dyes from the sources which is available abundantly but still not fully utilized. This study attempt to review some floral natural dyes and its application on textile sectors.

Keywords: Bio diversity, Natural dye, Colorants, Floral sources, textile dyeing.

I. Introduction

Natural dyes/colorants are derivative from flora and fauna are believe to be used as safe due to its nontoxic, non carcinogenic and biodegradable in nature.(1) Natural dyes can be obtained by different sources and it has a variety range of shades.(4) Plants are the most important sources for natural colorants and it can be obtained from various parts includes stem, leaves, flower, fruits, seeds and pills are utilize to extract the natural colorants. The extracted natural colorant used to dyeing the textile materials and also it poses some antimicrobial activity, antibacterial activity, insect repellent and other medicinal values.(5) Nowadays, the usage of natural dyes has been increasing rapidly due to result of stringent environment standards forced by many countries in response to toxic and allergic effect associated with synthetic/chemical dyes.(2) Demand of the natural dyes are not only in textile industries ,it will also play on vital role in leather, cosmetics, food and pharmaceuticals.(3)

Various natural dyestuff/colorants were obtained from natural plants. Particularly, flowers are the essential source of natural dyes. Floral dyes were providing various shades as well as fragrance effect on the fabrics (5). Flowers are rich source of tannin, are flame colored and it yields various shades like pink, red, brown. The flame colored shades of dye was utilized throughout India to dyeing silk and other fabric on a commercial scale.(7) Flowers are the most efficient fermentation agent which is used in ayurvedic medicines.(6) In dried form of flowers are utilized for the treatment of ulcers, fevers, skin disease, leucorrhoea, menorrhagia, disorder of mucous membranes, liver diseases, dysentery, diarrhea, etc.(9) Many studies revealed that by adding different combinations of mordants in different ratios it produced different shades and shows different values of color fastness.(8) From this paper reviews the valuable information on available flower sources, color obtained on textile material after dyeing and its application.

II. Discussion

Marigold flower is generally known as tagetes species, a class of herbs and the member of asteraceae family. It is cultivated and used as garden plants in India. Marigold flowers are rich source of lutein, a carotenoid pigment(10). It produces many variations of shades like yellow to orange in colour with corymbose clusters are much used for decorative purpose in celebration of festivals. Nowadays, Lutein is becoming an increasingly popular active component used in the Textile coloration.(11) The dyes obtained from marigold plants are alternative source of synthetic dye. The application of a variety of mordants used with marigold dye extracts gives immeasurable shades like brown, yellow, orange and so on to the fabric.(10). Marigold natural dye was extracted from the flowers and applied onto cotton fabric by ultrasound-assisted dyeing method under optimized conditions. The dyed fabrics produced yellow shades onto cotton substrate.(12)



Figure-1 Variety of marigold flower (10)

Hibiscus rosa sinensis (HRS) is a red flower of China rose it belongs to Hibisceae tribe of family Malvaceae. Hibiscus rosa sinensis (HRS) is an evergreen plant and it is available throughout the Middle East and eastern Asia. (13). The part of a flower is widely used in man application includes antifungal cream, haircare, herbal shampoo as well as an emollient agent. Anthocyanin is a rich source of hibiscus flowers(13&14). It is a natural colorants with a wide range of colours. By either changing the pH of the extracts or fixing the pH of the extract and changing the mordants the various colorants like pink, red, violet, blue and orange can be obtained by this dye. By application of heat the resulting colour of anthocyanin and the mordant complexes can be increased. The powdered petals of red flowers of HRS was extracted with 5% acetic acid which yielded a deep red colour that showed a great potential for woollen fibre dyeing(15).



Figure-2 Hibiscus rosa sinensis(16)

The dark red papaver rhoeas flowers are well known as corn poppy and it belongs to papaveraceae family. Papaver rhoeas plants grow widely in various areas. The dark red flower of plant height may reach 90cm.(17) Mordant play as a vital role in cotton dyeing with papaver rhoeas flowers. Papaver rhoeas flowers used as a natural dyeing source. As a dye, green, brown, lead and tan colours can be obtained by using different four mordant on the cotton fibre. The colour yield of dyestuff are increased by cationizing process with mordanted and without mordanted samples.(18) Papaver rhoeas flowers dyeing with cotton fibre shows excellent result in wash fastness test. In perspiration and dry rub fastness value of Papaver rhoeas flowers dyed with cotton fibre samples were generally in commercially acceptable range. There is no antibacterial activity were shown in the papaver rhoeas flower extracts.(18)



Figure-3 Papaver rhoeas flowers(corn poppy)(19)

Flower of Butea Monospermais commonly known as tesu, palas. It belongs to Fabaceae family.(21) Butea Monospermais is a medium sized dry season-deciduous tree, grows upto 15 m tall. Butea Monospermais also called as flame of forest.(22) Butea Monospermais flower which are bright red orange in colour, are source of chalcones pigment.(24) The flower of flame forest tree have been used for dyeing turbans and also used to preparation for abir a colored powder which is used during the Indian festival of holi. Butrin is main rich source of coloring pigment which is present in Butea Monospermais flower.(23) Butea Monospermais flower used as natural dye source. Butea Monospermais flower dye was extracted by boiling method. Alum mordant was used in the dye extracts. The dye was applied onto the cotton fabric and it produced yellow shade.(20)



Figure-4 Butea Monospermais flower(palas)(25)

Plumeria rubra L. is commonly known as frangipani and its belonging to apocynaceae family. This plant is a genus of laticiferous tree and shrubs. The native of the plant is tropical America and found from southern Mexico to northern South America and also abundant in India. The height of plant tree upto 3.5 to 6.0 m. Generally the plant is grown for its fragrance flowers and ornamental purpose. (26,27&28) Flowers are reddish pink, white or purple centre rich with yellow. Its also used in pectoral syrup.(29). Due to presence of phenolic compound in the flower of plumeria rubra is used as a good natural dye source. (30) The flower of plumeria rubra dye extracts were applied on cotton and silk fabric with different mordant using exhausting method. A wide variety of shades ranging from yellowish brown and dark brown colors can be obtained by this flower dye extracts.(31)



Figure-5 Plumeria rubra(frangipani)(32)

Bougainvillea glabra is commonly known as paper flower its belonging to nyctaginaceae family. The native of the plant is south America and eastern and central brazil and also abundant in india. It's a evergreen plant and varying in habit from shrub to a tree. The height of the plant reach upto 7m or long.(33) Bougainvillea glabra is most colourful attractive and cut flower which is used as gardening or ornamental purpose. The flowers are clusters and it can be white, purple, pink, red, orange etc. Bougainvillea glabra contain phenolic compounds and also possess some antioxidant activity as well.(34,35)Pink Bougainvillea glabra used as a natural dye source. The dye extracts can be applied onto the cotton fabric. By using different extraction methods and different mordants in the flower dye extracts, it produce various shades like dark pink, brown, yellow, dark black, Spanish olive color and dark red color onto the cotton fabric.(36)



Figure-6 Bougainvillea glabra(paper flower) (37)

Thepesia populnea (Milo) plant is a member of malvaceae family. This plant is a ever green tree and a tiny tree or shrub. The height of the tree is upto 6-10 m and it has crooked stem, dense crown. The native plant of milo is coastal areas of the Indian and pacific oceans from east Africa and India to mainland southeast asia.(38) The common name of the Thepesia populnea plants are pacific rosewood, India tulip tree, cork tree, umbrella tree, etc. Thepesia populnea plant used in herbal medicine, and also other parts of plant also use to cure a variety of ailments.(39) Thepesia populnea flowers are yellow in color and it has bell shaped.(38) Flower of thepesia populnea used as natural dye source. The flower of thepesia populnea dyes were obtained by the methanol extraction method and it was applied on the polyester fabric in dip and dry process.(39) Flower of thepesia populnea dye extracts were applied on the silk fabric with different mordants. The color fastness properties of the dyed silk fabric were analyzed. (40).



Figure 7- Thepesia populnea (Milo)(41)

Delonix regia

plant is an ornamental tree and its belonging to caesalpiniaceae family. Delonix regia commonly called as flame tree, royal Poinciana regia or flamboyant, gulmohar and peacock..(42) The ornamental tree abundantly found in India, Mexico, Australia, Caribbean, Northern mariana Islands, South florida and United Arab emirates. (43)Delonix regia plant is a rich source of carotenoids and antioxidants.(42) Delonix regia plant having the biological activity like antioxidant,(44)antiarthritic,anthelmintic,anticancer,antirheumatic,antimalarial,anti-diabetic activity(45).The flower of delonix regia can be utilized as natural dye source in textile. Delonix regia flower dyes were extracted using different pH medium and using with mordants. The dyestuff was applied onto the cotton, silk and wool fabric. The dyed fabrics were shown better results in fastness to washing and fastness to sunlight. Various parts of plants were also used as natural dye for dyeing silk fabric.(46,47).



Figure 8-Delonix regia(gulmohar)(48)

III. Conclusion

The uses of natural dyestuff/colorants are an essential alternative source of synthetic dyes. Natural dyes become as one of the thrust area in textile dyeing sectors due to its non allergic effects, non toxic in nature and results in less environmental pollution as well as less side effects. Indigenous conventional knowledge on dye yielding plants is very essential for development of future bio prospecting and provided proper preventive measures are considered for its sustainability. From this study, some important feasible flower dye sources were discussed.

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