

Phytochemical Analysis of Selected Natural Dyes

Adya Tiwari and Meenu Srivastava

Department of Textiles and Apparel Designing, College of Community and Applied Sciences,
MPUAT, Udaipur (Rajasthan) India

Abstract: The screening of phytochemical was carried out to analyse the qualitative chemical compositions of selected plant extract using precipitation and colouration reaction and categorize them in different chemical group like, alkaloids, flavonoids, tannins, amino acids, etc. Three natural dyes *Alkanna tinctoria*, *Quercus infectoria*, and *Thuja orientalis* were chosen for laboratory experiments in present investigation.

Keywords: Phytochemical, Analysis, Dye, Extract

I. INTRODUCTION

Phytochemicals are naturally occurring in the plants that have defense mechanism and used as protection from various ailments. The important phytochemical groups alkaloids, steroids, flavonoid, phenolic compounds, anthraquinones, and tannins present in various plant extracts are responsible for their inherent medicinal properties. (Chandrashekar *et al.*, 2012; Anand *et al.*, 2011; Kalaiarasan and John, 2010). Plant tannin has been recognized for their pharmacological properties and also perform many purposes like antimicrobial, antiviral, antibacterial, anti-tumor. Tannins are the substances which may provide the natural colour to the substance. Tannins are the most important ingredients which are necessary for dyeing. Saponins carry out medicinal functions which include serving as an expectorant and emulsifying agent besides having antifungal and antimicrobial properties. Alkaloids are used in nicotine sulfate, a byproduct of the tobacco industry, as a very potent insecticide and have a physiological effect. Glycoside widely used in herbal medication. Leaves, stem bark, and roots are rich in steroids. They are also used in nutrition, herbal medicine, cosmetics and medicine because of their profound biological activities. Terpenoids are used to inhibit the germination and development of competing plants and in scent in flowers or fruits, attracts insects to distribute pollen or seeds. Anthraquinones are considered to be associated with innate resistance of a plant to diseases and often shows antimicrobial activity. Phytochemicals are also responsible for the good antimicrobial activities and colouring of the textiles (Tiwari and Srivastava, 2018). Flavonoids are the substances which can give the colour. (Zachariah *et al.* 2014 and Chairman *et al.* 2015).

Present paper highlights the qualitative analysis of selected dye extracts for presence/absence of phytochemicals.

II. METHODOLOGY

The researcher selected three natural dyes *Alkanna tinctoria*, *Quercus infectoria*, and *Thuja orientalis* for laboratory experiments in present investigation. A qualitative analysis was carried out to identify the chemical constituents present in different dye extracts by the preliminary phytochemical screening.

III. RESULTS

The ethanolic, methanolic and aqueous extracts of various plant parts were prepared and subjected to qualitative analysis. Results of phytochemical investigation of selected plant sources with different solvents extract were recorded as present (+) or absent (-) depending on the outcome of the test. The compounds observed have been presented in Table 1 to 3.

Phytochemical screening of *Q. infectoria* dye extract

Table 1: Phytochemical screening of *Q. infectoria* dye extract

Constituents	Aqueous Extract	Ethanolic Extract	Methanolic Extract
Alkaloids	-	+	+
Steroids	-	+	-
Glycosides	-	+	-
Carbohydrates	+	+	-
Flavonoids	+	+	+
Saponins	+	+	-

Tannins	+	+	+
Phenolic Compounds	+	+	+
Terpenoids	-	-	+
Anthraquinone	-	-	-

Table 1 clearly revealed that the aqueous extraction of *Q. infectoria* showed positive results for Carbohydrates, Flavonoids, Saponins, Tannins and Phenolic compounds. The ethanolic extract had Alkaloids, Steroids Glycosides, Carbohydrates, Flavonoids, Saponins, Tannins and Phenolic compounds while methanolic extract had Alkaloids, Flavonoids, Terpenoids, Tannins and Phenolic compounds.

Phytochemical screening of *Alkana tinktoria* dye extract

Table 2: Phytochemical screening of *Alkana tinktoria* dye extract

Constituents	Aqueous Extract	Ethanolic Extract	Methanolic Extract
Alkaloids	+	+	-
Steroides	+	+	+
Glycosides	-	+	-
Carbohydrates	-	-	-
Terpenoids	+	+	-
Saponins	+	+	-
Tannins	+	+	+
Phenolic Compounds	-	-	+
Flavonoids	-	+	-
Anthraquinone	-	-	-

Table 2 reveals the presence of Alkaloids, Glycosides, Flavonoids, Tannins, and Terpenoids with aqueous and ethanolic extract of *Alkana tinktoria* dye while Steroids, Tannins, and Phenolic compounds were found with methanolic extract. Similar results were reported by Hasmida *et al.* (2014).

Phytochemical screening of *Thuja orientalis* dye extract

Table 3 : Phytochemical screening of *Thuja orientalis* dye extract

Constituents	Aqueous Extract	Ethanolic Extract	Methanolic Extract
Alkaloids	-	+	+
Steroids	-	+	+
Glycosides	+	+	+
Carbohydrates	+	-	-
Flavonoids	-	+	+
Saponins	+	+	+
Tannins	+	+	+
Phenolic Compounds	+	-	+
Terpenoids	-	-	-
Anthraquinones	-	-	+

The data presented in Table 3 portrays that Aqueous extracts of *T. orientalis* showed the presence of different phytochemicals like carbohydrates, glycosides, phenolic compounds, saponin, and tannins. Alkaloide, steroids, glycosides, flavonoids, saponins, and tannins found with ethanolic extracts while methanolic extracts showed the presence of Alkaloids, steroids, glycosides, flavonoids, saponins, phenolic compounds, anthraquinones, and tannins. It is confirmed from the findings of Singh *et al.* (2014) that the antimicrobial activity of different extracts of the leaf of *Thuja orientalis* along with standard antibiotics showed the significant level of antimicrobial activity of methanol and acetone extracts. Tiwari and srivastava (2018) also found steroids, tannins, and phenolic compounds in methanolic extract of *Alkana tinktorial* dye extract.

IV. CONCLUSION

It can be concluded from the above findings that the screening of phytochemicals in *Quercus infectoria* dye extracts with all the solvents showed the positive results of Flavonoids, Tannins and Phenolic compounds. The methanolic solvents of *Quercus infectoria* dye showed Alkaloids, Flavonoids, Terpenoids, Tannins and Phenolic compounds whereas the Aqueous solvents showed maximum phytochemicals i.e. Alkaloids, Steroids Glycosides, Carbohydrates, Flavonoids, Saponins, Tannins and Phenolic compounds. *Thuja orientalis* dye showed saponins, glycosides and tannins present in all dye extracts whereas the methanolic dye extract showed the presence of Alkaloids, steroids, glycosides, flavonoids, saponins, phenolic compounds, anthraquinones, and tannins. Steroids, Tannins, and Phenolic compounds were found with methanolic extract of *Alkanna tinctoria* dye.

REFERENCES

- [1]. Anand, M., Prabarakaran, P. and Pradeepa, V. (2011). "A study on the phytochemicals characterization and antimicrobial potential of *Andrographis paniculata*". *J. Pharmacy Res.*, 4 : 530-531
- [2]. Chandrashekar, R. and Rao, S.N. (2012). "Phytochemical analysis of Ethanolic extract of leaves of *Clerodendrum viscosum* (EELCV)". *World J. Pharmacy & Pharmaceutical Sci.*, 1: 1092-1099.
- [3]. Kalaiarasan and John, S.A. (2010). "Phytochemical screening and antibacterial activity of *Sida cordifolia* L. (Malvaceae) leaf extract". *Internat. J. Medicobiological Res.*, 1 (2) : 94-98.
- [4]. Hasmida, M. N., Nur Syukriah, A. R., Liza, M. S. and Azizi, M.C.Y. 2014. Effect of different extraction techniques on total phenolic content and antioxidant activity of *Quercus infectoria* galls. *International Food Research Journal*. 21(3): 1075-1079.
- [5]. Singh, S. V. and Purohit, M. C. 2014. Evaluation of colour fastness properties of natural dye extracted from *Symplocos racemosa* (Lodh) on wool fibres using combination of natural and synthetic mordants. *IJFTR*. 39(1): 97-101.
- [6]. Zachariah, S.M., Kumar, N.M., Darsana, K., Gopal, D., Thomas, N., Mridula, R.K. and George, N. 2014. Phytochemical Screening, Formulation and Evaluation of Dried Galls of *Quercus Infectoria* Oliv. *International Journal of Pharmaceutical Sciences Review and Research*. 26(1): 125-130.
- [7]. Chairman, K., Jayamala, M., Christy V.R. and Singh R. 2015. Phytochemical Screening and Antimicrobial Activity of *Curcuma longa* Natural Dye. *General Medicine*. 3(2): 171.
- [8]. Tiwari, Adya and Srivastava, Meenu (2018). Phytochemical analysis of Methanolic dye extracts of some medicinal plants. *Internat. J. Appl. Home Sci.*, 5 (5-9) : 939-942 (PDF) *Phytochemical analysis of Methanolic dye extracts of some medicinal plants*. Available from https://www.researchgate.net/publication/332409061_Phytochemical_analysis_of_Methanolic_dye_extracts_of_some_medicinal_plants [accessed Nov 30 2019].