Asian Journal of Innovative Research. (2021): 6(1) 17-22

ISSN 2455 7285

ASIAN JOURNAL OF INNOVATIVE RESEARCH

Available online at http://www.asianjir.com

Research Article Botany

PHYTOCHEMICAL SCREENING AND APPLICATION OF NATURAL DYE TO APPALAM PAPAD EXTRACTION FROM THE PEDICEL OF *Nyctanthes arbortristis* L

B. ANUSIYA, Dr. R. SAGAYA GIRI

P.G. and Research department of botany, Kunthavai Naacchiyaar Government Arts, College for Women (Autonomous), (Affiliated to Bharathidasan University)
Thanjavur -613 007, Tamil Nadu, India

ABSTRACT

The present study is to investigate the phytochemical screening and natural dye extractions from *Nyctanthes arbortristis* flower extract applied to Appalam Papad. The phytochemical screening *Nyctanthes arbortristis* flower revealed that the phytochemicals such as saponins, flavonoids, steroids, terpenoids, triterpenoids, antroquinone, polyphenol, glycoside, tannins, alkaloids and coumarins were present in *Nyctanthes arbortristis* flower pedicel extract. Significant amount of phytochemicals present in *Nyctanthes arbortristis* flower. The histochemical analysis further proved the presence of phytochemicals in *Nyctanthes arbortristis* flower.The prepared colour of the dye extract was found to be in reddish colour. Matched with pantone matching system – PMS5875. The antibacterial activity of Nyctanthes arbortristis flower extract has antibacterial potential against the color bacteria *E. coli* which indirectly inhibits stomach disorders.

Keywords: *Nyctanthes arbortristis*, Appalam Papad Phytochemical

INTRODUCTION

Colour is such a vital and vibrant ingredient of our existence that it is difficult to imagine what life would be like without it. Colour is one of the elements of nature that made the human living more aesthetic and fascinating in the world. It is supposed to be associated with emotions, human qualities, seasons, festivals and passions in our life. Even in the prehistoric times, our ancestors must have noticed the abundance of a multitude of colours worn by nature. With the growth of civilization, it was realized that most of the colours he saw in nature (Clouds at Sunset, Flowers on Plants etc) were not permanent; the fading of the colours of flowers took place when their petals fell. The green colour of leaves changed in yellow or brown due to ageing. In his urge to make his world colourful, he tried extracting the colours from flowers, plants and even animals. He found that these colours could be retained unchanged for a longer period unlike the natural thing wearing these colours. This led to the use of different types of natural colouring matters to dye prepared from different natural fibres such as Appalam Papad , Linen, Wool, and Silk etc. He observed that some dyes, which produce intense action on woollen fabrics, did not even stain Appalam Papad. A new class of dyes had to be used to dye Appalam Papad . Indigo, cutch, logwood, tyrian purple and henna were some of the natural dyestuff used for dyeing Appalam Papad fabrics (Shenai and Saraf 1991).

With the present national and international awareness of environmental ecology and pollution controls, natural dyes appear to be the ideal choice since they are chosen from the non-toxic lot and can be handled very easily and safely. Keeping in view, the present study is to investigate the phytochemical screening and natural dye extraction from *Nyctanthes arbortristis* flower pedicel extract applied to Appalam Papad.

MATERIALS AND METHODS

Collection of plant materials

The *Nyctanthes arbortristis* flowers were collected from Thanjavur, Thanjavur district, Tamil Nadu, India during February 2021. The collected flowers were washed several times

with distilled water to remove the traces of impurities from the flower. Then examined carefully, old infected and fungus damaged portion of the flowers were removed. Healthy reddish part of the flowers pedicel were removed and dried in room temperature and grind using grinder mixture. The powder was stored for further analysis.

Preparation of plant powder

One gram of Nyctanthes arbortristis flowers were taken and made a fine powder, powder was added in 50 ml of hyroalcholoic (70%) solvent, the extract was shaken well for 30 minutes by free hand and wait for 24 hours. After the extracts were filtered using whatman filter paper No.1, the filtrate was used for further analysis. **Determination of Extraction of Dye from Nyctanthes arbortristis flowers extract**

Material

Appalam Papad was purchased from local market at Thanjavur. It was used after bleaching for application.

Extraction of Dyes

The flowers of *Nyctanthes arbortristis* was cut into small pieces and put into distilled water and heated in a water bath for one hour to filtrate the extract. These dyes were used for dyeing Appalam Papad fabric. All material was thoroughly cleaned with distilled water and then after ground finely in the machine. Extraction was carried out throughout in media.

Dyeing Techniques

Appalam Papad was dyed with dye extract with keeping material to liquor with two days and done the further process.

Phytochemical screening

Chemical tests were carried out on the extract using standard procedures to identify the constituents as described by Sofowara (1993) and Harborne (1973 and 1984). Total phenols estimated by the method of Edeoga et al., (2005).

Flavonoid determine by the method of Bohm and Kocipai-Abyazan (1994). Total terpenoid content in the leaf extracts were assessed by standard method (Ferguson, 1956). Histochemical analysis (John Peter Paul, 2014; Gersbach et al., 2001). The antibacterial activity was performed by disc diffusion method followed by NCCLS, (1993) and Awoyinka *et al*., (2007).

RESULTS AND DISCUSSION

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 various colour. Organic pigments are large and often complex organic molecules responsible for the different colours of plants and foods. Besides giving the vegetable their characteristic colour, they are also responsible for critical plant functions. The different variations of colours are due to combinations of pigments (Gupta et al., 2013). In the present study the phytochemical screening and natural dye extraction from *Nyctanthes arbortristis* flower extract and applied to Appalam Papad..

In the present study was carried out on the *Nyctanthes arbortristis* flower revealed the presence of medicinally active constituents. The phytochemical characters of the *Nyctanthes arbortristis* flower investigated and summarized in Table-1 and figure 3. The phytochemical screening of *Nyctanthes arbortristis* flower extract exhibits on saponins, flavonoids, steroids, terpenoids, triterpenoids, antroquinone, polyphenol, glycoside, tannins, alkaloids and coumarins. The attractive colours and fragrance produced by the plants is due to specific phytochemicals present in them.

Table.1: Qualitative analysis of Phytochemicals in *Nyctanthes arbortristis* flower extract

S. No	Phytochemicals	extract
1	Tannin	++
2	Saponin	++
3	Flavonoids	++
4	Steroids	++
5	Terpenoids	++
6	Triterpenoids	++
7	Alkaloids	+
8	Anthroquinone	+
9	Polyphenol	++

10	**Glycoside**	++
11	**Coumarins**	++

(+) Presence, (++) High concentrations and (–) Absences

Table 2 shows the quantitative analysis of *Nyctanthes arbortristis* flower extract. Significant amount of flavonoids, phenol and terpenoids were present in *Nyctanthes arbortristis* flower extract.

Table 2 Quantitative analysis of *Nyctanthes arbortristis* flower extract

S. No.	Phytochemicals	Results (mg/gm)
1.	Flavonoids	110
2.	Phenol	152
3.	Terpenoids	20

Natural Dye

Natural products such as plant extracts provide unlimited opportunities for new drug discoveries because of unmatched availability of chemical diversity, either as pure compounds or as standardized extracts (Sasidharan et al., 2011), and recent evidences from the pharmaceutical companies shows that it still represents an extremely valuable source for the production of valuable chemical entities that can be used for the treatment of some complex diseases (Chin et al., 2013).These medicinal plants can be rich in phenolic compounds, alkaloids, diterpenoid, steroid and other compounds which inhibit the development of various microorganisms (Ranjitham et al., 2013). Besides these, phytochemicals in the plant extracts can act as reducing and capping agent in the reduction of metal ions to metal nanoparticles (Swarnalatha et al., 2013) and thus have found widespread use in the biosynthesis of metal nanoparticles.

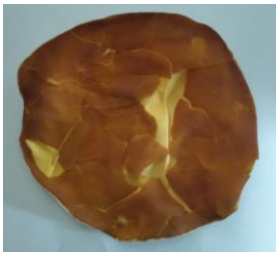
Flavonoids are a group of polyphenolic compounds with known properties which include free radical scavenging, inhibition of hydrolytic and oxidative enzymes and anti-inflammatory action. Flavonoids are 15 carbon compounds generally distributed throughout the plant kingdoms. Some isoflavones widely used in insecticides. They might also play a role in disease resistance. Some flavonoids such as quercetin and rutin, are known to support human health by serving as anti-inflammatory, anti-histaminic and anti-viral agents (Okwu, 2004). Flavonoid compounds exhibit inhibitory effects against multiple viruses. Numerous studies have documented the effectiveness of flavonoids, such as glycyrrhizin and chrysin (Duraipandiyan et al., 2006) against HIV. Flavonoids are potent water soluble antioxidants and free radical scavengers which prevent oxidative cell damage and have strong anticancer activity (Del-Rioaet al., 1997). Flavonoids have been referred to as nature's biological response modifiers, because of its inherent ability to modify the body's reaction to allergies and virus and showed their anti-allergic, anti-inflammatory, anti-microbial and anti-cancer activities (Duraipandiyan et al., 2006).

Natural Dye extractions from Nyctanthes arbortristis flower extract Application to Appalam Papad .

Extract of *Nyctanthes arbortristis* flowers were found to discharge colour in hot water very easily. Increasing the quantity of flowers 5 g to 20 g per 100 ml water for 48 hour is accompanied with the increase in colour strength and depth in colour. It was observed that, colour of the dye extract was reddish colour.

A natural dye is obtained from *Nyctanthes arbortristis* flower that produce red colors. In the present study to dyeing with Appalam Papad showed red color from the results (Table 2). It was observed that *Nyctanthes arbortristis* flower showed better colour strength values. In all the two Appalam Papad dyeing gave excellent results as compared with normal Appalam Papad.

Fig. 2: Colour produced by on Appalam Papad by conventional method, dyed with flower extract of *Nyctanthes arbortristis*

Normal (Without Dyeing)	Dyeing (Appalam Papad with dyeing)
Oval shape appalam 	
Round shape of appalam 	

Pantone Matching System (PMS)

The Pantone Matching System (PMS) has become the leading color reference system for "selecting, specifying, matching and controlling ink color" in the graphic arts and printing industries. With their forever-expanding variety of specialized colors, Pantone has created multiple color systems and guides that all types of designers look to when wanting to create a uniquely colored piece. When much time and effort is put into designing something that includes specific Pantone colors, designers would expect the final printed product to be accurately reproduced. When digitally printed, the file that includes the Pantone colors must go through a raster image processor (RIP) that interprets the colors and is then printed with the use of cyan, magenta, yellow and black toner (Pantone, 2008).

The PMS consists of thousands of unique color mixtures and is separated into different types of categories for specific purposes and usages. There are systems dedicated strictly for the graphic arts, including printing and publishing, home furnishing and interior decorating, paints and plastics Sharma, (2008). Table 6 shows the dyed Appalam Papad were compared with reference standard Pantone matching system (PMS).

Table.6: The dyed Appalam Papad with Pantone matching system (PMS)

Chemical mordant	Colour shades obtained in Appalam Papad	
	Pre-mordant	Normal
Oval shape appalam	PMS 1685	PMS 5875
Round shape appalam	PMS 483	

Natural dyes are non-toxic, non-allergic and biodegradable hence natural dye used in dyeing various. Metal salts were used as mordants. A naturally dyed textile product not fully environmental friendly. We have investigated bark, flowers, leaves and fruit extracts for dyeing Appalam Papad, selected metal salts being used as a mordant. The extracted natural dye was examined for pre, simultaneous and post mordant with metal salts (Bajirao Ahire, 2018).

Antibacterial activity

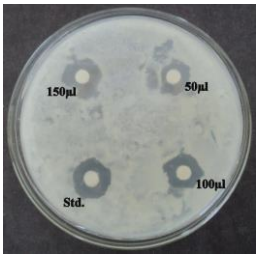
Flower extract of *Nyctanthes arbortristis* was screened against *Escherichia coli* species of bacteria were evaluated using the standard agar disc diffusion method. The *in vitro* antibacterial activity the presence of inhibition zones represented in the photographic Fig. 6 and Table 5. The inhibitory activity was reported in Table 5 were comparable with standard antibiotic *viz.* chloramphenicol.

Table 5: Antibacterial activity of *Nyctanthes arbortristis* flower extract

Microorganisms	Concentrations (µl/ml)			Std. (30µl/ml)
	50µl	100µl	150µl	
Escherichia coli (mm)	1.20±0.10	3.70±0.25	6.30±0.42	7.50±0.55

Values were expressed as Mean ± SD for triplicates

Bacterial standard : Chloramphenicol



Escherichia coli

Fig. 6: Antibacterial activity of *Nyctanthes arbortristis* extract

Conclusion

Overall, it can be concluded that the dye was prepared from *Nyctanthes arbortristis* flower extract has possesses potential dyeing capability to Appalam Papad. The *Nyctanthes arbortristis* flower pedicel extract possess antibacterial activity..

References

Ammayappan, L, Shakyawar, DB, Chhagan, L, Sharma, M, & Wani, SA. (2014). Extraction of natural colourants from agricultural residues and their application on woolen fabric: part 2. Man Made Textiles In India, 57(6), 212–215

Annamai (2014). Intimate Strangers: Unseen Ali NF, El-Mohamedy RSR. Eco-friendly and protective natural dye from red prickly pear (Opuntia Lasiacantha Pfeiffer) plant, 2011. Journal of Saudi Chemical Society.15, 257–261.

Azeredo, H., Betalains: properties, sources, applications, and stability–a review. Int. J. Food Sci. Technol., 44(12), 2365–2376, 2009.

Bashir S, Gilani AH. Studies on the antioxidant and analgesic activities of Azect marigold (Tagetes erecta) flowers. Phytotherapy Research., 2008; 22: 1692-4.

Bechtold, T., & Mussak, R. (Eds.). (2009). Handbook of natural colorants. John Wiley & Sons. West Sussex, England.

Belfer, N. (1972). Designing in batik and tie dye. Worcester, MA: Davis Publications.

Brennan, P. (2004). Natural Dyes. Retrieved March 5, 2013, from Angel Fire: http://www.angelfire.com/ok3/basketry/NaturalDyes.htm.

Chavan, R. B. (1995). Revival of natural dyes-a word of caution to environmentalists. Colourage, 42, 27-27.

Cooper, P. (1995). Color in Dye House Effluent, Society of Dyers and Colourists, The Dyer's Company Publication Trust, Bradford.

Dahanukar SA., Kulkarni AR and Rege NN. (2000) Pharmacology of medicinal plants and natural products. Indian Journal of Pharmacology: 32: S81-S118.

Delgado-Vargas, F., Jiménez, A. R. & Paredes-López, O. (2000). Natural Pigments: Carotenoids, Anthocyanins, and Betalains — Characteristics, Biosynthesis, Processing, and Stability. Critical Reviews in Food Science and Nutrition. 40(3), 173–289.

Dinesh Kumar, Sunil Kumar, Jyoti Gupta, Renu Arya and Ankit Gupta. (2011) A review on chemical and biological properties of Cayratia trifolia Linn. (Vitaceae). Pharmacognosy, 5(10): 184–188.

Doraisamy I. And K.P. Janakiraman, 1999. Natural Dyes : An Eco-solution ?. Textiles Magzine. (3): 8.

Dyer, A. (1976). Dyes from natural sources. Newton: Charles T. Branford Company.

El-Nagar, K, Sanad, SH, Mohamed, AS, & Ramadan, A. (2005). Mechanical properties and stability to light exposure for dyed Egyptian Appalam Papad fabric with natural and synthetic dyes. Polymer-plastics Technology and Engineering, 44(7), 1269–1279.

Evans WC. (1997) Trease and Evans pharmacognosy, 14th Edn. Harcourt Brace and company, Asia.Pvt. Ltd.

Gulrajani, M. L., & Gupta, D. (Eds.). (1992). Natural dyes and their application to textiles. Department of Textile Technology, Indian Institute of Technology. Delhi, Pg 19-46, 51,52.

Gulrajani, M.L., 1992. Introduction to Natural Dyes. Natural Dyes and their Application to Textiles. Department of Textile Technology IIT., Delhi, pp 17, 81.

Gulrajani, ML., Gupta, DB., Agarwal, V., Jain, M., Some studies on natural yellow dyes, part 1: CI Natural Yellow 3 (turmeric). Indian Text. J., 102(4), 50–56, 1992.

Gupta M, Thakur S, Sharma A, Gupta S. Qualitative and Quantitative Analysis of Phytochemicals and Pharmacological Value of Some Dye Yielding Medicinal Plants. Orient J Chem 2013;29(2).

Hahn N.I., (1998). Phytoestrogens Nature's Cure for What Ails Us? A Look at the research. Journal of the American Dietetic Association., 98: 974-976.

HANAN S MOSSALEM1, MOSAD A GHAREE, LAILA A REFAHY, ASMAA S MOHAMED, MOHAMED R HABIB. Gas Chromatography-Mass Spectrometry Analysis and Antioxidant Activity of Punica granatum L. Peels And Its Role As Immunostimulant Against Schistosoma Mansoni Infection In Biomphalaria Alexandrina. Asian J Pharm Clin Res, Vol 10, Issue 1, 2017, 252-258.

Harborne JB. (1973) Phytochemical Methods; A guide to modern techniques of plant Analysis.2nd Edition, London New York.

Harborne, J. B. (1984). Phytochemical Methods: A guide to modern techniques of plant analysis, 2nd ed: Chapman and Hall Ltd., London, New York.

Hassain E, Mandal SC and Gupta JK. (2011) Phytochemical screening and in vitro antipyretic activity of the methnol leaf-extract of Bombax malabaricum DC (Bombacaceae). Trop. J. Pharmaceut. Res, 10: 55-60.

Horrocks, A. R., & Anand, S. C. (Eds.). (2000). Handbook of technical textiles. Elsevier.

Iqbal, M. J., & Ashiq, M. N. (2007). Adsorption of dyes from solutions on activated charcoal. Journal of Hazardous Materials, 139(1), 57-66.

Jin, X. C., Liu, G. Q., Xu, Z. H., & Tao, W. Y. (2007). Decolorization of a dye industry effluent by Aspergillus fumigatus XC6. Applied microbiology and biotechnology, 74(1), 239-243

Khan Madiha, Mingli Xu, Jhadeswar Murmu, Paul Tabb, Yuanyuan Liu, Kathryn Storey,Sarah M. McKim, Carl J. Douglas, and Shelley R. Hepworth. Plant Physiology Preview. Published on November 23, 2011.

Kharbade, B. V. & Agrawal, O. P. (1988). Analysis of Natural Dyes in Indian Historic Textiles. Studies in Conservation. 33(1), 1-8.

Kirk-Othmer. (1976). Encyclopaedia of Chemical Technology. John Wiley and Sons: USA.

Klaichoi, C, & Padungtos, W. (2010). Development of batik painting technique silk fabric via natural dyes. In The 2nd RMUTP International Conference, Green Technology and Productivity (pp. 382–387).