Educational Administration: Theory and Practice
2023, 29(4), 5812-5815
ISSN: 2148-2403
https://kuey.net/

Research Article

Extraction and Phytochemical Screening of Dye from Bracts of Bougainvillea

Dattaguru Chandrakant Patkar[1]*, Dr. Neeta Gupta[1]

[1]*Dr. A. P. J. Abdul Kalam University, Indore (M.P.) - 452016.

Citation: Dattaguru Chandrakant Patkar et al. (2023). Extraction and Phytochemical Screening of Dye from Bracts of Bougainvillea, *Educational Administration: Theory and Practice*, 29(4) 5812-5815
Doi: 10.53555/kuey.v29i4.10784

ARTICLE INFO

ABSTRACT

In this research work the extraction and also phytochemical screening of dye from bracts of Bougainvillea Murayama is evaluated by centrifugation at different time intervals. The filtrate which collected from this extraction were evaluated for phytochemical data. The betacyanin is an active part of dye and it is also used in textile industries and food industries. In this study, the solvent extraction was performed to investigate the effects of factors for the extraction dye from the bracts. .The effects of Solid-liquid ratio and extraction time for the extraction of dye from Bougainvillea bracts were evaluated in this research work. This extraction is performed for 1:1, 1:3, 1:5, 1:7, 1:9, and 2:1 SLR ratio. The pH range was selected between 3.5 to 4.5 for the stability of betacyanin. The dye content of SLR 1:5 was then boiled at 30 ^{o}C for 10 min., 20min., 30min., 40 min., 50 min. and 60 min. to get constant values for equilibrium extraction time. Phytochemical screening of this dye was performed by taking some lab test. Phytochemical screening of this extracts was performed for Terpenoids, Saponins, Phenol, Volatile oils, Tannins, Flavonoids, cardinolides, Phlobatannins, Steroids and Alkaloids. The equilibrium condition was observed after 40 minutes extraction time for this process of extraction. The aqueous medium condition was evaluated for this extraction of dye.

Keywords: Bougainvillea bracts, dye, SLR, Extraction time, Phytochemical screening.

Introduction:

The Synthetic dyes used in textile, food, medicine, cosmetic and textile industries. These Natural dyes can be derived from minerals, plant sources and also from insects. The natural dyes are obtained from flowers, leaves, bark, roots, etc. of plants. The advantage of the natural dye is to maintain ecological balance. The industrial synthetic dyes are damaging the water sources and inhibit the penetration of sunlight through the water to affect oxygen levels and photosynthesis in aquatic ecosystem [1]. Natural pigments containing betacyanins, quinones, flavonoids were extracted from fruit and evaluated [2, 3]. The synthetic dyes are involved into the food chain and undergoes harmful effects. The water soluble betacyanins pigment from Bougainvillea bract source have dyeing properties and also have health benefits. Consumers are avoiding synthetic dye containing foods products [4]. The extraction of reddish purple Bougainvillea dye from different solid to solvent ratio and time is the objective of this research work. The natural dyes content for dyeing is obtained from different types and parts of plants [5]. The natural dyes are eco-friendly and these dyes can be used in textile and food for nontoxicity [6]. In the extraction of dyes the soluble components from solid part of source moves into the part of solvent. The extraction process do not show environmental problems because these natural dyes are usually extracted through water or lower alcohols [7]. The rate of mass transfer from solid part to the solvent part is decreases when dye concentration in solvent increases and then equilibrium in extraction is reached. [8] Bougainvillea is ornamental plant and abundantly available. This is good source for betacyanin and has anti-microbial properties [9]. Betalains is water soluble and nitrogenous pigments. betacyanins is red to violet and betaxanthins is yellow to orange pigment. This is conjugate of betalamic acid with cyclo-dopa and amino acids [10]. The effects, Solid-liquid ratio and extraction time during the extraction of dye from Bougainvillea bracts were evaluated in this research work. In vitro antibacterial activity of Bougainvillea spectabilis leaves extracts is been reported [11]. The Phytochemical screening was performed for Bougainvillea dye extracts.

Material and Methods:

Material

Bougainvillea Murayama bract were collected from local gardens of Maharashtra. Then this source was dried under the normal sunlight for five days. This bracts source was converted into fine powder by blender machine. The powder source of bougainvillea dye was stored in freeze to maintain freshness of this source. Aqueous Solvent was selected for extraction of betacyanin containing dye from the Bougainvillea bracts.

Fig.1 Bougainvillea Murayama plant bracts

Extraction Method

The clean Bougainvillea Murayama bracts as source of dye were taken in a glass beaker. 10g of fine powder of dye source was separately added into 150 ml beaker containing 100 ml solvent such as distilled water. This mixture was then stand for 30hrs and then allow for extraction and filtration process. This extraction is performed for 1:1, 1:3, 1:5, 1:7, 1:9, 2:1 SLR ratio by maintaining the pH range between 3.5 to 4.5 for the stability of betacyanin pigment. The acidic pH range was favourable for betacyanins [12]. Absorbance of these extract of different time intervals is recorded. This dye content of SLR 1:5 was boiled at 30 ^{o}C for 10 min., 20min., 30min., 40 min., 50 min. and 60 min. up to constant values for equilibrium time. Then this filtrate is centrifuged for 15 min at 10^{o}C. The mixture was then filtered through the filter paper Whatman No.1.These samples of Bougainvillea Murayama dye then evaluated in the by using UV-Visible spectrophotometer.

Phytochemical screening

The phytochemical screening of this Bougainvillea Murayama extracts was performed by taking tests for Terpenoids, Saponins, Phenol, Volatile oils, Tannins, Flavonoids, cardinolides,
Phlobatannins, Steroids and Alkaloids. The presence or absence of these components are represented in table.1.

Results and Discussion:

Effect of SLR

The extraction of Bougainvillea Murayama bracts gives reddish purple colour dye extract in the form of betacynin pigments. The absorbance of dye content from Bougainvillea Murayama bracts for different SLR were determine by using UV-Vis Spectrophotometer. The highest absorbance value was obtained for 1:5 SLR is represented by fig. a. The extraction of dye in terms of absorbance was increased up to particular SLR point. After this SLR value the extraction absorbance decreases because of mass transfer from solid to solvent was decreases.

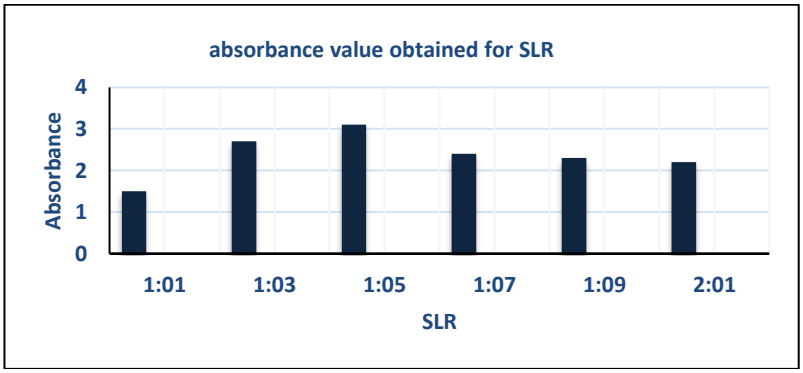

Fig. a Absorbance value obtained for SLR

Effect of extraction time

The extraction of Bougainvillea Murayama bracts for 1:5 SLR is taken at different time intervals. The absorbance obtained for 10 min., 20min., 30min., 40 min., 50 min. and 60 min. up to constant values of equilibrium time, was evaluated and recorded by UV-Vis Spectrophotometer. Fig.b. gives data about increasing absorbance and constant absorbance values of 1:5 SLR extract to indicate the equilibrium phase.

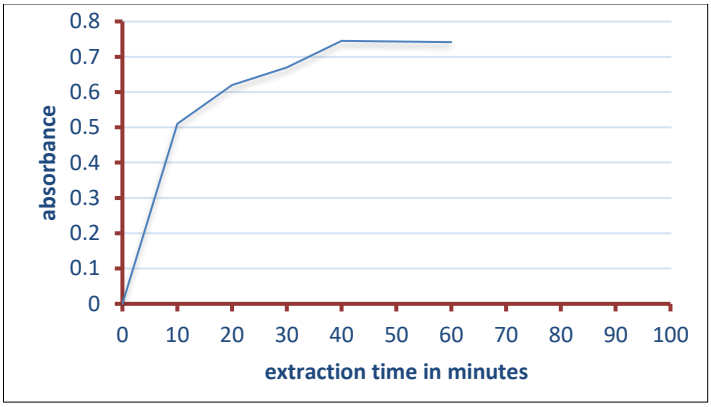

Fig b. Effect of extraction time on absorbance for 1:5 SLR.

Extraction and phytochemical screening:

Test for terpenoids

2ml chloroform was added in 2mlof extract. Then about 2 ml of concentrated H_2SO_4 was added. The reddish brown colour indicates presence of terpenoids.

Test for saponins

1ml of extract was added into 1 ml of distilled water. Then formation of froth after shaking indicates the presence of saponins.

Test for phenols

1ml of ferric chloride was added in 1ml of extract. The bluish green colour formation shows presence of phenols.

Test for volatile oils

Two drops of NaOH and dilute HCl was added in about 1ml of extract. The White precipitate indicates presence of volatile oils.

Test for tannins

10 ml of distilled water was added 0.2 g of fine powder source. Then this mixture was boiled. Then Two drops of 10% $FeCl_3$ was added in this. The presence of tannins indicated by greenish colour precipitate.

Test for flavonoids

1ml of NaOH solution was added in 1ml extract. The yellow colour appearance indicates presence of flavonoids

Test for cardenolides

1ml of benzene was added into 1ml of dye extract. The brown colour formation indicates presence of cardenolides

Test for phlobatannins

Two drops of 1% HCl was added in 1ml of dye extract. Then this mixture is boiled for few minutes. The red colour precipitate indicates presence of phlobatannins.

Test for steroids

1ml acetic acid was added into the 0.2 ml dye extract and then about 1ml of concentrated H_2SO_4 was added in this mixture. A blueish green colour of mixture indicates presence of steroids.

Test for alkaloids

Two drops of picric acid solution was added in 1ml of extract. The orange colour appearance indicates the presence of alkaloids.

Phytochemicals test	Aqueous extract
Terpenoids	+
Saponins	+
Phenol	+
Volatile oils	-
Tannins	+
Flavonoids	+
cardinolides	-
Phlobatannins	-
Steroids	-
Alkaloids	+

Conclusion:

The dye extracted from bracts of Bougainvillea Murayama plant source is eco-friendly. This source is available in abundant amount. This dye is alternative to synthetic dyes. The extraction is good for 1:5 solid to liquid ratio. The 40 min. extraction time is good or optimum for 1:5 SLR. The phytochemical tests are also useful for the determination of antimicrobial activity. The extract obtained by this natural source can be used for textile and food dyeing. The Bougainvillea Murayama dye can extracted by aqueous medium which indicates minimum cost of extraction method.

References:

1. Devadiga, (2020), Betanin: A red-violet pigment chemistry and applications. Dyes and Pigments 10. 5772
2. Sreekanth, (2007). Betanin A Betacyanin Pigment Purified from Fruits: International Journal of Phytotherapy and Phytopharmacology,14:740-44.
3. Naderi, N (2012). Characterization and Quantification of Dragon Fruit, Betacyanin Pigments, 35(1): 34-36.
4. Kashyap B, (2017), Effect of biocolours, Indian Journal of Ecology 44: 835-840.
5. Amaya (2019), Betalains, Encyclopaedia of Food Chemistry 7: 34- 39.
6. Agarwal, Kumar S, (2019), Nutraceuticals derived from seed storage proteins, Biocatalysis and Agricultural Biotechnology 17: 711-718.
7. Leong, Pan (2018). Investigation of betacyanins stability from peel and flesh of red purple pitaya, Food Science and Technology 98: 547-553.
8. Pradesh, (2014), Mass Transfer Enhancement Through Optimized Extraction of A Natural Dye, Indian Journal of Natural Products and Resources, 5: 334-335.
9. Lawrence (2017). Evaluation of pigments from methanolic extract,Natural Product Research 32(10): 1209-1210.
10. Mahayothee B, (2018). betacyanin content and antioxidant capacities in dried red-fleshed dragon fruit 54(2): 461-469.
11. Umamaheswari A, (2008), Antibacterial Activity of Bougainvillea spectabilis Leaves Extracts.2 (1-2):02-04
12. Reshmi, Aravindhan (2012). The Effect of Light, Temperature, pH on Stability of Betacyanin Pigments. Asian Journal of Pharmaceutical, 5(4): 6-8.
13. Kushwaha, Vyas (2017), Optimization of different variable for eco-friendly extraction of betalains 9(9): 1486-1491.
14. Kumar, Muthukumaran (2017). Extraction optimization and characterization of water soluble red purple pigment, Arabian Journal of Chemistry 10: 21457–2149.
15. Galappaththi, Petra (2017), water to ethanol ratio as extraction solvents and Effect, 23: 485-495.