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FORMULATION AND EVALUATION OF HERBAL LIPSTICK USING NATURAL COLOUR EXTRACT FROM *AMARANTHUS GANGETICUS* LINN LEAF

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ABSTRACT: Cosmetics have been in high demand since ancient times until today. Lipsticks are a type of cosmetic used to enhance their appearance and protect the lips. Generally, waxes, oils, emollients, pigments, and varieties of dye or colouring agents are used to prepare lipsticks. Synthetic colours and other ingredients are hazardous to the human skin and body. Substituting synthetic ingredients with natural substances will decrease the side effects of lipsticks. Also, natural ingredients protect lips from cracking and drying out, etc. With this objective, a study was performed to formulate lipsticks using natural colour extracted from leaves of *Amaranthus gangeticus* L. It is a popular leafy vegetable in north-east India, and it possesses different pharmacological activities. The phytochemical screening of the extract showed the presence of alkaloids, glycosides, and tannins, which increase the nutritional value of the herb. A total of six formulations were prepared with different concentrations of colour extract and evaluated with parameters such as melting point, breaking point, spreadability, surface anomalies, stability, irritation test, etc. The formulations met the physical requirements with good colour and were non-irritant to the skin.

INTRODUCTION: Cosmetics are often used to improve the appearance of external body parts, protect the skin, maintain body cleanliness and hygiene, and fragrance the body ¹. Cosmetic means, according to the Drugs and Cosmetic act 1940 and rules 1945, any article intended to be sprayed, poured, rubbed, or sprinkled on, introduced into, or applied to the human body or any part of it for cleansing, beautifying, promoting attractiveness, or altering appearance ².

Cosmetics have become important elements of the human being, especially in every woman's life, as cosmetics improve personality and give a boost to self-esteem and confidence in today's culture ^{1, 3}. Various types of cosmetics are available on the market that are applied to external parts of the body. For example, skin-care creams, lotions, powders, perfumes, lipsticks, fingernail and toe nail polish, eye and facial makeup, permanent waves, coloured contact lenses, hair colours, hair sprays, and gels.

Deodorants, baby products, bath oils, bubble baths, and many other types of cosmetics ^{2, 4}. Herbal cosmetics are the recent trend in the cosmetic or beautification market and are gaining popularity as people prefer natural ones over synthetic ones because they have fewer side effects, deliver

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nutrients, and provide various benefits to the body. These products are more compatible and affordable. These products are formulated using different herbal ingredients along with various cosmetic essentials to produce the bases. Different parts of plants, like leaves, roots, rhizomes, stems, leaves, flowers, fruits, etc., are used as crude or in the form of extract. Dry powder, fresh juice, resin, gums, essential oils, and fixed oils from different herbs are used in the formulation of herbal cosmetics^{5,6}.

In today's cosmetic market, several brands are available that deal with synthetic and natural products. With increasing demand for natural or herbal products, the market for herbal cosmetics is growing fast. So, the scope of new herbal products is very high and can fulfil the requirements of customers⁷.

Lipstick is one of the most widely used cosmetic products among women to enhance the beauty of the lips. Since ancient times, women have used different colours or dyes to beautify their lips⁷. During the reign of Queen Elizabeth I in the 16th century, lipstick started to gain popularity as a fashion statement. At that time, red plant dyes and beeswax were combined to make lipstick. Due to its widespread usage in the film industry, lipstick's popularity increased during the Second World War. Women were now frequent users of lipsticks as a part of makeup⁸.

In the northeastern region of India, women used natural colours from plants. For example, Barhamthuri leaf etc. Lipstick is also used to protect lips from different environmental hazards. These are formulated with different pigments or dyes, waxes, oils, and emollients. This can be observed by the fact that lipstick is marketed in hundreds of shades to satisfy the latest demands of women. The dyes that contribute to the colour of the lipstick are very harmful to humans upon consumption. Coal tars are the basic ingredients from which synthetic dyes are formed and can cause allergies, nausea, dermatitis, and drying of the lips. In a more severe form, they can be carcinogenic and even fatal^{5,7}. Herbal lipsticks are made up of various colours and excipients obtained from natural sources, which are beneficial for the lips and have fewer side effects as compared to

synthetic ones. That is why herbal lipsticks are becoming popular now^{3,9}. These are free of several harmful substances. Herbal lipstick has various benefits, including protecting the lips from dryness and cracking¹.

Ideally, lipsticks should be non-irritant and non-toxic to the skin, smooth, easy to apply, free from grittiness, stable during storage, and not melt or harden in variations of climate temperature, etc.^{4,6}. Cosmetics made with herbal sources are made from natural colour from vegetables that are widely available. Coloured pigments commonly used include rose petals, carrot, beet root, rose, indigo, and henna and these are very easy to mix with other ingredients⁴.

Amaranthus gangeticus L **Fig. 1** is a bright red to violet coloured low-cost leafy vegetable mostly popular in the north east of India, Bangladesh and South East Asia due to its appealing leaf colour, taste, sufficient nutraceuticals, phenolic compounds, and single source of betalains¹⁰. The herb is used as vegetable in Assamese and Bengali cuisine. It possesses significant anti-inflammatory, antioxidant, and hepatoprotective properties¹¹.

The stem and leaves of amaranths are good sources of dietary fibre, vitamin C, minerals, and protein containing essential amino acids, likely methionine and lysine. The natural colours and phenolic compounds of this species have an important function in promoting health benefits such as radical scavenging capability, food colourant, and they play an important role in the food industry¹².



FIG. 1: LEAVES OF AMARANTHUS GANGETICUS L

The objective of the study was to extract the colour from the *Amaranthus gangeticus* leaves and stems and use the colour in the formulation of herbal lipstick. In addition to the main objective, preliminary phytochemical screening of the extract was performed to identify alkaloids, glycosides, and tannins.

MATERIALS AND METHOD:

Materials: The herbal lipsticks were prepared using ingredients such as beeswax, olive oil, castor oil, coconut oil, acacia gum, rose essence, lemon juice, and colour extract from *A. gangeticus*. The quantities of ingredients are listed in **Table 1**.

TABLE 1: LIST OF INGREDIENTS WITH QUANTITIES

Ingredients name	Uses	Quantity					
		F1	F2	F3	F4	F5	F6
Bees wax	Glossy and hardness	15 gm	15 gm	15gm	15 gm	15 gm	15 gm
Castor oil	Blending agent	10 ml	10 ml	10 ml	10 ml	10 ml	10 ml
Olive oil	Blending agent	5 ml	5 ml	5 ml	5 ml	5 ml	5 ml
Coconut oil	Moisturing agent	1.5 ml	1.5 ml	1.5 ml	1.5 ml	1.5 ml	1.5 ml
Acacia	Surfactant	6 gm	6 gm	6 gm	6 gm	6 gm	6 gm
<i>A. gangeticus</i> extract	Colouring agent	0.5 ml	0.75 ml	1.0 ml	1.25 ml	1.5 ml	1.75 ml
Rose essence	Flavouring agent	5 Drops	5 Drops	5 Drops	5 Drops	5 Drops	5 Drops
Lemon juice	Antioxidant	1ml	1ml	1ml	1ml	1ml	1ml

Methodology:

Extraction of Colour: The plant *A. gangeticus* was collected in the month of December from the local market in Morigaon District, Assam. A maceration process was performed (shown in **Fig. 2**) to extract colour from *A. gangeticus* leaves. After 48 hours of

maceration in equal amounts of ethanol and water, the coloured solution was separated by filtration. The chloroplast layer was separated from the extract using chloroform with the help of a separating funnel. After the evaporation of the solvent, colour was collected.

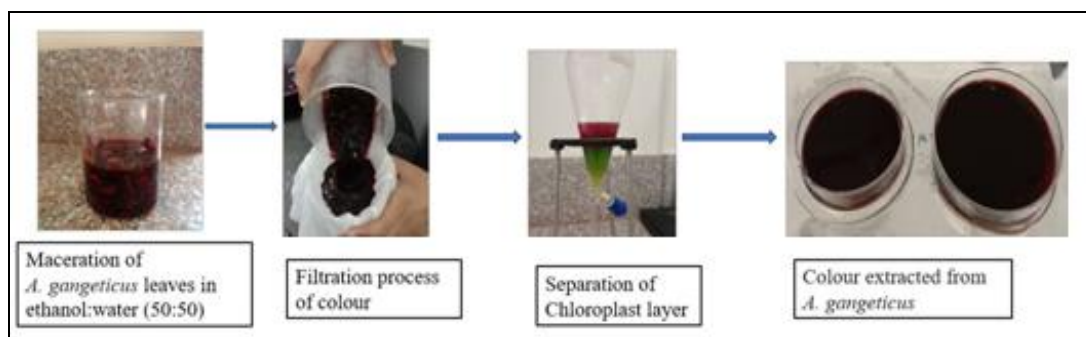


FIG. 2: COLOUR EXTRACTION PROCESS

Preliminary Phytochemical Screening of Extract of *A. gangeticus*: Qualitative phytochemical screening was performed to identify the phytochemical constituents, i.e., alkaloids, terpenoids, saponins, tannins, sugars, phenolics, flavonoids, and cardiac glycosides, using the following procedure:

Test for Alkaloids: The extract was diluted with dilute HCL and filtered. The filtrate was used as a test sample.

Dragendroff's Test: Add few drops of Dragendroff's reagent to about 3 ml of filtrate. The formation of an orange brown precipitate confirms the presence of alkaloids.

Mayer's Test: Add few drops of Mayer's reagent to about 3 ml of filtrate. The formation of precipitates confirms the presence of alkaloids.

Hager's Test: Add a few drops of Hager's reagent to about 3 ml of filtrate. The formation of a yellow precipitate indicates the presence of alkaloids.

Wagner's Test: Add a few drops of Wagner's reagent to about 3ml of filtrate. The formation of a reddish-brown precipitate confirms the presence of alkaloids.

Test for Cardiac Glycosides:

Kellar Killani Test: Add 2ml of glacial acetic acid, one drop of 5% ferric chloride solution to

about 2 ml of extract. After the addition of concentrated sulphuric acid, a reddish-brown colour ring was observed at the interface of two liquids. A violet ring may be formed below the brown ring. Just above the brown ring, a greenish ring may be formed in the acetic acid layer, and this ring spreads gradually throughout this layer.

Test for Saponin Glycosides (Foam Test): About 0.5 g of plant extracts were added to 5 ml of distilled water in a test tube. The formation of constant, persistent foam indicates the presence of saponin.

Test for Terpenoids (Salkowski Test): 2 ml of chloroform, followed by 3ml of concentrated sulphuric acid, were added to 0.5 gm of extract. The formation of a reddish-brown layer at the interface of the organic and aqueous layers indicates the presence of terpenoids.

Test for Flavonoids: 1% aluminium chloride solution was added dropwise to the extract; dropwise, the appearance of a yellow colour indicates the presence of flavonoids.

Test for Tannins: About 0.5 g of plant extracts were boiled in 10 ml of water and then filtered. To the filtrate, add a few drops of 0.1% ferric chloride. The appearance of a brownish-green or blue-black colour indicates the presence of tannins.

Test for Phenolics: To about 1 ml of extract, add a few drops of ferric chloride solution. Bluish green colour indicates the presence of phenolics.

Formulation of Lipsticks: In decreasing order of melting point, white beeswax, coconut oil, and olive oil were melted and mixed in a porcelain dish on a water bath. In this phase of colour extract, acacia and castor oil phases were slowly added with continuous mixing at the same temperature. At last, lemon juice and rose essence were added at 35°C. The liquid lipstick mixtures were transferred into moulds and cooled. The excess amount of mixture was scraped after solidification. The quantity of colour extract added was shown in **Table 1** in different formulations^{6,9}.

Evaluation of Lipsticks: The six prepared lipsticks were evaluated with the following parameters to maintain their ideal qualities^{1,2,6,7,9}.

Colour and Texture: prepared lipsticks were evaluated for colour and texture.

Melting Point: The melting point was determined by the capillary tube method to determine the safe storage temperature. The capillary tubes were filled with a small portion of lipstick and placed in the melting point apparatus. Melting point ranges were recorded from the temperature at which lipstick starts to melt to the point at which portions of lipstick completely melt.

Determination of pH: The pH of prepared lipsticks was determined by using a pH meter.

Skin Irritation Test: the test was performed by applying lipstick to the skin for ten minutes and observing if any irritation occurred or not in that particular area.

Spreadability: The prepared lipsticks were applied to the glass slide to observe the uniformity of layers⁶.

Breaking Point: The purpose of this test is to evaluate the strength of lipstick. The lipstick is inserted into a horizontal socket and placed apart from the edge of the support. Followed by a number of weights hanging from the support attached to the lipstick. The breaking point of this weight is defined as the weight at which the lipstick breaks, and it was progressively increased at intervals of 15 seconds⁹.

Ageing Stability: Prepared herbal lipsticks were kept for one hour in three different temperature, such as at 4°C, 20-30°C and 40-50°C. Different parameters were noted, including bleeding, crystallization, and application ease¹.

Solubility Test: To check the solubility, the prepared lipsticks were dissolved in a range of solvents¹.

Surface Abnormalities: The study was performed by visual observation to identify the presence of crystal contamination by bacteria, fungi on the surfaces of prepared lipsticks⁹.

Force of Application: It is the test for comparative measurement of the force to be applied for application.

A piece of coarse brown paper can be kept on a shadow graph balance, and lipstick can be applied at a 45° angle to cover a 1 sq. inch area until fully covered. The pressure reading is an indication of the force of application¹³.

RESULT AND DISCUSSION: The colour was extracted using ethanol and water (1:1) from *A. gangeticus* leaves. The colour of the concentrated extract was deep red. Preliminary phytochemical tests were performed on the extracted colour to determine the presence of alkaloids, glycosides, and tannins. The results are shown in **Table 2**. A total of six lipsticks (F1–F6) were prepared using different amounts of colour extract along with the ingredients of the lipsticks. The colours of all six formulations were very attractive, as shown in **Fig. 3**. The prepared lipsticks were evaluated using different parameters to check the quality of the product. The results are discussed below and shown in **Table 3**.

Colour and Texture: All formulated lipsticks shown attractive colour. A variety of pink coloured lipsticks **Table 3** were formulated with different amounts of colour addition.

Melting Point: The melting point range of formulated lipsticks were given in **Table 3**.

Determination of pH: All of the formulations had pH values close to 7, therefore they shouldn't cause lip irritation.

Skin Irritation Test: No irritation or any changes of skin observed after applying the lipsticks to the skin.

Spreadibility: The prepared lipsticks showed good result and uniform layer.

Breaking Point: The breaking point of all formulated lipsticks were observed in the range of 30-34 gm.

Aging Stability: The formulated lipsticks have showed perfect application and no bleeding or crystallization on the surface of the lipsticks, which were discussed in **Table 4**.

Solubility Test: The prepared lipsticks showed solubility in chloroform solvent.

Surface Abnormalities: The formulated lipsticks did not show any crystal, or mold and fungi growth on the surfaces of the lipstick.

Force of Application: All formulated lipsticks showed good force of application.

TABLE 2: RESULT OF PHYTOCHEMICAL SCREENING OF EXTRACT

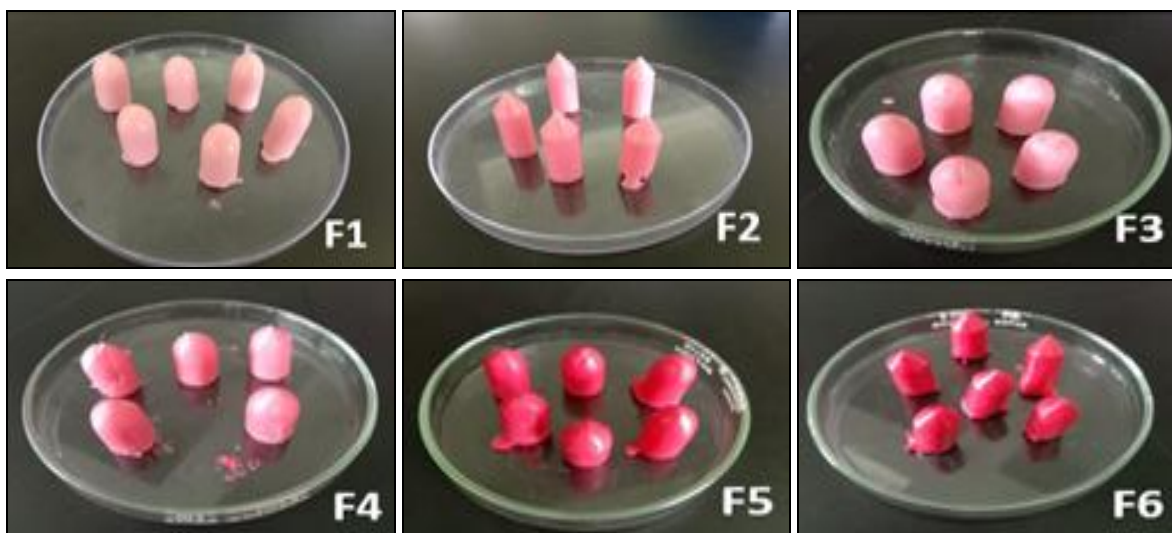
Chemical Test of extract	Result
Test for Alkaloid	
Dragendroff's test	Present
Mayer's test	Present
Hager's test	Present
Wagner's test	Present
Test for Cardiac Glycosides	
Killer-killani Test	Present
Test for Saponin Glycosides	
Foam Test	Present
Test for Terpenoids	Absent
Test for Flavonoids	Absent
Test for Tannins	Present
Test for Phenolics	Absent

TABLE 3: EVALUATION OF FORMULATED LIPSTICKS

Sl. no.	Evaluation Parameter	F1	F2	F3	F4	F5	F6
1.	Colour	Baby Pink	Light Pink	Pink	Dark Pink	Fluorescent Pink	Hot Pink
2.	Texture	Smooth	Smooth	Smooth	Smooth	Smooth	Smooth
3.	Melting Point	60-64°C	60-62°C	61-63°C	61-64°C	60-63°C	61-63°C
4.	pH	6.6	6.8	6.7	7.0	6.6	6.7
5.	Skin Irritation	No	No	No	No	No	No
6.	Spreadibility	Good	Good	Good	Good	Good	Good
7.	Breaking Point	34 gm	30 gm	30 gm	33gm	34gm	30 gm
8.	Solubility Test	Soluble in Chloroform	Soluble in Chloroform	Soluble in Chloroform	Soluble in Chloroform	Soluble in Chloroform	Soluble in Chloroform
9.	Surface abnormalities	No defect found	No defect found	No defect found	No defect found	No defect found	No defect found
10.	Force of application	Good	Good	Good	Good	Good	Good

TABLE 4: AGING STABILITY OF FORMULATED LIPSTICKS

Formulation	At 40°C temperature			At 25°C temperature			At 4°C temperature		
	Bleeding on surface	Crystallization on surface	Ease of application	Bleeding on surface	Crystallization on surface	Ease of application	Bleeding on surface	Crystallization on surface	Ease of application
F1	No	No	Yes	No	No	Yes	No	No	Yes
F2	No	No	Yes	No	No	Yes	No	No	Yes
F3	No	No	Yes	No	No	Yes	No	No	Yes
F4	No	No	Yes	No	No	Yes	No	No	Yes
F5	No	No	Yes	No	No	Yes	No	No	Yes
F6	No	No	Yes	No	No	Yes	No	No	Yes

**FIG. 3: PREPARED LIPSTICKS**

CONCLUSION: The study revealed that the use of synthetic colour in the formulation can be replaced by colour obtained from natural sources. In the present study, the extraction of colour from the leaves of *A. gangeticus* using ethanol and water was performed successfully. Lipsticks were successfully formulated using the natural colour along with different essential ingredients. Lipsticks were found to be stable, non-irritant to the skin, and attractive in colour.

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