

Formulation and Standardisation of Herbal Based Edible Ink

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ABSTRACT

A preliminary survey in primary school indicated that few children accidentally ingested ink, currently it is observed that only synthetic ink are used. Hence for benefit of children and toddlers it was thought worth to prepare edible ink. Four edible inks were prepared from different biological sources such as beetroot, turmeric etc. The preparation method was standardized by trial and error. Further the preparations were evaluated for several parameter such as Flow ability, Non-clogging nature, Colour, Brightness, Permanency of colour, Stability, Taste, Drying time. All inks were found to edible, safe, easy to prepare and stable.

Keywords: Plant extracts, Water, Vinegar, Slaked lime.

INTRODUCTION

Ink is a liquid that contain pigment and or dyes. Dye based inks are generally much stronger than pigment based inks can produce much more colour of density, because dyes are dissolved in liquid phase. Synthetic inks are classified based on nature of chromophore such as Acridine dye (acridine), Anthraquinone dye (anthraquinone), Diary methane dyes (biphenyl methane), Thiazole dye (thiazole), Fluorone dyes (fluorone) etc. It is complex medium composed of solvents, pigments, dyes, resins, lubricants, solubilises, surfactants, particulate matter and other materials. Several natural dye yielding plant are available medicinal value, such as aloe (cathartic), *adhatoda vasica* (bronchial), *indigo feranticto* (epilepsy) *crocus sativus* (sedative)

Though all natural dyes are not 100% safe they are less toxic than their synthetic counterparts. Many of the natural dyes like turmeric, annatto and saffron are permitted as food additives. They are obtained from renewable sources. Natural dyes cause no disposal problems, as they are biodegradable. Practically no or mild reactions are involved in their preparation. It is possible to obtain a full range of colours using various mordents. Consistency of colour is a challenge when dyeing with natural dyes. No two dye lots are identical; due to impurities in the natural dyes. Edible ink overcomes some of the problems lead by synthetic

ink via less expensive and not tedious process, Nontoxic, Safe to use in foods and confectionaries. They are obtained from renewable sources. In this study few plant species such as Beetroot (*Beet vulgaris*), Turmeric (*Curcuma longa*) were chosen for preparation of herbal ink. These plants are easily available plus with added pharmacological activity such as hypotensive, cardiovascular protective, vasodilatation, anti-fungal, anti-bacterial, etc.

MATERIALS AND METHODS

Extraction of maroon ink from beetroot (*Beet vulgaris*) by simple extraction

Materials

Beetroot-250g, Vinegar-10ml, Water-1000ml

Method

Beetroots were chopped and grinded. To the grinded paste 500ml of water was added. Then it was boiled for 45 min and is cooed and filtered using muslin cloth. Re-extracted using double the quantity of water and concentrate to the 200ml of the concentrated extract.5-10ml of vinegar was added. It was filtered and stored in an air tight glass bottle in a cool place away from sunlight.

Preparation of yellow ink from turmeric (*Curcuma longa*)

Materials

Turmeric (dry rhizome)-20g, Vinegar-5ml, Water-500ml

Method

20grams of dried rhizome of turmeric was grinded and pulverized. To this powder 500ml of water was added and boil for 60 mins. The extract was filtered using muslin cloth. Again it was concentrated to half of its volume. To this final extract 5ml of vinegar was added. It was filtered and stored in air tight glass bottle in a cool place away from sunlight.

Preparation of orange ink form slaked lime and turmeric (*Curcuma longa*)

Materials

Slaked lime-3g, Rhizome-20g, Water-500ml

Methods

20 grams of rhizome was grinded, to it 3gms of slaked lime was added. To this 500ml of water was added and boiled for 90mins, then it was filtered and concentrated for 45 mins. It was cooled and filtered till clear solution was obtained. Orange dye obtained was stored in air tight glass bottle in a cool place away from sunlight.

Preparation of brown colored ink from caramel

Materials

Sugar-250g, Glycerine water-100ml

Methods

Sugar was caramelized in a hot plate and diluted with glycerine water. Filtered finally. Brown colour ink obtained is stored in an air tight glass container away from sunlight.

Table 1: Effect of ink on UV rays and sunlight

Parameter UV rays / sunlight	Beet root ink	Turmeric ink	Turmeric & slaked lime ink	Caramel ink
1 st day of exposure	No change in colour.	No change in colour.	No change in colour.	No change in colour.
2 nd day of exposure	No change in colour.	No change in colour.	No change in colour.	No change in colour.
3 rd day of exposure	No change in colour.	No change in colour.	No change in colour.	No change in colour.
4 nd day of exposure	No change in colour.	No change in colour.	No change in colour.	No change in colour.
5 nd day of exposure	No change in colour.	No change in colour.	No change in colour.	No change in colour.
6 nd day of exposure	No change in colour.	No change in colour.	No change in colour.	No change in colour.
7 nd day of exposure	No change in colour.	No change in colour.	No change in colour.	No change in colour.

Table 2: Effect of ink on UV rays and sunlight - 2nd week of exposure

Resistant to UV light	Low (1 to 3 days)	Medium (3 rd day to 7 th day)	High (After a week)
Carmel (brown colour)	No change of colour	Colour changed to light brown	Colour faded to white
Turmeric with calcium hydroxide (yellowish orange)	No change of colour	Changed to light yellow	Colour faded to white
Beet root (maroon ink)	No change of colour	No change	Light pink

Table 3: Results for parameters evaluated have been listed down

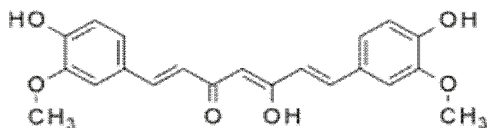
Parameter	Beet root ink	Turmeric ink	Turmeric & slaked lime ink	Caramel ink
Flow ability	Freely flowing	Freely flowing	Freely flowing	Freely flowing
Clogging nature	Non clogging	Non clogging	Non clogging	Non clogging
Colour	Maroon	Yellow	Yellowish orange	Brown
Brightness	Dark	Light	Light	Dark
Permanency of colour	3-8 days	3-7 days	1-3 days	3-7 days
Stability	Stable	Stable	Stable	Stable
Taste	Pleasant and sour	Characteristics	Characteristic	Sweet
Drying time	7-9sec	7-11 sec	6-7 sec	8-13 sec



Beetroot (*Bet vulgaris*),



Turmeric (*Curcuma longa*)



Curcumin

RESULTS

By trial and error method, four edible inks were prepared via, maroon ink from beetroot, yellow from turmeric, and orange from turmeric, brown from caramel. The prepared ink was filled in an ink pen and following character was studied and Evaluated.

The effect of the prepared ink on UV rays and sunlight was studied. The results are tabulated in table 1 and 2. There was no visible change of colour of the ink in one week of exposure. The herbal based inks have completely faded to a point of being almost white and unreadable.

The prepared inks were standardised by checking different parameters. All the inks were free flowing, non clogging and correct colour concentration. All the synthesised inks showed colour permanency for 1 week varying between 3-8 days. Further they were stable. Inks synthesised from beetroot and caramel tasted sweet, increased stability and quick drying time of 7-13 seconds.

CONCLUSION

Today, the vast majority of dyes and pigments are produced synthetically; colours produced from synthetic dyes are more consistent from batch to batch than colours produced by natural colorants. However, natural dyes are an eco-friendly way to impart almost any colour to textile product with the recent interest in environmental concerns; natural

dyes might be a good way to produce unique products with a green slant. In this direction, for betterment of our environment, four edible inks have been prepared and the preparation methods were standardized.

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