

Extraction and Optimization of Natural Colour from Ratanjyot, Its Application and Acceptance in Toffees

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Abstract

A study was undertaken for extraction and optimization of biocolour extracted from Ratanjyot and its acceptance in toffees. The optimization of extracting condition for extracted colour was done by using response surface methodology (RSM). The optimum time and temperature for the extraction of dye was obtained as 112 min and 38.8°C. The average particle size of powdered Ratanjyot was 0.1655 mm. The biocolour was extracted by using hexane as solvent. Then, four samples of toffees (C, S1, S2 and S3) were prepared by incorporating different concentration of Ratanjyot colour. The pH, fat, browning index, reducing sugars and total sugars were increased with increasing concentration of biocolour at fresh level. Hardness and stickiness was also increased. The moisture content of all the samples decreased with increasing concentration. L* and b* values of samples were decreased and a* values were increased with increasing concentration of biocolour at fresh level. The overall acceptability of samples S2 was found maximum at fresh level. Samples, S2 (1.2 ml of Ratanjyot colour in 222 g of toffees) was the best product with all medicinal properties of honey and Ratanjyot colour.

Keywords: Extraction; Natural colours; Ratanjyot; Toffees

Introduction

Ratanjyot (*Arnebia nobilis*) plant is imported to India from Afghanistan and sold under trade name Ratanjyot. Some varieties of this plant are available in the Indian market also. The roots of this plant have come into prominence because of their anticancer and anti-tumor property. These are also used as an antiseptic in the veterinary medicine [1]. The roots of this plant are imported from Afghanistan and does not find in India nor is there any record of its introduction. However, an air-dried market sample yielded 2.5% of a very crude viscous red dye, which on analysis gave seven naphthaquinones designated as Arnebins and identified as:

- Arnebin-1 (alkannin β , β -dimethylate; yield, 0.375%),
- Arnebin-2 (β , β -dimethylacrylic ester of hydroxyl alkannin; yield: 0.047%),
- Arnebin-3 (alkannin acetate; yield: 0.075%),
- Arnebin-4 (alkannin),
- Arnebin-5 ($C_{16}H_{18}O_5$, melting point (mp): 111-112°C),
- Arnebin-6 ($C_{18}H_{20}O_7$, mp-88-90°C),
- Arnebin-7 [5, 8-dihydroxy-2 (4'methylpent-3'-enyl)-1-4-naphthaquinone].

The roots also contain a wax ($C_{53}H_{106}O_2$, mp-82°C), hexacosanal, heptacosanic acid and sitosterol. Ratanjyot is popular in Asian countries for imparting a pleasing red colour to foodstuffs, oils, fat and medicinal preparations. Arnebins-all the seven possess antibacterial activity against gram positive bacteria and antifungal activity against candida albicans in varying degrees; Arnebin-2, being the most potent, is also used medicinally for enlarged liver and expulsion of the worms and is applied to wounds, sores and burns [1].

The toffees are a popular and highly acceptable confectionery liked by almost all age groups as a snack for quick energy. The toffee can be better utilized as a vehicle to promote consumption and utilization of fruits that have otherwise less market demand and quite limited shelf

life [2]. Colour in one form or another has been added to our foods for centuries. It is known that the Egyptians coloured candy and wine were coloured as long as 400 BC [3]. Colour of a food can play a profound role in flavour perception [4]. Food colors can be grouped divided into four categories: a. natural colors, b. nature-identical colors, c. synthetic colors and d. inorganic colors [5,6]. However, synthetic colours are hardly nutrient and have been blamed for toxic to different extents and some are found to be carcinogenic [7]. Currently pigments of various kinds and forms have been used as additives or supplements in food industries, cosmetics, pharmaceuticals, livestock feed and other applications [8].

The investment in natural food colour market across the globe has touched to US \$ 1 billion and is continuously growing as there is demand for natural food colours against synthetic food colours [9]. Because of consumer's choice for natural food processing industry and have contributed to the increase in natural colour market significantly [10]. They are non-toxic and non-allergic. It has soothing effect and aesthetic value. These also have some medicinal properties. The present study attempts to solve problems of synthetic colours in food. Several studies have been carried out in the area of natural colours. The present study "Extraction and Optimization of Natural Colour from Ratanjyot, Its Application and Acceptance in Toffees" can be considered to be in series with previous studies. The specific objective of the study was optimization of extraction parameter of biocolour from Ratanjyot and to observe the effect of Ratanjyot colour for physicochemical, microbiological, textural and sensory characteristic on the product.

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