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Stability evaluation of anthocyanins obtained from wild Jamun (*Syzygium cumini* Skeels) fruits and their utilization as a food supplement

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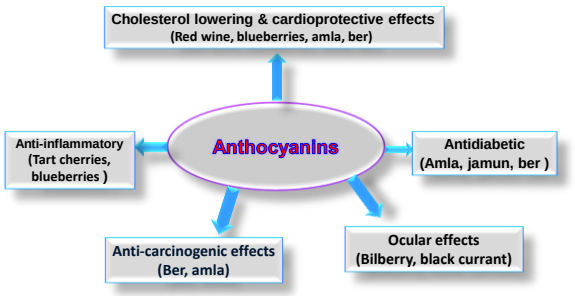
Introduction

- Anthocyanins are natural plant pigments
- Functionally active compounds contribute to the prevention of chronic degenerative diseases
- Well known for their antioxidant activity and medicinal properties

Anthocyanins- Health Perspective



Antioxidant and Antimicrobial Properties of Anthocyanins

- Antioxidant property increases with concentration of anthocyanins.
- Antimicrobial property against-
  - *Bacillus cereus*
  - *Salmonella* sp
  - *E. coli*
  - *Aspergillus niger*
  - *Candida albicans*

(Dwivedi *et al*., 2010)

Sources of Anthocyanins

Jamun *(Syzygium cumini)* A source of Anthocyanins

- Rich source of carbohydrates, vitamins and minerals
- Astringent property is due to oxalic acids, tannic acids, gallic acid and certain alkaloids
- Anthocyanins, phenolics and tannins help in inhibiting lipid peroxidation and platelet aggregation
- Anti-tumor, antimutagenic and hepatoprotective properties

Value Added Products

Jamun fruit extract supplement

Icecream supplemented with Jamun fruit

Juice powder

Jamun vinegar

Types of Jamun

- In India two types of *Jamun* fruits are found:
  1. Table type (small seeded) and
  2. Wild type (large seeded)
- Wild type *Jamun* has a higher anthocyanin content than table type, but due to low pulp content, it is not used for processing purposes
- Jamun seeds possess medicinal value and are used traditionally in the treatment of diabetes mellitus.

Table vs. Wild type Jamun

Table Type	Wild Type
Small seed, high pulp	Large seed, low pulp
Suitable for table as well as processing	Not suitable for table purpose but can be processed due to their acidity
High sugar acid ratio, low tannins	Low sugar: acid ratio, high tannins
Contains anthocyanins	Very rich in anthocyanins (more than table types)

Biochemical Composition of Jamun

Parameter	Value on fresh weight basis
Total anthocyanins (mg/100g)	157.96
Antioxidant activity (%)	76.47
Total phenolics (mg/100g)	415.49
Ascorbic acid (mg/100g)	22.74

(Mishra, 2012)

Types of anthocyanins in Jamun

1. Delphinidine-3-gentiobioside
2. Malvinidine-3-laminariobioside
3. Malvidin-3-glucoside
4. Malvidin-3-glucoside
5. Petunidin-3-gentiobioside
6. Cyanidin diglycoside

(Veigas *et al*., 2007)

Justification

Jamun fruits can be used as a potential source of anthocyanins for utilization in different food items as

- Nutrient supplement
- Natural Colourant

OUTLINE OF THE WORK

1. Identification and characterization of anthocyanins in wild Jamun

- Identification and characterization of anthocyanins present in wild Jamun will be done by HPLC.

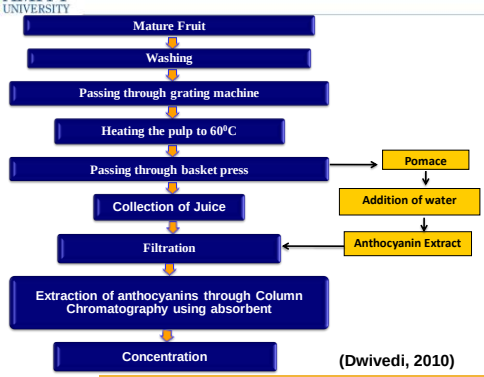
2. Extraction of anthocyanins

- Two methods of extraction of anthocyanins will be tried

1.Column chromatography method followed by concentration(Dwivedi, 2010)

2. Solvent extraction method followed by drying (Poughet et al., 1999)

Column chromatography in plum



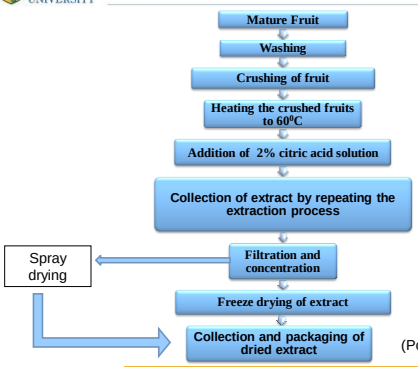
(Dwivedi, 2010)

Column chromatography

Adsorption of anthocyanins by using an adsorbent (XAD-16)

Elution of anthocyanins by using desorbent (ethanol)

Solvent extraction and drying



(Poughet *et al.*, 1999)

3. Microencapsulation

- Extracted anthocyanins will be encapsulated in food grade capsulating materials e.g. Maltodextrin 10E, 20E, gum arabic etc.

4. Stability evaluation

- Effect of pH, temperature and light on Jamun anthocyanins will also be evaluated.
- Plum anthocyanins have been reported to be sensitive to-
  - pH
  - Temperature
  - Light

Effect of pH on Stability of Plum Anthocyanins (Dwivedi *et al.*, 2010)

5. Use of anthocyanins as food supplement

- Effect of method of extraction and encapsulating material on stability of anthocyanins will be evaluated
- Anthocyanins obtained from wild Jamun will be used in different probiotic foods, confectionary items and beverages
- Plum anthocyanins have been reported to be used as food colourant in model RTS and squash (Dwivedi, 2010)

6. Evaluation of nutritional quality of foods supplemented with Jamun anthocyanins

- Foods supplemented with Jamun anthocyanins will be evaluated for following nutritional qualities:
  - Antioxidant capacity
  - Total phenolics contents
  - Antimicrobial activity
- Addition of Jamun pulp has been reported to increase the antioxidant activity and total phenolics content of pure fruit and vegetable juices on blending (Mishra and Sharma, 2011)

Expected Outcomes

- Exploitation of nutritional quality of a highly nutritive, underutilized fruit crop.
- Utilization of processing waste
- Development of a natural food colour as an alternative to synthetic colourants to prevent cancer and some life style diseases
- Supplementation foods with anthocyanins as a source of antioxidants and antimicrobial compounds

Research Gaps

- There is no report on anthocyanin extraction from Jamun
- Need of detailed study on identification and characterization of Jamun anthocyanins
- A standard technique need to be developed for anthocyanin extraction from Jamun and its encapsulation
- No effort has been made to increase the stability of anthocyanins in food products
- Acceptability of natural colourants among consumers need to be evaluated
- No emphasis has been given on utilization of wild jamun as a natural food colour and supplement
- Other bioactive compounds of wild jamun also need to be identified

Conclusion

- One third of the children in India are suffering from malnutrition therefore products supplemented by Jamun anthocyanin willl be helpful to overcome this problem
- Anthocyanins can be used as natural food colourant in place of synthetic ones which are carcinogenic in nature and hence can be beneficial for private sector also
- Encapsulated anthocyanins may be stored for longer duration without any alteration in stability and can be used as food supplement

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THANK YOU