

Advancement and Assessment of Passiflora Edulis F. Flavicarpa Pulp Submerged Anti- Aging and Anti-Oxidant Face Cream

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Abstract—The purpose of this study was the advancement and assessment of a face cream formulated from the pulp of *Passiflora edulis f. flavicarpa* to evaluate its anti-aging and antioxidant properties. Cream was prepared by the emulsification method using a base of emollients, emulsifiers and stabilizers. The pulp was incorporated at optimized concentrations determined by preliminary screening for antioxidant activity. Screening test was performed to access the bioactive compounds such as flavonoids, polyphenols and alkaloids. Four formulations F1, F2, F3 and F4 were developed using different concentrations of Passiflora fruit pulp extracts. Evaluation tests such as stability studies, pH, irritancy, wash ability, viscosity, microbial test and morphological assessment were performed for the four formulations to evaluate the efficacy, safety, and stability of the cream. The cream developed was evaluated for the texture, appearance, fragrance variation and absorption. The four formulations varied in their concentration of the pulp extracts. As the concentration of the pulp was increased the texture, appearance, fragrance and absorption was found to be optimized. The formulation F3 exhibited more stability and was more viscous when compared to other formulations i.e., F1 and F2. The final formulation F4 showed reproducible effects. The developed cream demonstrated good consistency and spread ability, homogeneity, pH, and non-greasy, and there was no phase separation during the study period of 3 months, according to the aforementioned data. The comparative formulation and development process highlighted the trade-offs between concentration, stability, and acceptability. Future formulations may consider optimizing the balance between natural and synthetic components to enhance overall performance while ensuring product safety and consumer satisfaction. Further studies can focus on long-term efficacy and user trials to validate the findings.

Index Terms—Passiflora edulis. f.flavicarpa, Bees Wax, Borax, Liquid Paraffin, Methyl Paraben, Water

AIM; to prepare and evaluate the anti-aging and antioxidant face cream using *Passiflora edulis f. flavicarpa*.

OBJECTIVE:

- To prepare and evaluate a cream having anti-aging and antioxidant effects on skin.
- To make a cream ideal for all skin types.
- To develop a stable cream formulation incorporating *passiflora edulis* extract with optimal consistency, spreadability and sensory characteristics.
- To identify and quantify bioactive compounds in *passiflora edulis* extract such as phenols, flavonoids etc.

I. INTRODUCTION OF PASSIFLORA EDULIS

Passion fruit, also well known as “the king of fruits”, “maraca”, “love fruit”, and “fruit lover”, is used as traditional folk medicines and cosmetic moisturizing agent in many countries. *Passiflora edulis*, also known as passion fruit, is widely distributed in tropical and subtropical areas of the world and becomes popular because of balanced nutrition and health benefits. The genus *Passiflora*, comprising about 500 species, is the largest in family *Passifloraceae*. Among them, the yellow-fruited *P. edulis f. flavicarpa* O. Deg. and the purple-fruited type, *P. edulis* Sims are the two main and common varieties with considerable economic importance. Currently, more than 110 phytochemical constituents have been found and identified from the different plant parts of *P. edulis* in which flavonoids and triterpenoids held the biggest share. Various extracts, fruit juice and isolated compounds showed a

wide range of health effects and biological activities such as antioxidant, anti-hypertensive, anti-tumor, antidiabetic, hypolipidemic activities, and so forth. In Brazil, the yellow passion fruit is most commonly used for the preparation of soft drinks and as a remedy in folk medicine, like juices nectars, tinctures or tablets. Most importantly, passion fruit contains nutritionally valuable compounds like vitamin C, dietary fiber and vitamin B. Studies have revealed various promising bioactivities of *P. edulis*, such as antioxidant, antimicrobial, anti-inflammatory, anti-hypertensive, hepatoprotective and lung protective activities, anti-diabetic, sedative, antidepressant activity, and anxiolytic-like action. The major nutrient components of *P. edulis* include dietary fiber, carbohydrates, lipids, carboxylic acids, polyphenols, volatile compound, protein and amino acids, vitamins, mineral, and so forth. To date, more than 110 kinds of chemical constituents have been isolated and identified from the *P. edulis*. Among them, flavonoids, triterpenoids, and carotenoids are the primary type.

PASSION FRUIT



Fig:3

The taxonomic classification of *passiflora edulis* f. *Flavicarpa*:

- Kingdom: Plantae
- Phylum: Tracheophyta
- Class: Magnoliopsida
- Order: Malpighiales
- Family: Passifloraceae
- Genus: Passiflora
- Species: *Passiflora edulis*, *Passiflora edulis* var. *flavicarpa*

NUTRITIONAL COMPOSITION OF YELLOW PASSION FRUIT

Table.1. Nutritional Composition Of Yellow Passion Fruit.

| Nutrients | Unit | Yellow passion fruit juice, raw Value per 100g |
|---------------------|------|---|
| water | g | 84.21 |
| Energy | kcal | 60 |
| protein | g | 0.67 |
| Total lipid(fat) | g | 0.18 |
| carbohydrates | g | 14.45 |
| Fiber,total dietary | g | 0.2 |
| Total sugars | g | 14.25 |
| minerals | | |
| Calcium,ca | mg | 4 |
| Iron,fe | mg | 0.36 |
| Magnesium, Mg | mg | 17 |
| Phosphorous,P | mg | 25 |
| Potassium, K | mg | 278 |
| Sodium,Na | mg | 6 |
| Zinc,Zn | mg | 0.06 |
| Copper, Cu | mg | 0.05 |
| Selenium, Se | µg | 0.1 |

| | | |
|------------------------------------|----|-------|
| Vitamin C, total ascorbic acid | mg | 18.2 |
| thiamin | mg | 0.000 |
| Riboflavin | mg | 0.101 |
| niacin | mg | 2.240 |
| Vitamin B6 | mg | 0.060 |
| Folate | µg | 8 |
| Vitamin B12 | µg | 0 |
| Vitamin A,RAE | µg | 47 |
| Vitamin A, IU | IU | 943 |
| Vitamin E, (tocopherol) | mg | 0.01 |
| Vitamin D | IU | 0 |
| Vitamin k | µg | 0.4 |
| Lipids | | |
| Fatty acids, total saturated | g | 0.015 |
| Fatty acids, total mono | g | 0.022 |
| unsaturated | | |
| Fatty acids, total polyunsaturated | g | 0.106 |

CHEMICAL COMPOSITION OF YELLOW PASSION FRUIT:

Minerals

Passion fruit is a very refreshing tropical fruit and full of minerals in fruit, juice, peel and seeds, which are known to be effective to human health. For instance, Fe, Zn, Mn, B, Cu, K, N, Ca, P, Mg, S, and Mo of skin and pulp and seeds of passion flower are 150, 41, 40, 25, 10, 3, 0.8, 0.4, 0.21, 0.15, 0.08, 0.08, and 110, 50, 16, 9, 6, 2, 1.4, 0.1, 0.25, 0.15, 0.08, and 0.12 ppm, respectively. Passion fruit juice is a source of minerals that naturally rich in Ca, Mn, P, and K, and so forth.

Flavonoids

The passion fruit pulp is a famous food source of flavonoids, which contains 158.0 mg/ml of total flavonoids, 16.2 mg/ml of isoorientin and 0.42 mg/g of quercetin.

Triterpenoids

Twenty nine triterpenoids varying in chemical structures have been isolated from fruits, leaves, stems, and roots of *P. edulis*

Alkaloids

Alkaloids including harmidine, harmine, harmane, harmol, N-trans- feruloyltyramine, and cis-N-feruloyltyramine have been found in fruits and leaves of *P. edulis*

Sulforaphanes and Carotenoids

Six sulforaphanes and 13 carotenoids have been isolated and identified in fruits of *P. Edulis*.

II. PASSION FRUIT PULP OFFERS SEVERAL HEALTH BENEFITS:

Antioxidant Activity: Large amount studies highlight the potential of passion fruit as a valuable source of natural antioxidants which can eliminate free radicals or inhibit the activity of free radicals, thereby helping the body to maintain an adequate antioxidant status. *P. edulis* fruit showed a higher antioxidant activity (64% of DPPH reduced) than mango, pineapple, banana and litchi (45%–58%). In addition, passion fruit exerted a higher free radical-scavenging activity (14.08 mmol Trolox equivalent) than little banana, big banana, papaya Colombo, papaya solo, onion, nectarine, orange, mango American, pineapple, mango José, and litchi (< 10 mmol Trolox equivalent). The variation of polyphenol components (286.6 mg Gallic acid equivalent/100 g), total flavonoids (70.1 mg quercetin equivalent/100 g), carotenoids (3.8 mg b-carotene equivalent/100 g), and vitamin C (44.4 mg ascorbic acid equivalent/100 g) may be responsible for the radical scavenging activity.

Anti-inflammatory property: The bioactive

compounds in passion fruit pulp, including flavonoids, exhibit anti-inflammatory properties, which may reduce inflammation in the body and lower the risk of related diseases.

Anti-Diabetic Treatment: Passion fruit pulp contains compounds like gallic acid and quercetin, which have been shown to help regulate blood sugar levels and improve insulin sensitivity. This makes it a potential therapeutic option for managing diabetes.

Digestive Health: The dietary fiber in passion fruit pulp aids digestion and can be used therapeutically to alleviate constipation and promote gut health. It may also help in managing conditions like irritable bowel syndrome (IBS).

Skin Health: Due to its antioxidant and anti-inflammatory properties, passion fruit pulp extracts are being explored for use in cosmetic formulations aimed at improving skin health, protecting against UV damage, and promoting wound healing.

Stress Relief and Anxiety Management: Some studies suggest that extracts from passion fruit may have calming effects, potentially aiding in the management of stress and anxiety.

Immune Support: The vitamin C content in passion fruit pulp supports the immune system, helping the body to fend off infections and illnesses. Overall, the

consumption of passion fruit pulp can contribute to a healthy diet and may play a role in the prevention of various chronic diseases.

Nutritional Supplement: Passion fruit pulp can be incorporated into dietary supplements due to its rich nutrient profile, providing vitamins, minerals, and antioxidants that support overall health and wellness.^[8]

CONCLUSIONS AND FUTURE RESEARCH DIRECTIONS:

Yellow passion fruit presented higher water and relatively lower nutritional components, while purple fruit presented higher content of vitamin C, vitamin A, fiber and calcium. Different plant parts (leaves, buds, peels, and pulp) and growth stages of *P. edulis* contain a variety of bioactive components such as total dietary and polyphenols. The yellow passion fruit presented higher content of pectin in peels, high content of carotene, quercetin, and kaempferol in pulps and higher values of total dietary fiber in seeds. Yellow passion fruit presented higher concentrations of pectin (37.37 g/100 g) in peels; high cryptoxanthin, α -carotene, β -carotene, provitamin A, quercetin, and kaempferol in pulps.¹

PRE-LIMINARY PHYTOCHEMICAL SCREENING OF YELLOW PASSION FRUIT:





Table:2

| SL.No | Test | Procedure | Observation | Inference |
|-------|-----------------------|--|--|------------------------|
| 1. | Test for alkaloids | | | |
| | Dragendroff's test | 2mL of sample + 1- 2mL of dragendroff's test | An orange red precipitate was formed | Presence of alkaloids |
| | Mayer's test | few drops of mayer's reagent+ 1mL of sample | Formation yellowish precipitate of | Presence of alkaloids |
| 2. | Test for flavonoids | | | |
| | Alkaline reagent test | 2-3 drops of NaOH+ 2mL of sample | Deep yellow color becomes colorless on addition of dilute acid | Presence of flavonoids |
| 3. | Test for | | | |

| | | | | |
|----|-------------------|---|--------------------------------|-------------------------|
| | Polyphenols | | | |
| | Lead acetate test | Sample is dissolved in 5mL distilled water + 3mL lead acetate | Formation of white precipitate | Presence of polyphenols |
| 4. | Test for proteins | | | |
| | Millon's test | 2ml sample drops of reagent + few millon's | Formation white precipitate | Presence proteins of |

III. RESULTS OF CHEMICAL TESTS:

Table. 3

| SL. No | TEST | OBSERVATION |
|--------|--------------------|---|
| 1. | Dragendroff's test |  |
| 2. | Mayer's test |  |
| 3. | Lead acetate test |  |
| 4. | Millon's test |  |

DESCRIPTION OF MATERIALS AND EQUIPMENTS:

MATERIALS USED:

Table.4

| SL. No | Materials | Materials suppliers details | Uses |
|--------|-----------------|-------------------------------|--|
| 1. | Bees Wax | Labogens Fine Chem. Industry | Emollient, stabilizer and humectant |
| 2. | Borax | Nice chemicals(P) LTD | Emulsifying agent |
| 3. | Liquid Paraffin | Multicure Pharma Pvt Ltd | Moisturizing and protective agent |
| 4. | Methyl Paraben | Atom Chem | preservative |
| 5. | Passion Fruit | YKA Store | Antioxidant, anti-aging agent and fragrant |
| 7. | Distilled Water | Water care technologies (WCT) | solvent |

EQUIPMENTS USED:

Table.5

| SL. No | Equipments | Suppliers' details |
|--------|--------------------|------------------------------|
| 1. | Heating Mantle | Labtech Enterprices |
| 2. | Measuring Cylinder | Glasil Scientific Inds |
| 3. | Beaker | Garg Process Glass India LTD |
| 4. | Glass Stirrer Rod | Maxxdge Private limited |
| 5. | Thermometer | Maxwell Products |
| 6. | China Dish | Excel industries |

METHODOLOGY: EMULSIFICATION method

COMPARITIVE FORMULATION AND DEVELOPMENT:

Table.6. Formulation Table

| SN | Ingredients | F1 (w/w) | F2 (w/w) | F3 (w/w) | F4 (w/w) | Blank (w/w) | Optimized Formula (w/w) |
|-----------------------|--|-------------|-------------|-------------|-------------|-------------|----------------------------|
| 1. | Bees wax | 3.2gm | 3.2gm | 3.2gm | 3.2gm | 3.2gm | 3.2gm |
| 2. | Borax | 0.16gm | 0.16gm | 0.16gm | 0.16gm | 0.16gm | 0.16gm |
| 3. | Liquid paraffin | 10gm | 10gm | 10gm | 10gm | 10gm | 10gm |
| 4. | Methyl paraben | 0.027gm | 0.027gm | 0.027gm | 0.027gm | 0.027gm | 0.027gm |
| 5. | Distilled water | 2 gm | 1gm | 0 gm | 0 gm | 6.6 gm | 0 gm |
| 6. | Passion fruit thick concentrate d pulp | 4.6gm | 5.6 gm | 6.6 gm | 6.6 gm | 0 gm | 6.6 gm |
| Total Weight of Cream | | 20gm | 20gm | 20gm | 20gm | 20gm | 20gm |

PREPARATION METHOD (EMULSIFICATION METHOD):

The cream was prepared by the following steps:

- 1) Beeswax was melted in a container on a water bath maintained at 70 °C temperature and added with mineral oil; this mixture A (oily phase).
- 2) Water was heated in another container at the same temperature and added with borax; this was Mixture B (aqueous phase).
- 3) Mixture B was slowly added to the mixture A with stirring to form a creamy emulsion.
- 4) In the last step, the preparation was brought down to 40°C temperature and added with a suitable Perfume.

FORMULATION OF YELLOW PASSION FRUIT CREAM (EMULSIFICATION METHOD)



Fig.9



Fig.10

Liquid paraffin and beeswax were heated in a borosilicate glass beaker at 70 °C and maintained the

heating temperature (Oil phase). In another beaker, borax was dissolved with yellow passion fruit pulp and heated in a beaker upto 70°C (Aqueous phase). Then slowly this aqueous phase was added to heated oily phase. This mixture was stirred vigorously until it formed a smooth cream. In the last step the preparation was brought down to 40°C temperature and added with the preservative methyl Paraben. ^[22]

IV. EVALUATION OF CREAM

1. Morphological Evaluation

Physical properties: The cream was observed for the colour, odour and appearance.

2. Physicochemical evaluation

a) Spreadability test:

To evaluate the spread ability of a cream by measuring the ease of spreading on a flat, non-absorbent surface place a small, measured amount of cream (e.g., 0.5 g or 1 g) at the center of the glass plate. Using a flat spatula, apply a consistent force to spread the cream across the surface of the glass plate in a circular motion. Examine the uniformity of the spread layer. Note any streaks, lumps, or resistance. Measure the diameter or area of the spread cream using a ruler or calibrated scale. Check the uniformity and effort needed to spread the cream. A uniform thin layer indicates good spread ability.

b) pH

The pH of the cream was determined using pH meter. The most accurate common means of measuring pH is through a lab device called a probe and meter, or simply a pH meter. The probe consists of a glass electrode through which a small voltage is passed. The meter is a voltmeter, measures the electronic impedance in the glass electrode and displays pH units instead of volts. Measurement is made by submerging the probe in the semisolid until a reading is registered by the meter.

c) Irritancy test:

Mark an area (1 sq.cm) on the left-hand dorsal surface. The cream was applied to the specified area and time was noted. Irritancy, erythema, edema, was checked if any for regular intervals up to 24 hrs. and reported.

d) Homogeneity:

Homogeneity of the formulated cream was tested for the homogeneity by visual appearance and by touch. After feel emolliency, slipperiness and amount of residue left after the application of fixed amount of

cream was checked.

e) Washability:

The ease of removal of the cream applied was examined by washing the applied part with tap water.

f) Viscosity:

Viscosity of cream was done by using Brooke field viscometer at a temperature of 25 °C using spindle No. 63 at 2.5 RPM. According to the results all the formulations showed adequate viscosity.

g) Test for microbial growth:

Agar media was prepared then the formulated cream was inoculated on the plate's agar media by steak plate method and a controlled is prepared by omitting the cream. The plates were placed in the incubator and are incubated at 37°C for 24 hours. After the incubation

period, the plates were taken out and the microbial growth were checked and compared with the control.
[23] [24]

IV. RESULTS AND DISCUSSION

Morphological Evaluation:

The cream was evaluated for morphological parameters showed in the Table 4. The colour of formulation was curcumin yellow. The odour of prepared formulations was pleasant and fruity which is desirable to cosmetic formulations. Texture and smoothness were acceptable as per requirement of cosmetic formulations.

Table.7. Morphological evaluation

| Sr.No | Parameter | Observation | | | | |
|-------|-----------|-------------|-----------------------|-----------------------|-----------------------|-----------------------|
| | | blank | F1 | F2 | F3 | F4 |
| 1. | colour | white | curcumin yellow | Curcumin yellow | Curcumin yellow | Curcumin yellow |
| 2. | odour | Odourless | Pleasant and fruity | Pleasant and fruity | Pleasant and fruity | Pleasant and fruity |
| 3. | texture | fine | Smooth and non-greasy | Smooth and non-greasy | Smooth and non-greasy | Smooth and non-greasy |

pH:

The pH of the cream was found to be in range of 6.1 to 6.6 which is good for skin pH. The formulation was shown pH nearer to skin required.

Table.8. pH-table

| Sr.No | Formulation | pH |
|-------|-------------|-----|
| 1. | F1 | 6.6 |
| 2. | F2 | 6.4 |
| 3. | F3 | 6.1 |
| 4. | F4 | 6.1 |
| 5. | Blank | 7 |

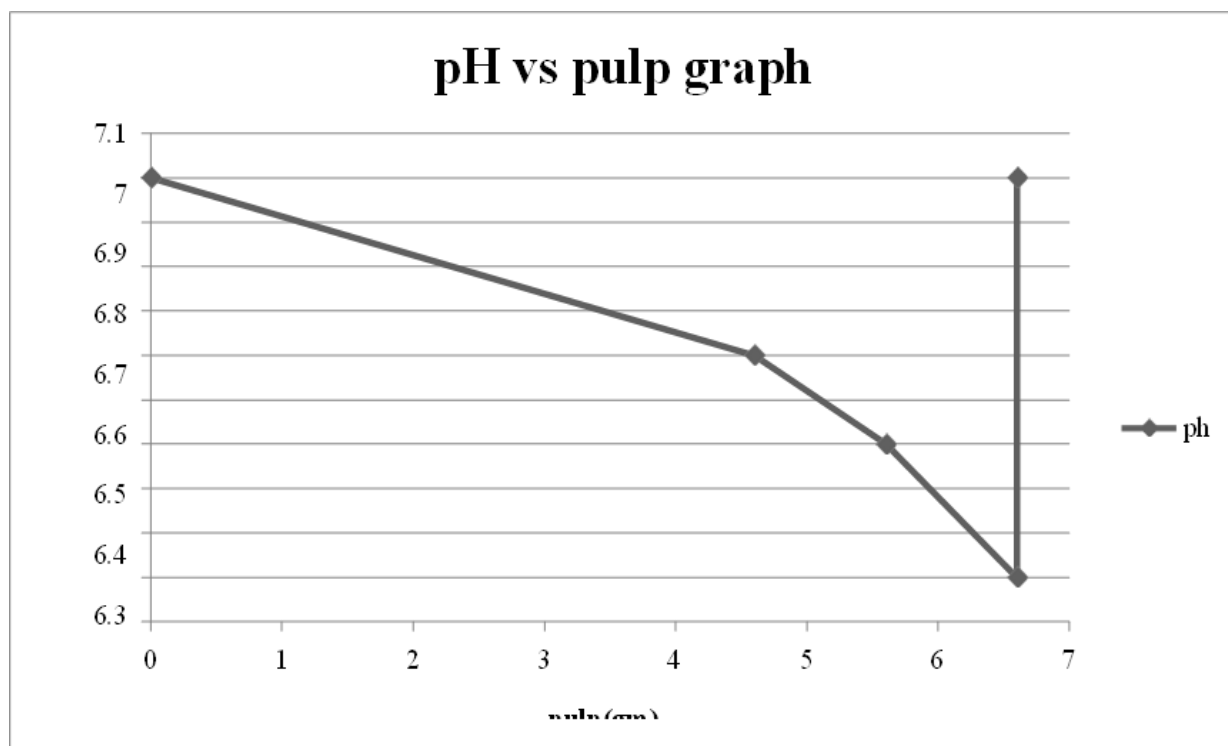


Fig. 11

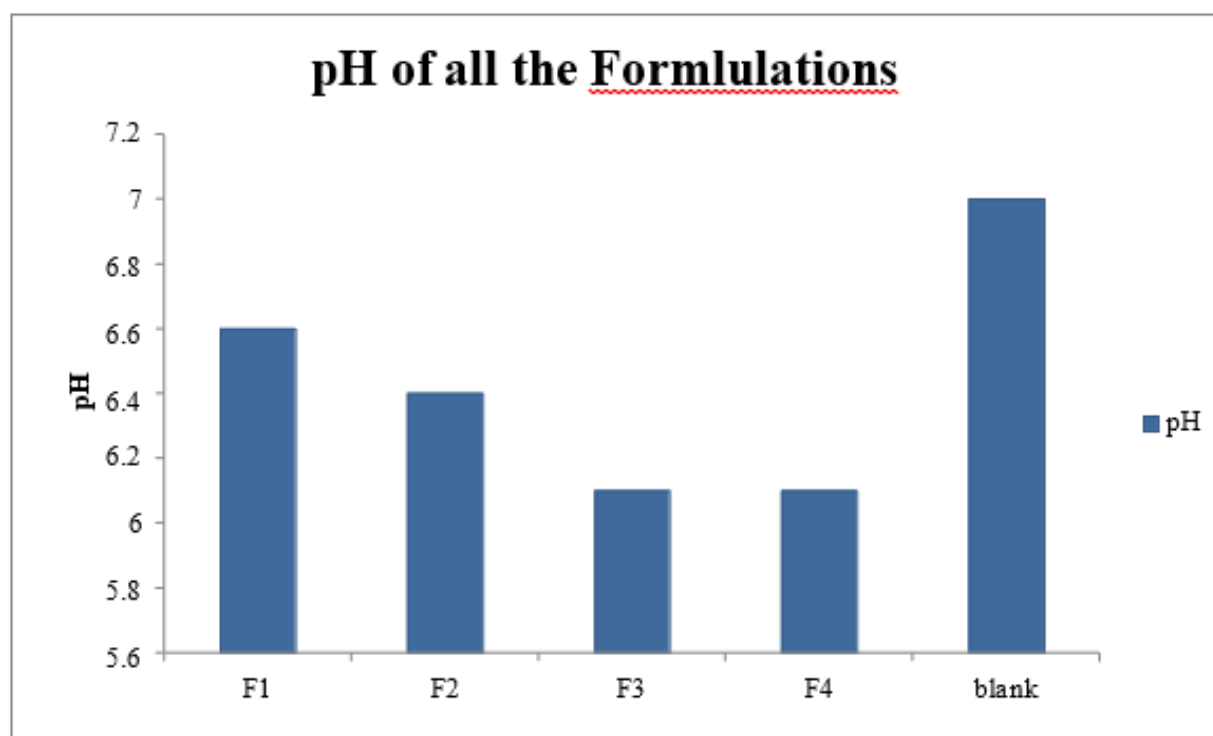


Fig.12

Washability Test:

All the four formulations showed good washability.



Fig.13

Table.9. Washability observation

| Sr.No | Formulation | Washability |
|-------|-------------|-----------------|
| 1. | Blank | Easily washable |
| 2. | F1 | Easily washable |
| 3. | F2 | Easily washable |
| 4. | F3 | Easily washable |
| 5. | F4 | Easily washable |

Irritancy test:

The table below displays the results of the irritancy test. During irritancy trials, the formulation displayed absence of irritation, redness and edema. The formulation is skin safe for usage.

Table.10. Irritancy observation

| Sr.No | Irritancy test | results | | | | |
|-------|----------------|---------|----|----|----|----|
| | | blank | F1 | F2 | F3 | F4 |
| 1. | Irritation | no | no | no | no | no |
| 2. | edema | no | no | no | no | no |
| 3. | redness | no | no | no | no | no |
| 4. | swelling | no | no | no | no | no |

Viscosity:

According to the results all the formulations showed adequate viscosity.

Homogeneity:

The homogeneity of the formulated cream was judged by the visual appearance and touch. The appearance and touch of the cream were good.



Fig.14

Test for microbial growth:

There was no sign of microbial growth after 24hrs of incubation at 37°C and it was comparable with the control.



Fig.15. agar plate

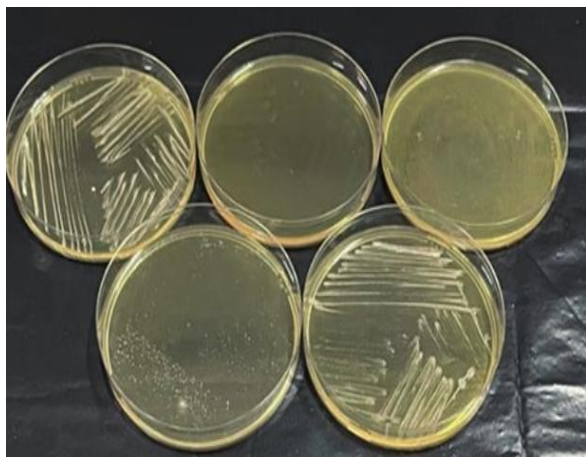


Fig.16. agar plate inoculated with cream

Spreadability test:

The formation of thin uniform layer of the cream and the ease of spreading showed that the formulated cream has good spreadable property. [23] [24]

Short term stability evaluation reports:

All formulations (F1 to F4) were stored at room temperature since 3 months. Their evaluation results reported that there are no remarkable changes found in the product till now and the product was stable. Evaluation results are reported below



Fig.17. stability of the cream after 3 months.

Table No: 11 short term stability evaluation

| SL.NO | PARAMETERS | F1 | F2 | F3 | F4 |
|-------|---------------|------------------------|------------------------|------------------------|------------------------|
| 1. | Colour | Curcumin yellow | Curcumin yellow | Curcumin yellow | Curcumin yellow |
| 2. | Odour | Pleasant and fruity | Pleasant and fruity | Pleasant and fruity | Pleasant and fruity |
| 3. | Texture | Smooth and non greasy | Smooth and non greasy | Smooth and non greasy | Smooth and non greasy |
| 4. | Spreadability | No residue left | No residue left | No residue left | No residue left |
| 5. | pH | 6.6 | 6.4 | 6.1 | 6.1 |
| 6. | Irritancy | Non irritant | Non irritant | Non irritant | Non irritant |
| 7. | Homogeneity | Uniform and consistent | Uniform and consistent | Uniform and consistent | Uniform and consistent |
| 8. | Washability | Easily washable | Easily washable | Easily washable | Easily washable |
| 9. | Viscosity | adequate | adequate | adequate | adequate |

V. RESULTS

Table.12. Results of the Tests Performed

| SL.NO | PARAMETERS | F1 | F2 | F3 | F4 |
|-------|------------|---------------------|---------------------|---------------------|---------------------|
| 1. | Colour | Curcumin yellow | Curcumin yellow | Curcumin yellow | Curcumin yellow |
| 2. | Odour | Pleasant and fruity | Pleasant and fruity | Pleasant and fruity | Pleasant and fruity |

| | | | | | |
|-----|------------------------------|------------------------|------------------------|------------------------|---------------------------|
| 3. | Texture | Smooth and non-greasy | Smooth and non-greasy | Smooth and non-greasy | Smooth And non greasy |
| 4. | Spreadability | No residue left | No residue left | No residue Left | No residue left |
| 5. | pH | 6.6 | 6.4 | 6.1 | 6.1 |
| 6. | Irritancy | Non irritant | Non irritant | Non irritant | Non irritant |
| 7. | Homogeneity | Uniform and consistent | Uniform and consistent | Uniform and consistent | Uniform and consistent |
| 8. | Washability | Easily washable | Easily washable | Easily washable | Easily washable |
| 9. | Viscosity | adequate | adequate | adequate | adequate |
| 10. | Test for microbial growth | No microbial growth | No microbial growth | No microbial growth | No microbial growth |

VI. DISCUSSION:

The main aim of this project was to develop a cream with anti-aging and antioxidant properties using the *Passiflora edulis* pulp extract. The cream was designed to provide benefits like moisturizing, soothing, and protection from skin aging. Passion fruit (*Passiflora edulis*) is widely known for its rich antioxidant content, particularly flavonoids, triterpenoids, and vitamin C. These compounds help neutralize free radicals, reduce skin inflammation, and provide a natural anti-aging effect. As per the literature review, the use of passion fruit in cosmetics has gained attention due to its nutritional properties and potential health benefits such as skin protection, moisturization, and promotion of skin elasticity. Four formulations (F1 to F4) were prepared, each with different concentrations of the passion fruit pulp to assess the optimal balance for consistency, stability, and efficacy. The cream exhibited curcumin-yellow colour, pleasant fruity odour, and smooth, non-greasy texture. The cream maintained a skin-friendly pH range of 6.1 to 6.6, ensuring it is suitable for various skin types. The ease with which the cream spreads was evaluated and found to be good, ensuring uniform application. No irritation or redness was observed, confirming the cream's skin compatibility. The cream showed consistent viscosity and was homogenous, ensuring proper distribution of ingredients in the formulation. The formulation F3, containing 6.6ml of passion fruit pulp, was found to have optimal texture, spreadability, and stability. This formulation provided the best balance between concentration and

effectiveness. The antioxidant properties of the passion fruit pulp were highlighted in its ability to slow down the aging process, improve skin elasticity, and provide moisturization. The inclusion of natural ingredients with minimal synthetic components made the cream safe and beneficial. Future research could focus on long-term efficacy studies, including in vivo tests on a larger population to validate the cream's effects. Additionally, further exploration into commercializing the cream and optimizing the balance between natural and synthetic ingredients may increase its marketability and consumer satisfaction.

VII. CONCLUSION

Four formulations (F1 to F4) of *Passiflora edulis* f. *flavicarpa* cream were prepared, each with different concentrations of the passion fruit pulp to assess the optimal balance for consistency, stability, and efficacy. The formulation F3, containing 6.6 ml of passion fruit pulp, was found to have optimal texture, spreadability, and stability. This formulation provided the best balance between concentration and effectiveness. The developed cream demonstrated good consistency and spreadability, homogeneity, pH, non-greasiness, and there was no phase separation during the research period according to the aforementioned data. The purpose was to harness the natural properties of *passiflora edulis* f. *flavicarpa* fruit pulp for potential benefit while utilizing a water-in-oil emulsion base for enhanced hydration and protection. The water-in-oil structure allows deeper penetration of the active ingredients, including fruit extract, into the

skin. This fruit is known for its antioxidant and anti-inflammatory properties which could contribute to improved skin health and a more radiant complexion. The prepared extract is compatible with other ingredients. The anti-oxidants present in passion fruit help combat free radicals, slowing down the aging process and improving skin texture. As consumers increasingly seek natural and sustainable beauty products, passion cream offers a valuable, eco-friendly alternative for nourishing and revitalizing the skin. Its natural moisturizing properties, along with its ability to promote skin elasticity and hydration, make it an ideal ingredient for skincare preparations. Therefore, the non-irritating product containing passion fruit extract are encouraged for further in vivo efficacy evaluation.

REFERENCES

- [1] Yadav R, Thakur S, Parihar R. Pharmaceutical preparation and evaluation of cold cream. *Int. J Innov. Sci. Res Technol.* 2018;8(5):1069-1072.
- [2] Siddiqua I. Preparation and evaluation of herbal cold cream with incorporated Curcuma longa. *Int. J Innov. Sci. Res Technol.* 2019;7(3):974- 976.
- [3] Nayana, P.V., Navyashree, P.S., Nithyashree, H.P., Pavan, N.K., Preethi,N.S. and Rakshitha, C., 2024. A Review on the Formulation and Evaluation of Herbal Cold Creams Incorporating Natural Oils. *Journal of Pharma Insights and Research*, 2(4), pp.207-211.
- [4] Sharma, A.N.S.H.U.L., Banyal, M.A.N.E.E.S.H., Gupta, J.Y.O.T.I. and Joshi, S.W.A.T.I., 2019. Formulation and evaluation of herbal cold cream. *IJARIE*, 9(3), pp.2578-2587.
- [5] Weyya, G., Belay, A. and Tadesse, E., 2024. Passion fruit (*Passiflora edulis* Sims) by-products as a source of bioactive compounds for non-communicable disease prevention: extraction methods and mechanisms of action: a systematic review. *Frontiers in Nutrition*, 11, p.1340511.
- [6] Devi Ramaiya, S., Bujang, J.S., Zakaria, M.H., King, W.S. and Shaffiq Sahrir, M.A., 2013. Sugars, ascorbic acid, total phenolic content and total antioxidant activity in passion fruit (*Passiflora*) cultivars. *Journal of the Science of Food and Agriculture*, 93(5), pp.1198-1205.
- [7] Pardo Solórzano, M.V., Costa, G.M. and Castellanos, L., 2024. *Passiflora* By-Products: Chemical Profile and Potential Use as Cosmetic Ingredients. *Scientia Pharmaceutica*, 92(4), p.57
- [8] Shaik Asif Ayub, Shaik Sana M Jafar Shaik, Dipak Sopan Nandakar, Mohammad ShoiabsheikhDiler; A Review Article on Pharmaceutical creams and their role in wound healing Volume-9-Issue-1-2023
- [9] Sjerobabski-Masneć, I. and Situm, M., 2010. Skin aging. *Acta Clin Croat*, 49(4), pp.515-8.
- [10] Al-Niaimi, F. and Chiang, N.Y.Z., 2017. Topical vitamin C and the skin: mechanisms of action and clinical applications. *The Journal of clinical and aesthetic dermatology*, 10(7), p.14.
- [11] Lv, Q.Z., Long, J.T., Gong, Z.F., Nong, K.Y., Liang, X.M., Qin, T., Huang, W. and Yang, L., 2021. Current state of knowledge on the antioxidant effects and mechanisms of action of polyphenolic compounds. *Natural Product Communications*, 16(7), p.1934578X211027745.
- [12] Panche, A.N., Diwan, A.D. and Chandra, S.R., 2016. Flavonoids: an overview. *Journal of nutritional science*, 5, p.e47.
- [13] He X, Luan F, Yang Y, Wang Z, Zhao Z, Fang J, Wang M, Zuo M and Li Y (2020) *Passiflora edulis*: An Insight into Current Researches on Phytochemistry and Pharmacology. *Front. Pharmacol.* 11:617. doi: 10.3389/fphar.2020.00617
- [14] Weyya, G., Belay, A. and Tadesse, E., 2024. Passion fruit (*Passiflora edulis* Sims) by-products as a source of bioactive compounds for non-communicable disease prevention: extraction methods and mechanisms of action: a systematic review. *Frontiers in Nutrition*, 11, p.1340511.
- [15] "Akhtar, N., Zaman, A., Ali, A., Mahmood, T., Khan, H.M.S., Khan, B.A., Rasul, A., Mustafa, R. and Madni, A., 2012. Effects of *Embllicaofficinalis* extract cream on human skin trans-epidermal water loss measured with noninvasive probe. *Journal of Pharmacy and Alternative Medicine*, 1(1), pp.32- 37."
- [16] "Dhandapani, S., Wang, R., cheol Hwang, K., Kim, H. and Kim, Y.J., 2023. Enhanced skin anti-inflammatory and moisturizing action of gold nanoparticles produced utilizing *Diospyros kaki* fruit extracts. *Arabian Journal of Chemistry*, 16(4), p.104551."

- [17] "Araujo, L.D.S., COSTA, E.M.R., Soares, T.L., SANTOS, I.S.D. and JESUS, O.N.D., 2017. Effect of time and storage conditions on the physical and physico-chemical characteristics of the pulp of yellow and purple passion fruit. Food Science and Technology, 37(3), pp.500-506."
- [18] "Abhijith, T.M., Azeez, A.A., Rajagopalan, D., Boopathi, C. and Shyam, A., 2021. Formulation and evaluation of Morus alba anti-aging cream. Pharma journal Net, 1(2), pp.85-7."
- [19] Dr.N.Tamilselvan , Chaithanya P, Keerthana V, Dereenadavis, Divya K S, Dona Haris., 2022. Formulation and Evaluation Of *passiflora edulis* Face Cream. International Journal of Creative Research Thoughts (IJCRT).
- [20] "Teixeira, A.P., Coutinho, B., Cancela, J., Cullen, L. and Brito, M., 2022. Valorisation of Kiwifruit Residues and their Application in an Anti-ageing Facial Cream. U. Porto Journal of Engineering, 8(5), pp.68-85."
- [21] "Abdellatif, A.A., Alawadh, S.H., Bouazzaoui, A., Alhowail, A.H. and Mohammed, H.A., 2021. Anthocyanins rich pomegranate cream as a topical formulation with anti-aging activity. Journal Of Dermatological Treatment, 32(8), pp.983-990."
- [22] Ajinath Eknath Dhakane, et al. "Formulation and Evaluation of Herbal Cold Cream by Sandal Wood Oil." International Journal of Creative Research Thoughts, IJCRT, 5 May 2023, www.ijcrt.org.
- [23] Rathod Vikas, and Dr.Santhosh Jain. "Formulation and Evaluation of Aloe Vera Cold Cream." International Journal of Novel Research and Development, IJNRD, 6 June 2023, www.ijnrd.org.
- [24] Sharma, A.N.S.H.U.L., Banyal, M.A.N.E.E.S.H., Gupta, J.Y.O.T.I. and Joshi, S.W.A.T.I., 2019. Formulation and evaluation of herbal cold cream. IJARIE, 9(3), pp.2578-2587