Journal of Neonatal Surgery
ISSN(Online): 2226-0439
Vol. 14, Issue 32s (2025)
https://www.jneonatalsurg.com

OPEN ACCESS

Formulation and Evaluation of Herbal Cream from Ivy Gourd and Other Natural Excipients

Saranya Bheeman[*1], Nithyapriya Karuppusamy[2], Sangameswaran Balakrishnan[3], Sutha Ponnusamy[4], Saranya Ravi[5], Yuvashree senthilkumar[6]

[1]Research Scholar, Dept of Pharmaceutics, SSM College of Pharmacy, Jambai, Tamilnadu

[3]Professor and Principal , SSM College of Pharmacy, Jambai, Tamilnadu

[2,4]Associate Professor, Dept of Pharmaceutics, , SSM College of Pharmacy, Jambai, Tamilnadu

[5,6] Research Scholar, Dept of Pharmaceutics, SSM College of Pharmacy, Jambai, Tamilnadu

[*]**Corresponding author:**

Saranya Bheeman

Research Scholar, Dept of Pharmaceutics, SSM College of Pharmacy, Jambai, Tamilnadu

Email ID: saranyabheeman96@gmail.com

Cite this paper as: Saranya Bheeman, Nithyapriya Karuppusamy, Sangameswaran Balakrishnan, Sutha Ponnusamy, Saranya Ravi, Yuvashree senthilkumar, (2025) Formulation and Evaluation of Herbal Cream from Ivy Gourd and Other Natural Excipients. *Journal of Neonatal Surgery*, 14 (32s), 2810-2816.

ABSTRACT

The acceptance and appeal of cosmetic formulations based on herbs have significantly increased in recent years. Products that are seen as natural, secure, and eco-friendly are becoming more and more popular. Herbal cosmetics are preferred not only because they have few adverse effects but also because they are biocompatible with the skin and can provide therapeutic benefits by using bioactive chemicals obtained from plants. Coccinia grandis, also referred to as Ivy gourd, is one of the many medicinal plants being investigated for cosmeceutical uses. A member of the Cucurbitaceae family, this climbing vine has long been utilized in herbal medicine systems to treat infections, inflammation, and skin conditions. Its antibacterial, antioxidant, and anti-inflammatory qualities are attributed to the abundance of phytochemicals found in its leaves, including flavonoids, alkaloids, tannins, and saponins. The development and assessment of a topical herbal cream with Ivy gourd extract as the main active ingredient is the main goal of this study. To improve the cream's moisturizing, restorative, and protecting qualities, additional natural excipients have been added to the recipe in addition to Ivy gourd, including aloe vera gel, beeswax, shea butter, and coconut oil. Careful plant material extraction, emulsion preparation, and natural base mixing are all steps in the formulation process. Numerous physicochemical and microbiological evaluation factors, including pH, spreadability, viscosity, stability, and antibacterial activity, are also described in this article. The encouraging outcomes of these evaluations demonstrate the potential of Ivy gourd as a key botanical ingredient in the creation of herbal skincare products that are sustainable, safe, and efficacious.

1. INTRODUCTION

The usage of herbal cosmetics has increased dramatically in recent years, which is indicative of consumers' increasing desire for natural and plant-based personal care products. Herbal cosmetics are said to be safer and kinder to the skin than synthetic ones, which could include harsh chemicals or artificial preservatives[(1)]. In particular, herbal creams are becoming more and more popular because to their many uses, which include hydrating, calming irritated skin, repairing damaged tissue, and providing protection from UV rays and other environmental hazards. These benefits are mostly attributable to the synergy of naturally existing bioactive substances in plant materials, which lower the likelihood of allergic reactions or long-term negative effects while coordinating with the body's biological processes[(2)].

Coccinia grandis is a climbing plant that grows quickly and is a member of the Cucurbitaceae family. It is sometimes referred to as Ivy gourd or crimson gourd. Because of its many health benefits, it has long been employed in Ayurvedic and folk medicine. Notably, Ivy gourd leaves are abundant in phytoconstituents with important medicinal qualities, including flavonoids, alkaloids, saponins, tannins, and glycosides[(1)]. Because of these substances' antibacterial, antioxidant, and anti-inflammatory properties, Ivy gourd is a useful component for skincare products. Its promise as a key botanical in topical products is supported by its capacity to resist oxidative stress, minimize skin irritation, and fight microbial infections.

With the use of complimentary natural excipients such aloe vera gel, beeswax, shea butter, and coconut oil, the current study aims to create a natural herbal cream that contains Ivy gourd leaf extract[3]. These components are highly valued for their ability to heal, soothe, and condition the skin. In order to develop a stable and effective cream base, the formulation procedure entails carefully extracting the bioactive chemicals from the plant material and then combining them with these excipients. The finished product is assessed for antibacterial activity and a number of physicochemical characteristics, including as pH, spreadability, viscosity, and stability. A thorough evaluation of the formulation's potential as a natural, potent skincare product is made possible by this methodical methodology[2].

2. MEDICINAL AND FUNCTIONAL ROLE OF INGREDIENTS

The well-known medicinal plant ivy gourd (Coccinia grandis) has long been utilized in herbal treatments for a number of illnesses. Bioactive substances such flavonoids, saponins, alkaloids, and tannins are abundant in its leaves[3]. These elements support a number of skin-benefiting characteristics. To protect the skin from bacterial and fungal diseases, for example, Ivy gourd extracts, especially those made with methanol or ethanol, have shown broad-spectrum antibacterial action. Furthermore, the flavonoid content has a strong antioxidant effect, assisting in the neutralization of free radicals that cause oxidative stress and premature skin aging. The plant is highly prized for its anti-inflammatory properties, which help to relieve minor wounds, swelling, and skin irritation[1].

Ivy gourd is combined with a number of natural excipients to improve the cream's medicinal and cosmetic benefits:

- Aloe Vera Gel is well renowned for its ability to soothe, hydrate, and cure wounds. It keeps the moisture balance and promotes skin regeneration[4].
- As a natural thickening agent, beeswax helps create a barrier that keeps moisture in and shields the skin from contaminants.
- Rich in vitamins A and E as well as important fatty acids, shea butter nourishes and softens dry skin by serving as an emollient[3].
- Coconut oil is good for keeping skin hydrated and healthy since it has antibacterial properties in addition to hydrating properties.

In line with the growing consumer trend for herbal and plant-based skin care products, these natural components work together to provide a well-balanced formulation that provides antibacterial protection, hydration, and skin barrier restoration.

3. MATERIALS AND METHODS

3.1 Materials

- Fresh Ivy gourd leaves
- Aloe vera leaves
- Beeswax
- Shea butter
- Coconut oil
- Rose water
- Ethanol (95%)
- Distilled water
- Nutrient agar, Mueller-Hinton agar for microbial studies

3.2 Extraction of Ivy Gourd

1. **Collection and Identification**: The meticulous collecting and identification of fresh Coccinia grandis leaves marked the beginning of the Ivy gourd extract preparation process. Mature, healthy leaves that were devoid of contamination, apparent illness, and pest damage were chosen from plants that were growing naturally[3,4]. A voucher specimen was deposited for future use after the plant was verified botanically by a trained botanist using accepted taxonomical references.
2. **Drying and Powdering**: In order to maintain the leaves' phytochemical integrity, the drying and powdering process was started. The fresh leaves were laid out in a well-ventilated, shady area to dry naturally after being properly cleaned with distilled water to get rid of dirt and surface impurities[5]. Sensitive bioactive substances that may otherwise deteriorate in direct sunshine were preserved by shade-drying for roughly seven days. After the leaves had completely dried, they were ground into a fine powder with a mechanical grinder and sieved to achieve a

consistent particle size. This powdered version improved the solvent extraction efficiency by increasing the surface area.

3. **Solvent Extraction**: Fifty grams of the dried leaf powder were macerated in five hundred milliliters of 95% ethanol for the solvent extraction. Over the course of 72 hours, the mixture was periodically stirred and maintained in an airtight glass container to optimize the phytochemicals' solubility[2]. Because it effectively extracts a wide variety of bioactive chemicals, such as alkaloids and flavonoids, ethanol was selected as the solvent. To get rid of any solid leftovers, the mixture was filtered using Whatman filter paper after the maceration period. In order to prevent heat-sensitive components from degrading, the filtrate was then concentrated using a rotary evaporator at a regulated temperature and lowered pressure[3]. Before being used in the creation of a cream, the resultant semi-solid Ivy gourd extract was refrigerated in a sterile container.

3.3 Preparation of Aloe Vera Gel

Fresh and mature aloe vera leaves were chosen from healthy plants to make the aloe vera gel that would be used to the herbal cream. Under flowing water, the leaves were carefully cleaned to get rid of any dirt, dust, or microbiological pollutants[6]. The leaf surface was meticulously cleaned in order to assist avoid contamination during the gel extraction procedure.

After being washed, the leaves were carefully peeled with a sterile knife to reveal the inner mucilaginous gel behind the outer green rind. To prevent the introduction of any contaminants, this clear gel was meticulously gathered using a sterile spoon or spatula. After that, the collected gel was moved to a sanitized blender[1,3].

The gel was blended for a few minutes at medium speed to guarantee a consistent consistency, producing a smooth, homogenous liquid. The fibrous content is broken down in this stage, making absorption into the cream formulation simpler. A clear, purified aloe vera extract was obtained by filtering the gel through sterile gauze or a fine muslin cloth after it had been blended to get rid of any last bits of solid material or fibers[4]. To preserve its freshness and bioactivity, the produced gel was refrigerated in an airtight, clean container until it was needed.

Table 1.Formulation of Herbal Cream

Ingredients	Quantity (%)
Ivy gourd extract	5
Aloe vera gel	10
Beeswax	15
Shea butter	10
Coconut oil	20
Rose water	40

Procedure:

1. The oil phase, which included coconut oil, shea butter, and beeswax, was heated to 70°C.
2. The same temperature was also applied to the aqueous phase, which included aloe vera gel and rose water[5].
3. The water phase was supplemented with ivy gourd extract.
4. With continuous stirring, the oil phase was introduced to the aqueous phase.
5. After cooling, the cream was poured into sterile containers.

4. EVALUATION OF THE HERBAL CREAM

4.1 Organoleptic Properties

The prepared herbal cream's organoleptic, or sensory, qualities—which are essential for customer acceptance—were assessed first. The cream's consistent greenish-white hue was caused by the natural plant colors found in aloe vera gel and Ivy gourd extract[6]. Due to the usage of natural excipients and essential oils, the smell was described as having a nice herbal scent. The cream's texture was smooth, silky, and uniform, showing no indications of phase separation or grittiness, guaranteeing user

satisfaction and ease of application.

4.2 pH Measurement

In order to preserve the skin's natural acid layer and avoid irritation, the formulation's pH is crucial. The cream sample was diluted in distilled water prior to testing, and the pH was determined using a calibrated digital pH meter[7]. With a pH of 6.4 ± 0.2, the herbal cream was found to be suitable for topical use without upsetting the skin's natural balance. This pH range is typically between 4.5 and 7.

4.3 Spreadability

A crucial physical characteristic that shows how easily the cream may be applied and dispersed across the skin is spreadability. One gram of the cream was sandwiched between two glass slides, and a fixed weight was applied for a predetermined amount of time to evaluate it. Next, the spread area's diameter was measured[8]. The following formula was used to determine the spreadability:

Spreadability = (Weight × Time) / Diameter

In order to ensure user comfort and efficient application, the herbal cream showed good spreadability, meaning that it distributes uniformly on the skin's surface without requiring excessive pressure.

4.4 Viscosity

Viscosity directly affects the cream's stability, application, and sensory feel by determining its thickness and flow properties. A Brookfield viscometer was used to measure the herbal cream's viscosity at room temperature[5,8]. The formulation's viscosity ranged from 3500 to 4500 centipoise (cP), which is ideal for topical creams because it is neither excessively stiff nor too runny, making it easy to apply and stable in the container.

4.5 Stability Studies

To evaluate the cream's physical integrity over time in a range of environmental settings, stability testing was carried out. Over the course of three months, the cream samples were kept at three distinct temperatures: 4°C (refrigerator), 25°C (room temperature), and 40°C (elevated temperature). Changes in color, odor, texture, and phase separation were monitored by periodic assessments[9]. The cream demonstrated good physical stability throughout the research by showing no discernible phase separation, discolouration, or physical changes under any of the storage settings.

4.6 Irritancy Test

Under the guidance of a dermatologist, a preliminary skin irritancy test was performed on a small group of healthy volunteers to guarantee the cream's safety for human use. Over the course of 24 to 48 hours, a tiny quantity of the cream was applied to the forearm, and any symptoms of redness, itching, burning, or swelling were noted[4]. The absence of negative skin reactions in the data suggests that the cream is safe for frequent topical application and does not cause irritation.

4.7 Microbial Assay

The agar well diffusion method was used to test the herbal cream made from Ivy gourds for antibacterial effectiveness. The assay was carried out against specific microbiological strains, such as the common fungal pathogen Candida albicans, the Gram-positive bacterium Staphylococcus aureus, and the Gram-negative bacteria Escherichia coli[10]. When compared to the cream base without the active extract, the test showed distinct zones of inhibition surrounding the wells containing the herbal cream, demonstrating its strong antimicrobial action. These findings lend credence to the use of Ivy gourd extract in the cream formulation as a functional antibacterial agent that may help treat or prevent skin infections[11].

5. ADVANTAGES OF HERBAL CREAMS OVER SYNTHETIC COUNTERPARTS

- The decreased risk of allergic responses is one of the main benefits of cosmetic formulations based on herbs. These products tend to be kinder to the skin because they are made from natural ingredients and typically do not include harsh chemicals. Because there is a far lower chance of irritation, redness, or negative responses than with synthetic cosmetics, they are especially appropriate for people with sensitive skin or allergies[3-5].
- Their environmental friendliness and biodegradability are significant additional advantages. Natural excipients and renewable plant resources that decompose readily in the environment and leave no toxic residues are commonly used to make herbal cosmetics[7]. This environmentally friendly quality reduces pollutants and the total ecological imprint of personal care products, which is in line with the growing emphasis on sustainable consumer goods worldwide.
- Moreover, a sophisticated blend of several phytochemicals that complement one another to improve therapeutic efficiency is frequently found in herbal creams[3]. The combined action of different bioactive substances, such as flavonoids, tannins, and saponins, can offer comprehensive skin advantages, such as antioxidant protection, antibacterial activity, and anti-inflammatory properties, in contrast to single synthetic active ingredients[5]. The

overall efficacy and health of the skin may be enhanced by this combination.

- Finally, parabens, sulfates, artificial perfumes, and other potentially hazardous ingredients are usually not included in the formulation of herbal cosmetics. Health-conscious consumers who are concerned about the long-term impacts of artificial preservatives and chemicals frequently included in traditional skincare products will find this clean-label strategy appealing[12]. The lack of these substances makes skincare more natural and comprehensive while lowering the chance of skin sensitivity.

6. FUTURE PROSPECTS

- **Advanced Formulations**: Advanced formulations like transdermal patches and nano-herbal creams are becoming more and more popular as herbal cosmetics continue to develop. By improving the bioavailability and skin penetration of herbal active components, these cutting-edge delivery methods seek to provide more effective and focused therapeutic outcomes[6,11]. For instance, plant extracts can be encapsulated into nanoparticles to create nanoformulations, which can enhance stability, regulate release rates, and boost skin absorption. In a similar vein, transdermal patches provide a practical, non-invasive way to gradually administer herbal components, which may enhance patient adherence and therapeutic results.
- **Clinical Trials**: Thorough clinical trials are necessary to confirm the safety and effectiveness of these herbal formulations on bigger and more varied populations, even in the face of encouraging initial results[13]. Standardized dosage, possible adverse effects, and the strong scientific proof required to back up therapeutic claims are all made possible by controlled clinical trials. These trials also help to bridge the gap between traditional herbal use and modern treatment by boosting consumer confidence and promoting acceptability among medical professionals[1].
- **Regulatory Approvals**: Obtaining regulatory authorization is another crucial step in launching herbal cosmetics. National and international regulatory agencies require herbal products to meet stringent standards for efficacy, safety, and quality. Complying with these standards requires correct labeling, good manufacturing procedures (GMP), and standardization of herbal extracts[9]. Obtaining certification promotes access to international markets while also guaranteeing customer safety.
- **Market Potential**: The market potential for herbal cosmetics has been greatly increased by consumers' increased awareness of and preference for natural and eco-friendly products. Manufacturers and entrepreneurs can profit greatly from the global demand for eco-friendly and sustainable beauty goods[14]. Herbal creams and other natural formulations are well-positioned to take a sizable chunk of the cosmetics market, spurring innovation and economic growth, as customers increasingly look for clean-label products free of artificial chemicals[2].

7. DISCUSSION

The promise of herbal-based skincare formulations, which provide safer and more environmentally friendly substitutes for synthetic ones, is becoming more widely acknowledged. Because of their natural origin and compatibility with the physiology of the skin, these formulations are often well-tolerated and less likely to induce unpleasant skin reactions (Muniappan et al., 2019; Rahmatullah et al., 2011)[3,11]. Consumer need for gentle, efficient, and eco-friendly personal care products is reflected in the growing preference for plant-based products.

This formulation's medicinal herb has long been prized for its healing qualities. It is abundant in bioactive substances that have been shown to have antibacterial, antioxidant, and anti-inflammatory properties, including flavonoids, tannins, alkaloids, and saponins (Farrukh et al., 2018)[4]. These qualities are especially helpful in minimizing oxidative stress, reducing inflammation, and shielding the skin from microbial infections—all of which are frequent issues in dermatological care. Additionally, in systemic models, the extract demonstrated biological activity, indicating the presence of strong phytoconstituents (Sakharkar et al., 2017)[7].

Aloe vera, beeswax, shea butter, and coconut oil are examples of natural excipients that are utilized in conjunction with the plant extract to further improve the cream's performance. These components assist skin hydration and barrier repair by offering extra moisturizing, restorative, and protective benefits (Nammas et al.,2024)[5]. The plant extract and excipients work in concert to create a well-balanced formulation that meets the needs of both therapeutic and cosmetic skin.

Positive physicochemical properties, such as the right pH, spreadability, viscosity, and physical stability over time, were validated by the herbal cream's evaluation. These characteristics are necessary to guarantee both product efficacy and consumer happiness. The cream's protective qualities are reinforced by its antibacterial action against common skin pathogens, which makes it a good option for treating mild skin infections (Trinh et al., 2020)[14].

The results provide credence to the creation of topical formulations derived from plants that are safe, stable, and efficacious for frequent application. In keeping with the current trend toward natural and holistic health treatments, the fusion of traditional herbal knowledge with modern formulation techniques offers a fascinating approach to skincare. The therapeutic potential of such herbal compounds could be further validated and improved by more study, including clinical trials and

sophisticated delivery systems.

8. CONCLUSION

Using Ivy gourd (Coccinia grandis) leaf extract along with natural excipients like aloe vera gel, beeswax, shea butter, and coconut oil, this study successfully created and completely assessed a herbal cream formulation. The Ivy gourd extract's bioactive ingredients were successfully preserved and integrated into a stable cream base that had the desired organoleptic qualities, such as a smooth texture, a lovely greenish-white color, and a pleasant herbal scent, thanks to the formulation process. In the very competitive skincare business, these sensory qualities are essential for both consumer acceptance and the overall appeal of the product.

The cream's physicochemical characterisation showed that it kept its ideal pH near that of human skin, improving compatibility and lowering the risk of irritation. The cream also showed outstanding viscosity and spreadability, which made application simple and the skin evenly covered. The formulation's resilience and appropriateness for commercial distribution and storage were confirmed by stability tests carried out over a three-month period at different temperatures, which revealed no appreciable changes in color, texture, or phase separation.

Crucially, the herbal cream had strong antibacterial action against common skin pathogens like Candida albicans, Escherichia coli, and Staphylococcus aureus, demonstrating its capacity to effectively fight microbial infections in addition to hydrating and protecting the skin. Because of its dual purpose, the cream bridges the gap between therapeutic skincare and cosmetics, making it a valuable cosmeceutical product. Its safety profile is further strengthened by the lack of irritation in early human trials, which suggests that it can be used without risk even on skin that is sensitive or irritated.

The results of this study are in line with the expanding global trend toward sustainable and natural personal care products. Due to increased knowledge of the effects on the environment and skin health, consumers are increasingly looking for formulations devoid of parabens, sulfates, synthetic chemicals, and artificial fragrances. By utilizing the combined effects of several phytochemicals that give antibacterial, anti-inflammatory, and antioxidant properties in a single formulation, the Ivy gourd-based cream provides an environmentally responsible substitute. The product's sustainability credentials are further improved by the use of natural excipients that are renewable and biodegradable.

In conclusion, our study opens the door for Ivy gourd to be used in a variety of topical applications by establishing it as a botanical constituent with promise for herbal skincare formulations. Future studies that concentrate on clinical trials, sophisticated formulation technologies like nanoemulsions, and regulatory standardization will be necessary to fully exploit the therapeutic and commercial potential of products made from Ivy gourds. In response to customer demand for safe, efficient, and ecologically friendly skincare products, this study adds significant insights to the developing field of natural cosmeceuticals by fusing traditional botanical knowledge with contemporary formulation science.

REFERENCES

[1] Pekamwar SS, Kalyankar TM, Kokate SS, School of Pharmacy, Swami Ramanand Teerth Marathwada University, Nanded-431606, Maharashtra, India. Pharmacological Activities of Coccinia grandis: review [Internet]. Vol. 05, Journal of Applied Pharmaceutical Science. 2013 May p. 114–9. Available from: https://japsonline.com/admin/php/uploads/908_pdf.pdf

[2] Nagare S PhD, Deokar GS, Nagare R, Phad N. REVIEW ON COCCINIA GRANDIS (L) VOIGT (IVY GOURD) [Internet]. Vols. 4–4, Sujata World Journal of Pharmaceutical Research. 2015 p. 728–43. Available from: https://www.wjpr.net

[3] Muniappan R, Reddy GVP, Raman A. Coccinia grandis (L.) Voigt (Cucurbitaceae). In: Cambridge University Press eBooks [Internet]. 2019. p. 175–82. Available from: https://doi.org/10.1017/cbo9780511576348.010

[4] Farrukh U, Shareef H, Mahmud S, Ali SA, Saudi Basic Industries Corporation (SABIC), Rizwani GH. Antibacterial activities of Coccinia grandis L. Pakistan Journal of Botany. 2018;1259–62.

[5] Nammas M. Systematic Review of Plant-Based Excipients in Topical Drug Delivery. Ibnosina Journal of Medicine and Biomedical Sciences [Internet]. 2024 Nov 12; Available from: https://doi.org/10.1055/s-0044-1791500

[6] R P, G VK. Coccinia indica: A Comprehensive Review of Pharmacology, Therapeutic Applications, Nutritional Potentials, and Future Prospects. The Journal of Phytopharmacology [Internet]. 2022 Jun 7;11(3):211–6. Available from: https://doi.org/10.31254/phyto.2022.11313

[7] Sakharkar P, Chauhan B. Antibacterial, antioxidant and cell proliferative properties of Coccinia grandis fruits.Avicenna J Phytomed, 2017; 7 (4): 295-307.

[8] Arunachalam R, Dhanasingh S, Kalimuthu B, Uthirappan M, Rose C, Mandal AB. Phytosynthesis of silver nanoparticles using Coccinia grandis leaf extract and its application in the photocatalytic degradation. Colloids

and Surfaces B Biointerfaces [Internet]. 2012 Feb 3;94:226–30. Available from: https://doi.org/10.1016/j.colsurfb.2012.01.040

[9] Meenatchi P, Purushothaman A, Maneemegalai S. Antioxidant, antiglycation and insulinotrophic properties of Coccinia grandis (L.) in vitro: Possible role in prevention of diabetic complications. Journal of Traditional and Complementary Medicine [Internet]. 2016 Mar 2;7(1):54–64. Available from: https://doi.org/10.1016/j.jtcme.2016.01.002

[10] Waisundara VY, Watawana MI, Jayawardena N. Costus speciosus and Cocciniagrandis : Traditional medicinal remedies for diabetes. South African Journal of Botany [Internet]. 2015 Feb 11;98:1–5. Available from: https://doi.org/10.1016/j.sajb.2015.01.012

[11] Rahmatullah M, Biplob K. An evaluation of antihyperglycemic and antinociceptive effects of crude methanol extract of Coccinia grandis (L.) J. voigt. (Cucurbitaceae) leaves in Swiss albino mice. Advances in Natural and Applied Sciences. 2011;5(1):1–5.

[12] Munasinghe M a. a. K, Abeysena C, Yaddehige IS, Vidanapathirana T, Piyumal KPB. Blood Sugar Lowering Effect ofCocciniagrandis(L.) J. Voigt: Path for a New Drug for Diabetes Mellitus. Experimental Diabetes Research [Internet]. 2011 Jan 1;2011:1–4. Available from: https://doi.org/10.1155/2011/978762

[13] Hossain SkA, Uddin SrN, Salim MdA, Haque R. Phytochemical and Pharmacological screening of Coccinia grandis Linn. Journal of Scientific and Innovative Research.2019;3:65–71.

[14] Trinh PTN, Nguyen TQ, Van Hau N, Hung QT, Van Du C, Tuan NT, et al. Chemical constituents of the stem of Coccinia grandis. IOP Conference Series Materials Science and Engineering [Internet]. 2020 Jan 1;736(2):022080. Available from: https://doi.org/10.1088/1757-899x/736/2/022080