

Formulation and Evaluation of a Moisturizing Day Cream Containing Olive Leaves Extract

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Submitted: 05-05-2023

Accepted: 15-05-2023

ABSTRACT:

The purpose of the current work is to investigate the incorporation of olive leaves extract standardized for oleuropein which have antioxidant, anti-inflammatory, skin protectant and antiaging properties into stable topical moisturizing day cream formulations. The physicochemical and rheological properties, and accelerated stability tests of three cream formulas containing different concentrations (0.1%, 0.4% and 1.0% w/w) of olive leaf extracts were assessed and compared with commercial cream product containing no olive leaf extract. A questionnaire was distributed to 100 volunteers to use the prepared creams containing olive leaf extracts and to compare with the commercial cream containing no olive leaves extract. All physical and rheological properties of the prepared formulations were found to be the same as the commercial cream product. Stability studies showed a stable homogenous appearance and effective cream during three months of storage at room temperature. Most of the volunteers are satisfied with the creams containing olive leaves extract, and have noticed significant differences between these creams and the cream containing no olive leaves extract.

KEYWORD: Olive leaves, Anatomy of human skin, Uses of moisturizing day cream, Moisturizing cream use as a the, Side effect of moisturizing cream, Precautions, Material and method, Evaluation.

I. INTRODUCTION:¹⁻⁵

Human skin changes throughout life. Physiological and external interactions. unique or Overlap of chronological aging and extrinsic or photochemical aging During his lifetime both are more or less responsible for it Dysfunction of the skin's natural self-protection and repair. Areas of the body most exposed to the harmful effects of ultraviolet light Radiation is the strongest, just like

the face and hands found in our social life. Endurance up and endurance up Criteria increased the number of people with both The need and desire to improve appearance. Growing Use of Plant Extracts in Cosmetics Due to the adverse effects of synthetic chemicals For example, toxicity, allergy. etc. Plant extracts are widely used Many purposes in cosmetic applications such as moisturizing, Bleaching, tanning, coloring agents, sunscreens, free radical scavengers, antioxidants, immune stimulants, detergents, reservatives. Polyphenols in olive leaves are of great interest to researchers Because they have many activities. B. Antioxidants, antibacterial agents, Anti-inflammatory . An olive leaf It is considered a cheap raw material and contains oleuropein. Range of 60-90 mg/g (dry weight). Oleuropein is a natural product of the equoiriodoid group. Heteroside Acid Ester of Elenoldeteric Acid and 3,4-Dihydroxyphenol Ethanol containing glucose molecules, hydrolyzed Give elenolic acid glucoside and hydroxytyrosol. Many molecules isolated from fruits or leaves of Olea europea Said to be derived from oleuropein Oleic acid ring-opening aglycone rearrangement to secoiriodoid compounds such as Hydroxytyrosol (Syed Harris 2010). great interest in Recently, this natural polyphenolic compound (such as oleuropein) For many years as an additive or natural ingredient in food and cosmetics Beyond food preparation and storage, A new area known as dietary supplements. This science Therapeutic effect of food and cosmetic ngredients. Oleuropein has high antioxidant activity in vitro and is comparable to water-soluble analogues of tocopherol. Oleuropein interception Suppresses superoxide anions and hydroxyl radicals, Respiratory burst of neutrophils and HCl-derived radicals . Recent studies show Its oleuropein increases the production of nitric oxide (NO). Macrophages attacked by lipopolysaccharide Inducible induction of the enzyme nitric oxide synthases that enhance functional activity

immunocompetent cells. known as oleuropein. Produces anti-inflammatory effects by inhibiting lipoxigenase Activity and production of leukotriene B4 . Recent studies have shown that phenolic -components Olive leaves have a direct antioxidant effect on the skin, Oleuropein acting specifically as a radical scavenger Skin level.

MOISTURIZING DAY CREAM:

Contains arich combination of moisturizers, emollients and antioxidants suitable for normal and combination skin. Light and fast absorb. Provides deep and intensive 24hour hydration for healthy skin.

ANATOMY OF HUMAN SKIN :⁶⁻⁸

Human skin is the outer covering of the body and the largest human organ Integumentary system. The skin consists of up to seven layers of ectodermal tissue and protects the underlying muscles. Bones, ligaments, internal organs. Human skin is similar to and very similar to that of most other mammals. Similar to pig skin. Human skin is almost entirely covered with hair follicles, but it can appear hairless. there is There are two common skin types, hairy and bald (hairless). The adjective of sarcasm literally means "that skin" (from Latin cutis, skin). In contact with the environment, the skin plays an important immune role in protecting it Body and excessive water loss from pathogens. Other functions are insulation, temperature Regulation, sensory, synthesis of vitamin D, and protection of vitamin B folate. Severe skin damage It tries to heal by forming scar tissue. This is often discoloration and depigmentation. In humans, skin pigmentation varies between populations and skin types range from dry to oily. skin like that Diversity provides a rich and diverse habitat for bacteria containing about 1000 species from 19 phyla. on human skin.

STRUCTURE:

The skin has pigmentation such as melanin provided by mesoderm cells, melanocytes. Absorbs some of the potentially dangerous ultraviolet (UV) rays in sunlight. Includes DNA repair An enzyme that helps reverse UV damage. People who lack the genes for these enzymes are

more likely to suffer. skin cancer. Malignant melanoma, a form primarily caused by ultraviolet light, is particularly aggressive and As a result, it can spread rapidly and often be fatal. Human skin pigmentation varies between populations how to stand out. This allowed people to be categorizedby their skin color. Skin is the second largest human organ in terms of area (innerorganelle). theintestine is 15-20 times larger). The average adult skin has a surface area of 1.5 to 2.0. Square meters (16.1 to 21.5 square feet). Skin thickness varies greatly on all parts of the body, Men and women, young and old. For example, the skin on my forearm is average. 1.3mm for males and 1.26mm for females. Average square inch (6.5 cm²) of skin holds 650 perspirations It has glands, 20 blood vessels, 60,000 melanocytes, and over 1,000 nerve endings. average human skin cells They are approximately 30 microns in diameter, but there are variations. Skin cells typically range from 25 to 40 microns (square), depending on a number of factors. The skin consists of three main layers: epidermis, dermis, subcutaneous .

EPIDERMIS:

The epidermis contains no blood vessels, and cells in the deepest layers are nourished almost exclusively by diffused oxygen from the surrounding air and to a far lesser degree by blood capillary esextending to the outer layers of the dermis. The main type of cells which make up the epidermis are Merkel cells, keratinocytes,with melanocytes and Langerhans -cells also present. The epidermis can be further subdivided into the following strata (beginning with the outermost layer): corneum, lucidum (only in palms of hands and bottoms of feet), granulosum, spinosum, bascle. Cells are formed through mitosis at the basale layer. The daughter cells (see cell division) move up the strata changing shape and composition as they die due to isolation from their bloodsource. The cytoplasm is released and the protein keratin is inserted. They eventually reach the corneum and slough off (desquamation). This process is called "keratinization". This keratinized layer of skin is responsible for keeping water in the body and keeping other harmful chemicals and pathogens out, making skin a natural barrier to infection.

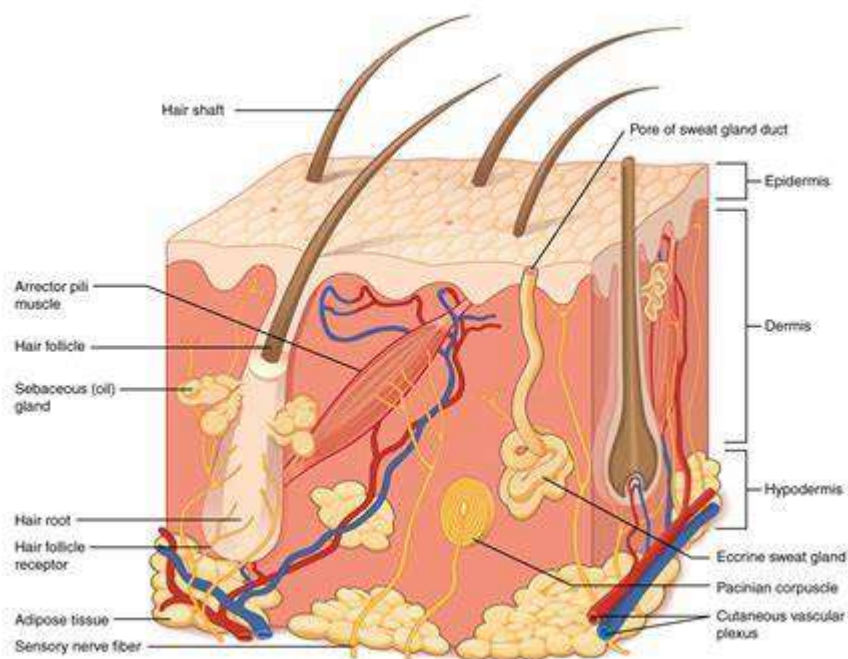


Fig no-1 skin

COMPONENTS:⁹⁻¹⁰

The epidermis contains no blood vessels, and is nourished by diffusion from the dermis. The main type of cells which make up the epidermis are keratinocytes, melanocytes, Langerhans cells and Merkel cells. The epidermis helps the skin to regulate body temperature.

LAYERS:¹¹⁻¹²

Epidermis is divided into several layers where cells are formed through mitosis at the innermost layers. They move up the strata changing shape and composition as they differentiate and become filled with keratin. This process is called keratinization and takes place within weeks. The outermost layer of the epidermis consists of 25 to 30 layers of dead cells. Sub layers: Epidermis is divided into the following 5 sub layers or strata:

- Stratum corneum
- Stratum lucidum
- Stratum granulosum
- Stratum spinosum
- Stratum germinativum (also called "stratum basale").

Blood capillaries are found beneath the epidermis, and are linked to an arteriole and a venule. Arterial shunt vessels may bypass the network in ears, the nose and fingertips. About 70%

of all human protein-coding genes are expressed in the skin. Almost 500 genes have an elevated pattern of expression in the skin. There are less than 100 genes that are specific for the skin and these are expressed in the epidermis.

DERMIS:¹³

The dermis is the layer of skin beneath the epidermis that consists of connective tissue and cushions the body from stress and strain. The dermis is tightly connected to the epidermis by a basement membrane. It also harbors many nerve endings that provide the sense of touch and heat. It contains the hair follicles, sweat glands, sebaceous glands, apocrine glands, lymphatic vessels and blood vessels. The blood vessels in the dermis provide nourishment and waste removal from its own cells as well as from the Stratum basale of the epidermis. The dermis is structurally divided into two areas: a superficial area adjacent to the epidermis, called the papillary region, and a deep thicker area known as the reticular region.

PAPILLARY REGION:

The papillary region consists of loose connective tissue. Named after the shape of the finger Protrusions called papillae that extend toward the epidermis. The papillae give the dermis a "bumpy" appearance. The surface that works with the epidermis and strengthens the bond between her

two layers of skin. On the palms, fingers, soles and toes, papilla impacts are formed that protrude into the epidermis contour of the skin surface. These epidermal ridges are displayed in patterns (see: fingerprint) is genetically determined

RETICULAR REGION:

The reticular region lies deep within the papillary region and is usually much thicker. meticulously constructed It is an irregular connective tissue, densely packed with collagen, so named for its elasticity and resilience. There are intertwined filaments in it. These protein fibers give strength properties to the dermis, Elasticity and elasticity. In addition, the reticular region contains hair roots, sebaceous glands, sweat glands, receptors, nails and blood vessels. Tattoo ink is held in the dermis. Stretch marks, often due to pregnancy or obesity, are also found in the dermis.

SUBCUTANEOUS TISSUE:¹⁴

The hypodermis (also called hypodermis and subcutaneous tissue) is not part of the skin, but lies beneath the dermis. Cutis. Its purpose is to attach the skin to the underlying bones and muscles and supply them with blood vessels, and nerves. It is composed of loose connective tissue, adipose tissue, and elastin. main cell The types are fibroblasts, macrophages and adipocytes (subcutaneous tissue contains 50% of body fat). fat serve As padding and insulation for the body.

FUNCTIONS:¹⁵⁻¹⁷

SKIN PERFORMS THE FOLLOWING FUNCTIONS:

1. **Protection:**an anatomical barrier from pathogens and damage between the internal and external environment in bodily defense; Langerhans cells in the skin are part of the adaptive immune system. Perspiration contains lysozyme that break the bondswithin the cell walls of bacteria.
2. **Sensation:** contains a variety of nerve endings that react to heat and cold, touch, pressure, vibration, and tissue injury; see somatosensory system and haptics.
3. **Heat regulation:**The skin contains a blood supply far greater than its requirements which allows precise control of energy loss by radiation, convection and conduction. Dilated blood vessels increase perfusion and heatloss, while constricted vessels greatly reduce cutaneous blood flow and conserve heat.
4. **Control of evaporation:** The skin provides a relatively dry and semi-impermeable barrier to fluid loss. Loss of this function contributes to the massive fluid loss in burns.
5. **Aesthetics and communication:**
6. Others see our skin and can assess our mood, physical state and attractiveness. Storage and synthesis: acts as a storage center for lipids and water, as well as a means of synthesis of vitamin D by action of UV on certain parts of the skin.
7. **Excretion:** sweat contains urea; however its concentration is 1/130th that of urine, hence excretion by sweating is at most a secondary function to temperature regulation.
8. **Absorption:** The cells comprising the outermost 0.25–0.40 mm of the skin are "almost exclusively supplied by external oxygen", although the "contribution to total respiration is negligible". In addition, medicine can be administered through the skin, by ointments or by means of adhesive patch, such as the nicotine patch or iontophoresis. The skin is an important site of transport in many other organisms. 9. Water resistance: The skin acts as a water-resistant barrier so essential nutrients are not washed out of the body.

USES OF MOISTURIZING DAY CREAM:

- I. This medication is used as a moisturizer to treat or prevent dry, rough, scaly, itchy skin and minor skin irritations (such as diaper rash, skin burns from radiation therapy).
- II. Emollients are substances that soften and moisturize the skin and decrease itching and flaking.
- III. Some products (such as zinc oxide, white petrolatum) are used mostly to protect the skin against irritation (such as from wetness).
- IV. Dry skin is caused by a loss of water in the upper layer of the skin. Emollients/moisturizers work by forming an oily layer on the top of the skin that traps water in the skin.
- V. Petrolatum, lanolin, mineral oil and dimethicone are common emollients. Humectants, including glycerin, lecithin, and propylene glycol, draw water into the outer layer of skin.
- VI. Many products also have ingredients that soften the horny substance (keratin) that holds the top layer of skin cells together

(including urea, alpha hydroxy acids such as lactic/citric/glycolic acid, and allantoin).

- VII. This helps the dead skin cells fall off, helps the skin keep in more water, and leaves the skin feeling smoother and softer.

MOSTURIZING CREAM USE AS A THERAPY:

- Use this product as directed. Some products require priming before use. Follow all directions on the product package. If you have any questions, ask your doctor or pharmacist.
- Some products need to be shaken before use.
- Check the label to see if you should shake the bottle well before using.
- Apply to the affected areas of the skin as needed or as directed on the label or by your doctor.
- How often you apply the medication will depend on the product and your skin condition.

SIDE EFFECT OF MOISTURIZING CREEM:

- Most emollients can be used safely and effectively with no side effects. However, burning, stinging, redness, or irritation may occur. If any of these effects last or get worse, tell your doctor or pharmacist promptly.
- If your doctor has prescribed this medication, remember that your doctor has judged that the benefit to you is greater than the risk of side effects. Many people using this medication do not have serious side effects.

PRECAUTIONS:

- Before using this product, tell your doctor or pharmacist if you are allergic to any of the

ingredients in the product; or if you have any other allergies.

- This product may contain inactive ingredients, which can cause allergic reactions or other problems.
- Talk to your pharmacist for more details.
- If you have any of the following health problems, consult your doctor or pharmacist before using this product: skin cuts/infections/sores.
- Some ingredients (such as preservatives, fragrance) may make you more sensitive to the sun. Check the label for any warnings or ask your doctor or pharmacist if you need to take any special precautions when in the sun.

MATERIAL AND METHOD:¹⁸

CHEMICALS

Glyceryl monostearate was purchased from faci Italy. Stearyl alcohol, propylene glycol, mineral oil, isopropyl myristate, Cethiol CC, Propylparaben, Methylparaben, Imidazolidinyl Urea and fragrance were obtained from BASF, Germany. Oleuropein (40%) used as a standard is Chengdu Biopurity Phytochemicals Ltd China. Chromatographic Grade - Double distilled water, HPLC grade Acetonitrile (Merck), analytical grade acetic acid. And ethanol Purchased from Sigma-Aldrich.

OLIVE LEAF SPECIMEN COLLECTION:

Olive leaf samples were taken from trees located in this area Sunny areas of Beit Sahul, West Bank, Palestine. Of Collected directly from the central tree November 2012.

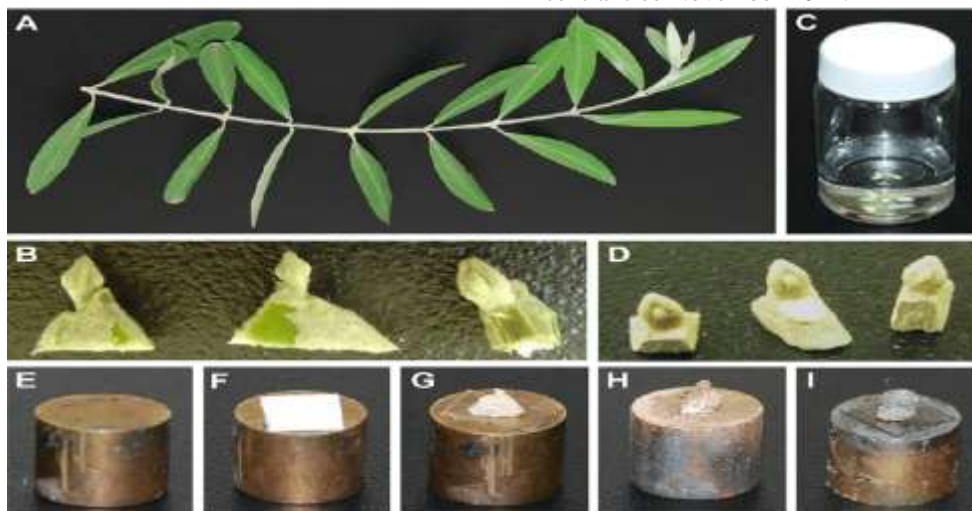


Fig no-2 Olive Leaf Specimen Collection

OLIVE LEAF EXTRACTION:

Fresh olive leaves are dried at room temperature, grinding to get the olive powder that was stored in Zimmer Temperature in the dark until extraction. 10 grams of olive leaves the powder was soaked in 100 ml of 80% ethanol at ambient temperature temperature. Then extract the Whatman No.1 filter for separating coarse materials (Whatman, UK) Particles out of solution.

The filtered extract is then Evaporate at room temperature on a rotary evaporator. Vacuum. Production of cream using olive leaf extract A base cream was prepared containing an aqueous phase and an oil phase. Of Composition and amount of formulation ingredients . For the preparation of all creams The ingredients are assembled according to the formula of Add various olive leaf extracts to Concentration (0.1%, 0.4%, 1.0% w/w).



Fig no-3 Olive leaf extraction

AMOUNTS OF INGREDIENTS USED TO MAKE 100G MOISTURIZING DAY CREAM CONTAINING OLIVE LEAF EXTRACT:

Phase	Ingredients	Amount in Grams
Oil phase	Glyceryl monostearate	4.5
	Stearyl alcohol	1.50
	Steareth-	120.80
	Mineral oil	5.00
	Isopropyl myristate	4.00
	Cetiol CC	1.00
	Silicone oil	1.00
	Propyl paraben	0.10

Aqueous phase	Distilled water	Add to 100
	Carbomer	0.10
	Propylene glycol	3.00
	Methylparaben	0.20
	Imidazolidinyl urea	0.20

Table no-1 Formulation of moisturizing cream

METHODS OF PREPARATION:

Moisturizers can be categorized into oil in water (o/w) moisturizers and water in oil (w/o) moisturizers based on the nature of the dispersed phase. Compared to ointments, water in oil (w/o) is less greasy and has better spreadability, while oil in water (o/w) readily rubs into the skin and is easily removed by water.

PREPARATION OF OIL IN WATER (O/W) MOISTURIZER :

The emulsifier and oil-soluble components are combined in a beaker and melted at 75 °C in a water bath. Water, water-soluble materials and preservatives are melted at 75 °C in another beaker. The oil phase is placed in a mortar and pestle after heating, and the water phase is gradually added and triturated until a clicking sound is heard. Finally, perfuming agents and/or preservatives are added as the temperature cools down. The amount of water in this preparation will be greater than the amount of oil.

PREPARATION OF WATER IN OIL (W/O) MOISTURIZER:

The emulsifier and oil soluble components are melted together at 75 °C in one beaker. Water and water-soluble materials are taken to another beaker and melted at 75 °C. The water phase is placed in a mortar and pestle after melting, and the oil phase is gradually added and triturated until a clicking sound can be heard. The perfuming agent is added after the cream has cooled to the desired temperature. This preparation would have a lower amount of water phase and a higher amount of oil phase. Depending on the dispensing medium, moisturizers come in a variety of formulations. A cosmetic emulsion is the most common delivery method. The emulsification method incorporates several steps that contain the active ingredients.

EVALUATION OF PHYSICAL PROPERTIES OF CREAM FORMULATIONS:¹⁹⁻²⁰

The prepared cream contains olive leaf extract, investigating the physical properties of commercially available cream products (ph, color, consistency and homogeneity) as well as rheological properties.

DETERMINATION OF pH VALUE:

Determination of ph of the cream was measured with a ph meter (ph meter 211R Hanna).

UNIFORMITY:

The uniformity of the cream is

It was classified as follows.

+++ = excellent, ++ = very good, + = good, - = bad.

CONSISTENCY:

The consistency of the cream was rated as are as follows:

Cone attached to support bar ejected set the fixed distance to 10 cm, Note the center point of the graduated cylinder through which the cone passes Down after 10 seconds.

RHEOLOGICAL PROPERTIES:

Preparing the cream It is evaluated for the following rheological properties:

VISCOSITY:

A Brookfield viscometer was used to measure viscosity of the cream (mpa.s). The spindle is 5rpm. Allow cream sample to stand for 30 minutes at test temperature (25±1°C) before measurement. At each speed, the right dial. Note the viscometer reading. Spindle speed is lowered continuously and the corresponding scale reading is wrote down. Measurements were performed in triplicate at ambient temperature. Direct multiplication of scale values The coefficients listed in the Brookfield viscometer catalog give viscosity in centipoise. Average of 3 time calculated.

II. CONCLUSION:

Olive leaf extract can be used as a moisturizing agent, antioxidant and anti aging for cosmetics products, such as anti aging cream or moisturizing day cream o/w emulsified nonionic system, which is able to permeate the skin in small concentrations. Such cream preparations provide a satisfactory effect applied to the skin. Most of the volunteers have noticed significant difference between the creams containing olive leaves extract compared to the one without olive leaf extract. It was found a relationship between the application of cream and improvement of the skin.

REFERENCES:

- [1]. Vera, I., Bruna, G. C., Kamila, M., Raquel, M., Jose, R. S. O., Herida, S., Perla, R., Marcos, A. C., Ana, S., Helena, M. R. 2012. Development of a tropical formulation containing *S. Lutea* Extract: stability, in vitro studies and cutaneous permeation, *J App Pharm Sci*, 2: 174-179
- [2]. Sawalha, S., Arraez-Roman, D., Sergura-Carretero, A., Fernandez-Gtierrez, A. 2009. Characterization of Phenolic Compounds in diatomaceous earth used in the filtration process of olive oil by HPLC-ES-TOF(MS). *Journal of Agro Food industry hi-tech*. 20: 46-50.
- [3]. Somova, L.I., Shode, F.O., Ramnanan, P., Nadar, A. 2003. Antihypertensive, antiatherosclerotic and antioxidant activity of tripenoids isolated from *Olea europaea*, subspecies *Africana* leaves. *J .Ethnopharmacol*, 84: 299- 305.
- [4]. Pooley, R.J., and Peterson, L.R. 1997. Mechanisms of microbial susceptibility and resistance to antimicrobial agents. In *The Biologic and Clinical Basis of Infectious Diseases*, (5th Edition. Editors ST, Shulman JP, Phair LR, Peterson JR.) pp. 550. Philadelphia: W.B. Saunders Company.
- [5]. Syed Haris, O. 2010. Oleuropein in Olive and its Pharmacological effects. *Scientia Pharmaceutica*. 78: 133- 154
- [6]. Kanlayavattanakul M., Lourith N., 2011 "Therapeutic agents & herbs in topical applications for acne treatment", *International Journal of cosmetic Science*, 33: 289- 297.
- [7]. Turakhiya Jignesh M, Savani Hitesh D, Patel Jainish M, Akbari Bhavesh V, Prajapati Neha G, Shah Vyoma S. 2013, "A review superporous hydrogel (SPH) – an approach for controlled drug delivery. *Univ J Pharm*: 2(1):47–58
- [8]. Yilmaz H, Yavuz O (1999) Content of some trace metals in honey from south-eastern Anatolia. *Food Chem*, 65 :475–476
- [9]. Wadi M; Al-Amin H; Farouq A; Kashef H; Khaled S A (1987) Sudanese bee honey in the treatment of suppurating wounds. *Arab Medico*, 3: 16-8.
- [10]. Baby, A. R., Zague, V., Maciel, C.P.M., Kaneko, T. M., Consiglieri, V. O., Velasco and M. V. R, (2004). Development of Cosmetic Mask Formulations. *Rev Bras Cienc. Farm Ahmed, S.A. and M. Grainage*, 1985. Use of indigenous plant resources in rural development, potential of neem tree. *Int. J. Dev. Technol.*, 3: 123-130.
- [11]. .Joshi, P.C. and O. Prakash, 1992. Allelopathic effects of litter extract of some tree species on germination and seedling growth of agricultural crops. *Proceedings of the 1st National Symposium on Allelopathy in Agroecosystem, (NSAA'92), Indian Society of Allelopathy, Hisar, India*, pp: 127-128.
- [12]. Quddus, M.A., 2001. The cropland agroforestry experiences of the village and farm forestry project in Northwest Bangladesh. *Proceedings of the National Workshop, September 16-17, 2001, Gazipur, Bangladesh*, pp: 229-239.
- [13]. Rho, B.J. and B.S. Kil, 1986. Influence of phytotoxin from *Pinus rigida* on the selected Plants. *J. Nat. Sci. Wankwang Univ.*, 5: 19- 27
- [14]. Zackrisson, O. and M.C. Nilsson, 1992. Allelopathic effects by *Empetrum hermaphroditum* on seed germination of two boreal tree species. *Can. J. For. Res.*, 22:44-56.
- [15]. Fallah, A., V.M. Ghalavand and R. Khajepour, 2006. Effects of blending method of livestock compost with soil and mixing it with chemical compost on yield and parts of yield of seed corn in Khorramabad. *Lorestan Agric. Nat. Resour. Sci. Magaz.*, 40: 233-242.
- [16]. Maheswarappa, H.P., H.V. Nanjappa and M.R. Hegde, 1999. Influence of organic

- manures on yield of arrowroot, soil physicochemical and biological properties when grown as intercrop in coconut garden. *Ann. Agric. Res.*, 20: 318-323.
- [17]. Vadiraj, B.A., Siddagangaiah and S.N. Potty, 1998. Response of coriander (*Coriandrum sativum* L.) cultivars to graded levels of vermicompost. *J. Spices Aromatic Crops*, 7: 141-143.
- [18]. Roshan Telrandhe , Pavan Deshmukh , Mahendra Gunde. Formulation and Evaluation of herbal toothpaste compared with marketed preparation. *International Journal of Pharmaceutics and drug Analysis* 2017 ; vol.5 Issue10
- [19]. Ancora, C., Roma, C., Vettor, M. 2004. Evaluation of cosmetic efficacy of oleuropein, Symposium on the New Frontiers of Dermo-cosmetology: Efficacy, Stability and Safety. Rome, Italy, November 4–6.
- [20]. Ansari, M., Kazemipour, M., Fathi, S. 2011. Development of a Simple Green Extraction Procedure and HPLC Method for determination of Oleuropein in Olive Leaf Extract Applied to a Multi-Source Comparative Study. *Journal of the Iranian Chemical Society*. 8: 38-47.