‘’FORMULATION, EVALUATION AND PHARMACOLOGICAL PROPERTIES OF GARADU (SWEET POTATO)”

[1]Mr. Amol G. Jadhao, [2]Pandhari V. Ingle, [3]Ashwini S. Borkar, [4]Akanksha D. Thigale,

[5]Miss. Jayshri B. Sanap

[1]Assi. Prof. of Pharmaceutics Department, Gawande College of Pharmacy, Sakharkherda, Buldana, Maharashtra, India-443202.

[2,3,4]Students B. Pharm Final Year, Gawande College of Pharmacy, Sakharkherda, Buldana, Maharashtra, India-443202.

[5]Principal & Asso. Prof. of Pharmacology Department Gawande College of Pharmacy, Sakharkherda, Buldana, Maharashtra, India-443202.

Gawande College of Pharmacy, Sakharkherda, Buldana, Maharashtra, India-443202.

ABSTRACT:

Sweet potato (Ipomoea batatas) is a global food crop, now being recognized as a functional food due to several of its nutraceutical components. Several experimental studies have reported that sweet potato can generally be beneficial in the prevention or treatment of chronic diseases through its antioxidant, anti-inflammatory, immunomodulatory, anticancer/antitumor, antimicrobial and antiulcer activities. Studies on the haematinic effect of potato leaves and their ability to enhance some haemotological parameters are reviewed in this paper. Furthermore, the review provides an overview of the significance and influence of cultivar on the composition and pharmacological activities of sweet potato. Sweet potato contains a lot of beneficial phytochemicals, some of which are peculiar to certain varieties. There is, therefore, a need for the continuous evaluation and selection of cultivars with the appropriate phytochemical composition and bioactivities to be able to fully explore the medicinal value of sweet potato. Studies aimed at the isolation, characterization and toxicological evaluation of its bioactive compounds may help to strengthen and confirm the possible role of sweet potato as a health promoting food and an alternative remedy for chronic diseases. This review highlights the pharmacological reports on different forms of sweet potato and their potential medicinal values.

IndexTerms:

Sweet Potato, Cassava, Nutritional Attributes, Antivenom Activity, Antiviral Activity, Hepatoprotective Activity.

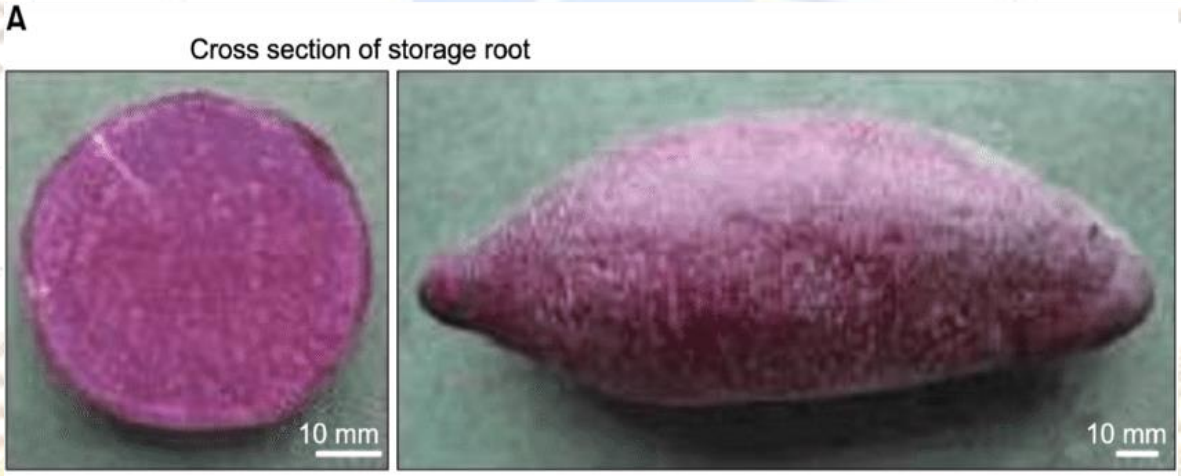
I. INTRODUCTION:

Benefits such as a rich source of dietary fibre, antioxidants, vitamins, and minerals, sweet potato root tubers also contain no saturated fats or cholesterol. Islam, 2014 reported that sweet potato leaves contain more polyphenols than any other commercial vegetables such as spinach, cabbage, and lettuce. He stated that, the leaves of sweet potato contain at least 15 anthocyanins and 6 polyphenolic compounds. [1] The Monpa ethnic groups of Arunachal Pradesh, India, use the tubers of sweet potato as a staple food and the leaves as fish feed.7 Sweet potato, which originated in Central America, is now widely cultivated and consumed throughout the world. European explorers introduced the crop to Africa and India by the early 1500s, China by and Taiwan and Miyako Island in Japan by 1 Sweet potato ranks seventh among almost all food crops

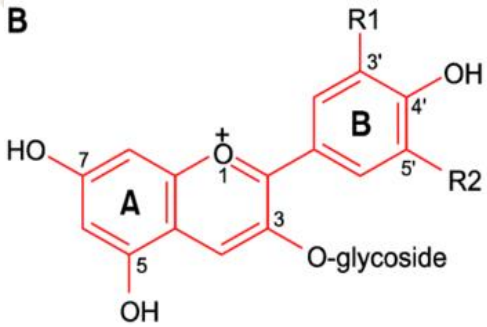
worldwide, with an annual production of 115 million metric tons.13 Approximately 92% of world's sweet potato supply is produced in Asia and the Pacific Islands: 89% of which is grown in China. With the above background in mind, this review aims at providing an insight into the nutritional value, health benefits, phytochemical composition, biological activities and medicinal properties of sweet potato, and demonstrates the potential of sweet potato as a medicinal food. [2] Marketing of minimally processed fruits and vegetables has increased rapidly due to an increased demand for fresh and convenient foods with health benefits. Minimal processing basically consists of washing, peeling and cutting of fruits and vegetables with subsequent application of a treatment to prolong shelf-life. However, as a result of these operations, intracellular products such as enzymes might be released, which may have a negative impact on the quality and shelf-life of fruits and vegetables. One of the strategies to minimise the undesirable effects of minimal processing is the application of edible coatings, providing an additional protection for freshcut vegetables, being complementary to modified atmosphere packaging (MAP). This combined strategy can reduce water losses and gas exchanges rates and act as a carrier for additives that could control undesirable reactions, microbial growth, etc.[7] An advanced alternative to traditional dosage forms is gastro retentive mucoadhesive drug delivery systems, where a combination of mucoadhesion with the ability to expand by unfolding and swelling for a desired period Gastro retentive mucoadhesive film is a drug-loaded polymeric film mainly comprised of API, film-forming polymer, mucoadhesive polymer and plasticizer with a suitable solvent Present work aims to formulate and evaluate the Gastro retentive mucoadhesive film of Ritonavir with desired characteristics. [11] Prior to 1986, sweet potato was regarded as a low value, low status and highly perishable commodity in southern Africa.5 It received little research attention until the Southern African Root Crops Research Networks (SARRNET) intervened by distributing germplasm and encouraging demand-led research. This initiative prompted the release of several new varieties within southern Africa. Orange-fleshed and yellow-fleshed cultivars have been recognised as good sources of β-carotene, a precursor of vitamin A6,7 and are promoted across the developing world. According to Laurie8, vitamin A deficiency in South Africa is still a serious health problem. Studies by Labadarios9 reported that 64% of children between the ages of 1 and 9 years, and 27% of women of reproductive age, were vitamin A deficient in South Africa. The highest prevalence was concentrated in Limpopo (43.5%) and KwaZulu-Natal (38.9%). Poor education of mothers was highlighted as the main cause of vitamin A deficiency in rural communities.6 This deficiency suggests that nutrition education, not just literacy, needs to be part of participatory studies on food security in the rural areas affected by poverty and malnutrition. [16] In most African countries, livestock production, mostly from ruminants, accounts for 35–40% of the agricultural gross domestic product. However, availability and quality of conventional feeds/concentrates for livestock fluctuate markedly, and the feeds are expensive. [17] Sweet potato is one of the most important food security crops in the world with an approximate production of 106 million tons from 8 million ha (FAO, 2016). It is the 3rd most important root crops in the world, after potatoes and cassava (Naidoo et al., 2016). Asia is the largest sweet potato-producing continent in the world with the production of 79 million tons (about 75% is from China alone), followed by Africa (FAO, 2016). In East Africa, it is the second most important root crop after cassava (Low et al., 2009). It can be grown in several environmental conditions (Andrade et al., 2016; Niringiye et al., 2014).[18] Ayurveda is a medical approach that is known as the world's ancient healing system developed in India. The practice of this healing process is more than 3000-year-old and has its penned in the Vedas as well as. Ayurveda is made up of two words, ayu meaning life and Veda meaning knowledge. Its main motive is to improvise good health rather than fighting off the ailment. However, certain treatments may be focused on a particular health issue. [20] Sweet potato (Ipomea batatas) is a low-input tropical crop that has great nutritive and agronomic characteristics. Currently, Nigeria is the largest producer in Africa and the second largest producer of sweet potato tubers in the world, after China (FAO, 2008). Sweet potato is rich in complex carbohydrates, dietary fibre, iron, calcium and vitamin. [21] More than 70% of crop productivity reduced in agriculture worldwide is due to adverse environmental factors including drought, soil salinity, soil alkalis and other factors. Drought is one of the most important factors in agriculture in many regions, which play a key role on crop growth and productivity in many regions of the world and threatened food security and rural livelihoods. Agriculture is a major economic sector in the developing country like India where,

employing about 85% of the labour force and contributing 48% of the domestic national product. [22] Newspapers play a vital role in health communication by disseminating knowledge on various aspects of information relevant to the community (Fineberg and Rowe, 1998). Despite the advent of round-the-clock television news channels and internet news; print media have not lost its significance. In India, the circulation of newspapers has increased by about 33% within 2001 to 2005 and India is the biggest newspaper market in the world with 107 million daily sales. Newspapers are an important source of health and nutrition science for many readers. Mass media should be considered as a tool that may influence behaviour of the community. Therefore, the reporting of news about medicine, public health and nutrition science is an area of concern to many health and social scientists. [23] The immune system is a system that plays a role in maintaining the integrity of the body against the dangers that various foreign objects can cause. Immunity refers to the body's ability to eliminate foreign substances (bacteria, viruses, parasites) or abnormal cells that are potentially harmful Some health problems detect due to disorders in the immune system. [27] Sub-Saharan African (SSA) farmers confront substantial hurdles to satisfy their year-round food needs and earn a living from agriculture Potato farmers, mainly smallholders in this region, realize that the crop's high yielding income in a short growing season helps them overcome these problems. Potatoes are a versatile staple crop with a high value per unit area of land unusable for food security and horticulture purposes.[29] Accumulation of fat will lead to cardiovascular and other degenerative diseases (Kumar et al. 2015; Noori 2012). Hyperlipidaemic blood triggers modification of low-density lipoprotein (LDL) into its oxidized form (ox-LDL), which can increase reactive oxygen species (ROS) and cause oxidative stress (Halder & Bhattacharyya 2014). The oxidative stress could cause the accumulation of lipid peroxidation products, such as malondialdehyde (MDA), and reduces endogenous antioxidants, such as superoxide dismutase (SOD) (Barkas et al. [30] However, understanding the major sweet potato production constraints and identifying suitable varieties and storage materials for vine production were not studied in Ethiopia and elsewhere. In this study, survey and storage experiment was conducted to identify the major sweet potato production constraints and suitable varieties under different storage types as a source of planting material. [18] Wheat is one of the three major cereals across the globe because of its acreage, high productivity, wide adaptation and prominent position in the international food grain trade. In Bangladesh, wheat is the second most important staple crop occupying 4% of the total cropped area and producing 7% of the total consumable cereals. The land area of Bangladesh is 130,172 square kilometres with current population (2017) of ~164 million (Source: http://www.worldometers.info/worldpopulation/bangladesh-population/-accessed on 22 February 2017). Wheat along with other cereal plays a vital role in providing food security to this people. [34]

Fig 1: Freshly harvested sweet potato tuberous roots.



B



Name	R1	R2
Delphinidin	OH	OH
Petunidin	OCH_3	H
Cyanidin	OH	H
Pelargonidin	H	H
Peonidin	OCH_3	H
Malvidin	OCH_3	OCH_3

Fig 2: Sweet potato diagram and starcher.

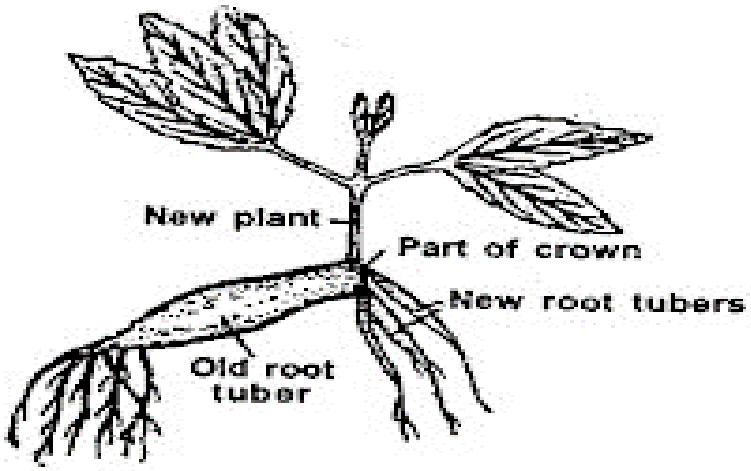
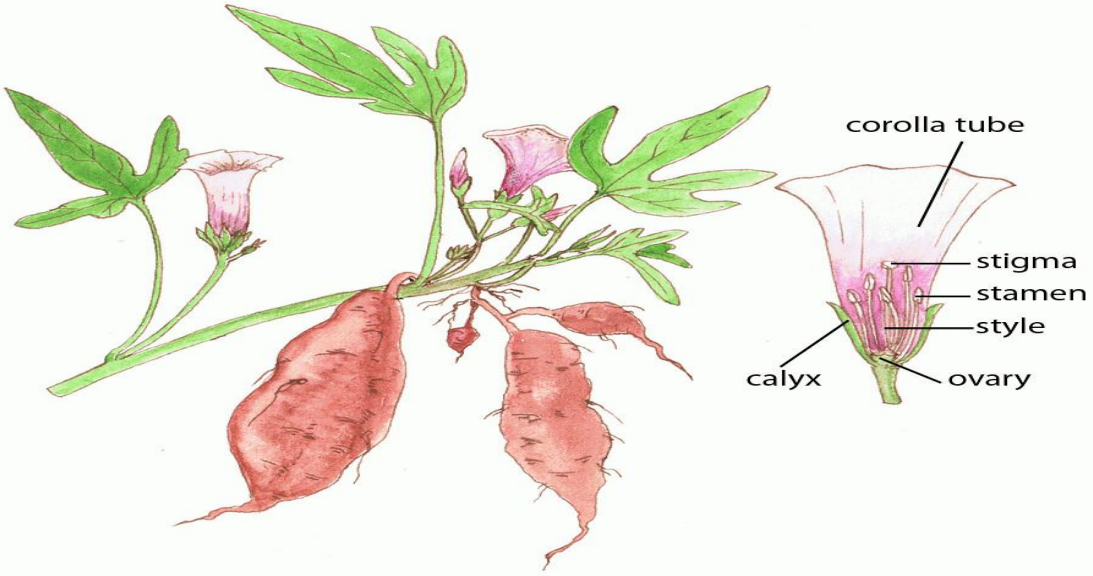


Fig 18.1. Vegetative propagation in Dahlia through roots

Fig 3: Vegetative propagation in dahlia through roots



Flowering shoot with tubers, and median section of flower of *Ipomea batatas*, sweet potato

Fig 4: Flowering shoot with tubers and median section of flower of ipomea batatas sweet potato.

II. METHOD OF PREPARATION:

Materials and Methods:

Specific information from the journal database was collected to do this comprehensive review. The range of source articles was from 2010 to 2022, with some important additional information before 2010 also collected. Stingless bee, Heterotrigona itama, propolis, phytochemical, compound, anti-inflammatory, and bioactivity were used as finding keyword.The tools used in this study were thermometers, analytical scales (analytical balance) with accuracy of 0.1 mg, porcelain plates (crucial), ovens with temperature that can be controlled, desiccators (water content analysis); muffle furnaces with controlled temperatures, Crucible silica with lid, spatula (ash content analysis); test tube, erlenmeyer glass, tube, and soxhlet reagent, 200 ml fat flask, measuring pipette, titration instrument, heater, filter paper, beker glass (fat content analysis); macro kjeldahl heater, 500 ml kjeldahl flask, distillation apparatus with straightconveyor kjeldahl tube adapters, distillation, burettes (protein content analysis); 400 ml beaker cups, watch glasses, measuring cups, measuring flasks, blenders, cooking pans, pans, gas stoves, sample plastic bags, label paper, and scales. The material that will be used in this research is sweet potatoes. The chemicals used for protein content analysis are sulfuric acid 98%, the catalyst for mercury tablets, BDH or Na2 SO4 and 0.1 gram of mercury (kjeldahl tablets), 60% NaOH solution, indicator methyl red and methyl blue ratio 2: 1, HCl solution 0.1 N, boric acid 0.3% whereas chemicals for analysis of fat content are 8 N HCl solution (65%), Diethyl ether (grade AR) or Petroleum ether (grade AR), aqua dest, and cooking oil 3 liters. Sweet potato (not damaged) cleaned and peeled skin in a container filled with water so that no browning reaction (browning) and washed again clean. Next, sweet potatoes are cut using a knife, with a size of 4 cm x 4 cm (cuboid or box). Baked sweet potatoes as much as 500 g in the oven with a temperature of 100 ° C, for each roasting takes 15 minutes. Sweet potatoes that have been cooked are removed (drained) until cool. After the roasting process is complete, sweet potatoes are ready for chemical testing including water content, protein content, ash content, fat content, carbohydrate content, and total energy. [3,4]

Methods:

1] Sample Preparation:

For each sweet potato sample, tubers were randomly taken, washed with tap water, diced into approximately 0.5 cm cubes, freeze-dried (general purpose freeze dryer, FD-1C-55, Bokang experimental instrument Co., Ltd, Beijing) and ground by pestle and mortar into powder. Prepared powder was stored at −80˚C until use.

2] Nutrient Composition Content Measure:

Starch in sweet potato was measured by the national standard GB/T5009.9-2008 method with acid hydrolysis; Protein was conducted based on the national food safety standard GB5009.5-2010 methods, protein content in sweet potato sample was calculated with conversion ratio N × 6.25; Fat was determined as described by the national standard GB/T14772-2008; Total dietary fiber in sweet potato was measured using official GB/T5009.88- 2008 methods. All assay data were based on dry sample of sweet potato.[5]

3] Biological Material and Method:

The dried OFSP was milled in to flour and analyzed nutritional profile, functional properties, microbial and sensory quality using a standard method. Sensory analysis was conducted for the porridge (10gm Orange-fleshed sweet potato flour, 200ml water, about 1g salt and 3g sugar cooked.Six sweet potato genotypes from South Korea were used in this study, which differ in terms of the skin shape and colour and in flesh colour (Table 1). The experiment took place in the experimental field of the Faculties of Horticulture and Agronomy from Craiova, Romania, in 2019. After 160 days from the planting moment, the harvest was carried out and the roots were sorted and the healthy ones were stored at a temperature of 18-200 C and 75% RH (relative humidity).[33,35]

4] Materials Venlafaxine:

Methods Isolation of Fenugreek Mucilage The fenugreek seeds (Trigonella foenum graceum L.) used in study was procured from a local market in Mumbai, India. The seeds were authenticated by Professor Harshad Pandit, Khalsa College, Mumbai, India. The isolation of mucilage of fenugreek seeds (FNM) was done by method described by Pooja Abhang et al. (2012). Briefly, 100 g of crushed fenugreek seeds was soaked in 500 ml of double distilled water for overnight and boiled at 80◦C using water bath for 4 h with occasional stirring or till thick mass was obtained. It was kept aside at room temperature for 4 h with intermittent stirring and then kept aside for overnight below 20◦C. The hydrated mucilage was separated by using muslin cloth. The mucilage was then precipitated with 300 ml of absolute alcohol. The precipitated mucilage was filtered using vacuum filtration. The filtered mucilage was then dehydrated with 200 ml of acetone. This treatment also removes any oil if present in hydrated mucilage. After filtration precipitated mass was dried. [8]

5] Materials and methods Plant material:

The tests were performed using sweet potatoes (Ipomoea batatas Lam) from the variety 'Blanca Correntina', with white flesh, brown skin and elongated shape, cultivated in Corrientes (Argentina) 27° 8′ 16″ S, 58° 50′ 25″ W. Twenty kilograms for each sample was purchased from the local market during April and May 2011. The roots were selected by weight (average weight = 151.88 45.93 g), washed, sanitised (150 ppm sodium hypochlorite/5 min) and immersed in an ice bath at 4 °C per 30 min, hand-peeled and diced with sharp knives into pieces of 2 cm. These samples were considered as control (without treatments). Immediately after dicing, the samples were submitted to the treatments, details of which are given in the following sections.

6] Cassava starch coating:

The cassava starch coating (EC) was prepared with 2.5 g of commercial cassava starch (Molino's Argentinos S.R.L), 0.2 g of potassium sorbate and 2.5 g of glycerol solubilised in 100 mL of distilled water. The mixture was stirred until complete dissolution, diluted to pH = 5 with 25% citric acid (Fama et al., 2007) and heated to 80 °C with constant stirring until gelatinisation and allowed to cool before applying to sweet potatoes.[7]

7] Plant Materials:

These medicinal plants Aniba panurensis, Ajania fruticulosa, Tithonia Diversifolia, meyer lemon and Psidium guajava were collected by lab from Malbazar. The fruits of Ajania fruticulosa, leaves extract were sun dried for 7days.After drying the plants were crushed in powder. After for obtain juice of Meyer lemon was squeezed. The all plants were identified by our Guide-Mr.Shibanjan Paul Roy, Freelancer Scientist. The essential oils of Aniba rosaeodora and Psidium guajava were collected by lab.

Materials and Methods:

Materials:

Clarithromycin, xanthan gum, gellant gum (Yarrow chem. Products, Mumbai) sodium alginate (Chemvin Industries, Thrissur). All the other chemicals and reagents used in this study were of analytical grade. Preparation of Calibration Curve of Clarithromycin: The working standard solutions of clarithromycin (5-25 µgml) were scanned in the UV region and the absorbances were observed against 0.1 N HCl (pH 1.2) solution as blank at 273 nm. Finally, the calibration curve was plotted with concentration on X-axis and respective absorbances on Y-axis. Metformin HCl was obtained from Universal Medicament Nagpur, India. Microcrystalline cellulose (MCC, Avicel pH 101) and ethyl cellulose were purchased from S. D. Fine Chem. Labs. (Mumbai, India), Eudragit RSPO (ammonium meth acrylic copolymer type A NF) was obtained as gift samples from Degussa India Ltd. (Mumbai, India), and gum copal and gum damar were received as a gift sample from Imax Inc. (Chennai, India). All other ingredients used throughout the study were of analytical grade and were used as receivedLocation of study.The study was carried out on the research farm of the International Livestock Research Institute (ILRI), Ibadan, Nigeria (07°30′N, 03°54′E). Weather conditions

were characteristic of the subhumid tropics. During the study, solar radiation was 14.04 MJ/m2/d, mean relative humidity was 75% (56–95%), temperature ranged from 21.7 to 30.2°C (mean 25.9°C) and rainfall was 1648 mm over 139 d cows served as replicates. The rations were fed separately ad libitum in 2 equal portions at 08.00 and 16.00 h to cows housed in individual pens measuring about 2 m × 3 m. The green panic and supplements were offered at levels estimated to supply about 70% and 30%, respectively, of the expected daily ad libitum consumption of the rations at an intake of 2.5% of bodyweight. Feeds offered and refused (orts) were recorded daily to determine dry matter intake. Sweet potatoes tubers (centennial variety) were drying experiment was calculated by using Equation Four of the popular thin layer drying models reported to have performed well for roots and tubers, namely Modified Page 1, Approximation of Diffusion, Two Term Exponential and Wang and Singh were selected and fitted to the data. Regression analysis was performed using Data Fit (Oakdale Engineering, 2008). The primary criterion for selecting the best equation to describe the drying curve was coefficient of determination. [12,21,17]

Chemicals:

Methyl Prednisolone (MP) And Alendronate Were Purchased From M/S Sigma-Aldrich, USA. All Other Chemicals and Reagents Were Purchased from SD Fine Chemicals Ltd., Mumbai, India.

Plant Material:

Panchito grit (PG) was procured from Nagarjun Pharmaceuticals (P) Ltd., Naroda, Ahmedabad. It was mixed in warm milk before administration to the animals. The daily human dose of PG is 15 g once a day, which when extrapolated came to 1.35 g/kg/day in rats.

Animals:

The 21-day-old SD weanlings weighing between 30 and 45 g of either sex was used for the experiment. The animals were housed in polycarbonate cages at room temperature (20 ± 3°C) and humidity (60 ± 10%) with 12:12 h light–dark cycle. The present study was approved by the Institutional Animal Ethics Committee for Animal Experimentation. [19]

Current Cultivation Methods:

In general, sweet potato production includes the following operations: land preparation, planting, fertilizing, weed control, insect control, irrigation, harvesting, and marketing preparation. Physical production inputs in these operations for the four sample farms will be discussed in this order. [24]

Crude fat:

The crude fat was determined by repeated extraction using Soxhlet apparatus with petroleum ether as extraction solvent [19]. A dried round bottom flask of the Soxhlet extraction unit containing boiling chips and petroleum ether (40-60°C) was weighed (W1). The extraction thimble containing the sample weighing 20 g was mounted to the extraction system. Condenser and cooling circulator were fixed on the extraction thimble. The heating mantle was used to heat the round bottom flask containing the boiling chips and extraction solvent, this was carried out for a period of 6 hours. The solvent was recovered, and crude fat was collected in the round bottom flask. The collected fat and the round bottom flask were weighed (W2) and the percentage crude fat was calculated as:

$$\% \text{ Crude Lipid content} = \frac{W2-W1}{\text{Weight of the sample}} \times$$

[25]

Preparation of Plant Materials:

The plants were cut into smaller pieces or macerated and air-dried for two weeks at room o temperature (25-30 C). The dried plants were then ground into powder and stored in air-tight glass containers prior to their use in experiments.

Collection and Identification of Plants:

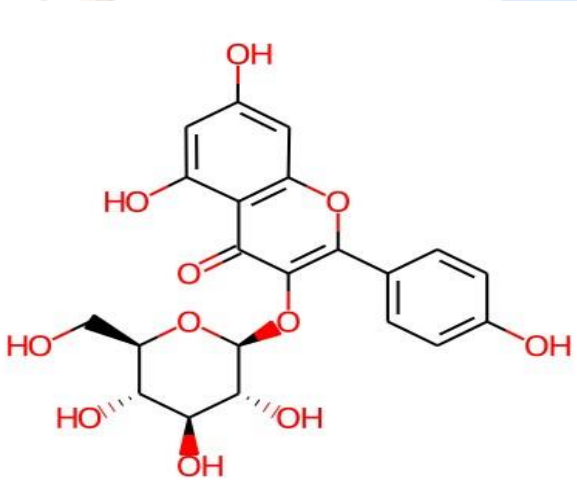
Dried fruits of Xylopia aethiopica (UIH-22458) and leaves of Persea americana (UIH-22459) were collected from University of Ibadan campus. Voucher specimens were deposited at the University of Ibadan Herbarium (UIH) for reference purpose. [6]

Breeding Methods:

The breeding methods for a crop are not set in concrete. Depending on the pollination and propagation biology various options exist on how to breed a crop (Schnell, 1982). What is the pollination biology of sweet potato? It is an open-pollinated crop propagated by cloning. For population improvement, sweet potato should be treated as an open-pollinated crop and for variety development as a clonally propagated crop. The general principle of breeding clonally propagated crops is to break normal clonal propagation by generating true seeds, which results in a new population and genetic variation. All subsequent propagation steps are asexual by clonal propagation in which selection is carried out (Grüneberg et al., 2009a). This selection aims at a set of individuals superior to previous sets. Finally, superior clones are used to generate true seeds. [31]

Anthocyanin Composition:

HPLC-DAD analyses showed qualitative differences in the anthocyanin composition of different purple sweet potato varieties (e.g., 'Yamagawamurasaki', 'Aya Murasaki', 'Stokes Purple', 'Purple Okinawa') as previously described by several authors (Tsukiji et al. 2002; Oki et al. 2003; KonczakIslam et al. 2003; Suda et al. 2003; Tian et al. 2005; Truong et al. 2010). The non-acylated pigments eluate very early (try less than 20 min), while the monoarylated and diacylated major anthocyanins showed a retention time between 33 to 39 minutes under chromatographic conditions previously described by Hillebrand et al. (2009). Because of the coelution of some of the anthocyanins, the assignment of all pigments is based on HPLC analyses, coupled with mass spectrometric measurements (HPLC-ESI-MSN). Anthos cyanin composition was determined in 4 cultivars of purple sweet potato (Ipomoea batatas L.) grown in Japan (Fig. 2). The studied varieties included:[26]



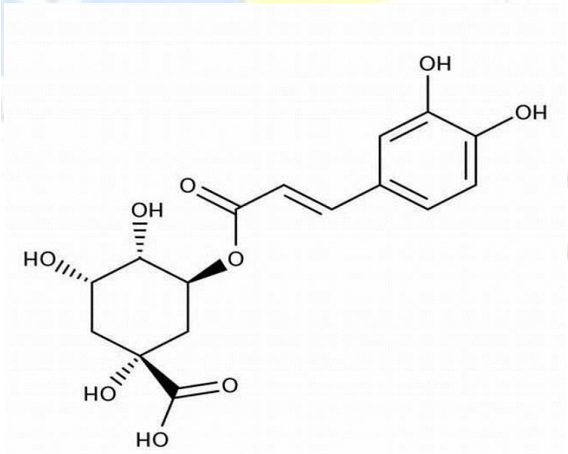


Fig 5: Chemical structure of chronemics acid Chemical structure of 3,4 dio-caffeeylguinic

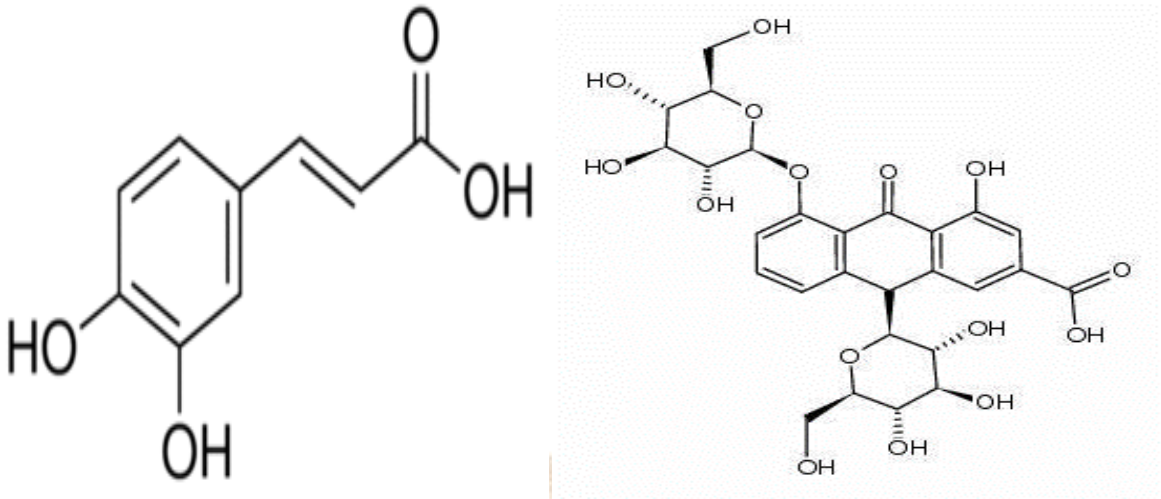


Fig 6: Chemical structure of chronemics acid Chemical structure of 3,5 dio-caffeeylguinic.

III. PHARMACOLOGICAL PROPERTIES:

1) Anti-cancer potential:

Extracts from different parts of sweet potato have also been reported to exhibit anticancer and antitumor properties. Sweet potato extract inhibits proliferation and induces apoptosis in prostate cancer cells in vivo and in vitro this anticancer activity was attributed to the high polyphenol content of the extract. Similarly in a very recent study, purple fleshed sweet potato extract was found to have inhibitory effect on the growth of MCF-7 (breast cancer) and SNU-1 (gastric cancer) cancer cell lines. Taking into account medical history, anthropometry, dietary, and lifestyle considerations over the 10-year study, the researchers concluded that eating sweet potatoes and potatoes regularly was associated with a decreased risk of the disease. 4-Ipomeanol from infected sweet potatoes is reported to possess cytotoxic and anticancer properties. It was the first agent to be developed by the National Cancer Institute based on a biochemical-biological rationale as an anticancer agent targeted specifically against lung cancer. Because of the specific lung toxicity 4-Ipomeanol is being tested as a new drug for the treatment of lung carcinoma. On the other hand, 4- Ipomeanol is metabolized by liver cells too. However, since the compound exhibits significant cytotoxic activity, it could be used as a lead in drug discovery for lung cancer. [1,2]

2) Anti-ulcer activity:

The anti-ulcer activity of the tubers of sweet potato was studied in cold stress and aspirininduced gastric ulcers in Wistar rats. Methanolic extracts of I. batatas tubers were evaluated in cold stress and aspirin induced gastric ulcer models using cimetidine and omeprazole respectively as standards for 7 days in the cold stress model and for 1 day in the aspirin-induced gastric ulcer model. Gastroprotective potential, status of the antioxidant enzymes (superoxide dismutase, catalase, glutathione peroxidase and glutathione reductase), along with glutathione and lipid peroxidation, were studied in both models. The results showed that I. batatas tubers possessed gastroprotective activity, as evidenced by its significant inhibition of mean ulcer score and ulcer index, and a marked increase in glutathione, superoxide dismutase, catalase, glutathione peroxidase, and glutathione reductase levels, as well as reduction in lipid peroxidation in a dose dependent manner. [2]

3) Antidiarrheal Activity:

Ezeigbo Et Al. Evaluated the Antidiarrheal Property of Methanolic Extract of Leaves of R. Serpentina in Castor Oil-Induced Diarrhea in Mice. The Dose Of 100, 200, And 400 Mg Kg of Extract Was Administered to The Mice. The Dosedependent Reduction in Intestinal Weight and Fluids Volume Was Observed Which Are Responsible for Antidiarrheal Effect of R. Serpentina. A Significant Reduction in Glycosylation, Atherogenic, Arteriosclerosis, And Non-Hal-C Was Observed. The Obtained Results Highlighting Therapeutic Potential of Mretin Lowering the Risk of Atherogenic Dyslipidemia, Arteriosclerosis and Glycosylation in Alloxane Induced Diabetic Mice

4) Antivenom Activity:

Rajashree Et Al. Reported Antivenom Activity of The Ethanolic Extract of R. Serpentina. Theakston And Reid 1983 Method Was Used for The Determination of Median Lethal Dose (LD50) Of N. Naja Venom. The Plant Extract Significantly Reduced the Lethal Effect of The N. Naja Venom. About 0.14 Mg ofR. Serpentina Plant Extract Was Sufficient to Neutralize the Lethal Effect Of 2LD50 Of N. Naja Venom. James Et Al. Explore the Venom Neutralizing Potential of The Aqueous Extract of R. Serpentina by Procoagulant, Direct, And Indirect Hemolytic Activities. In It, R. Serpentina Plant Extract Was Effectively Neutralize All the Toxic Effects Induced by The Daboia Russell Venom. [8]

5) Antiviral Activity:

The Antiviral Activity of Garlic Extracts Has Been Evaluated Against Influenza B, Human Rhinovirus Type 2, Human Cytomegalovirus (HCMV), Parainfluenza Virus Type 3, Herpes Simplex Type 1 And 2, Vaccinia Virus, And Vesicular Stomatitis Virus. Interestingly, In Vivo Experiment Exhibited the Antiviral Activity of Garlic Extract and They Reported That Garlic Showed Protective Activity Against Influenza Viruses By Improving The Production Of Neutralizing Antibodies When Given To Mice And This Activity Was Based On The Presence Of Several Phytochemicals Namely, Ajoene, Allicin, Allyl Methyl Thiosulfate, And Methyl Allyl Thiosulfate. Allicin Acts by Preventing Several Thiol Enzymes, While Ajoene's Antiviral Activity Was Due to The Prevention of Adhesive Interaction and Fusion of Leukocytes. [13]

6) Anti-malarial activity:

Malaria is still prevalent disease in many tropical and subtropical countries. Andrographis paniculata, was found to considerably inhibit the multiplication of Plasmodium burgher, (Misra et al., 1992) one of the parasites which transmit the malaria. The protective action of andrographis is proposed to be due to reactivation of the key antioxidant enzyme superoxide dismutase (Chander et al., 1995). Andrographis paniculata, extracts effectively killed filarial that obstruct lymph channels consequently leading to elephantiasis, in dog. Recent research also reported Antmalarial effect of Andrographis paniculata, against Plasmodium falciparum.

7) Hepatoprotective activity:

Andrographis paniculata (Kalmegh) is used extensively in the Indian traditional system of medicine as a hepatoprotective and hepatostimulative agent. The aqueous extract of the leaves of this plant has traditionally been used for treatment of various liver disorders and jaundice. Approximate 26 different remedies including Andrographis paniculata, used to treat liver disorders in traditional ayurvedic medicine (Handa and Sharma, 1990). Andrographolide i.e. main constituent of Andrographis paniculata, were found to be effective in preventing carbon tetrachloride induced liver damage (Rats and mice). Androgrpholide also show noteworthy hepatoprotective effect against different types of liver damage which induced by paracetamole or galactsamine, (Handa and Sharma, 1990) and had a higher capacity than a classical antioxidant silymarin in preventing a decrease of bile production induced by paracetamole. [15]

8) Antibacterial Property:

Then evaluated antibacterial property by well diffusion method (Collins et al. 1995) [163]. The microorganisms used Staphylococcus lugdunensis, Pseudomonas putida, Fusobacterium nucleatum and klebsiella oxytoca. As in the sample total 20µl of test solutions of the sample and standard prepared of (2%, 4% and 6%) were then pipette by help of micropipette. [9]

9) Antidiabetic

At the later stage of non-insulin-dependent diabetes mellitus (NIDDM), which is the predominant type of human diabetes, symptoms result mainly from decreased secretion of insulin by pancreatic Langerhans cells. Prevention of the NIDDM and inhibittin of the serious adverse effects of diabetes such as retinopathy, neuropathy, and cataracts, are important subjects for researchers. At present, the diabetic mellitus population in the United States is increasing markedly and is estimated at more than 18 million persons. Diabetes contributes to the death of more than 213000 Amer icans each year and is a leading cause of heart disease, blindness, and kidney failure. [32]

IV. EVALUATION OF GARADU:

1) Safety evaluation:

Sweet potatoes contain oxalic acid, a naturally-occurring substance found in some vegetables which may crystallize as oxalate stones in the urinary tract in some people.88 Therefore, individuals with a known history of oxalate urinary tract stones may be advised to avoid eating them.89 Adequate intake of water is also advised to maintain normal urine output in these individuals to minimize stone risk.[2]

2) **Evaluation of Pharmaceutical parameters of Lotion:**

Basically, Pharmaceutical evaluation of lotion formulations was carried out.

3) PH:

Lotion PH was measured with a digital PH meter. The solution was immersed in the PH meter before the 10% solution of lotion was prepared and the solution immersed in PH meter after the measurement recorded- (Namita & Nimisha 2013).

4) Viscosity:

The evaluation of viscosity done by Brookfield viscometer by using LV-64 spindle. By adjustment of rotation rate was 25RPM. Then into the spindle and the viscosity was measured for the formulated lotion.

5) **Stability Test:**

A period of 3.5 months then after studied for PH, viscosity and spreadability (Negi et al. 2012) [168]. At different temperatures the formulated lotion was stored and humidity conditions26±2 °C / 60±5% RH (at room temperature), 40±3 °C / 74±8% RH (accelerated temperature).

6) **Sensitivity Test**:

On the forearms of 6 volunteers a portion of lotion was applied and left for 25minutes. After 25minutes if. [9]

7) **Biological Evaluation:**

Swelling Index Test Is Very Useful for Materials with Swelling Properties, Especially Gums and Mucilage, Pectin and Hemicelluloses. Hemolytic Index- Saponin Have Characteristics of Frothing Property and Have Ability to Cause Haemolysis When Added to Suspension of Blood. The Plants from Caryophyllace, Aralaceae, Sapindaceae, Primulaceae Contain Saponin. It Is Determined by Comparing with Reference Material Saponin Which Have Haemolytic Activity In 1000 Unit Per Gram. Bitterness Value- Bitter Properties of The Plants Materials Are Determined the Comparing the Threshold Bitter Concentration of The Materials with That of A Dilute Solution Of Quinine HCL. It Stimulate the Gastric Secretion

8) **Microscopical evaluation**:

Microscopic Evaluation of Raw Herbal Medicines Is Necessary to Identify Crushed or Powdered Materials. It Includes a Detailed Evaluation of Herbal Medicines and Is Used to Identify Medicines Arranged on The Basis of Their Known Histological Features. Measurement Of Leaf Constants Surface Constants Can Be Measured, Such as Number of Stomata, Stomatal Index, Number of Venous Islets, Number of Vein Terminations, Proportion of Palisades. The Number of Stomata, The Index of The Stomata, Is Present in The Upper and Lower Epidermis and Is Made by Peeling the Epidermal Layer and Then the Clear Layer Is Slowly Held on A Microscope Slide, Cut with A Slide and Then a Drop of Chloral Hydrate Is Added to Remove Any Chlorophyll. [10]

9) **Evaluation of granules:**

The granules were evaluated for angle of repose, loose bulk density (LBD), tapped bulk density (TBD), compressibility index and drug content. Angle of repose was determined by funnel method. Bulk density and tapped density were determined by cylinder method, and Carr's index (CI) was calculated using the following equation. Carr's index(TBD-LBD×100/TBD. Hausner's ratio was related to interparticle friction and could be used to predict powder flow properties. Hausner's values of the prepared granules ranged from 1.12 to 1.25 was thought to indicate good flow properties.

10) Evaluation of tablets:

The prepared matrix tablets were evaluated for hardness, weight variation, thickness, friability and drug content. Hardness of the tablets was tested using a Strong-Cobb hardness tester (Tab-machine, Mumbai, India). Friability of the tablets was determined in a Roche friabilator (Campbell Electronics, Mumbai, India). The thickness of the tablets was measured by vernier caliper. Weight variation test was performed according to the official method. Drug content was analyzed by measuring the absorbance of standard and samples at λ=233 nm using UV/Vi's spectrophotometer (Shimadzu 1601, Kyoto, Japan.[14]

11) Evaluation of Tablet Properties:

Determination of Precompression Parameters. The preformulation studies including Bulk density, tapped density carried out using UV visible spectrophotometer (UV 1800, Shimadzu) at λ max of 226 nm.

12) Kinetics Study:

The mechanism of Atenolol release from the floating tablets was studied by fitting the dissolution data of optimized formulation in following models. [28]

V. CONCLUSION:

Sweet potatowas a global food crop that could be explored for its nutritional and medicinal value. Cultivation of sweet potato genotypes with superior health-promoted and medicinal properties could decrease the need for transgenic modifications. Cultivars with high biological activities could be used to developed high nutraceutical value products or provide the platform for the identification and isolation of certain bioactive constituents which may serve as a starting or model molecule for the production of semi or novel synthetic drugs. Knowledge of the general pharmacological activities of sweet potato and the peculiar bioactivities of the different cultivars will facilitate optimal exploration of the medicinal value of sweet potato. Sweet potato was an extremely versatile vegetable and was wonderfully healthy for children and adults alike. It was a healthy alternative to other potatoes. They were not only sweet but also good for cardiovascular health, longevity, prevention of diabetes, and reduced the risk of cancer.

VI. REFERENCES:

1) Taiwo Betty Ayeleso1, Khosi Ramachela2 andEmmanuel Mukwevho1 * Department ofBiological Sciences, North-West University, Private Bag X2046, Mmabatho, 2Department Of Crop Science, North-West University, Private Bag X2046, Mmabatho 2735, South Africa Tropical Journal ofPharmaceutical Research,A review of therapeutic potentials of sweet potato: Pharmacological activities and influence of the cultivar, December 2016; 15 (12): 2751-2761 ISSN: 1596-5996 (Print); 1596-9827 (Electronic).
2) Remya Mohanraj And Subha Sivasanka,Sweet Potato (Ipomoea Batatas [L.] Lam) - A Valuable Medicinal FoodJournal of Medicinal Food J Med Food 17 (7) 2014, 733–741 # Mary Ann Liebert, Inc., And Korean Society ofFood Science andNutrition DOI: 10.1089/Jmf.2013.281.
3) Paula Mariana Kustiawan 1,* , Evita Novi Yanti 2 , Khairun Nisa 2 , Azzah Fatimah Zulfa 2 , Muhammad Alib Batistuta 1 Faculty Of Pharmacy, Universitas Muhammadiyah Kalimantan Timur, Samarinda, 75124, East Kalimantan, Indonesia 2 Undergraduate Program In Pharmaceutical Science, Universitas Muhammadiyah Kalimantan Timur, Samarinda, 75124, East Kalimantan, Indonesia Bioactivity Of Heterotrigona Itama Propolis As Anti-Inflammatory: A Review Scopus Author ID 56516976300 Received: 17.05.2022; Accepted: 21.06.2022; Published: 11.09.2022 Review Volume 13, Issue 4, 2023, 326 Https://Doi.Org/10.33263/BRIAC134.326
4) Dyah Triasih1* and Fitri Dwi Utami 1 Study Program of Livestock Product Processing Technology State Polytechnic of Banyuwangi 2 Department of Biology Education, Universitas Sebelius Maret, Indonesia the Effect of Different Processing Techniques in Sweet Potato (Ipomoea batatas) of ContentNutritionE3SWebofConferences142,01007(2https://doi.org/10.1051/e3sconf/202014201007 ICALS 2014.
5) Hua Ji1,2*, Haixin Zhang3, Hongtao Li1,2, Yunchao Li1,2 1 Institute of Genetics and Physiology, Hebei Academy of Agricultural and Forestry Science, Shijiazhuang, China 2 Laboratory of Quality & Safety Risk Assessment for Agro-Products (Shijiazhuang), Ministry of Agriculture, Shijiazhuang, China 3 Department of Gardens, Hebei Professional College of Political Science and Law, Shijiazhuang, China Analysis on the Nutrition Composition and Antioxidant Activity of Different Types of Sweet Potato Cultivars Food and Nutrition Sciences, 2015, 6, 161-167 Published Online January 2015 in SciRes. http://www.scirp.org/journal/fns http://dx.doi.org/10.4236/fns.2015.6101 Received 29 December 2014; accepted 17 January 2015; published 20 January 2015.
6) *Gbadamosi, I.T and Kalejaye, A.O. Department of Botany, University of Ibadan, Ibadan, Nigeria. *Corresponding author address: gita4me2004@yahoo.com th (Received: 3rd March, 2016; Accepted: 8 July, 2017) Comparison of The Antioxidant Activity, Phytochemical and Nutritional Contents of Two Antihypertensive Ethnomedicinal Plants Ife Journal of Science vol. 19, no. 1 (2017) https://dx.doi.org/10.4314/ijs.v19i1.15.
7) Gonzalo A. Ojeda,1 * Sonia C. Sgroppo1 & Noemı E. Zaritzky 1 Laboratorio de Tecnologıa Quımica y Bromatologıa, Facultad de Ciencias Exactas, Naturales y Agrimensura, UNNE, Av. Libertad 5460, Corrientes 3400, Argentina 2 Centro de Investigacion y Desarrollo en Criotecnolog ıa de Alimentos

(CIDCA), Unlp-Conicet, Calles 47 y 116, La Plata, Buenos Aires 1900, Argentin Application of edible coatings in minimally processed sweet potatoes (Ipomoea batatas L.) to prevent enzymatic browning (Received 10 June 2013; Accepted in revised form 8 September 2013) International Journal of Food Science and Technology 2014, 49, 876–883 https://www.researchgate.net/publication/260901928.

8) Saveena Chauhan1, Amrinder Kaur1 , R. K. Pareek2 1 Department of Ayurveda, School of Pharmaceutical Sciences, Lovely Professional University, Punjab, India, 2 Department of Basic Principle, Ayujyoti Ayurvedic Medical College, Sirsa, Haryana, India Pharmacobotanical and pharmacological evaluation of ayurvedic crude drug: Rauwolfia serpentina (Apocynaceae International Journal of Green Pharmacy • Oct-Dec 2017 (Suppl) • 11 (4) | S686 InternationalJournal of Green Pharmacy • Oct-Dec 2017 (Suhttps://www.researchgate.net/publication/327175655.
9) Shibanjan Paul Roy-Guide, Satyabrat Sarma and Shyam Prakash Rai. Scientist Cum Inventor, M. Pharm (Pharmacology), Freelancer Scientist Cum Inventor Race Course Para, Jalpaiguri, West Bengal, India 2. 1st Asian and 1st Indian Individual Scientist to Did This Research about Hydnora Africa an African Plant, West Bengal, India Novel formulation and evaluation herbal based lotion for the antimicrobial and antifungal properties ISSN (E): 2277-7695 ISSN (P): 2349-8242 NAAS Rating: 5.23 TPI 2023; 12(3): 4595-4603 © 2023 TPI www.thepharmajournal.com Received: 15-12-2022 Accepted: 23-02-2023 https://www.thepharmajournal.com.
10) Prajakta Tambare, Firoj A Tamboli*, Harinath N More Department of Pharmaceutical Quality Assurance, Bharati Vidyapeeth College of Pharmacy, Kolhapur, Maharashtra, India International Journal of Pharmacognosy and Pharmaceutical Sciences www.pharmacognosyjournal.net Online ISSN: 2706-7017, Print ISSN: 2706-7009 Received: 20-02-2021, Accepted: 05-03-2021, Published: 08-04-2021 Volume 3, Issue 1, 2021, Page No. 09-12 at: https://www.researchgate.net/publication/351489626.
11) P. Shailaja * and G. Loknadh Assistant Professor, Department of Pharmaceutical Technology, A. U. College of Pharmaceutical Sciences Andhra University, Visakhapatnam – 530003, Andhra Pradesh, India AU College of Pharmaceutical Sciences, Andhra University, Visakhapatnam – 530003, Andhra Pradesh, India Formulation And Evaluation Of Gastro Retentive Mucoadhesive Film Of Ritonavir Received on 24 March 2021; received in revised form, 25 May 2021; accepted, 02 June 2021; published 01 January 2022 Shailja and Loknadh, IJPSR, 2022; Vol. 13(1): 464-470. E-ISSN: 0975-8232; P-ISSN: 2320-5148 International Journal of Pharmaceutical Sciences and Research 464 IJPSR (2022), Volume 13, Issue 1 http://dx.doi.org/10.13040/IJPSR.0975-8232.13(1).464-70.
12) Jincy Elizebeth Antony * And Sujith S. Nair Department of Pharmaceutics, Crescent College of Pharmaceutical Sciences, Payangadi, Kannur - 670358, Kerala, India M. Pharm Student, Department of Pharmaceutics, Crescent College of Pharmaceutical Sciences, Payangadi, Kannur - 670358, Kerala, India. Formulation And Evaluation of Stomach Specific Floating In-Situ Gel of Clarithromycin Received On 14 May 2019; Received in Revised Form, 15 July 2019; Accepted, 03 September 2019; Published 01 March 2020 Antony And Nair, IJPSR, 2020; Vol. 11(3): 1479-1487. E-ISSN: 0975-8232; P-ISSN: 2320-5148 International Journal of Pharmaceutical Sciences and Research1479IJPSR(2020),Volume11,Issue3Https://Www.Researchgate.Net/Publication/353600110.
13) Gaber El-Saber Batiha 1,2, * ,† , Amany Magdy Beshbishy 1,† , Lamiaa G. Wasef 2 , Yaser H. A. Elewa 3,4, Ahmed A. Al-Sagan 5 , Mohamed E. Abd El-Hack 6 , Ayman E. Taha 7 , Yasmina M. Abd-Eliakim 8 And Hari Prasad Devkota 9 National Research Center For Protozoan Diseases, Obihiro University Of Agriculture And Veterinary Medicine, Nishi 2-13, Inada-Cho, Obihiro, Hokkaido 080-8555, Japan; Amanimagdi2008@Gmail.Com 2 Department Of Pharmacology And Therapeutics, Faculty Of Veterinary Medicine, Damanhour University, Damanhur 22511,Albeheira, Egypt; Lamiaawasef@Vetmed.Dmu.Edu.Eg Received: 27 February 2020; Accepted:12 March 2020; Published:24 March 2020https://Www.Researchgate.Net/Publication/339885168.
14) K. J. Washer*, R. B. Kakde1 And M. J. UmekoDepartment of Pharmaceutical Technology, Smt. Kishoritai Bhoyar College of Pharmacy, Kamptee, Nagpur-441 002, 1University Department of Pharmaceutical Sciences, R. T. M. Nagpur University Nagpur-440 010, India Formulation and Evaluation of a Sustained-Release Tablets of Metformin Hydrochloride Using Hydrophilic Synthetic

and Hydrophobic Natural Polymers Indian Journal of Pharmaceutical SciencesMarchApril2011Marchnhttps://www.researchgate.net/publication/352561926.

15) *1Pallav Kaushik Deshpande, Anupam Kumar Pathak2 And Ragini Gothalwal11Department Of Biotechnology, Barkatullah University, Bhopal, India 2Department Of Pharmacy, Barkatullah University, Bhopal, India Pharmacological Properties Of Andrographis Paniculata Article History: Received 27th August, 2014 Received In Revised Form 20th September, 2014 Accepted 31st October, 2014 Published Online 30th November, 2014International Journal Of International Journal Of Research And Review In Health Sciences Recent Advances In Multidisciplinary ResearchJuly2014November2014Https://Www.Researchgate.Net/Publication/306117931.
16) Nosipho M. Motsa1 Albert T. Modi1 Tafadzwa Ashe Mabhaudhi1 1 School of Agricultural, Earth and Environmental Sciences, University of Kwazulu-Natal, Pietermaritzburg, South AfricaSweet Potato (Ipomoea Batatas L.) As A Drought Tolerant and Food Security Crop Received: 28 July 2014 Revised: 09 Oct. 2014 Accepted: 16 June 2015 Motas NM, Modi AT, Mochudi T. Sweet Potato (Ipomoea Batatas L.) As A Drought Tolerant and Food Security Crop. S Afr J Sci. 2015;111(11/12), Art. #2014-0252, 8 Pages. Http://Dx.Doi.Org/10.17159/ Sajs.2015/20140252 Page 1 Of 8 Http://Www.Sajs.Co.Za.
17) Studies On Sweet Potato Forage And Dried Brewers' Grains As Supplements To Green Panic For Bunaji Cows I. Etela1, U.I. Oji2, G.A. Kalio3 And G.O. Tona41 Department Of Animal Science And Fisheries, University Of Port Harcourt, Chobe, Port Harcourt 2 Department Of Animal Science, Rivers State University Of Science And Technology, Napoli, Port Harcourt 3 Department Of Agriculture, Rivers State College Of Education, Nele4 Department Of Animal Production And Health, Ladoke Akintola University Of Technology, Ogbomosho, Nigeria Tropical Grasslands (2008) Volume 42, 245–251.
18) Tinsae Abrham1 | Hussien Mohammed Beshir2 | Ashenafi Haile21 Shone Town Administration Environment and Forest Protection Office, Shone, Ethiopia 2 School of Plant and Horticultural Sciences, Hawassa University, Hawassa, Ethiopia Sweet potato production practices, constraints, and variety evaluation under different storage types Received: 16 June 2020 | Revised: 14 September 2020 | Accepted: 30 October 2020 DOI: 10.1002/fes3.26 https://www.researchgate.net/publication/346021211 Food Energy Secur. 2020;00:e263. | 1 of 12 https://doi.org/10.1002/fes3.263.
19) An Experimental Study To Evaluate The Antiosteoporosis effect Of Panchatantra Ghita In A Steroid-Induced Osteoporosis Rat ModelRenuka Munshi, Tanvi Patil, Chetan Garuda,[1] And Dushyant Kothari[1]Indian J Pharmacol. 2016 May-Jun; 48(3): 298–303. Doi: 10.4103/0253-7613.182881PMCID: PMC4900004 PMID: 27298501.
20) Athira R Nath, Vishesh Awasthi, Thamara K, Sowmya Kumar Pharmacological Potential of Polyherbal Ayurvedic Formulations Department ofLife Science, Mount Carmel College, Autonomous Bengaluru, Karnataka, India. Email: Sowmyang11@Gmail.Com Received: 30 June 2022, Revised andAccepted: 23 August 202Vol 15, Issue 11, 20222.
21) Rufus Rotimi Diiorio, Effects ofPre-Treatments on Drying Kinetics of Sweet Potato Slices (Agricultural Engineering Department, School ofEngineering, Lagos State Polytechnic, Ikorodu. 23401. Lagos Nigeria 136 September, 2012 Agric Eng Int: CIGR Journal Open Access atHttp://Www.Cigrjournal.Org Vol. 14, No.3
22) Chauhan, V.B.S., Behera, S., Pati, K., Bansode, V., Nedunchezhiyan, M, Regional Centre, ICAR-Central Tuber Crops Research Institute, Bhubaneswar 751 019, Odisha, India Corresponding author: Chauhan V.B.S.; Email: vbs.chauhan@icar.gov.inBreeding for Drought Tolerance in Swee Potato (IpomoeabatatasL.),ChapterJanuar2021https://www.researchgate.net/publication/356718188.
23) Mekam Maheshwar* and Raghunatha D. Rao Division of Extension and Training, National Institute of Nutrition, Hyderabad, AP, India A comparative analysis of nutrition science coverage by popular Indian daily newspapers Journal of Media and Communication Studies Vol. 3(4), pp. 131-143, April 2011 Available online http://www.academicjournals.org/jmcs ISSN 2141 – 2545©2011AcademicJournahttps://www.researchgate.net/publication/228484456.

24) Wen-Yuan Huang andHerbert K. Marianists and Returns of Producing Sweet Potatoes in Hawa Hawaii Agricultural Experiment Station• College of Tropical Agriculture and Human Resources • University of Hawaii Departmental.
25) Ibrahim Ahmad Muhammad a*, Tesi'd Abdulmumin Mika 'il a, Abdulmumin Yunusa a, Sadiya Ahmad Bichi a Department of Biochemistry, Kano University of Science and Technology Wadi, Gaya-Dutse Road, Wudil, Kano State, P.M.B -3244, Nigeria. b Department of Science Laboratory Technology, Kano University of Science and Technology wadi, Gaya-Dutse Road, Wudil, Kano State, P.M.B- 3244, Nigeria. Nutritional Contents of Two Varieties of Sweet Potatoes (Ipomoea batatas (L.) Lam) Cultivated IN North Western Nigeria Received 18 March 2022 Accepted 27 May 2022 Published 14 June 2022 (http://creativecommons.org/licenses/by/4.0).
26) Elyana Cuevas Montilla • Silke Hillebrand • Peter Winterhalter Institute of Food Chemistry, Technosphere Universität Braunschweig, Stalinists. 20, 38106 Braunschweig, Germany Fruit, Vegetable and Cereal Science and Biotechnology 5 (Special Issue 2), 19-24 ©2011 Fruit, Vegetable and Cereal Science and Biotechnology ©2011 Global Science Books Global Science Books Corresponding author: * p.winterhalter@tu-bs.de Anthocyanins in Purple Sweet Potato (Ipomoea batatas L.) Varieties.
27) Dwi Hadi Setya Palupi1, Riski Sulistiarini2, *, Vita Olivia Siregar2 1Sekolah Tinggi Ilmu Farmasi Yayasan Pharmasi, Semarang, Indonesia 2Pharmacy Faculty, Mulawarman University, Samarinda, Indonesia *Corresponding author Imunomodulator Activity of Three Types "Kayu Kuning" Borneo Journal of Tropical Pharmacy and Chemistry Submitted: 13 October 2021 Accepted: 30 June 2022 DOI: https://doi.org/10.25026/jtpc.v6i1.375 Journal hohttps://jtpc.farmasi.unmul.ac.id.
28) Harshal Ashok Pawar,1 Pooja Ramchandra Gharat,1 Rachana Vivek Dhavale,1 Pooja Rasika Joshi,1 and Pushpita Pankaj Kumar Rakshit2 1 Dr. L. H. Hiranandani College of Pharmacy, Smt. CHM Campus, Opp. Ulhasnagar Railway Station, Ulhasnagar, Maharashtra 421003, India 2 SVKM'S NMIMS, Vile Parle (W), Mumbai, Maharashtra 400056, India Development and Evaluation of Gastroprotective Floating Tablets of an Antihypertensive Drug Using Hydrogenated Cottonseed Oil Received 30 September 2013; Accepted 7 November 2013 Academic Editors: O. A. Odeku and R. Zelko Hindawi Publishing Corporation ISRN Pharmaceutics Volume 2013, Article ID 137238, 9 pages http://dx.doi.org/10.1155/2013/137238.
29) Fana Haile1, Shimelis Admassu2,*, Abrehet Fisseha, Food Beverage and Pharmaceutical Industry Development Institute, Ministry of Industry, Ethiopia 3 Hawassa University, School of Nutrition, Food Science and Technology, Hawassa, Ethiopia, Effects of Pre-treatments and Drying Methods on Chemical Composition, Microbial and Sensory Quality of Orange-Fleshed Sweet Potato Flour and Porridge, American Journal of Food Science and Technology, 2015, Vol. 3, No. 3, 82-88 Available online at http://pubs.sciepub.com/ajfst/3/3/5 © Science and Education Publishing DOI:10.12691/ajfst-3-3-5 Received June 10, 2015; Revised June 27, 2015; Accepted July 09, 2015 https://www.researchgate.net/publication/279983876.
30) Nurkhasanah Mahfudh1,*, Nanik Sulistyani1 , Asiilah Fatihatul Khoirot1 , Tsanawiyah Indah Safira1 , Fezah Othman2 & Zainul Amiruddin Zakaria3 1 Faculty of Pharmacy, Universitas Ahmad Dahlan, Yogyakarta, Indonesia 2 Department of Biomedical Sciences, Faculty of Medicine and Health Sciences, University Putra Malaysia, 43400 Serdang, Selangor Darul Ehsan, Malaysia 3 Department of Biomedical Science, Faculty of Medicine and Health Sciences, University Malaysia Sabah, 88400 Kota Kinabalu, Sabah, Malaysia Received: 26 November 2021/Accepted: 19 March 2022 Sains Malaysian 51(9)(2022): 2873-2883 http://doi.org/10.17576/jsm-2022-5109-11 Sweet Potato (Ipomoea batatas L.) Leaves Ethanol Extract Increases Endogenous Antioxidant Activities in Hyperlipidemic Rats.
31) W.J. Grüneberg,1 * D. Ma,2 R.O.M. Mwanga,3 E.E. Carey,4 K. Huamani,1 F. Diaz,1 R. Eyzaguirre,1 E. Guaf,5 1 International Potato Center (CIP), Lima, Peru; 2 Xuzhou Sweet potato Research Center (XSPRC), Xuzhou, China; 3 CIP Sub-Saharan Africa (CIP-SSA), Kampala, Uganda.
32) Shahidul Islam's, 20050682 Submitted 11/14/05, Revised 1/2/06, Accepted 1/15/06. The author is with Dept. of Agriculture, Univ. of Arkansas at Pine Bluff, Mail Slot 4913, 1200 North Univ. Drive, Pine Bluff, AR 71601. Direct inquiries to author Islam (E-mail: islam_s@u, sweet potato (Ipomoea batatas

L.) Leaf: Its Potential Effect on Human Health and Nutrition See discussions, stats,and authorprofilesforthis publication at: https://www.researchgate.net/publication/229459560.

33) Fana Haile1 , Shimelis Admassu2,*, Abrehet Fisseha3 2 Food, Beverage and Pharmaceutical Industry Development Institute, Ministry of Industry, Ethiopia 3 Hawassa University, School of Nutrition, Food Science and Technology, Hawassa, Ethiopia Effects of Pre-treatments and Drying Methods on Chemical Composition, Microbial and Sensory Quality of Orange-Fleshed Sweet Potato Flour and Porridge *Corresponding author: shimelisemire@yahoo.com Received June 10, 2015; Revised June 27, 2015; Accepted July 09, 2015 American Journal of Food Science and Technology, 2015, Vol. 3, No. 3, 82-88 Available online at http://pubs.sciepub.com/ajfst/3/3/5 © Science and Education Publishing DOI:10.12691/ajfst-3-3-5.

34) M.M. Rahman1*, M.S.N. Mandal2, M.A. Alam3, S. Rahman4, N. Begum5 And I.H. Khalil6 1Regional Wheat Research Centre, Bangladesh Agricultural Research Institute, Rajshahi-6212, and Faculty of Agriculture and Environment, Plant Breeding Institute, University of Sydney, Australia 2Wheat Research Centre, Bangladesh Agricultural Research Institute, Nishapur, Dinajpur, Bangladesh Identification Of Drought Tolerant Spring Wheat Genotypes Based On Some Of The Physiological Traits SabraoJournal of Breeding and Genetics 49 (1) 104-115, 2017 Manuscript received: December 28, 2016; Decision on manuscript: February 4, 2017; Manuscript accepted: February 22, 2017. © Society for the Advancement of Breeding Research in Asia and Oceania (SABRAO) 2017.

35) Rodica SOARE1, Maria DINU2, Cristina BĂBEANU3, Marin SOARE11 University of Craiova, Faculty of Agriculture, 19 Libertăţii Street, Craiova, Romania 2 University of Craiova, Faculty of Horticulture, 13 A.I. Cuza Street, Craiova, Romania 3 University of Craiova, Faculty of Science, 13 A.I. Cuza Street, Craiova, Romania Biochemical Changes During the Storage of Sweet Potato Roots Scientific Papers. Series B, Horticulture. Vol. LXVI, No. 1, 2022 Print ISSN 2285-5653, CD-ROM ISSN 2285-5661, Online ISSN 2286-1580, ISSN-L2285-5653 https://www.researchgate.net/publication/366906257.