Review Article

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Plant-based medicines: now serves basis of novel drug discovery

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Abstract

Natural dosage forms, from vegetation, have been the groundwork for curing human diseases. The history of disease remedies is rooted in the existence of human civilization. The existing day medication system has advanced over the years with the aid of the enduring scientific and observational efforts of researchers; however, the groundwork for its improvement remains rooted in usual medicine. Plant-based drugs which have been used as crudes now serve as the groundwork for advanced drug discovery. The indigenous information of herbal fabrications has been surpassed down from technology to era which has extensively contributed to the development of special typical structures of medicine. This review gives a short account of protein-rich grains which are obtained from plants fabricated with current friendly formulations.

Keywords: *protein-rich grains, ice-pops, history, manufacturing, Medicinal benefits.*

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1. Hemp Seeds [1]

Biological source - Genus Corchorus

Hemp Seed Nutrition Facts [3]

Hemp seeds are loaded with important nutrients. In addition to supplying efficient values of protein and hemp seeds are also contain manganese, vitamin E and magnesium. One ounce of hemp seeds contains as follows

- 161 calories
- 3.3 grams carbohydrates
- 31.6 grams protein
- 12.3 grams fat
- 2 grams fiber
- 2.8 milligrams manganese
- 15.4 milligrams vitamin E
- 300 milligrams magnesium
- 405 milligrams phosphorus
- 5 milligrams zinc
- 3.9 milligrams iron

Cultivation [2]

Today, Europe accounts around 25% of hemp crops around the world. 40% of Europe's hemp is cultivated in France. High amounts are also cultivated in Estonia, The Netherlands, Romania, Lithuania, and Italy. Hemp is an annual crop valued across by farmers and industry players alike for its durable plants and notably high yields. Generally, industrial hemp is divided into two cultivar types: so-called 'fibre cultivars', which have long stalks and minimal branching, and 'seed cultivars' which are characterised by their short stalks, large seed heads, and higher branch density. Depending on the species and growing conditions, hemp plants can grow up to 1.3 - 5 metres in height. Hemp crops thrive in nitrogen-rich, non-acidic, well-drained soil with a minimum pH of 6.

1. **Hemp Seed Benefits**
   - Antioxidants
   - Against Chronic Disease
   - Skin Health
   - Heart-Healthy Fats

- Muscle Growth

2. Pumpkin Seeds

Pumpkin Seed Nutrition Facts [4]

Not only are pumpkin seeds high in healthy fats and protein, but they're also rich in manganese, magnesium and phosphorus as well. One ounce of dried pumpkin seeds contains:

- 151 calories
- 5 grams carbohydrates
- 29.8 grams protein
- 12.8 grams fat
- 1.1 grams dietary fiber
- 0.8 milligrams manganese (42 percent DV)
- 150 milligrams magnesium (37 percent DV)
- 329 milligrams phosphorus (33 percent DV)
- 4.2 milligrams iron (23 percent DV)
- 0.4 milligrams copper (19 percent DV)
- 14.4 micrograms vitmain K (18 percent DV)
- 2.1 milligrams zinc (14 percent DV)

Cultivation

Pumpkins are generally planted as single rows with 30-40 inches between plants in the row and 8-12 feet between rows, depending on plant type. Plant populations at these spacing are approximately 1,600 (for pumpkins in excess of 30 pounds) to 2,800 plants per acre

Pumpkin Seed Benefits [5]

- High amount of Antioxidants
- High in Plant-Based Protein
- Helps Prevent Anemia
- Weight Loss

3. Peanut [6]

Biological source - *Arachis hypogaea*

Family - Fabaceae

Nutritional Value [7]

Calories	166.0
Protein	**24.4 g**
Total Carbohydrate	6.0 g
Dietary Fiber	2.4 g
Total Fat	14.1 g
Saturated Fat	2.2 g
Monounsaturated Fat	7.4 g
Polyunsaturated Fat	2.8 g
Omega 6 fatty acid	2.7 g
Omega 3 fatty acid	Trace
Vitamin E	1.4 mg AT
Thiamin	0.04 mg
Pantothenic acid	0.29 mg
Vitamin B6	0.13 mg
Zinc	0.79 mg
Copper	0.12 mg
Selenium	2.6 mcg
Magnesium	50 mg
Phosphorus	103 mg
Potassium	180 mg
Calcium	16 mg
Sodium	116 mg
Iron	0.45 mg
Cholesterol	0.0 mg
Kingdom:	Plantae
Family:	Fabaceae
Subfamily:	Faboideae
Genus:	Arachis
Species:	A. hypogaea

Cultivation

Groundnut needs 400-450mm of water. When it is grown under light soils, 8-9 irrigations are required. Peg penetration (40-45 DAS) and pod development (85-90 DAS) are the critical stages that require irrigation if

available. Irrigation through sprinklers allows saving the water up to 25 % and also increases the yields

Peanut medicinal benefits [8]

- Lowering cholesterol levels.
- Stop small blood clots forming
- Reduce your risk of having a heart attack or stroke
- Lot of proteins

6. Sunflower Seeds [9]

Biological source

Helianthus annuus

Sunflower Seed Nutrition Facts

Adding sunflower seeds to your diet is an easy way to boost your intake of vitamin E, thiamine and manganese. One ounce of dried sunflower seeds contains approximately.

- 164 calories
- 5.6 grams carbohydrates
- **19.3 grams protein**
- 14.4 grams fat
- 2.4 grams dietary fiber
- 9.3 milligrams vitamin E
- 0.4 milligrams thiamine
- 0.5 milligrams manganese
- 0.5 milligrams copper
- 91 milligrams magnesium
- 14.8 micrograms selenium
- 0.4 milligrams vitamin B6
- 63.6 micrograms folate

Cultivation

Sunflower is sown by Dibbling method which requires 5-6 kg seed per hectare, while furrow sowing needs 8-10 kg per hectare. The excess seedlings are thinned 10-15 days after seedling emergence. Seeds should be treated with captan or ceresan @ 3 g/kg seed under dryland conditions

Sunflower Seed Benefits

- Convenient and Portable Snack
- Keeps Skin Healthy
- Reduces Inflammation
- Maintains Healthy Cholesterol Levels
- Lowers Blood Sugar

7. Flaxseeds

Biological source

Linum usitatissimum Linn

Flaxseed Nutrition Facts [10]

Flaxseeds are a great source of protein and fiber, as well as key micronutrients like manganese, thiamine and magnesium. One ounce of flax seeds contains as follows

- 150 calories
- 8.1 grams carbohydrates
- **18.3 grams protein**
- 11.8 grams fat
- 7.6 grams dietary fiber
- 0.7 milligrams manganese
- 0.5 milligrams thiamine
- 110 milligrams magnesium
- 180 milligrams phosphorus
- 0.3 milligrams copper
- 7.1 micrograms selenium

Cultivation

Flaxseed is usually sown by broadcast or by drilling in rows. The seed requirement is more in bold seeded varieties and in utera cropping system. Irrigation in Flaxseed Farming

Generally, the flax crop is treated as a rainfed crop.

Flaxseed Benefits [10]

- Supports Regularity
- Improves Weight Loss
- Keeps You Feeling Full
- High in Bone-Building Manganese
- Promotes Brain Health

8. Sesame Seeds

Biological source - Sesamum indicum Linn.

Sesame Seed Nutrition Facts

Sesame seeds are bursting with important vitamins and minerals, such as copper, manganese, calcium and

magnesium. One ounce of dried sesame seeds contains as follows

- 160 calories
- 6.6 grams carbohydrates
- **17 grams protein**
- 13.9 grams fat
- 3.3 grams dietary fiber
- 1.1 milligrams copper
- 0.7 milligrams manganese
- 273 milligrams calcium
- 98.3 milligrams magnesium
- 4.1 milligrams iron
- 176 milligrams phosphorus
- 0.2 milligrams thiamine
- 2.2 milligrams zinc
- 0.2 milligrams vitamin B6

Cultivation

Sowing and Spacing in Sesame Farming:

Sowing of sesame can be done in broadcast or line. However sowing the seeds in lines is preferred. Mixing the seed with dry sand (1 time seed: 4 times dry sand) and spread the mixture along the furrows to ensure even distribution

Sesame Seed Benefits [11]

- Promotes Healthy Blood Cell Formation
- Strengthens Bones
- Good Source of Protein
- Reduces Blood Pressure
- Protects Against Anemia

9. Chia Seeds [12]

Biological source - Salvia hispanica L

Nutrition Facts

Compared to other types of seeds, chia seeds are one of the best sources of fiber available. They also supply a good amount of manganese, phosphorus and calcium, as well as protein and heart-healthy fats. One ounce of chia seeds contains:

- 137 calories
- 12.3 grams carbohydrates
- **16.5 grams protein**
- 8.6 grams fat
- 10.6 grams dietary fiber
- 0.6 milligrams manganese (30 percent DV)
- 265 milligrams phosphorus (27 percent DV)
- 177 milligrams calcium (18 percent DV)

Cultivation

Chia seeds are propagated from both seeds and seedlings, growing chia plant from seeds can be best job, prepare the soil for crop, just sprinkle seeds over the soil and stab them gently and cover them with soil. Watering should be done at regular intervals, chia seeds start sprouting within 7 to 10 days.

Chia Seed Benefits [13]

- Supports Gut Health
- High in Plant-Based Protein
- Strengthens Bones
- Improves Heart Health
- Prevents Constipation

10. Cashew

Biological source - Anacardium occidentale

Cashew Nutrition Facts [14]

- 157 calories
- 8.56 grams (g) of carbohydrate
- 1.68 g of sugar
- 0.9 g of fiber
- **15.3 g of protein**
- 12.43 g of total fat
- 10 milligrams (mg) of calcium
- 1.89 mg of iron
- 83 mg of magnesium
- 168 mg of phosphorus
- 187 mg of potassium
- 3 mg of sodium
- 1.64 mg of zinc

Cultivation

Fresh seeds that sink in water are planted in an upright position in a planting bag containing a loose, sterilized soil mixture. 3 to 4 seeds can be planted directly in the planting hole.

Cashew medicinal benefits

Rich in fiber, protein,healthy fats. And A variety of vitamins, minerals.

Ice popsicles/Ice-pops

Introduction [15]

The present invention relates generally to systems for making medicated popsicles in order to encourage children to consume prescribed or otherwise indicated medications. Children may be reluctant to take required medication for a variety of reasons. The inherent taste of the medication may be displeasing, the flavorings used to conceal the inherent taste of the medication may be displeasing or have negative associations, the color may be displeasing, the mouth feel of the liquid may be displeasing, or the child may simply distrust anything being served on a spoon. Alternate forms in which to serve medication, particularly ones that children will have strongly positive associations with, are clearly of value. Children generally like popsicles, which have the additional benefit of being soothing to sore throats. Medicated popsicles are an available retail item for a very limited number of medicines, and in a very limited number of flavors. Examples of these include freezer pops sold under the trademarks "Benylin" and "Pedialyte". The former is available in only three flavors and the latter is available in only four flavors. These freezer pops also address only a narrow range of children's medicines. Further, a sick child may well be even more picky about what they'll eat than a healthy child, and the very limited number of flavors does not offer a sufficiently broad solution. There are also numerous commercially available home-made popsicle kits with molds and popsicle sticks or holders, where fruit juice or other edible liquids may be poured in and frozen in a home freezer. However, these juices and liquids generally do not include the sort of concentrated flavorings which may be needed to sufficiently disguise the taste of particular medications, or the sort of bright colors which children may associate with popsicles as a festive treat. These kits also do not include any means for labeling directly on the popsicle mold what sort of medication is contained, the concentration, the flavoring, or when the mixture was prepared or served. Further, the size popsicles produced by these kits are significantly larger in volume than what is needed to provide a dose of medication plus sufficient amounts of colorants and flavorings. There are several frozen medication mixture systems which bear discussion. For instance, U.S. Pub. No. 20080181934 entitled "Novel enhanced medicinal delivery system processes and products thereby especially useful for children" published Jun. 5, 2008, teaches the administering of medications particularly to children in the form of "gelatins and candies". This publication also teaches the home mixing of medication with the modifying agents. The system further includes an embodiment wherein a dose of medication is combined with texturing, flavoring and sweetening agents and then frozen to be served as a medicated popsicle. However, there is an explicit requirement to include gel-type texturing agents thus complicating attempts at successful home formulation if additive concentrations are modified. Additionally, the publication does not teach anything about a suitable popsicle forming container, Another example of a medicated popsicle is found in U.S. Pat. No. 6,162,468 entitled "Frozen aqueous solution with nutrients method of packaging and utilizing the same" filed Aug. 5, 1999 which teaches "a tasty means for taking a pre-measured dose of a medicine" which in all embodiments is pre-mixed. The storage and dispensing means taught is a "sealable plastic container" which is described as preferably a "releasably sealable long, slender plastic package" that is essentially a tubular bag made of flexible plastic film. The '468 patent does not teach a reusable container for freezing a popsicle, nor popsicle holder or means for recording data relevant to the medication dose, nor does it teach the home mixing of conventional store-bought medication with flavorings, wherein the caregiver and patient can select the specific mixture of flavorings. Yet another example of a medicated popsicle is found in U.S. Pat. No. 5,431,915 entitled "Frozen oral medication delivery system and method 16" filed Dec. 20, 1993 which teaches several embodiments of an "oral medication delivery system for administering . . . in a frozen form" thus producing and administering a medicated popsicle. These embodiments include a pre-mixed flavored medication requiring shaking to improve even dispersion immediately prior to freezing, and two embodiments of a pre-measured two part dose of powdered medicine and liquid to provide flavoring and sweetening, the two parts being mixed immediately prior to freezing. For all embodiments the use of a sealable container is taught, with various methods of unsealing. The '915 patent does not teach a reusable container for freezing a popsicle, nor popsicle handle or means for recording data relevant to the medication dose, nor does it teach the home mixing of conventional store-bought medication with flavorings, wherein the caregiver and patient can select the specific mixture of flavorings.

A need exists, therefore, for a system and method of delivering doses of medication in frozen popsicle form

wherein the flavor of the medication is masked by flavors more pleasing to children, the size of the popsicle is suitable for a child's dose of medication, the included popsicle handles are easy and convenient to use, and the system includes convenient means for recording information including medication type, dosage and time of administering.

The History of Popsicles [17]

In 1905, eleven-year-old Frank Epperson left a cup filled with powdered soda, water, and a stirring stick on his San Francisco porch. That night, low temperatures caused the mixture to freeze — and a summertime staple was born. Today, two billion popsicles are sold every year.

1923: Epperson debuts his "Epsicle" at an Alameda, California, park. His children, who call the creation Pop's 'sicle, persuade him to change the name. Two years later, Epperson partners with the Joe Lowe Company of New York, which distributes the treats around the country.

1939: The brand introduces its mascot, a boy dubbed Popsicle Pete, who appears in ads for the next five decades.

1986: The company retires its two-stick variety (first sold during the Great Depression for a nickel) on the advice of moms, who deem it too messy.

2010: Popsicle — now owned by Unilever and made at plants in Nevada, Maryland, and Missouri — releases new Jolly Rancher — flavored pops, but classic cherry still ranks as the most popular.

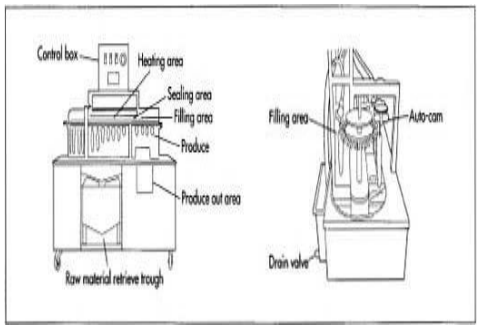
The Manufacturing Process [18]

1. The popsicle begins with making water ice in sets of sterilized vats. The vats are refrigerated to 35-37°F (1.7-2.8°C). The base material, consisting of sugar, corn syrup, stabilizers, and gum, is mixed with water and then subdivided into several separate vats where the flavoring and coloring are added. The formulas for the mixes are constant, but trained inspectors flavor-test the batches and adjust flavorings and other ingredients to taste. In the refrigerated vats, the fluid becomes water ice— it does not quite reach the point of freezing and still can be pumped easily.

   The water ice is pumped to a million-dollar machine called a Vita-Line. The machine is circular and about 15 ft (4.6 m) in diameter and transports sets of molds through several processes to form the pops. The machine is made of stainless steel and supports 200 to 300 strips of molds. Each strip may be 6, 8, or 12 molds wide, 4-8 ft (1.2-2.4 m) wide, and 30-40 ft (9-12 m) long. A typical popsicle machine will generate 4,320 pops per hour; larger machines produce twice as many, and a production line may include five machines.

   A continuous chain across the top of the machine and around the wheel moves the molds through the process. All fluids are pumped by electrically powered pumps. Pneumatics (air pressure) control the movements of slave cylinders and the opening and closing of valves in a simple sequence of motions. In the first set of steps, the molds are pre-rinsed, washed, rinsed again, Fig: 01 Two types of popsicle filling and sealing machines.

   and sanitized (heated) in a minute-long process. The machine inverts the molds so that



   a spray bar can pre-rinse any materials out of the molds. Two wash bars, above and below the molds, wash and rinse the molds in a fresh water rinse. Another bar sanitizes the molds.

2. After washing, the molds are reinverted so they can be filled. The flavored water ice is pumped through sets of nipples into the molds, and the molds are pulled into a tank filled with water containing calcium chloride (salt brine) that is ammonia-cooled to-25--30°F (-32--34°C). As the molds are drawn along the 20-ft (6-m) length of the tank, their contents pass from the liquid to frozen state. If several different layers of flavors make up the particular pop, hoppers with different fluids are attached to the same machine that makes single-flavor pops. The first fill is injected, the mold is partially submerged in salt brine to freeze it, and a vacuum pump sucks out any remaining liquid on the frozen surface. During the second fill, the second flavor is added, flash-frozen, and sucked dry of standing water; finally, the third fill is added. Midway through the process, the

water ice is partially frozen. At this stage, pops designed to have a twisted appearance are given that twist, and an injector pushes the sticks into the pops, which freeze from the outside toward the center so the frozen outside supports the stick. In the last 3 or 4 ft (0.9 or 1.2 m) of the machine, the centers of the pops freeze.

3. The molds then pass briefly through a tank containing 180°F (68°C) water that slightly heats the molds. An overhead extractor pulls the pops out of their molds by their sticks. If the pops are to be dipped to make an outside coating on them, the extractor lowers them into a dip tank, and the coating is flash frozen. The extractor bar then carries the popsicles to the bagging area where the bags are blown open by bursts of air as the pops are dropped by the extractor. They fall by gravity into the waiting bags.

   The bagged pops ride on a conveyor along an assembly line where workers snap open boxes, fill the boxes with bagged pops, tape the boxes closed, and pack sets of boxes into a larger set called a master pack. The master packs are taken to the freezer where they are stored until shipment. In an alternative wrapping process, popsicles are dropped by the extractor bar on sheets of mylar or glassine paper that has been preprinted. The wrapping machine shapes the wrapper around each bar, seals the top and bottom, and cuts off the excess paper at both ends.

Types of popsicles [19]

- Rose Popsicle
- Blueberry Popsicle
- Orange Mint Popsicle
- Fruit Popsicle
- Pineapple Coconut Popsicle
- Cucumber, Lime, and Mint Popsicle
- Mango Strawberry Popsicle
- Avocado Popsicle.

Medicinal use of ice Popsicle [20, 21]

- It's a therapy tool.
- It is a diversion and it breaks down barriers.
- It's calming and it evens the playing field.
- It's not a medication or miracle pill.
- They were usually a privilege of the wealthy and were made of ice, fruit pulp, fruit syrup, and flowers for flavor, fragrance, and color.
- Popsicles also bring a sense of familiarity when a child is in the hospital. "This is an item they have at home, so when they realize we also have Popsicles, it's comforting.
- Eating frozen foods such as popsicles or sorbet can help alleviate sore throat symptoms.
- The cold temperatures can help ease the pain of a sore throat quickly, and many of these frozen foods are softer and easier to swallow.
- Staying properly hydrated while sick with a chest cold can keep mucus thin and help lessen congestion.
- Popsicles are great as a different way to hydrate and are especially easy on the throat.

References

1. Small E. Cannabis: a complete guide. CRC Press; 2016 Oct 14.
2. Amaducci S, Scordia D, Liu FH, Zhang Q, Guo H, Testa G, Cosentino SL. Key cultivation techniques for hemp in Europe and China. Industrial Crops and Products. 2015 Jun 1;68:2-16.
3. Oseyko M, Sova N, Lutsenko M, Kalyna V. Chemical aspects of the composition of industrial hemp seed products. Ukrainian Food Journal. 2019 Jul 1;8(3):544-59.
4. Glew RH, Glew RS, Chuang LT, Huang YS, Millson M, Constans D, Vanderjagt DJ. Amino acid, mineral and fatty acid content of pumpkin seeds (Cucurbita spp) and Cyperus esculentus nuts in the Republic of Niger. Plant foods for human nutrition. 2006 Jun;61(2):49-54.
5. Lestari B, Meiyanto E. A review: the emerging nutraceutical potential of pumpkin seeds. Indonesian Journal of Cancer Chemoprevention. 2018 Jul 3;9(2):92-101.
6. Yin D, Wang Y, Zhang X, Ma X, He X, Zhang J. Development of chloroplast genome resources for peanut (Arachis hypogaea L.) and other species of Arachis. Scientific reports. 2017 Sep 14;7(1):1-1.
7. Liu CC, Tellez-Garay AM, Castell-Perez ME. Physical and mechanical properties of peanut protein films. LWT-Food science and technology. 2004 Nov 1;37(7):731-8.

8. Toomer OT. A comprehensive review of the value-added uses of peanut (Arachis hypogaea) skins and by-products. Critical Reviews in Food Science and Nutrition. 2020 Jan 19;60(2):341-50.
9. Adeleke BS, Babalola OO. Oilseed crop sunflower (Helianthus annuus) as a source of food: Nutritional and health benefits. Food Science & Nutrition. 2020 Sep;8(9):4666-84.
10. Partner YE. Category: Nutrition.
11. Lokhande P, Kharche A, Wagh SG, Manithe D, Harke S. Immune boosting super food supplement from natural resources. Journal of Pharmacognosy and Phytochemistry. 2019;8(5):2108-13.
12. Da Silva Marineli R, Moraes ÉA, Lenquiste SA, Godoy AT, Eberlin MN, Maróstica Jr MR. Chemical characterization and antioxidant potential of Chilean chia seeds and oil (Salvia hispanica L.). LWT-Food Science and Technology. 2014 Dec 1;59(2):1304-10.
13. Hever J, Cronise RJ. Plant-based nutrition for healthcare professionals: implementing diet as a primary modality in the prevention and treatment of chronic disease. Journal of geriatric cardiology: JGC. 2017 May;14(5):355.
14. oluwaseyi Agboola-Adedoja M, Adelusi AA, Qudus Adebayo Ogunwolu C, Ugwu A, Alli MA, Adesanya KA, Akinpelu AO. Cashew production, consumption and utilization: Implication on health of end users.
15. Weseman RA, Gilroy R. Nutrition management of small bowel transplant patients. Nutrition in clinical practice. 2005 Oct;20(5):509-16.
16. Harvey BM, Knight PM, inventors; Harvey, Bryce M., Knight, Philip M., assignee. Frozen oral medication delivery system and method. United States patent US 5,431,915. 1995 Jul 11.
17. Renaud A. The Boy Who Invented the Popsicle: The Cool Science Behind Frank Epperson's Famous Frozen Treat. Kids Can Press Ltd; 2019 Oct 1.
18. Bubnick L, Enneking K, Egbers J. Designing Healthy Ice Pops. Science and Children. 2016 Sep 1;54(1):70.
19. Magalhães-Guedes KT, Barreto IT, Tavares PP, Bezerra PQ, Silva MR, Nunes IL, Mamede ME, Miguel MG, Schwan RF. Effect of kefir biomass on nutritional, microbiological, and sensory properties of mango-based popsicles. International Food Research Journal. 2020 May 1;27(3):536-45.
20. Bandaranayake WM. Traditional and medicinal uses of mangroves. Mangroves and salt marshes. 1998 Sep;2(3):133-48.
21. Beeton M. The Book of Household Management... Ward, Lock, & Company; 1888.