

GINGER OIL PROCESSING; PROBLEMS, CHALLENGES AND ECONOMIC PROSPECTS.

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Abstract: Ginger is a commonly used spice, all over the world. It is also a remarkable plant with a very high amount of herbal, healing and medicinal benefits that can be used in all of our lives; the root and its essential oil are also used as preservative and flavouring agent. It aids digestion of food items such as meat, poultry and it can be added while cooking meat as it softens the meat. Processing of the crop to different forms plays an important role in the application of ginger for both local and internal purposes. This paper reviews the varieties; white type used in internal trade and yellow type that is mainly produced for Export trade. Products of Ginger, benefits of using ginger oil in order to improve the living standard of people and uses. The problems associated with the processing as well as economic importance of the oil are also reviewed. The intension of this study is to enable researchers have the understanding of processing and economic importance of the oil as a form of generating income and medicinal qualities treasure as well as mechanizing technologies that will enhance the processing of this product.

Keywords: Ginger root, Oil, Processing, Prospects and Challenges.

1. Introduction

Ginger (*Zingiber officinale*) is a perennial herb and grows to about 3 - 4 feet high with a thick spreading tuberous rhizome. It is made up of stalk with narrow spear-shaped leaves and white or yellow flowers growing directly from the root. Ginger became familiar as one of the world's favourite spices next to pepper (Foster, 2000). This root can be widely used as herb, condiment, spice, home remedy and medical agent. Ginger snap cookies and gingerbread are also food in many homes, not only for children but also for parents. Ginger is regularly in everyday cooking due to the fantastic amount of herbal, healing and medicinal qualities that can be beneficial in all of our lives.

Ginger products are made from fresh or dried ginger root, or from steam distillation of the root and the applications include extracts, tinctures, capsules, and oils. Fresh ginger root can also be prepared as a tea. It is also a common cooking spice and can be found in a variety of foods and drinks, including ginger bread, ginger snaps, ginger sticks and ginger ale.

Oil from this crop is usually obtained from the root of ginger. The peculiar hot taste and pungent taste of ginger can be attributed to the presence of an acrid compound called Gingerol. Most of the health benefits of ginger are due to this Gingerol.

2. Products from Ginger

Primary products:

- **Fresh ginger:** Fresh ginger can be used directly due to its outstanding flavor as it contains the full note of the spice compared to other products from it. Fresh rhizomes with low fibre content but rich in aroma, pungency, fat and protein are preferred for green ginger purposes.
- **Preserved ginger in syrup or brine:** Immature green ginger is preserved in brine or sugar syrup. Crystallized ginger is also made from the ginger in sugar syrup by further processing. Crystallized ginger is the peeled ginger impregnated with sugar syrup, dried and coated with crystalline sugar.
- **Dried ginger:** Dry ginger obtained by drying of fresh ginger comes in the spice trade for the preparation of ground ginger and extraction of oleoresin and oil. It is available in a number of physical forms. It can be peeled or unpeeled and sometimes partially peeled. (Oliver, et al, 2008).

Secondary products:

- **Ginger powder:** Ginger powder is made by pulverizing dry ginger in a mesh size of 50 to 60. Grinding of Ginger releases the flavour, improves the texture of the powder and readily dispensable in the matrix.
- **Ginger oils:** Ginger oil is produced commercially by steam distillation of freshly ground dry ginger. The yield of oil varies from 1.5 to 3.0% with an average of 2.0%. The oil obtained is a green or yellow mobile liquid which becomes viscous on ageing (Purseglove *et al.*, 1981). The most suitable material for oil distillation is coated African ginger, followed by Nigerian splits and Cochin ginger. Ginger oil can also be recovered by steam distilling fresh ginger peelings and the yield is 1.5 to 2.8%. Ginger oil benefits include its therapeutic effects and it is used as an analgesic, expectorant, carminative,

stimulant, anti-emetic, antiseptic, antispasmodic, bactericidal, laxative, tonic, etc.(Purseglove *et al.*, 1981) .

- **Oleoresins:** Ginger oleoresin is obtained by extraction of powdered dry ginger with suitable organic solvents like alcohol, acetone and ethylene dichloride, etc. Concentration of solvent extract under vacuum and complete removal of traces of solvent yields 'oleoresin of ginger'. The yield, flavour and pungency of extracted oleoresin vary with cultivars, maturity of rhizome, choice of solvent and the method of extraction employed. Generally a yield of 3.9–9.3% with an average of 6.5% on dry weight of ginger is obtained.

Commercial ginger oleoresin usually has a volatile oil content of 25–30% and replacement strength of 1 kg oleoresin for 28 kg good quality ground spice. They are offered to the consumer in liquid form or dispensed on sugar or salt.

3. Processing of Ginger oil

Ginger oil can be produced from fresh or dried rhizomes. Oil from the dried rhizomes will contain fewer of the low boiling point volatile compounds (the compounds that give ginger its flavour and aroma) as these will have evaporated during the drying process. The best ginger oil is obtained from whole rhizomes that are unpeeled.

Ginger oil is obtained using a process of steam distillation. The dried rhizomes are ground to a coarse powder and loaded into a still. Steam is passed through the powder, which extracts the volatile oil components. The steam is then condensed with cold water. As the steam condenses, the oils separate out of the steam water and can be collected. In India the material is re-distilled to get the maximum yield of oil. The yield of oil from dried ginger rhizomes is between 1.5 to 3.0%. The remaining rhizome powder contains about 50% starch and can be used for animal feed. It is sometimes dried and ground to make an inferior spice.

4. Beneficial Effects of Ginger Oil

The following are some of the benefits of ginger oil.

Stomach: Ginger root and ginger oil is often used for stomach upsets. It is one of the best remedies for indigestion, stomach ache, diarrhea, flatulence and other stomach and bowel related problems. Ginger and the products can be added to various food preparations.



Figure 1: Picture of fresh Ginger roots.

Food poisoning: Ginger is antiseptic and carminative in nature. As a result of this fact, it can be used for treating food poisoning, intestinal infections and bacterial dysentery.

Nausea and Vomiting: From previous study, ginger root and its oil are effective against nausea, motion sickness and vomiting. Usage of ginger may result in reduction in pregnancy related vomiting in women.

Heart: It is strongly believed that ginger boosts and strengthens the heart. Ginger oil is useful as a measure to prevent and cure heart diseases. Preliminary research has indicated that ginger may be helpful in reduction of cholesterol levels and prevention of blood clotting which might lead to stroke.

Respiratory: It is effective in various respiratory problems such as cold, cough, flu, asthma, bronchitis, breathlessness and also good expectorant. Ginger is very effective in removing mucus from the throats and lungs and hence it is generally added with tea and honey for treatment of respiratory problems.

Inflammation and Pain: In traditional medicine, ginger extract is often used to treat and reduce inflammation. It is analgesic in nature and reduces pain caused by muscle aches, arthritis, rheumatism, headache, migraine, etc. Ginger oil or paste of ginger is often massaged on aching muscles to remove muscle strain. It is further believed that regular use of ginger leads to reduction of prostaglandins which are the compounds associated with pain. Hence ginger helps in pain relief.

Menstrual Problems: Irregular and painful menstrual discharges can be treated with ginger.

Malaria: Ginger root and ginger oil is also effective against yellow fever and malaria.

Stress: Ginger oil, being an essential oil is stimulating and therefore relieves depression, mental stress, exhaustion, dizziness, restlessness and anxiety.

Impotency: Ginger is helpful and effective in removing impotency and treating premature ejaculation.

Kidney: It is also believed that ginger root juice works perfectly in dissolving kidney stones.

Hair: Ginger is useful for hair care as well. Usage of the juice of ginger in controlling dandruff.

Cancer: According to the preliminary research by American Cancer Society on animals, ginger may be useful in treating cancer through chemotherapy. (Health Benefits of Ginger 2011).

5. Economic Prospects of Processing and Uses of Ginger Oil

Spices are high value and export oriented commodity crops, which play an important role in agricultural economy. Among all spices, ginger is the main crop supporting the livelihood and improving the economic level of many ginger growers in Africa. The freshly harvested ginger is used for consumption as green ginger and some sold at very low prices. (Yadav et al 2010) Sometimes the farmers are not able to sell their produce since there is no local market big enough to absorb and handle green ginger in large quantities. Therefore, it is essential to convert a part of produce into low volume high value ginger oil to make the crop remunerative. As it is abundantly available everywhere, different products like ginger oil, ginger oleoresin can be

prepared for export, which are very common in developed countries. Dried ginger can also be prepared and it may either be sold as such or in the form of an off white to very light brown powder. The dried ginger or ginger powder is generally used in manufacturing of ginger brandy, wine and beer in many western countries. Ginger oil is primarily used as a flavouring agent in confectionary, for drinks and for several medicinal purposes. Therefore there is the need to improve on the processing technologies so as to achieve the following economic merits;

- i. Source of Revenue: Due to the benefits of using ginger oil, the product will command good price when accepted, properly processed and packaged in Nigeria.
- ii. Employment opportunity: The processing will encourage the establishment of industries to create employment for the populace.
- iii. Land Tenure System: Provision of large arable area of land for the cultivation of this crop will result into achieving large output which implies large economic returns.
- iv. Mechanization: Processing of this crop will enhance the use of improved technologies as related to the products from Ginger.

6. Challenges of the Processing of Ginger Oil

Processing of Ginger into Essential Oil, play an important role in improving the economy of a country and also enhancing the standard of living of the people. Traditionally, ginger is processed under primitive conditions, which result into low yield and poor hygiene. Therefore challenges posed from the processing of the oil arise from;

- i. Lack of contiguous parcels of arable land: The difficulties of acquiring contiguous parcels of land ranging from 2–5 Hectares to enable the farmer family to rely on this source of income and focus meaningfully on it without distractions.
- ii. Appropriate Harvesting Time: Correct harvesting is very important. The essential oil content varies considerably during the development of the plant and even the time of day. If the plant is harvested at the wrong time, the oil yield or its quality can be severely reduce.
- iii. Post Harvest Losses: Post – harvest losses of ginger are caused by pests, environmental factors, production and harvesting practices. Loss refers to the disappearance of food

measured quantitatively, qualitatively and nutritionally. Quantitative loss involves the reduction in weight through water loss and loss of dry matter by respiration. Qualitative loss is frequently described by comparison with locally accepted quality standards and is often difficult to assess as it is based subjectively. Nutritional loss includes decline in vitamins, carbohydrates, proteins and lipids. In ginger, the main sources of deterioration are weight loss, sprouting, rotting and discoloration in commercial ginger.

- iv. Lack of supports from the Government: If government funding is provided as a matter of policy to encourage ginger farming, available human and material resources will surely support the growth and development of this crop.
- v. The attitude of consumers at our local market level: If the consumers have the understanding of the benefits of ginger as an herb with healing qualities, the scale of operation may then gradually move from the peasantry level to a medium level where it should be.
- vi. Absence of credits to support the farmers: The government should grant to ginger farmers the revenue to go into the production of this beneficial crop. (Godfrey 2008).
- vii. Use of appropriate mechanized equipment to remove drudgery from the processing.

Conclusion

Ginger botanically known as *Zingiber officinale*, is one of the world's favourite spice. The refreshing pleasant aroma, biting taste and carminative property of ginger make it an indispensable ingredient of food processing throughout the world. To enhance the processing and uses of ginger, it is therefore important to look for a mechanical means of processing the ginger into essential oil and make the crop remunerative.

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