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Value Addition in Medicinal and Aromatic Crops

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SUMMARY

Increasing global demand for chemicals and products derived from medicinal and aromatic plants have opened up entrepreneurial opportunities to process these plants for value added products thereby generating enormous employment avenues. India is gifted with 8000 medicinal and 2500 aromatic plants, many of which can be mined for natural chemicals and processed for commercial products with export value. The upward trend in the exports of medicinal and aromatic plant products in recent years has prompted both Government and private organizations for developing processing technologies for rural, semi-urban and urban entrepreneurs. Low and high level value addition through processing can be done by unskilled rural youth and unemployed, educated urban youth. From a single medicinal or aromatic plant, it is possible to manufacture a number of value added consumer products and trade them in national and international markets. Medicinal and aromatic plants sector is a sunrise industry with plenty of opportunities for new, young, innovative entrepreneurs for starting successful, eco-friendly, natural product industries.

INTRODUCTION

The use of medicinal and aromatic plants for performing rituals, as offerings to gods and goddesses, in functions, for treating diseases and as beauty aids dates back to several centuries. Civilizations that came up in different parts of the globe made use of different species of medicinal and aromatic plants occurring in their areas. Records indicate that several species were used by different civilizations for treating the same disease. Similarly, the same species was used for curing different diseases. Single or multi herbal formulations are in vogue even today in tribal dominated areas of the world. innovative persons in these areas have developed simple processing technologies, probably through trial and error method and experience gained through practical use. Until modern technology came into existence, these simple processes produced value added products to serve the needs of the society. With the advent of modern technologies, the scenario has changed dramatically. The availability of advanced instrumentation made it possible to isolate and identify chemicals responsible for pharmaceutical and fragrance properties of these plants and study their role in human physiology in curing diseases or improving public appeal. This has led to several fascinating discoveries viz. different plant parts of the same plant being useful for curing different diseases or yielding varying flavour compounds. For example, leaves of periwinkle (*Catharanthus roseus*) plant are used for treating cancer and the roots for curing hypertension. Similarly, essential oil of stem bark of cinnamon (*Cinnamomum zeylanicum*) contains cinnamaldehyde the aromatic oil from leaves of the same plant contains eugenol. Based on the structure of natural chemicals, several synthetic molecules of pharmaceutical and flavour importance were synthesized that are widely used in the pharmaceutical, flavour and fragrance industries. This has led to the development of number of new technologies and the product is driving the global natural product economy today.

Uses of medicinal and aromatic plants

Medicinal plants yield crude drugs such as roots, bark, stem, leaves, seeds etc. which on further processing produce phytochemicals. These are used for the preparation of drugs in different systems of medicine. They are also used in herbal cosmetics, incense sticks, cosmeceuticals, functional foods etc. Aromatic plants on steam distillation or solvent extraction or super critical fluid extraction yield essential oils, concretes, absolutes, perfumed waters etc. Essential oils on further processing through fractional distillation produce aroma chemicals. These isolates are extensively used in flavour, fragrance, cosmetics industries and in aromatherapy.

Value Addition methods in Cultivation of Medicinal plants:

Value addition of the medicinal plants can be achieved directly by improving the quality of the cultivated or collected plant material and indirectly by quality assurance of the plant material or the semi-processing of the material to a value added product. The active principle contained in every medicinal plant consists of a number of compounds having specific action on organ. Value addition of the medicinal plants can be achieved directly by improving the quality of the cultivated or collected plant material and indirectly by quality assurance of the plant material or the semi-processing of the material to a value added product. Value Addition methods in Cultivation of Medicinal plants is essential for the medicinal value of the raw drugs and commercial exploitation. The raw material is liable to be rejected or accepted at very low price causing not only economic loss to the cultivators or collectors of the medicinal plants which is totally depend on to make use of its latent medicinal qualities by using different methods of value addition. Different methods having devised to extract these substances either individual or collectively depending on result, generally following procedures are used.

Active constituents:

There are number of chemical tests are available for quantification of active ingredients, some of them are minerals, alkaloids, volatile oils, anthraquinones, coumarins, tannins, phenols, saponins, cardiac glycosides, flavonides, mucilage etc. which are use for to recognize active principle in medicinal plants, it is very essential for improving value addition of cultivated medicinal plants. The quantification of active ingredients which is starting stapes for standardization of raw drugs.

Extraction:

It is suitable methods for obtaining the active principles when the part of the plant is being used are such as leaves bud or flowers. In certain cases it is preferable except in certain cases to use herb that have been faintly dried, as the diminution of water content which having focus to the standard constituent. This procedures allows retention of numerous of the volatile principle with extensive knowledge of medicinal plants and their compound.

Decoction:

The medicinal herbs whose active principle having thorny to extract for that types of herbs used this method because these are enclosed in woody parts of the herb, which required extend heating in arrange to pass into solution. Occasionally, the extraction by decoction need boiling whole part of plant or part of it in water for a specified moment and allowing it to macerate for extra time before filtering. In high mucilaginous content herbs this methods is very useful. A considerable deviation of this method is to immerse the plant earlier in cold water for a specific time which depending on the drug required thus, make extraction easier at the decoction stage.

Maceration:

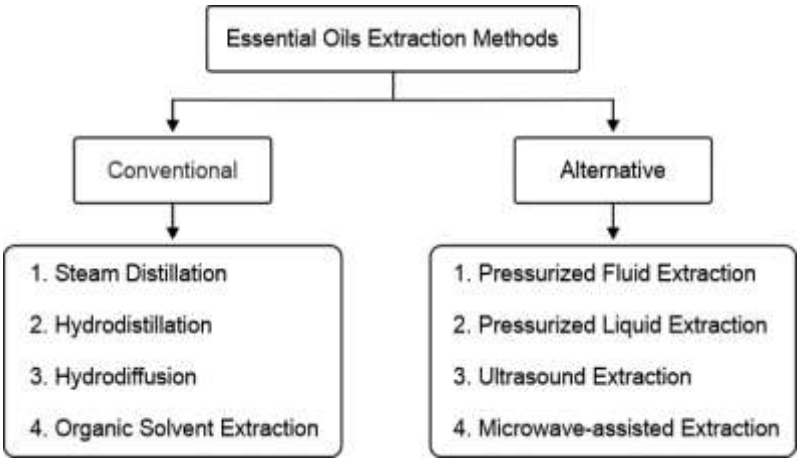
The medicinal herbs whose active principle having soluble in cold water for that types of herbs used this method because in cold water few hours during, which period all the values that do not require heat to release them and will be release in solution means that are not thermo-labile. The yield of mucilage since definite herbs superior when extraction is carried out by means of cold maceration. This methods used in the pharmaceutical industries probably now this time. Dehumidifying: It is costly but valuable method to dry herbs. In this method literary sucks water out of the plant. The Dehumidifier should be placed in a more or less preserved small room in which the herbs are placed on mesh trays. With the help of this method quickly dry the herbs and there is no used heat.

Advance processing of medicinal plants

For the production certain drugs, primary processing of parts of plants containing the intermediates could be carried out restoring some value of the resource material. For example, diosgenin (from *Dioscorea* sp.) and hecogenin (from sisal) used in the production of steroids can be commercially produced. Processed products (galenicals) from plants could be standardised fluid/solid extracts or powders or tinctures can be prepared with considerable value addition to raw materials. Standardized extracts of many plants (e.g. *Aloe* species, *Atropa belladonna*, *Cassia angustifolia*, *Capsicum annuum*, *Centella asiatica*, *Cephaelis ipecacuanha*, *Digitalis* species, *Commiphora waghtii*) are widely used in health care. Some of these have to be formulated for incorporation into appropriate dosage forms. New formulations require some development work, particularly on account of the nature of the processed products. Plant extracts are difficult to granulate, sensitive to moisture and prone to microbial contamination. Hence the types of excipients to be used and the processing parameters have to be determined. Most of the utilization of medicinal plants have involved: the production of standardised traditional medicines, galenicals and extracts, the formulation and development of dosage forms, the development of new preparations based on the traditional pharmacopoeia, research and development in processing and formulation and basic chemical and pharmacological studies. Processing using clean and pollution free technologies are needed in these areas.

Extraction of essential oils and value addition in aromatic crops:

Technology for processing aromatic crops is quite simple and all the required machineries and manufacturing facilities are available in most parts of our country. As these extraction plants can be made locally, commercial cultivation would be viable in many parts of our country with participation of even small group of farmers. For sustainable utilization of the extraction unit, the raw materials will be available through these types and farming clusters. Following are some of the types of extraction methods available for essential oil extraction from aromatic plants. The type of method will be chosen based on the resources available and requirements as decided by the type of material used and other considerations.



Extraction methods for Essential oils

Distillation

1. Hydro distillation, 2. Steam distillation 3.Hydro diffusion.

Other specialized distillation

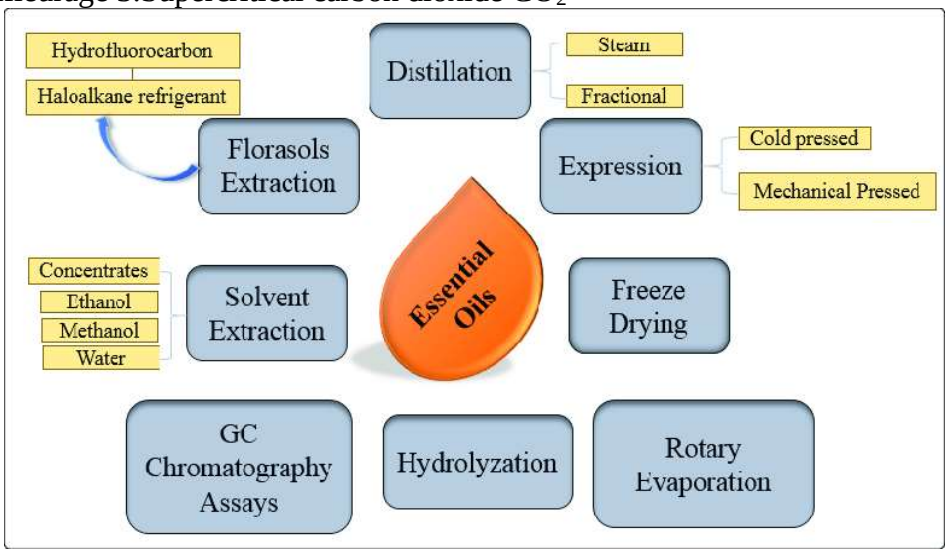
1. Cohobation, 2. Rectification, 3. Water and steam distillation, 4. Fractional distillation.

Expression

1. Sponge expression 2. Machine abrasion,

Solvent extraction

1. Maceration, 2. Enfleurage 3.Supercritical carbon dioxide CO_2



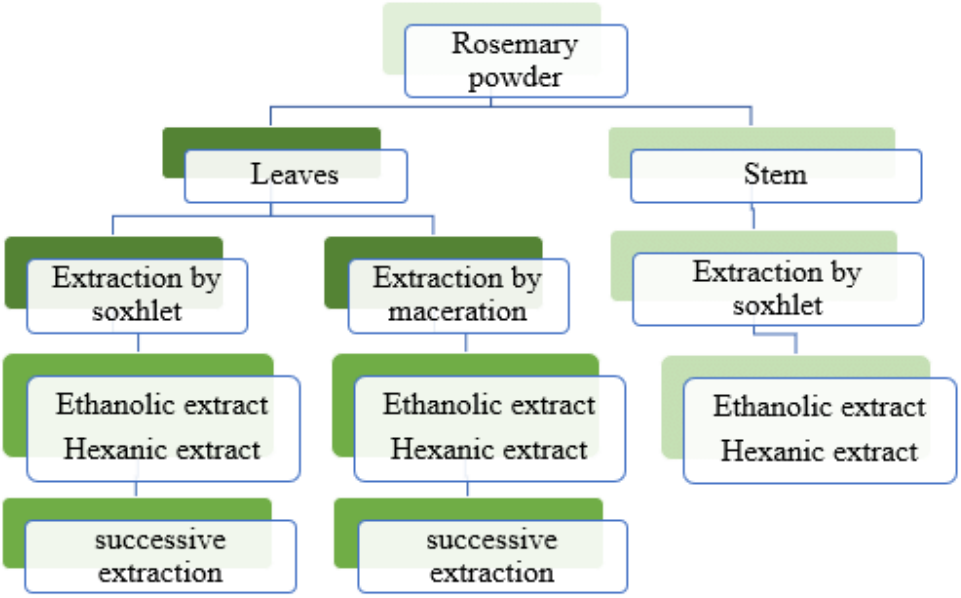


Fig. Several methods for extraction of essential oil

Most citrus peel oils are expressed mechanically, or cold-pressed, since peel contains large quantities of oil and relatively low cost to grow and harvest the raw materials. Prior to the discovery of distillation, all essential oils were extracted by pressing. Most flowers contain too little volatile oil to undergo expression and their chemical components are too delicate and easily denatured by the high heat used in steam distillation. Instead, a solvent such as hexane or supercritical carbon dioxide is used to extract the oils. Supercritical carbon dioxide is used as a solvent in supercritical fluid extraction. This method has many benefits, including avoiding petrochemical residues in the product and the loss of some "top notes" when steam distillation is used. It does not yield an absolute directly. The supercritical carbon dioxide will extract both the waxes and the essential oils that make up the concrete. Subsequent processing with liquid carbon dioxide, achieved in the same extractor by merely lowering the extraction temperature, will separate the waxes from the essential oils.

Quality assurance

In MAPs, control of the quality of the raw materials, finished products and of processes is pivotal importance, if one is to produce goods for world markets and human consumption. International Standard Specifications exist for some processed products and some countries and buyers have their own requirements. The quality requirements for medicinal plant preparations are stringent in terms of content of active principles and toxic materials. Whereas, the production of traditional medicines for local use does not require such stringent standards, what is produced will be a much more improved version of the already produced medicines using traditional methods.

CONCLUSION

Global consumer preference for natural products to synthetic ingredients in perfumery, flavouring, pharmaceutical and many other industries has created tremendous potential for natural products from medicinal and aromatic plants. To match this demand, technologies were developed for commercial utilization by entrepreneurs. India with its natural wealth of medicinal and aromatic plants offers excellent scope for establishing enterprises at rural as well as urban centres for manufacturing and trading value added products from medicinal and aromatic plants.

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