

EXTRACTION AND ANALYSIS OF ESSENTIAL OILS FROM SPICES

The project consists of two phases. In the first year pepper is analysed and in the second year the essential oil from ginger is extracted and analysed.

Phase I-

Extraction, Analysis And Characterisation of Essential Oils from Pepper Varieties

CHAPTER - I

INTRODUCTION

India is world's largest exporter of spices and spice products-powdered [ground] spices, blended spices, spice pastes, spice essential oils, oleoresin etc. India is known as the "home of spices" spices, notably pepper, has major role in the development of civilization. It is valued as a medicine and an agent for preservation of food. Pepper is the dried berry of a perennial vine called "Piper Nigrum" which yields the black pepper, belongs to the family "Piperaceae". The carbohydrate of pepper is represented by starch and crude fibre. The pungency is actually due to piperine.

The use of spices ranges from use in medicine and for flavouring and preserving food items. By science and technology it was realized that the essential oil responsible for flavour characteristics could be recovered by steam distillation. But the essential oil fails to represent the true essence of the spice, since they do not contain nonvolatile particles. This non volatile particle from a spice can be isolated in a most concentrated form called oleoresin and it can provide all functional properties of the parent spice.

At the stage of harvesting, fresh pepper will be dark green in colour which is due to chlorophyll. During ripening carotenes will be formed, which will effectively mask chlorophyll and give a yellow to red colour to the outer skin. On drying at mature green stage, the product assumes a black colour. This colour change is due to enzyme catalyzed oxidation of colourless phenolic compounds present in the skin. Due to oxidation, phenolic substrate will be converted into black polymeric compounds.

PEPPER VARIETIES

Pepper is unique in the spice world as the pepper fruits are marketed in four different versions. They can be processed to give black, white, green and red pepper corns.

Black pepper

Black pepper is produced from the still green-green unripe drupes of pepper plant. The drupes are cooked briefly in hot water, both to clean them and to prepare them for drying. The heat ruptures cell walls in the pepper, speeding the work of browning enzyme using drying. The drupes are dried in the sun or by machine for several days, during which the pepper around the seed shrinks and darkens into a thin, wrinkled black layer. Once dried, the spice is called black pepper corn. Black pepper corn is considered spicier than white peppercorn.

White pepper

White pepper consists of the seed of the pepper plant alone, while the darker coloured skin of the pepper fruit removed. This usually accomplished by a process known as retting, where fully ripe peppers are soaked in a water for week, during which the flesh of the pepper softens and decomposes. Alternative processes are used for removing the outer pepper from the seed, including decortications, removal of the outer layer from black pepper from black pepper from small peppers through mechanical, chemical or biological methods.

Green pepper

Green pepper, like black, made from the unripe drupes. Dried green peppercorns are treated in a way that retains green colour, such as treatment with sulfur dioxide or freeze drying.

Pepper leaf

Pepper leaves are oval and taper to point. They are usually bright to dark green, but can also be mottled. The size of the leaf corresponds somewhat to the size of the fruit; plants that produce very small peppers also tend to have small leaves, while the larger bell pepper cultivars have large, broad leaves.

Pepper stem

It is green coloured .

OLEORESIN

Oleoresins are the true essence of spices representing their holistic character in terms of flavor, colour, and taste attributes. It is a yellowish brown viscous liquid.

MANUFACTURE OF OLEORESIN

It is obtained by the solvent extraction of pepper. The extraction is done using soxhlet extractor.. After extraction the solvent is removed by simple distillation. The non-soluble portion of the extracted solid remains in the thimble, and is usually disca

CONSTITUENTS OF OLEORESIN

The oleoresin of pepper would contain besides the volatile essential oil, some residual solvent, the main pungent principle piperine and piperettine and its stereo isomer; chavicine in comparatively small amounts, other extractable compounds as sugars resinous material, fixed oils, polyphenols, pigments in small amounts.

SOLVENTS USED FOR MANUFACTURING OLEORESIN

Solvent approved for the manufacture of oleoresin are Hexane, Acetone, Methanol, Ethanol etc.Extraction is often done at temperature and pressure high enough to produce super fluid conditions. The extraction solvent has then properties of both gas and a liquid. Thus increases the solvent power. Solvents used in extraction should exhibit the following characteristics.

Be acceptable as a food solvent.

Be able to be removed down to very low levels without harming the product.

Be easy to be removed by distillation.

Leave no harmful residues in the food product

USES OF SPICE OLEORESIN

Spice oleoresins find wide application in a number of industries due to its strong flavour and aroma.

Meat canning

Beverages

Pharmaceutical

Perfumery

Tobacco sauces

PIPERINE

It is an alkaloid having molecular formula $C_{17}H_{19}NO_3$ extracted from black pepper.

It is one of the sharp-tasting constituents of the fruit of the pepper. Piperine constitutes approximately 5 to 10% of black or white pepper. The sharp flavour of freshly ground pepper is attributed to the compound chavicine, a geometric isomer of piperine. The loss of pungency of ground pepper on storage is associated with slow transformation of chavicine into piperine.

STRUCTURE OF PIPERINE

