The ARC-Agricultural Engineering provides essential oil quality analysis services

Essential oils

Essential oils business is a niche farming business, in an effort to reduce barriers for emerging farmers the ARC-Agricultural Engineering division has upgraded its laboratory to include essential oil quality analysis services.

What is essential oils?

Essential oils are volatile compounds extracted from plants for their various natural components that are useful in manufacturing products for human kind. These compounds are used in different industries such as manufacturing of pharmaceuticals, food additives and so forth. The compounds are found in the oil glands of the plants. The extracted oils have different compounds depending on the plant, region and time of harvest. In South Africa, the common sources for essential oils are cultivated and wild plants, wild plants include wild *Lippia javanica, tagetis minuta* while cultivated include lemon grass and rosemary.

Wild *Liipia javanica* (Lemon Bush)

Wild *Tagetes Minuta* (marigold)

Why essential oils?

The economic benefits of essential oil are immense and can even be further enhanced by maximizing production, increasing secondary processing within the country. Southern Africa produces high quality essential oils but there is not adequate supply from the region to meet EU manufacturers demand. The industry can earn much needed foreign currency and continued investment in the industry can substantially increase the exports. This can help create jobs and increase economic growth in the industry.

How are they extracted?

A variety of extraction methods have been used in the extraction of essential oils. The most widely used methods are solvent extraction and distillation. Recently new techniques have been developed including microwave assisted, Co2 assisted extraction and so forth. This article is limited to solvent and distillation as traditional methods.

- **Solvent extraction**

A mixture of the solvent and bio-mass is heated or agitated depending on the characteristics of the biomass. The mixture can be heated and agitated for better extraction with the solvent, which gives a better yield than separating the operations. The solvent method is normally associated with long extraction time and is known as one of the oldest methods of extraction. Since extraction occurs for a long time, normally at solvent boiling point, degradation of critical compounds may occur with solvent extraction.

The extracted solution mixture of solvent and desired product then undergoes a filtration process. During filtration, the solvent is evaporated from the mixture of solvent and product. A good filtration results in less than 10 parts per million (0.001 %) of solvent in product. The most commonly used solvent particularly in the perfumery industry is exhane. Since perfumes are applied to a human skin, high concentration of left over solvent is potentially a health hazard. There are strict regulations particularly in Europe, on the allowable amount of solvent in human skin products. Thus choice of solvent is importance to meet regulatory requirements. The evaporation or vacuum system is used to remove solvent from oil concrete needs to be efficient to reduce solvent concentration in product.

- **Steam distillation**

Steam distillation is one of the most commonly employed method in essential oils extraction. In this method, plant material is tightly packed in to the extraction cell. A separate steam boiler used to heat water to 100 degrees Celsius. The steam is then pass though the plant material, as the steam passes, the compounds are extracted in to the passing steam. The mixture of steam and volatile compounds is then condensed. The final mixture is separated by the difference in densities between the extracted oil and water, normally the water would be at the bottom and the oil above as the density of extracted oil is usually lower than that of fresh water.

Why quality is critical?

It is important for the seller to confidant in product they have and its characteristics. Quality analysis will assist the seller of the oil obtain a fair price for the product. ARC-IAE has qualified experienced technicians that can assist sellers with the quality analysis. The oil analysis is carried out with the assistance of the gas-chromatography equipment. The physical properties are analyzed using mini-FTIR, FTIR and Viscometer.

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