PART 4 – AROMA CHEMICALS DERIVED FROM ESSENTIAL OILS

12 CONCLUSIONS

South Africa has a long involvement in the essential oil industry with regards to the production of major essential oils like eucalyptus and citrus oils, supplying some 5% and 2% of the world market respectively. These industries are however under severe pressure from the low cost producers (e.g. China and Brazil) and the strengthening of the Rand. South Africa has a fledgling essential oils industry in the production of the higher value minor essential oils (e.g. geranium, chamomile and lavender) that was pioneered by the CSIR.

It is estimated that South African production of essential oils and related plant extracts is between R 60 - 100 million, of which only R 10 - 15 million is attributable to the minor essential oils. Although there are some 100 local producers, only a dozen commercial producers and a couple of development projects consistently supply the market. The number of operational distillation units is estimated between 30 and 40, many of which are too small for economic production. Locally produced essential oils are generally sold to two or three of the local companies that have been able to penetrate the international export market. Low volumes of smaller quantities of oil are sold into the growing local aromatherapy market.

It is widely accepted that South Africa has many indigenous plants that have potential commercial value. However, to exploit these commercially on an international scale one needs to move from wild-harvesting to cultivation in order to ensure sustainability, in terms of quantity and quality. There is a common misconception that there is a ready market for new and novel products. The reality is that the market is very conservative and market acceptance of a new product must be coupled with an intensive development programme. The initial demand must be created, and issues such as safety, quantity and quality addressed. With regards to essential oils from indigenous plant materials, there are several plants showing some promise, including Artemesia and Cape Chamomile. However, it is only Buchu that has enjoyed any international success. Shortage of supply and an over-reliance on wild harvesting has however placed this industry under pressure in recent times.

The Study concluded that before a new producer can commercialise new aroma, fragrance and flavour compounds from indigenous plant material, it must first establish itself as an internationally recognized producer of accepted essential oils. The establishment of an essential oil industry in South Africa could therefore be seen as “school fees” in the creation of a longer-term indigenous aroma chemical industry.

Although there are no unique grounds upon which South Africa can claim competitive advantage in the global essential oils industry, there is a combination of factors that are in South Africa’s favour. These include:

- Being in the Southern Hemisphere – many growing regions are in the Northern Hemisphere; the seasonal effect makes Southern Hemisphere suppliers attractive.
- Traditional strong trade links with Europe, a major importer of flavour and fragrance materials.
- Being established as a world class agricultural producer in a wide range of products.
- A diverse climate with a range of biomes - thus allowing for a good selection of essential oil crops to be grown.
- Good quality soils – being largely uncontaminated by centuries of exploitation as is the case in the developed world.

However, in spite of these competitive advantages and substantial interest from international buyers, South Africa has not yet established itself in the international essential oils market.

The CSIR initiated the interest in the essential oil industry almost ten years ago, doing research work in conjunction with local commercial farmers. However, over time various technical difficulties were encountered and many producers began to feel that the CSIR's consulting terms were too onerous. As a result, an independent association, the South African Essential Oils Producer Association, was formed in 2000 in the Mpumalanga Province and now has a branch in each of the Kwazulu Natal and Western Cape Provinces. The Association has achieved some nominal success, but is generally considered by stakeholders to be under funded and disorganised. The Association endeavours to provide basic production information and support to growers. The Association has identified that the main industry constraints are achieving sufficient production volumes, so as to attract international buyers, and access to chemical analytical facilities to monitor and control quality.

The CSIR has reduced its involvement significantly, although it retains some peripheral involvement in that it supports some community development projects (e.g. Giyani in the Limpopo Province). No one organisation has taken over the CSIR's role as lead agent in promoting the essential oil industry from a research and development perspective. Each of the Agricultural Research Council and the National Botanical Institute has some peripheral involvement (the later in the case of indigenous plant species). There are several other institutions, most linked to Universities (such as the Natural Resource Institute at the University of Kwazulu- Natal), which have ad hoc programs that producers can draw support from. However, there is no concerted public research and development program and practically no publicly available information. There are various Government Departments (inclusive of the Department of Industry, the National Department of Agriculture and the Department of Science and Technology) that have newly established posts focusing on the essential oil industry, but these have not yet been co-ordinated. The fragmentation and lack of co-ordination in the industry are constraining factors on the growth of the industry.

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One of the major contributing factors for the abovementioned fragmentation is that the essential oils industry falls across two industry sectors (the agricultural and chemical sectors). This has lead to some confusion as to how, and by whom, the industry should be supported.

The Study's analysis of the essential oil value chain identified four separate stages. It is not possible to consider the creation of an essential oil industry in South Africa without considering the complete value chain.

1. **Agricultural - Crop selection and Crop Cultivation**
   A large component of the value chain is agricultural. Industry stakeholders are unanimous in their view that unless the volumes of quality oils are increased the economies of scale required to encourage later stage innovation and beneficiation of essential oils will not materialise.

2. **Primary Processing (e.g. Drying, distillation)**
   This first step is aimed at achieving the best quality and quantity of product. Although the primary process currently utilized in South Africa is steam distillation, there is a trend internationally towards more sophisticated extraction processes. Although technology associated with primary distillation is relatively simple, good distillation practices are required to ensure the best yields and quality of oils. Furthermore, without fully understanding the manner in which the distillation process can affect quality it is not possible to improve processing thereby optimizing quality.

3. **Secondary beneficiation (e.g. Rectification, Fractionating, Formulations)**
   This area distinguishes a world-class supplier of essential oils from a mere "bulk producer" of essential oils. The strength of a local industry is therefore dependent on its ability to integrate its activities directly with the international flavour and fragrance houses. This requires continued exposure to the international players and an increasing level of technical sophistication.

4. **Sales and marketing**
   Most end users have a very specific specification for their ingredients and formulations are often developed around a certain source of the ingredients. "Breaking" into this market is therefore difficult. However, once relationships have been developed stability of off-take is assured, provided that the specifications continue to be met.

The issues confronting developing countries endeavouring to upgrade their essential oils industry are very similar. Analysis of these issues as well as the value chain above, has led to the identification of a number of critical success factors for the development of a successful essential oils business and industry.

1. There must be a sustainable and significant **quantity** of the correct **quality** essential oil being produced. Besides horticultural issues, there needs to be careful quality control. Each oil has a minimum level of production (before international buyers will seriously consider a commitment) requiring the availability of good genetic material, production systems, post harvest treatment, distillation practices and storage and handling practices.

2. **Market focus** is critical. Close relationships with international customers, particularly large flavour and fragrance houses, are essential. This requires a reputation in the market place (both as individual companies and as a producing region committed for the long term), knowledge of regulatory parameters and trends, industry quality standards and testing procedures, and understanding of the market dynamics.

3. There must be a high level of **technical service**. Substantial chemistry and organoleptic skills and experience are required. This requires local commitment to ongoing research and development as well as skills development and training.

Consideration was given to the selection of essential oils that would make attractive options for commercial production in South Africa. Whilst it is theoretically possible to perform an economic analysis of all the oils that could potentially be grown in South Africa and then to rank these by profitability, there are so many variables that the exercise would be largely academic. Furthermore, agricultural decisions are quite complex.

The Study has therefore focused on the creation of a long-term sustainable producer base for a wide range of oils and compiled a Primary and Secondary list. The Primary List contains the mainstream crops with sufficient market knowledge and technical support available to see success in the short-term. The Secondary List contains oils that may be of interest to broaden the production base in South Africa. The list excludes bulk oils (such as eucalyptus and citrus) as South Africa already has a significant presence in these markets. Based on these lists, it is estimated that South Africa could generate an additional R125 million per annum in turnover over the next three to five years. Job creation resulting from the development of this industry will predominantly be in the agricultural sector; however it will provide approximately 10 jobs in the downstream chemical processing areas of analytical chemists, laboratory assistants and process operators.

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Table 28: Proposed list of attractive essential oil crops

Proposed Primary List	Proposed Secondary List
Geranium Roman Chamomile German Chamomile Rosemary Oil (verbenone type and cineol type) Lemon Balm (Melissa) Marjoram Thyme oil Basil oil Lavender Oil Lavandin Oil Lemon grass Buchu	Spearmint Peppermint Parsley Seed Jasmin Tuberose Marigold Celery Seed Vetiver Cassie (Mimosa) Yarrow Dill Tarragon Coriander Fennel Vaerian Helichrysuam

The Study has therefore concluded that the further development of the essential oil industry would be a valuable complementor to an Aroma and Fine Chemical industry. Furthermore, the essential oil industry could act as a precursor to the successful commercialisation of a wider range of South African indigenous plant products. Whilst the basis for a profitable and sustainable essential oils industry in South Africa already exists, the industry has not yet reached critical mass and is not sufficiently mature enough to gain international prominence. However, there is a real opportunity to develop this industry in South Africa.

In order to realize this opportunity, the industry must be better supported. The consensus amongst industry players is that Government has a key role to play in developing the industry. This would primarily involve the areas of research and development, and the development and enhancement of education and information systems.