# Essential oil extraction facility reduces rural poverty

Gerrit Bezuidenhout | *Features Reporter*

A new essential oils facility, manufactured by engineering company Joint Advanced Manufacturing (JAM), promises to alleviate rural poverty by providing a sustainable platform for the distillation of various crops for the essential oils market.

JAM MD **Mauritz Johnson** says that the facility can handle up to 100 ha of plant material.

"The size of the facility depends on the type of the crop used, the size of the crop, which is measured in hectares, and the yield of plant material that is to be processed. The most common plant material used comes from geranium plants and these are normally planted in fields of 2 ha and larger. The geranium yields about 15 t to 20 t of plant material a hectare. Oil is extracted through a distillation process. The processing facilities are designed to process the plant material at a rate of eight distillations a day shift, at up to two tons of material a distillation," Johnson explains.

The distillation facilities, that can handle up to 100 ha of plant material, are built units, measuring 12 m × 9 m and can handle two distillation vessels at the same time.

The smaller facilities that produce one distillation at a time are 9 m × 9 m. A mobile distillation facility is also available and is built into a 6-m shipping container, as well as a trailer version, which is used for small-scale farming activities on between 2 ha and 10 ha.

Each facility consists of a boiler or steam generator with a capacity of up to 1 200 kg/h of steam at a maximum pressure of 1 000 kPa.

In addition, the unit normally also contains two distillation vessels, a heat exchanger, an oil separator, an industrial cooling tower, a water treatment plant and various laboratory equipment to filter and handle the oil. In the case of mobile distillation vessels, the unit will also have a weighbridge.

Johnson says that the distillation time of the plant material varies between the different types of plant being distilled. Steam is passed though the plant material at a rate of 1,5 kg/m²/min. He says that distillation of geranium plant material varies between 45 and 60 minutes.

Depending on the size, construction of the facilities varies from two to four months and the training of operators for the distillation facility takes one to two weeks. Johnson says that the training is hands-on and that the equipment used is selected and designed for ease of operation.

**ESSENTIALLY WELL OILED**
The distillation facility can process up to 20 t of plant material for every hectare

"The company specialises in turn-key solutions. Not only does JAM design the facility, but it also manufactures most of the equipment that is required. The company also trains all the personnel in all the relevant disciplines to operate the facility.

"This includes first aid," Johnson explains. With regard to business skills training and transfer, the Council for Scientific and Industrial Research has established a department known as Technology Transfer for Social Impact.

**MAURITZ JOHNSON**
The distillation facilities provide a financial solution for rural communities

**GROBBIES GROBBELAAR**
Data gathering enables the client to be well informed on the state of the distillation facility

**LOUIS LE ROUX**
A two-part software package enables the facilities to be in constant contact with the client

The department handles the technology transfer, setting up businesses for the local communities, training the community in business skills and agricultural skills, and maintains a presence to continue assisting the communities with the businesses.

The distillation facilities also contain various software and hardware components to enable the gathering of data. The data is used to monitor the environmental conditions and the process parameters of the distillation facilities at remote locations.

Electronics manufacturing company Omnigo provides the electronic hardware used in the distillation facilities. Omnigo director **Grobbies Grobbelaar** says that the electronic hardware systems installed measure parameters such as temperature, humidity, the flow of the biomass, the position of the facility, wind speed and light intensity.

The measurements are collected and processed in suitable data formats that can be stored and transmitted.

He says that the electronic hardware can be categorised as telemetry units which consist of various sensors, used for data accumulation, processing and transmitting.

The units are locally developed and manufactured and can be used in other applications as well.

"Although the units are custom made for a specific application, the functional blocks can be reconfigured to be used in other telemetry and monitoring applications," Grobbelaar explains.

Development manager **Louis le Roux** of high-end technological engineering company Kreon Technology, that developed the software components of the system, says that the software systems were all developed locally and are easy to use.

"The software consists of two parts. The first part was developed to work on the electronic hardware units mounted on the harvesting units and processing plants of the distillation facilities. The software collects the data, processes it and saves it at a central point at the processing plant from where it is distributed. The data can be sent over a suitable communication link such as a fixed line, the global system for mobile communications or satellite to a central server on the Internet.

"The second part was developed for Internet users. The software at the hosting facility receives the data over the communication link, processes the data and saves it on the server. The server is then accessible on the Internet for users to log into and download the data," Le Roux explains.

He says that the software is easy to use and because it is Internet-based, a user only needs to log into a secure website to download the data collected from the plants in rural areas.

The data is in a text format and can easily be imported into a programme such as Excel or Matlab.

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