

Research Paper :

Fractionation of Lemon grass oil for commercial exploitation

NADEEM AKBAR AND B.K.SAXENA

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See end of the article for authors' affiliations

Correspondence to:

NADEEM AKBAR

Fragrance and Flavour
Development Centre,
KANNAUJ (U.P.) INDIA

ABSTRACT

Water-steam distilled lemon grass (*Cymbopogon flexuosus* L.) oil contains citral 72-78% as main content. Citral was isolated under reduced pressure up to the maximum purity of 90% and further it is chemically converted into highly valuable aroma chemical, geranyl nitrile. The results indicated that isolation of citral and production of geranyl nitrile was a profitable processing for the perfumery industry.

Key words : Essential oil, Perfumery, *Cymbopogon flexuosus*, Geranyl nitrile, Lemon grass

Lemon grass (*Cymbopogon flexuosus* L.) is an aromatic species of *Cymbopogon* belonging to family Graminae. It has been known for its essential oil for a long time and widely distributed to different agro-climatic zones of the country. This aromatic grass is perennial in nature and once planted properly can give economic yield for numbers of years depending upon the management practices, climate, soil fertility etc. This crop is sensitive to environmental conditions *i.e.* rainfall, humidity, temperature and soil fertility. Therefore, there is wide variation in both yield and quality of the oil produced at different locations. In India, this plant is found growing in wasteland, saline soils, alkaline soils, hill slopes and marginal lands of semi-arid regions with low to moderate rainfall. The essential oil is obtained from the distillation of whole plant. Lemon grass is of four high yielding varieties like CKP- 25, Kalam Krishna, Pragati and Praman.

Essential oil is the volatile oil produced by steam, or water-steam distillation of whole plant material. The vapours are condensed to yield a water condensate and an essential oil that can be separated off, usually by gravity. Essential oil is a complex mixture of hundred constituents. These constituents can be separated into single isolate by using fractional distillation unit. Fractionation is a process in which the oil is redistilled in vacuum so individual components, or fractions, are separated out as they evaporate one after the other. This is possible because fractions or constituent has its own rate of volatility based on time and temperature.

In 1997, Bhattacharya *et al.* reported four *C. flexuosus* cultivars OD -19, Pragati, Cauvery and SKK -7 rich in neral/ geranial, one rich in geraniol GR-1 and one hybrid (CKP- 25) *C. flexuosus* x *C. khasianus*

Hackstapf ex. Bor.) rich in neral/ geranial that has been released for commercial cultivation. In addition to the above named lemon grass cultivars, Kulkarni (2000) listed SD 68 and Krishna as additional cultivars grown in India. Baratta *et al.* (1998) screened a commercial oil of lemongrass for its antimicrobial and antioxidant properties

The aim of this study was to fractionate the oil for getting the maximum recovery of citral and conversion of citral into geranyl nitrile for the benefit of new entrepreneurs.

MATERIALS AND METHODS

Lemon grass oil was collected locally and subjected to GC analysis by using Hewlett Packard 5890 series II gas chromatograph equipped with flame ionization detector (FID) and Carbowax 20mm polar fused silica capillary column (30m x 0.32mm.). The injector and detector temperature were maintained 210°C and 220°C, respectively. Nitrogen was used as carrier gas, flow rate 1.5 ml/min. The amount of sample injected was 0.1ml (split ratio 60:1). The oven temperature was programmed from 60-210°C at 3c/min.

After the analysis of lemon grass oil, it was then separated into various fractions using a 25-litres capacity glass fractionating column equipped with 4-neck flask capacity 25 liters, double walled column 4"/ 1 meter with stainless steel wire sulzer packing, reflux divider 4" with thermometer, condenser 4"x24" long, receivers of 5000ml and 2000 ml of 2 necked 1"/1" with bottom outlet 1". The vacuum pump of 600 liters capacity per minute was used with the unit. Glass reaction unit of 25 liters capacity 4 neck flask fitted with Teflon stirrer, thermometer pocket, reflux divider 4" with 1" thermometer, heat exchanger 4"/ 24" receivers of 5000ml and 2000 ml of 2 necked 1"/1"