The Asian Journal of Experimental Chemistry, **Vol. 4 No. 1&2 (June & December, 2009) : 97-100**

Research Paper :

Fractionation of lemon grass oil and anti-microbial activity of various fractions

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Accepted : ***October, 2009***

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ABSTRACT

The oil of lemon grass (*Cymbopogon flexuosus*) was fractionated under reduced pressure into ten (10) fractions and the sensitivity potential of the bacteria *Salmonella typhi* and *Staphylococcus aureus* to these fractions were investigated. The oil sample was first evaluated for anti-microbial properties using the cup plate method. The oil sample showed high antimicrobial activity on the *Salmonella typhi* and *Staphylococcus aureus*. The oil was then fractionated and each fraction was collected at its boiling point range under vacuum 5-10 mm Hg. The sensitivity potential of the test organisms was then carried out in these fractions. The results obtained indicated that *Salmonella typhi* was highly sensitive to the fractions 5, 6 and 7 (boiling point) 90-92^0 C and moderately sensitive to all other fractions while *Staphylococcus aureus* showed no sensitivity to the entire fractions.

Key words : Fractionation, Boiling points, Inhibitory effects, and Sensitivity potential

Lemon grass (*Cymbopogon flexuosus* L.) is a aromatic species of *Cymbopogon* belonging to the 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 a number of years (4-5) 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 semiarid 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. There are three distinct varieties of palmarosa that grow side by side in wild condition. The three varieties are Trishna,Tripta and PRC-1.

Essential oil is the volatile oil produced by steam, or water 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 fraction or constituent has its own rate of volatility based on time and temperature.

A sample of lemon grass oil produced in New Zealand was found by Lis Bal Chin *et al.* (1996) to possess the following major constituents, Limonene 4.6%, Neral 26.1%, Geranial 42.5%. Chagonda and Chalchat (1997) found that the main constituents of an oil of citratus produced from plants grown in Zimbabwe have neral 30% and geranial 41% with two other less major constituents *i.e.* Myrcene and geraniol. In 1997, Bhattacharya *et al.* reported four *C. flexuosus* cultivars OD-19, Pragati, Cauvery, 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. Chisowa *et al.* (1998) analyzed an oil of *C. citratus* produced from plants grown in Zambia for the chemical investigation of the oil. Chalchat *et al.* (1998) also reported that oils produced from *C. citratus* from plants collected in the Ivory Coast were found to posses the volatile component. In the same year, Liu *et al.* (1998) determined the composition of an oil of *C. citratus* produced from plants grown in China. A commercial sample of lemongrass oil purchased in Austria was subjected to GC MS analysis by Oberhofer *et al.* (1999) for its volatile composition. Lemongrass oil was produced from *C. citratus* in Zimbabwe from four consecutive years. Chagonda *et al.* (2000) analysed the