Figures 1 and 2. 1. A plant of parent variety IIHR/Sel 21. **2.** A leaf variant segregated in a progeny of IIHR/Sel 21.

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EFFICACY OF ODORIFEROUS ORGANIC COMPOUNDS ON THE GROWTH OF KERATINOPHILIC FUNGI

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THE essential oils and chemically related compounds represent a group of volatile substances, which are chiefly the products from the seed plants. The antimicrobial activity of these products has been reported earlier[1–5]. The inhibitory effect of essential oils against soil-inhabiting dermatophytes has also been reported[6–8]. The antimicrobial activity in the essential oils of plants may be due to their components like aliphatic acids and aldehydes[9]. The isolated substances from higher plants also possess systemic activity and less phytotoxicity as compared to the systemic antimicrobial substances[10]. The compounds showing such activity can be employed as surface applicants as a preventive measure for dermal diseases caused by various keratinophilic and related dermatophytes. Recently, the influence of organic volatile compounds on the growth of keratinophilic fungi was reported[11]. The present study was undertaken to test the efficacy of essential oils of seven medicinal plants viz. *Juniperus macropoda* Boiss. of Pinaceae; *Sessafras officinale* Nees. of Lauraceae; *Citrus sinensis* Osbeck of Rutaceae, *Vetiveria zizinoides* Stapf of Graminae; *Syzygium aromaticum* (Linn.) Merr & Perry of Myrtaceae; *Allium sativum* Linn. Liliaceae and *Eucalyptus citriodora* Hook of Myrtaceae (the last three are commonly called as clove, garlic and eucalyptus respectively), against the mycelial growth of 4 keratinophilic fungi viz. *Nannizzia incurvata* Stock. strain (+); *N. incurvata* Stock. strain (−); *Malbranchea aurantiaca* Sigler & Carmichael and *Botryotrichum keratinophilum* Kushwaha & Agrawal.

The essential oils were obtained from the dried wood of *J. macropoda* and *S. officinale*, fresh rind of the fruits of *C. sinensis*, roots of *V. zizinoides*, dried flower buds of clove, bulbs of garlic and leaves of eucalyptus, by the water and steam distillation methods[12], and dried over an anhydrous calcium chloride in a desiccator.

Table 1 *Efficacy of essential oils against the mycelial growth of keratinophilic fungi*

Essential oils used	Diameter of inhibition zone (mm)*			
	N. incurvata strain (+)	*N. incurvata* strain (−)	*M. aurantiaca*	*B. keratinophilum*
J. macropoda	20	13	15	9
S. officinale	15	9	20	22
C. cinensis	10	18	26	14
V. zizinoides	10	12	9	10
S. aromaticum	20	13	17	10
A. sativum	8	—	9	11
E. citriodora	7	—	14	13
Control (Aureofungin)				
500 ppm	8	7	9	8

* Inhibition zone includes the diameter of the filter paper disk (6 mm).

The antifungal activity of these oils was assayed against the test fungi following the filter paper diffusion plate method[13]. Sterilized filter paper disks (6 mm diam.) were dipped in the oil samples and placed on Sabouraud's dextrose agar plates freshly seeded with the spores of different test fungi. The plates were then incubated at 28°C for 7 days for maximum growth of the fungi. The antifungal activity of the oils was measured in terms of clear inhibition zones appearing around the filter paper disks dipped in 500 ppm solution of Aureofungin. The inhibition zones measured in each case are recorded (table 1).

The data (table 1) reveal that most of the oil samples were antifungal in nature varying in the degree of their activity. This may be due to the nature of the effective compounds and their capacity of diffusion into agar medium. The oil of *C. sinensis* was highly toxic, showing an inhibition zone of 26 mm diameter against *M. aurantiaca*. The oil of *S. officinale* showed the inhibition zone of 22 and 20 mm against *B. keratinophilum* and *M. aurantiaca* respectively. The highest inhibition zone went up to 20 mm in plus strain of *N. incurvata* caused by the oils of *J. macropoda* and *S. aromaticum*. *N. incurvata* strain (−) was resistant showing poor inhibition zone of 18 mm in the presence of *C. sinensis* oil. Veena and Kazmi[14] reported the resistance of some pathogenic bacteria to the extracts of *C. sinensis*. No toxic effect of *A. sativum* and *E. citriodora* was noted against the minus strain of *N. incurvata*.

The activity of these oils against most of the test fungi was remarkably greater than that of the concerned controls (table 1) except for that of *V. zizinoides* against *M. aurantiaca* and *A. sativum* against *N. incurvata* strain (+) which are just equal to the control. Among all the test fungi, *M. aurantiaca* was the most susceptible to all the oils tested and *N. incurvata* strain (−) the most resistant. The isolation of the effective compounds from these oils (which showed good fungitoxic activity) would be useful as potential antimicrobial weapons against diseases caused by the keratinophilic fungi tested here and other related dermatophytes.

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PHYLLODY, A NEW DISEASE OF GREEN GRAM (*PHASEOLUS AUREUS* ROXB.) IN TAMIL NADU

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GREEN gram (*Phaseolus aureus* Roxb.), one of the most important pulse crops of Tamil Nadu, is extensively cultivated as a companion crop with cereals, cotton and groundnut. Since the average diet of the Indian population is deficient in protein content there is need for increase in its production. Intensive cultivation practices often create new disease[1]. During March–April 1986, the experimental plots (var. Co. 2) in our university farm were severely affected by a disease, causing the production of phylloid flowers. The disease was characterized by stunting and smalling of leaves in the initial stages. Later, when the plants reached the flowering stage, the floral parts were transformed into green, leaf-like structures followed by abundant vegetative growth (figure 1). The sepals usually big in size became leaf-like structures. The veins of the petals and sepals were thickened and appeared prominent (figure 2). Nearly 18% of plants exhibited phylloid flowers. The production of side branches and shoots from the base of the plants were increased (figure 3) in comparison with the healthy plants. There was drastic reduction in the 1000 grain weight as well as the number of grains per capsule (table 1).

Attempts to transmit the disease through sap inoculation were unsuccessful. By side wedge grafting the disease was successfully transmitted on 25-day-old Co. 2 green gram plants. Infected termin-

Figures 1–3. **1.** Green leaf like structure and abundant vegetative growth of the flowers; **2.** Prominen and thick veins of the petals and sepals, and **3.** Production of side shoots in the infected plants.