

# Suppression of Foot Microbiota

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## ABSTRACT

Wearing shoes has become an inevitable event in this corporate lifestyle. Dampness in foot is caused due to long hour use of shoes. Thus, shoes provide some sustainable environment for microbial growth. By feeding on dead cells of foot, microbes cause smell (bromodosis) due to the breakdown of leucine present in sweat. The aim of the project is to prepare a spray, in order to prevent bromodosis due to foot microbiota (surface of foot), by extraction of organic compounds. A study was undertaken to determine the suppression of ethanol and water concentrates of *Curcuma longa* (turmeric), *Azadirachta indica* (neem leaves) and *Curcuma amada* (Mango ginger). The culture was prepared by traditional swabbing and inoculation method (nutrient broth culture). Agar well diffusion method is used to determine the antimicrobial activity of plants extracts by swabbing the microbial inoculum over the entire surface of agar plate. *Curcuma longa* with curcumin as its active compound, which exhibit antifungal, and antiviral properties. *Azadirachta indica* has antibacterial properties whereas *Curcuma amada* has antifungal and antioxidant properties. The active compound of turmeric, was taken in the concentrate of 15% and 30% have lesser inhibiting properties which was compared to neem and mango ginger concentrates by agar well diffusion method. Mango ginger concentrate has a less inhibitory property than neem. Neem has the highest inhibition at 15% concentration. Concoction of high suppressants could be formulated for the product (spray).

**Keywords:** Bromodosis, Antifungal, Anti-bacterial, Anti- Viral, Inhibitory property, Agar well diffusion method.

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## INTRODUCTION

Various microbes grow on our body. In certain places over accumulation of microbes cause bad smell and infections. If it is left untreated it will cause a great damage to that part of the skin. There are many fungal infections like athlete's foot, ringworm and jock itch. Our main focus of our project is about inhibiting the microbial growth on our feet. On wearing shoes for a long time, sweat and bad smell is produced. The bad smell being produced is due to the microbial activity and not particularly due to the release of sweat. *Staphylococcus epidermidis*, a bacteria breaks down the amino acid which is present in sweat called leucine. In order to reduce the sweat it is necessary to inhibit the growth of microbes. Bromodosis or smelly feet is the build-up of sweat which results bacteria growth on the skin and it is a very common medical condition. Bromodosis can be caused by fungal infections like athlete's foot. At present there is no cure for it but there are treatments like washing feet in regular intervals, using alternate wears, using deodorants and powder to reduce odour.

In our project, we have used neem, turmeric, mango ginger. Neem (*Azadirachta indica*) is a member of the *Meliaceae* family and its role as health-promoting effect is attributed because it is rich source of antioxidant. It has been widely used in Chinese, Ayurvedic, and Unani medicines worldwide especially in Indian Subcontinent in the treatment and prevention of various diseases. Earlier finding confirmed that neem and its constituents play role in the scavenging of free radical generation and prevention of disease pathogenesis.

Curcumin is the major source of turmeric. It aids in the management of oxidative and inflammatory conditions, metabolic syndrome, arthritis, anxiety, and hyperlipidemia. It may also help in the management of exercise-induced inflammation and muscle soreness, thus enhancing recovery and performance in active people. It mainly heals the wounds by reducing the inflammation.

Mango Ginger is known for several therapeutic properties and hence is used extensively for treating digestive issues. Mango Ginger is known for its antibacterial, antifungal, anti-inflammatory, antioxidant properties

### MATERIALS AND METHODOLOGY

Neem leaves, turmeric and mango ginger was purchased from the field which was cleaned and then used. All the other chemicals used were analytical grade obtained commercially.

#### Inoculum Preparation

The Nutrient broth is prepared in a sterilized conical flask and it is let to cool till room temperature. The nutrient broth is inoculated by swabbing live samples from dumpy shoes. The Inoculated broth is incubated at 37 °C for almost 24 hours for good microbial growth.

#### Extract Preparation

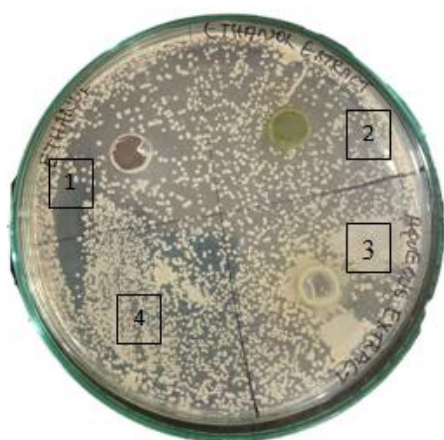
In the autoclave, beakers for extract preparation are sterilized. The extract is prepared by measuring the amount of plant material used and the material is grinded by using motor and pestle. The paste thus made is allowed to soak in water and ethanol respectively. (The water and ethanol for extract is taken in equal volume of that of the paste). The extract is filtered using an autoclaved cloth.

#### Agar Well Diffusion Method

In a sterile petri dish, nutrient agar is poured and set to solidify. When the media is solidified the Petri is divided in to four quadrants. A well is made in each quadrant at the centre. The media in the Petri is now completely swabbed with the culture previously inoculated. Each well is filled with extracts and control (Ethanol extract, Water extract, Ethanol control and Water control). The Petri is now incubated at 37 °C for a day. Similarly, duplicates are also made for each plant extract.

### RESULTS AND DISCUSSION

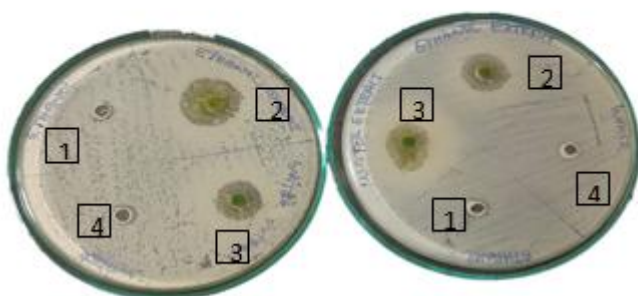
#### Antimicrobial Activity of Neem



1. Ethanol control
2. Ethanollic Neem extract
3. Aqueous Neem extract
4. Distilled water control

The extraction of neem was done using both ethanol and water. Direct swabbing is done. It means that the microbes are rubbed in the shoes by which microbes bind to it and it is directly swabbed in the nutrient agar.

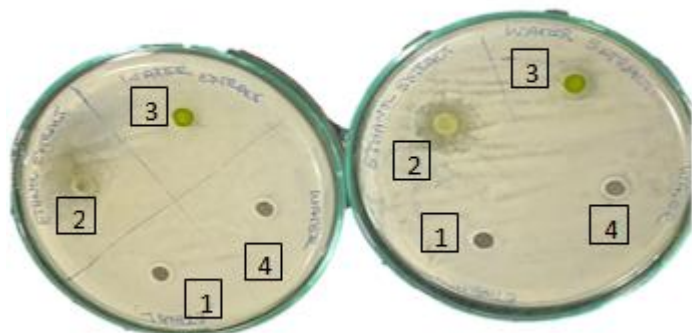
**Antimicrobial Activity of Neem Concentration of extract: 15%**



1. Ethanol control
2. Ethanollic Neem extract
3. Aqueous Neem extract
4. Distilled water control

Here direct swabbing is not done. Instead, the swab containing microbes is inoculated in a nutrient broth and allowed to grow for a day. And swabbed in the nutrient agar. Here extract is done using both ethanol and water.

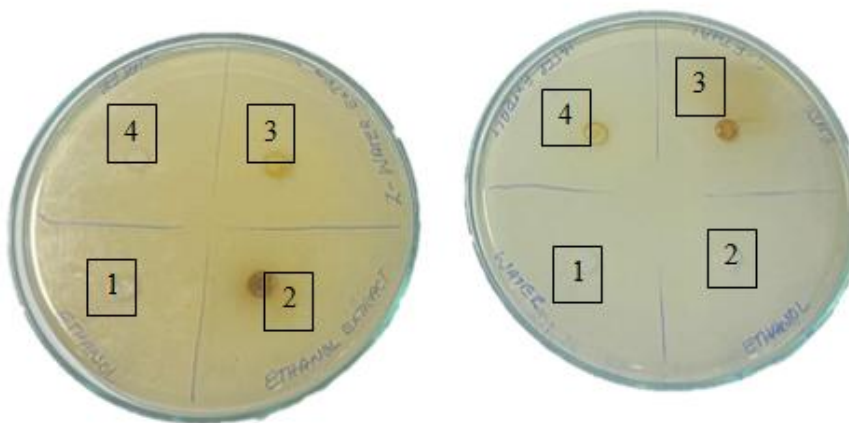
**Antimicrobial Activity of Neem Concentration of extract: 15%**



- 1.Ethanol control
- 2.Ethanollic Neem extract
- 3.Aqueous Neem extract
- 4.Distilled water control

Ethanol extract has good inhibiting properties while compared to water extract. Based on the formation of zone of inhibition

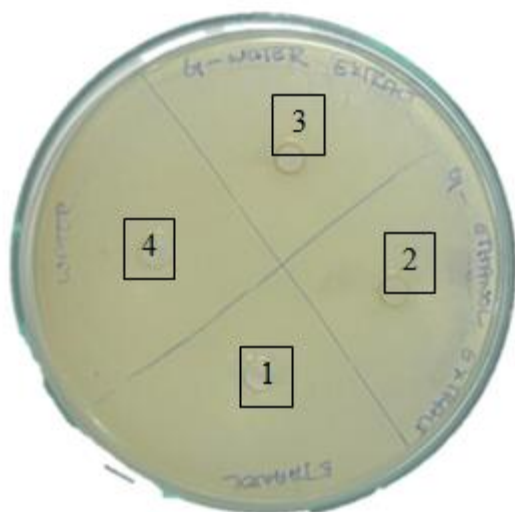
**Antimicrobial Activity of Turmeric Concentration of extract: 15%**



- 1. Ethanol control
- 2.Ethanollic Neem extract
- 3.Aqueous Neem extract
- 4.Distilled water control

No significant inhibition observed at 15% concentration of turmeric extract.

**Antimicrobial Activity of Mango ginger Concentration of extract: 15%**



- 1.Ethanol control
- 2.Ethanollic Neem extract
- 3.Aqueous Neem extract
- 4.Distilled water control

No significant inhibition observed at 15% concentration of turmeric extract.



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#### **Declarations:**

Conflict of interest: The authors report no conflicts of interest.

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Ethical Clearance: Nil

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