Available online at www.elixirpublishers.com (Elixir International Journal)

Bio Technology

Elixir Bio Tech. 96 (2016) 41738-41740

ISSN: 2229-712X

Comparative Study of Clove Oil against Bacteria and Fungal Species

Seema Verma, Arunima Karkun and Huma Naz Siddiqui
GD Rungta College of Science and Technology.

ARTICLE INFO

Article history:
Received: 9 June 2015;
Received in revised form:
17 July 2016;
Accepted: 23 July 2016;

Keywords
Antimicrobial activity,
Agar well diffusion.

ABSTRACT

In the present study the test was carried out for the screening of antimicrobial activity of clove oil extracted from clove. Screening was done using agar well diffusion method against Bacteria and Fungi. 4 Bacterial and 10 fungal species were taken. According to the result clove oil was effective against Bacteria as compared to Fungi in particular concentration. We can conclude by our work that clove oil is better for antibacterial. It has also been noticed that by increasing concentration of clove oil the growth of fungi has decreased.

Introduction

The Modern Age of technology and globalization has always kept the herbal and traditional Medicines in a adorable and trusted position. Reason for this trust for herbs and natural products is the decreasing efficiency of conventional medicines to some extent. Spices are always a better alternative to use it against bacterial and fungal infection. Indian culinary traditional includes more use of spices in food. Indian kitchens are considered as first Hospitals. The botanical name of clove is *Syzygium aromaticum* and common name is Laung, Lavang. It is aromatic flower buds of tree of family Myrtaceae. Clove tree is an evergreen tree, that grows 8-12 m tall. With large leaves and Sanguine flowers grouped in terminal clusters. Cloves are harvested when buds are 1.5-2.0 cm long calyx, that terminates in four spreading sepals and four unopened petals that form a small central ball.

CLOVES are used in Kitchen as spice and flavoring agent as a Dental wash which inhibits the growth of *Porphyromonas gingivlis* and *Prevotella intermedia*. It is used as antiseptic and disinfectant and so many Chemical Composition of Clove is volatile oil- 14 to 20%, Gallotannic acid- 10 to 30%, Oleanolic acid, Vannilin, Eugenin. Clove oils are composed of- Eugenol (80-95%),

Eugenyl acetate (1-5%), Beta caryophyllene (4-12%). Anti microbial activity of clove oil is largely due to presence of Eugenol. The main chemical components of clove oils are eugenol, acetyl eugenol, iso-eugenol and β-caryophyllene (Fichi et al., 2007; Silva & Fernandes, 2010; Rahimi et al., 2012). The phenolic compounds which are obtained from oil are responsible for the antibacterial and antifungal activity. The present paper deals with the study of antibacterial and antifungal activity of clove oil and to determine and compare its activity between them.

Methodology

➢ Isolation of clove oil (Hydrodistillation)

Clove buds washed, dried and then weighed. Buds fed inside round bottom flask of Clevenger apparatus and then assembled apparatus is allowed to work for 8 hours.

Extraction of clove oil by Clevenger apparatus. Oil is collected and stored in closed glass test tube in refrigerator.

Bacteria used were- *E.coli, Bacillus cereus, Brevundimonas diminuta and Bacillus thirungenesis.*

Fungi used were- Aspergillus fumigatus , A. flavus , A. nidulus , Aspergillus niger, Alternaria alternata, Alternaria crassa, Penicillium notatum, Penicillium Meleagranum var viridiflavum, Penicillium multicolor and Penicillium citrinum

Inoculation method (Agar well diffusion)

➢ Each strain was poured in two petri plates.
➢ One plate inoculated with each of the strains with oil.
➢ Other kept as control without oil.
➢ Inoculation of clove oil was done in three wells 50µl, 75µl and 100µl, in same plate, with the help of micropippete and punching tube in Laminar.

Tele:
E-mail address: arunimakarkun@gmail.com

All the bacterial plates were incubated at 37 degree centigrade for 24 hours and fungal plates for 3 days at 28° C.

Results and Discussions

Clove oil is found to be more effective against bacteria as compared to fungi as a whole. For *E.coli*, oil was found more effective than other two *B.cereus* & *B. diminuta* whereas oil was not effective against *Bacillus thirungenesis*. At 75 µl and 100 µl clove oil has shown good antibacterial activity. However in 50 µl oil was least effective (Table- 1, Figure- 1,2,3). Among fungi *Penicillium multicolor*, *Aspergillus niger*, *Alternaria crassa*, *Penicillium citrinum* and *Penicillium Meleagranum var viridiflavum* was resistant to clove oil. Least activity was found against *A.fumigatus* than rest four other fungal strains. However in high concentration it was inhibited. Inference can be drawn that essential oil of clove is more effective on bacteria than fungi. Maximum zone of inhibition was shown against *Aspergillus nidulan* at 100 µl. Clove oil tested against the bacterial and fungal strains, it was concluded by Radhika and Kamal Rai aneja that clove oil emerged as the potent agent exhibiting even much higher antibacterial and antifungal activity than the standard antibacterial and antifungal drugs ciprofloxacin and amphotericin-B respectively. They tested clove oil against five dental caries causing microorganisms namely *Streptococcus mutans*, *Staphylococcus aureus*, *Lactobacillus acidophilus* (bacteria), *Candida albicans* and *Saccharomyces cerevisiae* (yeast).

Table 1. Zone of inhibition measurement at different concentrations

Name of Bacteria	50 µl	75 µl	100µl
E.coli	10mm	20mm	28mm
Bacillus cereus	8mm	15mm	24mm
Brevundimonas diminuta	8mm	18mm	24mm
Bacillus Thirungenesis	No effect	No effect	No effect

Table 2. Zone of inhibition measurement at different concentrations

Name of Fungi	50 µl	75 µl	100 µl
Aspergillus nidulans	No effect	No effect	18mm
Alternaria alternata	No effect	6mm	18mm
Aspergillus flavus	No effect	No effect	10mm
Penicillium notatum	No effect	6mm	8mm
Aspergillus fumigatus	No effect	No effect	6mm
Alternaria crassa	No effect	No effect	No effect
Aspergillus niger	No effect	No effect	No effect
Penicillium citrinum	No effect	No effect	No effect
Penicillium multicolor	No effect	No effect	No effect
Penicillium meleagrinum var. viridiflavum	No effect	No effect	No effect

Fig 1. *B.cereus*

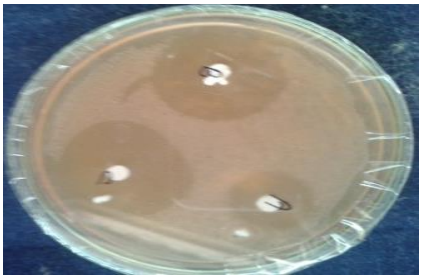

Fig 2. *Brevundimonas diminuta*

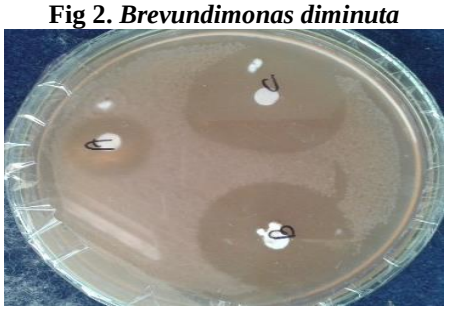

Fig 3. *E.coli*

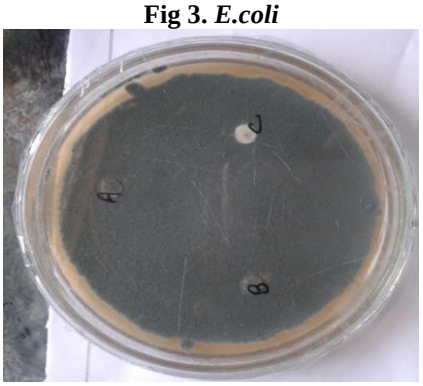

Fig 4. *Aspergillus fumigatus*

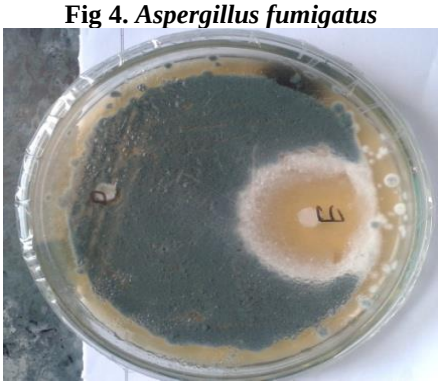

Fig 5. *Aspergillus nidulans*

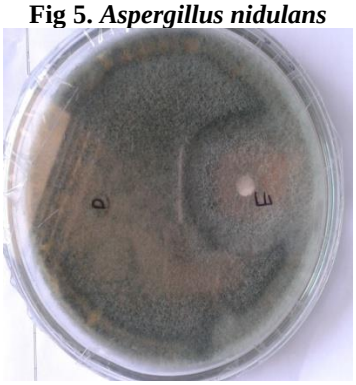

Fig 6. *Alternaria alternate*

According to Baraka and his coworkers (2011),clove oil inhibits the growth mycelium and they found effective against *F. oxysproum*, *F.solani*, *F. monliforme*, *T. paradoxa*, *B. theobromae and R.solan*. Our presents study results also agrees with the statement as it was effective for some fungi, but in higher concentration. May be on increasing concentration it will

be more effective. Hitokoto et al. (1980), showed that eugenol extracted from powdered cloves completely inhibited the growth of both *Aspergillus flavus* and *Aspergillus versicolor* at a concentration of 250 µg/mL. In 2011 Rana and his coworkers tested the antifungal acticity of clove oil on many fungi and they found it effective.

Conclusion

In todays world the use of herbal products are increasing. Clove which has been chosen by us during investigations has given positive result for Bacteria. Clove oil showed inhibitory effect against all bacteria and fungus more or less. For bacteria, it was more effective. For fungi, it was more effective in higher concentration. However it can be concluded by saying that on increasing concentrations of oil it can show inhibitory effect.

References

Baraka MA, Radwan FM, Shaban WI, Arafat KH (2011) Efficiency of some plant extracts, natural oils, bio fungicides and fungicides against root rot disease of date palm. Journal of Biological Chemistry and Environmental Sciences 6: 405-429.

Fichi G, Flamini G, Giovanelli F, Otranto D, Perrucci S (2007) Efficacy of an essential oil of Eugenia caryophyllata against Psoroptes cuniculi. Experimental Parasitology 115: 168-172.

Hitokoto H, Morozumi S, Wauke T, Sakai S, Kurata H (1980) Inhibitory Effects of Spices on Growth and Toxin Production of Toxigenic Fungi. Applied and Environmental Microbiology 39: 818-822

Inder Singh Rana, Aarti Singh Rana, Ram Charan Rajak (2011)Evaluation of antifungal activity in essential oil of the Syzygium aromaticum (L.) by extraction, purification and analysis of its main component eugenol. Braz J Microbiol. 42(4): 1269–1277.

Kamal RaiAneja and Radhika Joshi. Antimicrobial Activity of *Syzygium aromaticum* and Its Bud Oil against Dental Cares Causing Microorganisms. Ethnobotanical Leaflets , 2010;14: 960-75.

Rahimi AA, Ashnagar A, NikoeiH (2012) Isolation and characterization of 4-allyl-2-methoxyphenol (eugenol) from clove buds marketed in Tehran city of Iran. International Journal of ChemTech Research 4: 105-108

Silva NCC, Fernandes JA (2010) Biological properties of medicinal plants: a review of their antimicrobial activity. The Journal of Venomous Animals and Toxins including Tropical Diseases 16: 402-413.