nano fungi

Active ingredients

Clove, Lavender and Tea tree and Cinnamon essential oils.

Description

Nano Fungi is a natural antifungal blend containing encapsulated essential oils in biopolymer nanoparticles (VAM®- Multifunctional Active Vectors)*, with an average particle diameter of 500-600nm and enzymatic release triggers. The encapsulation of the blend through the VAM ® Technology allows the essential oils stabilization, which are extremely sensitive and complex to be formulated in their free form due to their high reactivity with the medium components. In addition to increased stability, nanoparticles consist in strategic materials that are nutrient sources for microorganisms, which results in a "trap" system, the fungus degrades the capsule and comes in contact with the antifungal blend. The Nano Fungi actives blend acts synergistically such as a natural antifungal. The action of Nano Fungi was proven against *Candida albicans* and *Aspergillus fumigatus*. The fat-soluble nature of essential oils and their constituents enable interactions with cellular lipid structures resulting in the increase of the membrane permeability, which can cause electrolyte imbalance and cell death. Studies have shown that essential oils penetrate into the tissues approximately 100 times faster than the water. The high membranes penetration capacity confers to the phenolic compounds such as Eugenol (the main component of Clove) an antimicrobial activity, resulting in the rupture of the membranes and increasing their nonspecific permeability, generating a leakage of the cell contents and finally death of the fungus. As a result the clove essential oil has proven effective against fungi isolated from onychomycosis, as *Candida albicans*, *Trichophyton men-tagrophytes*, *Saccharomyces cerevisiae* and *Aspergillus niger* (AFFONSO *et al*, 2012), and other fungi as *Fusarium oxysporum*, *Penicillium sp*. and *Trichoderma sp*. (EL-MESALLAMY *et al*, 2012). The three components of cinnamon oil, which have been identified such as antifungal agents, are cinnamic aldehyde, eugenol, and o-methoxycinnamaldehyde (GARCÍA-CAMARILLO, 2006). The cinnamon essential oil has a strong antifungal potential against dematiaceous fungi and candida species (MOREIRA, 2007; CASTRO; LIMA, 2013). The Tea tree essential oil is a powerful antifungal and its main compounds are cineole and terpinen-4-ol. The cineole acts as an antimicrobial with marginal effect, or it is irritant to the skin which increases the membrane permeability to facilitate the entrance of other antimicrobial agents. The terpinen-4-ol holds the main antimicrobial activity because it alters the membrane permeability and fluidity, causing structural damages to the fungi membranes and cell walls, compromising their integrity (CAVALCANTI; ALMEIDA; PADILHA, 2011). It has high permeation power being able to eliminate subcutaneous infections and promoting quick results (PAZYAR *et al*, 2013; NOVACOSK; TORRES, 2006). The Lavender essential oil has fungitoxic and fungistatic action. The main components of Lavender oil are linalool and linalyl acetate that inhibit the germ tube formation and the hyphae elongation in *Candida albicans*, reducing the infection's progression and spread (D'AURIA *et al*, 2005).

*VAM ® Lipid and biopolymer particles of natural origin, biocompatible and biodegradable, produced in a water medium, aggregating multifunctionality to the active ingredients and with specific release triggers (Nanovetores ® Patented Technology)

Evaluation of the antifungal effectiveness

Product tested: Nano Fungi at the following concentrations 1%, 3%, 4% and 5%.

Method: Pour plate method in Sabouraud Dextrose Agar medium to evaluate the antifungal activity against Aspergillus fumigatus and Candida albicans.

Incubation time: 7 days.

Results: There was no growth of Aspergillus fumigatus in the culture media containing Nano Fungi in concentrations of 1%, 3%, 4% and 5% (Figures 1 and 2)

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There was no growth of Candida albicans in the culture media containing Nano Fungi in concentration of 5% (Figures 3 and 4).

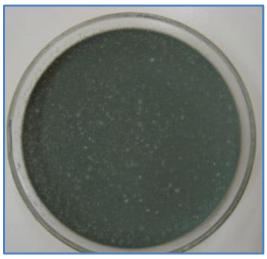

Figure 1

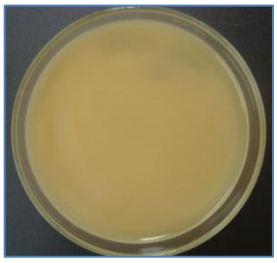

Figure 2

Figure 1. Growth of Aspergillus fumigatu in Sabouraud Dextrose Agar culture medium without Nano Fungi.

Figure 2. Sabouraud Dextrose Agar culture medium containing Nano Fungi. There was no growth of Aspergillus fumigatus.

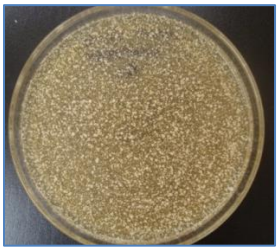

Figure 3

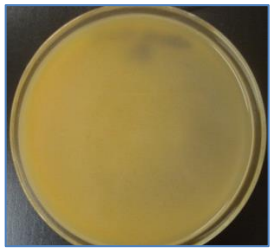

Figure 4

Figura 3. Growth of Candida albican in Sabouraud Dextrose Agar culture medium without Nano Fungi

Figura 4. Sabouraud Dextrose Agar culture medium containing Nano Fungi (5%). There was no growth of Candida albicans.

Technical information

INCI NAME: AQUA, LINOLEIC ACID, OLEIC ACID, MELALEUCA ALTERNIFOLIA LEAF OIL , LAVANDULA OFFICINALIS FLOWER OIL, CINNAMOMUM ZELANICUM BARK OIL, EUGENIA CARYOPHYLLUS FLOWER OIL, HYDROXYPROPYL GUAR, POLYSORBATE 80, PPG-15 STEARYL ETHER, STEARETH-2, STEARETH-21, BHT, PHENOXYETHANOL, CAPRYLYL GLYCOL

Aspect: Milky liquid white to cream in color.

Use concentration: 1% - 5%.

pH stability: 8,0 to 11,0

Solubility: Dispersible in water.

How to use: Add the formulation below 40ºC under gentle shaking.

Storage: Keep at room tempera-ture between 20ºC – 25ºC.

Vehicle compatibilities: Non-ionic vehicles or cationic. It can be applied in gels, emulsions, liquid soaps, shampoos, conditioners and serums.

Incompatibility: Polymers and Anionic surfactants and Ethanol.

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