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Commentary

Two Tropical Disease Vectors are affected by an Herbal Oil in Water Nano-Emulsion

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COMMENTARY

In undeveloped countries, mosquito-borne tropical neglected and emergent diseases are a major problem. Aedes aegypti plays a key role in the transmission of arboviruses such as dengue fever, chikungunya fever, Zika, and urban yellow fever. Dengue fever has become a significant public health problem in various tropical and subtropical nations in recent years, with an estimated 3.9 billion people worldwide at risk, spread across 128 countries. According to estimates, there are roughly 390 million instances per year, with 96 million showing clinical symptoms. The mosquito Culex quinquefasciatus, which is linked to the spread of lymphatic filariasis, is another vector. The loss due to lymphatic filariasis in India is estimated to be over $1 billion per year due to treatment costs and lost productivity. Furthermore, developing tropical diseases that are conveyed by mosquitos may become a public health issue in some areas. The recent incidences of Zika virus in Brazil have brought this issue to light.

DESCRIPTION

However, the possibility of these diseases spreading to industrialised countries, especially those in Europe, should be taken into account. Infection with the Zika virus, as well as clusters of cases of microcephaly and other neurological problems, particularly in newborns, is a developing public health concern of global concern. Due to the potential of nanostructured systems to affect the properties of bulk materials, nanotechnology is an emerging sector for novel products in various industrial areas. Nano formulations containing botanical insecticides have a lot of potential because of the advantages that the nanoscale can provide, such as improved physical stability, protection against chemical degradation, controlled release, better water solubility, and even reduced evaporation loss, which is especially useful if a volatile oil is used. Oil in water nano-emulsions are scattered systems of fine spherical droplets of immiscible oil in water that are thermodynamically unstable. Surfactants, which play a key role in the kinetic stability of nano-emulsions during storage, are frequently used to stabilize these colloids. The external aqueous phase allows for the diluting of the oil in water nano-emulsions, which provide a significant advantage in terms of the availability of natural oils in water for mosquito larval larvicidal reasons. The nano-emulsion droplet size range is still a point of contention. Frequently, recognised definitions imply that it is associated with droplets with a mean diameter of 20 to 100–500 nm, with the highest limit varying depending on the author [1].

Nano-emulsions, also known as miniemulsions, can be made using both high- and low-energy processes. The first category uses high-energy devices to reduce droplet size, such as high-pressure homogenizers, sonication, or high-shear stirrers. However, this strategy frequently raises the expense of the procedure and makes the practical use more challenging. Low-energy approaches, on the other hand, involve changes in surfactant spontaneous curvature. The phase inversion temperature method is used to perform phase inversion [2].phase inversion composition, which is performed under constant composition and changing temperature, and phase inversion composition, which is performed under constant composition and variable temperature. If a volatile solvent capable of rapidly diffusing to the exterior phase is utilised during the SE, one would expect a stage of evaporation, often under lower pressure. It's possible that some volatile oil components will be lost in this situation. In the case of the PIT, the inherent temperature increase is a key point that might lead to the loss of volatiles from the volatile oil. As a result, the PIC can be considered the best approach for nano-emulsification of volatile oils since the change in spontaneous curvature is initiated at a constant temperature, which can be obtained even at room temperature, preventing volatile oil loss during the process. Using inexpensive stir-ring apparatus and these low-energy processes, tiny droplets can be achieved [3].

As a result, these unique delivery systems can be obtained using a low-cost approach that can be easily spread for practical applications. To our knowledge, the majority of studies aimed at creating larvicidal aqueous nano-emulsions containing bioactive volatile oils continue to use high-energy methods. In this respect, the goal of this work is to create a nano-emulsion using L. Alba using a simple titration method and test its larvicidal activity against Aedes aegypti and Culex quinquefasciatus larvae for the

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first time [4]. The leaves were dried in a forced air oven at 40°C and kept shielded from light at room temperature until the volatile oil was extracted using hydrodistillation using a Clevenger type device the extraction time was 120 minutes after the water was brought to a boil. The extraction was done in three replicates, with each replicate utilising 100 g of dried leaves. Following the extraction, samples containing volatile oil were centrifuged with anhydrous sodium sulphate to remove residual water before being stored at 5°C in amber glass vials. According to Santos, the volatile oil production is proportional to the dry plant material employed in the extraction. The relative density of the population was calculated using a pycnomete, according to the Brazilian Pharmacopeia [5].

CONFLICT OF INTEREST

None

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