Eucalyptus Oil as a Remedy for Agriculture crop protection: A Review

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ABSTRACT

The word “eucalyptus” originates from Greek terms meaning “well” and “cover,” describing its association with closed flowers. This evergreen tree, native to Australia and other regions, has become one of the most widely planted tree species globally due to its rapid growth and versatility. Eucalyptus offers economic benefits, supports smallholders, and aids in regenerating damaged forests. However, its environmental impact, including water resource depletion and soil erosion, requires further study. Eucalyptus oil, influenced by factors like altitude and tree age, has various pharmaceutical applications. It serves as an insecticide, pesticide, and nematicide, thanks to components like 1,8-cineole. The oil repels insects, inhibits pests, and even deters disease vectors. Additionally, it exhibits antidiabetic, antioxidant, and pain-relieving properties, making it a valuable natural remedy. In conclusion, eucalyptus cultivation offers economic benefits and ecological advantages, but its environmental consequences need closer examination. Eucalyptus oil’s diverse applications in pest control and healthcare underscore its multifaceted importance.

Key words: Eucalyptus, Remedy, Eucalyptus oil, Natural remedy

Introduction

The Greek terms “Eu” and “Kalypta,” which have the meanings of “Well” and “Cover,” respectively, and when combined have the meaning “well cover,” make up the English word “eucalyptus.” As a result, the word “eucalyptus” alludes to a little cap that covers a closed flower; in terms of environments, it is classified as an evergreen flowering tree and shrub (Khan et al., 2006). According to Abebe et al., (2003), it is native to Australia and Tasmania, with a few species also existing in New Guinea, the Philippines, and Indonesia. It has since become the most frequently different kinds of trees that were entire world. In particular, the expanding tropical nations with their growing populations have rapidly rising demands for wood for industrial uses and fuel needs. People frequently choose to plant exotic tree species that develop quickly and are highly useful as a solution to this problem (Zerga et al., 2015). The planting of eucalyptus species has produced significant economic profitability when compared to the agricultural usage of land utilized in cultivation of crop (Lemenih et al., 2010). Eucalyptus species are frequently incorporated with different farming systems. Among the most popular trees employed by the government plantations, community programs, and private woodlots is eucalyptus. Comparing to most native tree species, this tree species develops more quickly and thrives in poor soil. Eucalyptus poles, which may be used to build dwellings, fences, and farm implements, are clearly preferred by smallholders (Muluneh et al., 2011). Furthermore, the sale of eucalyptus poles and products has the
potential of helping boost food security, alleviate poverty, increase farm incomes, and diversify smallholder farming practices in various parts of the Amhara region (Zerfu et al., 2002). Eucalyptus plantations can be utilized as a management technique for regenerating damaged forest lands and have a catalytic impact on the regeneration of native species (Gil et al., 2010). Since eucalyptus is frequently introduced by farmers, especially according to many other tree species, this one offer better and more versatile services for smallholders in tropical and subtropical regions (Hailemicael et al., 2012).

Significance of eucalyptus oil

Eucalyptus oil’s output and chemical make-up are impacted by several variables. Previous research has demonstrated the existence of complex inter- or intra-species elements that can be split into exterior and internal components. Internal factors that significantly impacted yield and chemical composition were identified, including tree age and physiological leaf age (mature and juvenile), according to Singh et al. (2012). The yield, productivity, and chemical makeup of the eucalyptus oil depend greatly on the essential oil’s pretreatment and extraction procedures. In the pharmaceutical sector, eucalyptus oil containing 1,8-cineole as its primary constituent is used as a raw material to make decongestants, aromatherapy oils, and disinfectants.

Oil As A Repellant: Insecticide, Pesticide, Nematicide

Due to phenolic acids emitted from certain Eucalyptus species’ volatile oils and leaves, which have harmful effects on other plant species, essential oils may be used as insecticides, pesticides, and nematicides. The numerous components, including 1,8-cineole, citronellal, p-cymene, eucamalol, limonene, -pinene, -terpinene, and all oocimene, among others, are what give eucalyptus oil its pesticidal properties (Su et al., 2006). Insecticides and pesticides use 1,8-cineole as a carrier solvent since it is a genus-specific discerning chemical Eucalyptus and is largely responsible for a range of its repellent attributes. Whilst contrasted to other insect pests, Eucalyptus staigeriana, E. citriodora, and E. globulus were found to operate more successful against the (Lutzomyia longipalp) blood-sucking sandfly (Maciel et al., 2010). Since the hydrosol still offers extremely effective protection from a thick radius of insects over a period of several hours, Eucalyptus citriodora (Maia et al., 2011) may be excellent necessary oil tick repellent solution for usage around kids and pets. Recent research by Ceferino et al. (2006) showed that the essential oils of Echiumcinerea, Echiumcinalis, and Echiunsaligna proved fungiment toxic and opposition against permethrin-resistant scalp lice, thru KT50 ideals of 12.0, 14.9, and 17.4 minutes, correspondingly. By using a pair of distinct bioassays-contact toxicity and fumigation- E. globulus oil’s insecticidal activity has been examined against housefly larvae and pupae. According to Rani et al. (2016), the adult Musa domesticaflies were fumigatively harmful to E. globulus leaf oil. The greatest concentration of resulted in 100% death in 6.5 minutes and 0.24 a few seconds, comparing to no mortality of fies for up to two days in the control group. Larvae and pupae had LD50 values for oil of 48.2 and 15.69, respectively. Mortality rates of larvae and pupae in the control category were 10.16 0.31 and 10.16 0.28%, respectively. Red bugs were driven away by E. Globules (Samani et al., 2015) leaf essential oil. The concentrations of 1.2 or 50% in this investigation exhibited a greater acaricidal effect on mites. This activity increased as oil concentration increased (maximum at 50%), whereas there was none at the negative control.

Eucalyptus Oil as other pharmaceutical applications (Fig. 1)

Antidiabetic: E. globulus leaf essential oil displays anti-diabetic and antioxidant qualities. It lessens oxidative stress by reducing blood sugar levels in diabetic mice that inhibits the necessary generation of reactive oxygen species through protein glycation. Eucalyptus citriodora had exceptional anti-diabetic consequence which is comparable to the medication Glibenclamide (Dey et al., 2013). An ethanolic extract of E. camaldulensis (Dawoud et al., Fig. 1. Eucalyptus Oil as other pharmaceutical applications)
2015) leaves are being shown in recent research to significantly lower postprandial hyperglycemia in type-2 diabetic rat models. Given this property, it may be useful for those with type-2 diabetes who have insulin resistance and are susceptible to high postprandial glucose surges. E. camaldulensis oil’s antidiabetic effects have been assessed in vitro by the inhibition of -amylase and -glucosidase, as stated by Basak and Candan. A non-competitive procedure inhibited -amylase and -glucosidase similarly.

**Antioxidant:** The monoterpenoid-rich oil extract Eucalyptus tereticornis has antioxidant properties. Additionally, the methanol extracts of E. globulus exhibited the capacity to interrupt the oxidation process (Sugimoto et al., 2005). Increased production of reactive oxygen species (ROS) and oxidative damage to parts of the tissue have both been associated with hyperglycaemia in diabetes. Due to the presence of -diketone and ellagic acid, (Osawa et al., 2005) leaves are being shown in recent research to significantly lower postprandial hyperglycemia in type-2 diabetic rat models. Given this property, it may be useful for those with type-2 diabetes who have insulin resistance and are susceptible to high postprandial glucose surges. E. camaldulensis oil’s antidiabetic effects have been assessed in vitro by the inhibition of -amylase and -glucosidase, as stated by Basak and Candan. A non-competitive procedure inhibited -amylase and -glucosidase similarly.

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**Conclusion**

The cultivation of eucalyptus species has demonstrated substantial economic profitability, often surpassing traditional crop production. It is a preferred choice among smallholders due to its ability to thrive in poor soil conditions and its utility in constructing various essential items. Additionally, eucalyptus plays a vital role as a source of fuel wood for both rural and urban populations, contributing to food security, poverty reduction, and income diversification. Furthermore, eucalyptus plantations have shown promise in supporting biodiversity, facilitating the natural regeneration of native species, and rehabilitating damaged forest lands. However, this remarkable tree genus is not without ecological and environmental consequences. Concerns about water resource depletion, soil erosion, undergrowth suppression, and soil mineral depletion have been raised, necessitating further research into its impact on ecosystems. Eucalyptus oil’s role as a natural repellent and its effectiveness against a wide array of insect pests offer sustainable solutions for pest management. These applications extend to fumigant toxicity against stored pests and even the potential to replace chemical pyrethroids for controlling disease vectors. Its positive impact on pest control, coupled with its ecological and economic significance, underscores the multifaceted importance of eucalyptus and its oil.

**Conflict of Interest:** None

**References**


