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MEDICINAL PLANTS AS NATURAL COMPOUNDS WITH ANTIMYCOTOXICOGENIC EFFECT

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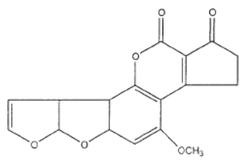
Abstract: *The use of natural compounds in organic agriculture and in the food industry as antimicrobial agents and preservatives represents a successful trend in the search for new alternative solutions to synthetic organic compounds. In this regard, this paper aims to study the antimycotoxicogenic potential of lavender and sage against aflatoxins developed on wheat grains. The technique used was fumigation in a closed environment followed by identification of total aflatoxins by ELISA method. The results obtained showed an effect of inhibiting the development of aflatoxins on the surface of wheat grains, which increases with the concentration administered. In terms of medicinal plant species with major effect, sage essential oil has proven to be more effective compared to lavender.*

• Introduction

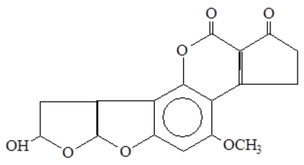
The infestation of cereal grains by fungi is a serious problem worldwide, a phenomenon that leads to a decrease in yield, quality and nutritional value of grains, and last but not least, to the production of mycotoxins that are harmful to both humans and animals, so early detection of fungal contamination is an essential control measure to ensure the longevity of their storage and guarantee food safety. Since strategies for applying physical or chemical control (in the form of fungicides) have sometimes proven to be ineffective and may even increase mycotoxin production [Audenaert et al., 2011, Nour et al. 2020], a possible alternative is the use of natural products, essential oils and antioxidant compounds.

Essential oils are recognized as some of the most promising classes of natural compounds usable for inhibiting antifungal agents [García-Díaz et al., 2020, Varma et al., 2001, Reddy et al., 2010b].

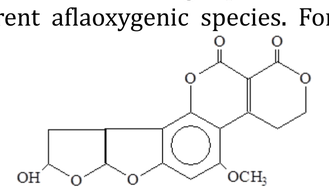
Aflatoxins are a group of heterocyclic mycotoxins with oxygen atoms that have bisdifuranic ring systems. Aflatoxins are derived difuranocoumarins produced by different varieties of Aspergillus flavus, Aspergillus parasiticus, Aspergillus bombycis, Aspergillus ochraceoroseus, Aspergillus nomius, Aspergillus pseudotamari. From a mycological perspective, there are large qualitative and quantitative differences between the toxic abilities of different aflaoxygenic species. For ex:



Aflatoxin B1



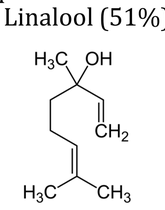
Aflatoxin B2

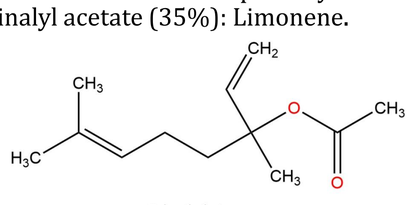


Aflatoxin G2

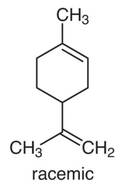
Figure 1. Aflatoxins

Lavender essential oil is a complex mixture of phytochemicals obtained by distillation from the flower spikes of certain species of lavender. The primary chemical components in lavender oil include: Linalool (51%): Linalyl acetate (35%): Limonene.





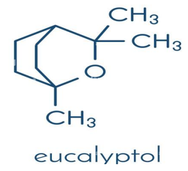
Linalyl Acetate



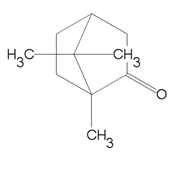
racemic

• Linalool — limonene

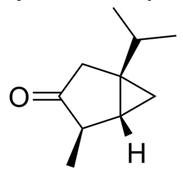
Sage essential oil contains **camphor, thujone, and pinene**, the dominant component being eucalyptol



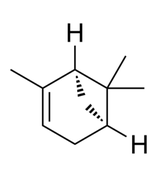
eucalyptol



camphor



alfa-thujone



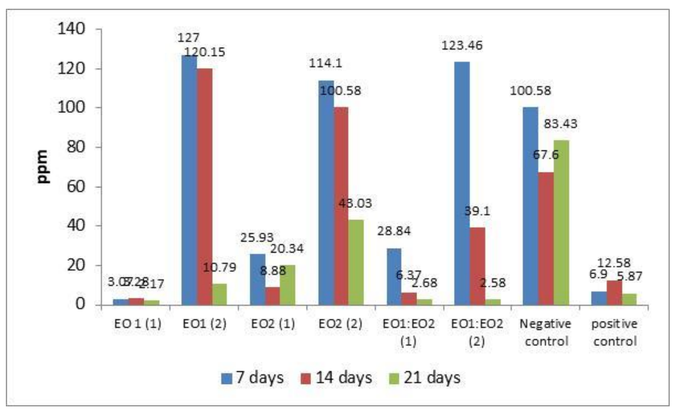
alpha-pinene

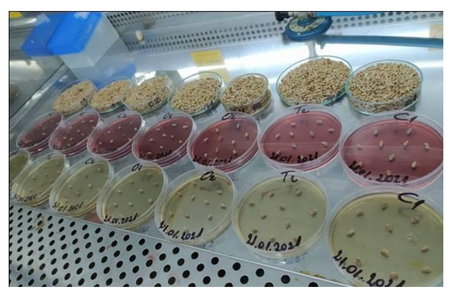
• Material and method

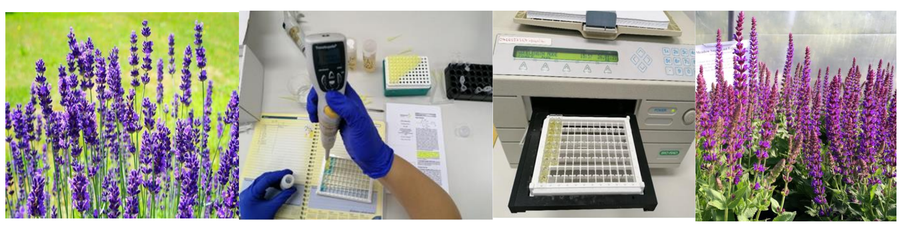
The wheat samples (200 g) were sterilized with hypochlorite solution 1:10 (v/v), followed by washing with water, so that the opportunistic mycoflora was inactivated. The 200 g wheat were treated separately with essential oils, in 2 different concentrations: EO1(1), EO1(2), EO2(1), EO2(2), individual and in mixture for both concentration: EO1:2(1), EO1:2(2). The second concentration was obtained by diluting 1:1 the first concentration of oil Distilled water was added, according to the water adsorption curve for wheat, to obtain a water activity of aw=0.995. The samples were incubated at 25°C for 28 days, and aw was kept at a 0.85 by periodically weighing samples and spraying water. After 7, 14, 21 and 28 days the samples were analyzed for aflatoxins content.

Results and discussions

The results shown a significant decrease of total aflatoxins after fumigation with EOs . The rate of inhibition depends on concentration applied and on medicinal plant species.







•Conclusions

The study indicated medicinal plants as EOs and extracts can be used as natural antimicotoxicogenic agents in cereals protection.

•References

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