OPINION

A review of plant essential oils' efficacy and applicability in the food industry

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ABSTRACT

Scientists are committed to focus on sustainable breakthroughs in the exploitation of bioactive compounds for improving safety and food quality as a result of consumer knowledge of and expectations for high-quality eco-friendly food items. By reducing the development or survival of microorganisms, Essential Oils (EOs), which are derived from plants and have antimicrobial (antibacterial and antifungal) action, are used in food items to extend the shelf life of foods. EOs are effective against foodborne pathogens such *Escherichia coli, Listeria monocytogenes, Salmonella* spp., and *Staphylococcus aureus*, according to in vitro research. In recent years, methods to make the use of essential oils and their components in food preparation have been actively used to capitalize on the rising interest in these natural preservatives as alternatives to synthetic ones. The purpose of this research is to assess existing information about the use of EOs in food preservation, as well as how this process typically influences technological attributes and customer impressions. A presentation of the most promising trends to simplify the use of the EOs is then given, after which important elements pertaining to the limitations of the various choices are underlined. The next step in producing environmentally friendly, sustainable foodstuffs and a biodegradable way to preserve food is to use essential oils into packaging materials.

Key Words: *Plants*; *Essential oils*; *Bioactive compounds*; *Shelf life*; *Food safety*

INTRODUCTION

Urbanization has increased recently as a result of recent developments in technology, globalization, and economic growth, which have also resulted in considerable changes in consumer lives and eating habits. Modern consumers' increasing health consciousness as a result of realizing the value of food in preserving and enhancing human wellbeing is one of the most significant improvements to consumer lives. The green earth idea influences how natural goods are used in daily life around the world. Food perishables are vulnerable to oxidation and microbial contaminations, which can modify their sensory qualities, cause them to lose vital nutrients, and cause the industry to suffer significant financial losses. To lessen all of these impacts and enhance the safety, shelf life, and quality of the products, artificial preservatives and antioxidants must be added during industrial food processing. Propyl gallate, butylated hydroxytoluene, and butylated hydroxyanisole are examples of synthetic antioxidants that are less expensive and more stable, but there have been questions raised about their safety due to the possibility that long-term consumption could cause allergies, gastrointestinal problems, or even cancer. Similar to nitrites, benzoate-es may be hazardous and carcinogenic when used in high doses. Finding solutions for natural food preservation is becoming increasingly popular as elements include clean labeling. Essential Oils (EOs), which are mostly made up of the fragrant and volatile substances that are naturally present in all sections of plants, are well-known for their potent antibacterial properties. The volatile compounds in EOs are thought to be responsible for their antimicrobial (which prevents spoilage by inhibiting the growth of microorganisms) and antioxidant (which prevents lipid oxidation and peroxidation) properties. As a result, they have been widely used for medicinal, bactericidal, veridical, fungicidal, antiphrastic, insecticidal, and antioxidant purpose. Since they are mostly employed in aromatherapy, EOs has drawn interest from the food sector in recent years because of their ability to slow the growth of harmful germs. Lavender, thyme, cinnamon, oregano, basil, or rosemary are just a few examples of the approved crops that provide the majority of essential oils with antibacterial qualities. Additionally, by-products from agricultural waste such grape seeds, apricot kernels, and orange peels can be used to make essential oils and extracts. The number of individual compounds in EOs ranges from ten to hundreds, with major bioactive components present at high concent-

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-rations. These compounds include terpenoids (phenols, ethers, ketones, aldehydes, alcohols, and esters), phenylpropanoids, and terpene compounds, such as limonene, p-cymene, and terpinene. Terpenes or terpenoids are well-known for being effective antibacterial, antifungal, antiviral, and antiprotozoal agents. It is important to note that their composition may differ owing to extrinsic and intrinsic variables, depending on the plant parts employed (roots, stems, leaves, seeds, flowers, and others). Water or steam distillation, solvent extraction, expression under pressure, microwave- and ultrasonic-assisted extraction, supercritical fluid extraction, and subcritical water extraction) are some examples of extraction techniques. The major ways of EOs application in the food business are illustrated, as well as the steam distillation process. More than one mechanism may be responsible for EOs' antibacterial effects. Because trepans and phenolic are lipophilic, they can easily enter the cytoplasm of microorganisms and damage the phospholipid bilayer of mitochondria and the inner membrane, increasing cellular permeability and causing the leakage of cytoplasmic materials like DNA and RNA as well as specific ions like Na+, K+, and Mg2+. Another mechanism is the alteration of the lipid-protein interaction in a bacterial cell brought on by lipophilic hydrocarbons naturally present in EOs affecting the activity of the ATPase's required for ATP synthesis. Additionally, some phenolic included in EOs may interfere with the cytoplasmic microscopic coagulation, proton motive force, and electron transport.

CONCLUSION

The findings of this analysis offer new information on the application of EOs in the food industry as a substitute for synthetic antioxidants in conventionally manufactured foods. According to the existing research, a variety of foodborne diseases have been successfully treated using essential oils. Some characteristics of EOs, such as their high volatility, low degree of water solubility, and potent odour, may limit their application as food preservatives in the food business. Many solutions have been considered to solve this issue. Therefore, including them in an edible coating might be a potential option. Aiming to raise a product's worth and shelf life while simultaneously boosting customer trust in processed food goods.