

## USE OF NATURAL PRESERVATIVES IN FOOD INDUSTRY

Ansari Ayesha Abshar Ahmed

Anjuman-I-Islam SaifTaiyabji Girls' High School Mumbai

Email- [ansariayesha777.aa@gmail.com](mailto:ansariayesha777.aa@gmail.com)

### Abstract:

Naturally occurring antimicrobial compounds could be applied as food preservatives to protect food quality and extend the shelf life of food and beverages. These compounds are naturally produced and isolated from various sources, including plants, animals and microorganism in which they constitute part of host defence system. Many naturally occurring such as nisin, plant essential oils and natamycin have been widely studied and are reported to be effective in their potential role as antimicrobial agent against spoilage and pathogenic microorganisms. The microorganisms that are been used in food fermentation also produce bacteriocins. products off animals origin such as tissues, milk and eggs contain different antimicrobial agents that are mainly in the form of peptides (polypeptides). Increasing level of consumer concerns on chemical antimicrobials and increasing resistance of pathogenic microbes have turned the attention towards studied on the potential antimicrobial activities of natural products. Natural antimicrobials are generally recognized as safe and they appear to be the most promising solution for microbial resistance and could best meet with consumer's demand for healthier foods and healthier environment.

**Key Words:**Antimicrobial, natural products, plant, animal, microorganisms, food preservative, plant essential oils, nisin, natamycin, herbs.

### Introduction:

For many years, technological advancement has been very important for good processing because it increases food shelf life, avoiding waste and improving the availability of nutrients to the consumer. Natural subtracts are compound present in plants, bacteria, fungi and mushrooms and the most common are bacteriocins, fungal metabolites, phenyl propanoids, bioactive compounds and essential oils.

Pathogenic and spoilage microorganisms can be transmitted by good and water, therefore, the use of additive becomes important for conservation during food storage, production and consumption to prevent transmission of food borne disease to consumers and unwanted deterioration. The presence of fungi and bacteria in food causes loss of net turnover in the food industry and its agriculture besides the loss of credibility and quality of products.

It is estimated that as much as 25% of all produced food is lost after harvest and a significant part is of poor quality due to microbial activity. The growth of spoilage microbiota in foods (i.e. pseudomonas spp, flavobacterium spp, bacillus spp, coliforms) is generally not harmful, however, it has a negative impact on shelf life, organoleptic characteristics and overall quality of the finished products, thus affecting consumer choices and resulting in significant commercial losses. If bacterial growth could be delayed or inhibited, it would be possible to obtain a great advantage regarding public health and food product shelf life. For this purpose chemical preservatives are still employed but because there are many concerns about them, consumers seem to prefer the use of natural products and are looking for foods that appear "more green".

### Content:

The recent changes in food production and processing practices, the ever changing eating habits of consumers and the globalization of the food market are important factors affecting the safety and quality of foods. According to the centres for **Disease Control & Prevention**, it has recently been reported that "food borne infections" cause about 76 millions cases of illness, 325,000 hospitalization, and as many as 5,000 deaths per year in the US. The food industry has now started exploring natural alternatives for the preserving food to reduce the dependency on chemical preservatives, some of which are linked to obesity and metabolic syndrome. Specifically natural antimicrobials produced by plants and microorganisms like Salmonella Typhimurium, Escherichia Coli, Listeria Monocytogens and Clostridium Botulinum and also food spoilage bacteria like Brochothrixthermosphaeta. Lactobacillus spp, Bacillus spp, etc. Food borne pathogens and spoilage microbe pose a serious health concern for consumers and destroy the appearance, texture and sensory characteristics of the food, affecting the food industry and consumers alike.

In the years a large number of studies have been conducted searching the antimicrobial activity of natural products. Plants specially herbs and spices are been given more attention. Nowadays there are over 1,340 plants with defined antimicrobial activities. Over 30,000 antimicrobial compounds, antimicrobial compounds have been isolated from plants. However, antimicrobials from microorganisms and animals

have also shown a numerous studies. This research explores the recent natural antimicrobials from plants, animals and microorganisms which could be used to control spoilage and pathogenic micro organ in food products.

1) **Natural antimicrobial products from plants:**

Some natural antimicrobials are used for food preservation, as well as inhibition of growth of spoilage and pathogenic microorganisms, come from plants and are used in the form of essential oils. These oils are composed of terpene compounds, alcohols, acids, esters, aldehyde, ketones, amines and sulphides. They can be extracted from different raw materials such as plant leaves, roots, fruits, stems, barks, etc. Some commonly used plants are cinnamon, thyme, rosemary, organo, basil and clove.

Essential oils are able to inhibit microbial growth, causing bacteriostatic and bactericidal effects and have inhibitory against fungi and yeast through physical, chemical or biochemical alterations in microorganisms. It also act permeability of the membrane of the microbial cells, interacting with membrane proteins, changing its function and structure and inducing the loss of biomolecular of the interior of the cell. It also influence election transport enzymatic activity, protein synthesis and nucleic acid.

2) **Bacteriocins:**

Natural extracts are more widely used than synthetic antimicrobials in some countries, such as Nigeria. They are widely used to inhibit the growth of fungi and yeasts, considering their plt. Natural antimicrobials extracted from plants, animals or microorganisms are being increasingly used in natural food preservation and as flavoring agents in some foods. Bacteriocins are recognized as potential source of food biopreservatives and can be used for food safety of several types of goods by inhibiting undesirable microflora. Bactenecins are peptides that are inserted into the cell, membranes to form pores, inhibiting the synthesis of peptidoglycan and DNA replication.

3) **Nisin:**

Nisin is peptide extracted from *Lactococcuslactis* bacteria that are common in milk due to their ability to ferment sucrose. Nisin is a potential biopreservative that cause the intracellular material to efflux.

4) **Products from fungi:**

Fungal metabolites are another type of natural preservative that has been used for being a low toxicity product, its use in the agrochemical industry aims to control pests and plant diseases. *Aspergillusfumigatus* has metabolites with antifungal activity similar to commercial fungicides carbendazim and hemiexazol against the phytopathogens *B. Cinerea*, *AlternariaAlternata*, *F.Solaniand Gibberellasaubinetti*. The mechanisms of antimicrobial action of mushrooms.are the inhibition of synthesis of the cell wall, of proteins or of nucleic acids such as antibiotics.

5) **Marine product:**

Chitosan is extracted from crustaceans, show antifungal action, and how been used in fruit and vegetable packaging in seeds treatment as well as in the encapsulation of antimicrobial agents.

6) **Use of probiotics:**

Preventing microbial growth and retarding lipid oxidation can be reached through a series of methods to maintain the quality and safety of Chicken meat. Some of these methods are artificial drying, Vacuum packaging, ionizing radiations, high processing, applying chemicals and using antimicrobial metabolitesof fermentative microorganisms. In recent years using probiotics as microbial preservatives has drawn a lotof attention due to consumer's concern about artificial additives.

7) **Lipid Antimicrobials:**

Fatty acids and their soaps have been used since antiquity for cleansing and disinfecting. Fatty acids and their polyhydric alcohol esters are considered to be of low toxicity and have been used mostly as emulsifier, in foods since the early 1900s. At low concentrations the compounds inhibit certain bacteria and fungi in the foods and may have considerable potential for commercial use as safe preservatives. In general fats and oils from animals and vegetables are known for their ability to inhibit microorganisms through antimicrobial agents such as fatty acids or their oxidation products such as fatty acids or their oxidation products such as peroxides and through associated antioxidant phenolic compounds formed by plants.

8) **Organic acid antimicrobials:**

Increasing the acidity i.e. lowering the pH of foods is an effective way of limiting microbial growth. The pH levels can be lowered in foods either through acidulent addition or through natural fermentation resulting in production of acid by desirable microorganisms. Acid inhibits microbial growth by lowering

pH or through the antimicrobial activity of undissociated molecules or anions. As pH decreases the antimicrobial activity of short chain organic acids increase more than that of long chain acids. As pH decreases the undissociated shorter molecule is able to enter the microbial cell, where it dissociates, acidifies the cytoplasm and interferes with chemical transport across the cell membrane or with enzymatic activity.

9) **Polypeptide Antimicrobials:**

Among the natural substances considered safe alternative to synthetic chemical preservative in food processing are various enzymes and other peptides. Polypeptides with antimicrobial properties have been isolated from all plants & animal in which they have been sought. Defensins are a family of small molecular weight peptides.

10) **Antimicrobial Agents in insects:**

The successful colonization and the great diversity of insects is at least in part due to their resistance to microbial attack. Insects have developed several defense mechanisms including (1) the cuticle which in addition to being a physical barrier contains chemical antimicrobial agents of unknown importance such as short chain fatty acids (2) the gut which contains physical barriers e.g. pH, water activity, limited oxygen level, potentially the normal gut flora and food derived antimicrobials including chlorogenic acid, Caffeic acid and quinones acting as inhibitors of microbial growth. Antimicrobial insect secretions are skatole, hydrogen peroxide, phenols, phenylacetic acid and mucopolysaccharides.

11) **Killer toxins:**

Strains of *Saccharomyces cerevisiae* first were found to secrete protein & inactivating a limited number of strains of related yeasts. In other genera of fungi a broad range of such activity has been found, and the compounds involved are called Killer toxins. Killer strains of *Saccharomyces* produce proteins or glycoproteins killing sensitive strain usually by perturbation of the plasma membrane. In *K. lactis*, the lactose fermenting yeast two plasmids are responsible for killer activity.

**Conclusion:**

According to this review, we can observe many alternatives for production of foods with a safe microbiological standard and without addition of synthetic preservatives. However, many studies are needed to prove that these substances are harmless to the environment and to humans. A huge number of natural antimicrobials are nowadays known, only a limited number of natural antimicrobial compounds are currently used in commercial applications due to the higher cost compared to chemical preservative. In most cases natural antimicrobials are extracted and purified to be tested or applied to food products. The future will anticipate more investigation of naturally antimicrobials to food products, especially in the areas of synergistic effectiveness and optimum concentrations.

**References:**

- 1) The evolving of natural products in drug discovery.
- 2) Improvement in shelf life and safety of perishable foods by plants essential oil and smoke antimicrobials.
- 3) Antimicrobial activities of essential oils, plant extracts and their application in foods.
- 4) Use of natural antimicrobials to improve the microbiological safety of foods.
- 5) Antibacterial and antifungal properties of natural preservatives.