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Antioxidant and Antimicrobial Activity of Basil, Thyme and Tarragon Used in Meat Products

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Abstract

Currently, the food industry, including the meat industry, is paying close attention to the use of natural additives as preservatives. From ancient times, the plants are used to treat various diseases, to produce perfumes and as ingredients to improve the taste in food. This paper presents a bibliographic and experimental study of the antioxidant and microbial properties of basil, thyme and tarragon. International scientific papers on the use of these plants in the food industry, including the meat industry, are targeted. The role of basil, thyme and tarragon in the manufacture of functional and stable products in storage is mentioned. Percentage decrease in *Salmonella Abony* growth under the influence of basil constituted 84.4%, thyme 61.6% and tarragon 76.8% after 48 hours of action and respectively 97.2%, 90.2% and 95.3% after 72 hours of action. The interdependence between the percentage reduction of S. Abony infestation and the concentration of basil, mushrooms and tarragon was respectively: basil (R^2 = 0.7725 … 0.7916), thyme (R^2 = 0.7733 … 0.7768), tarragon (R^2 = 0.7689 … 0.8137).

Keywords

Basil, Tarragon, Thyme, Antimicrobial Activity, Antioxidant Activity, Meat Products

1. Introduction

The European Commission has accepted various components of essential oil (EO) as food-friendly and safe. The FDA classifies these substances as GRAS

(generally recognized as safe). This category includes thyme, cloves, cinnamon, oregano, mustard, nutmeg and basil [1] [2] [3] [4].

The use of new plant oil extraction technologies makes it possible to use them successfully in the manufacture of supplements and new products with high biological value [5] [6]. The authors of the studies [7] and [8] mention the great biological and structural diversity of the compounds found in different plants, noting their antifungal, antibacterial and antiparasitic properties. The antioxidant properties of thyme have been reported in studies [9] [10] [11], mentioning its use in the stability of meat lipids. Also of interest are the results of the study of thyme used for pork, reported by Tanabe H, *et al.* [12]; and for beef reported by Medina *et al.* [13].

The data reported in studies [13] [14] [15] [16] [17], regarding the antimicrobial properties of herbs and spices, would be of interest to food industry specialists.

Natural antioxidants are increasingly mentioned as an object of study in research worldwide [18] [19] [20] the most important being tocopherols, flavonoids and phenolic acids. Most often these substances are investigated as a potential to prevent or delay the oxidation of lipids [21] [22]. The content and activity of antioxidants in plants depends on several factors: climate genotype, temperature, light, soil type and other conditions (processing, storage after harvest), etc. [23].

2. General Characteristics of Thyme, Basil and Tarragon

Antioxidant and antimicrobial activity of thyme.

The role of thyme in increasing stability and reducing lipid oxidation during food storage is reported in papers [24] [25] [26]. The oxidative inhibitory capacity of thyme extracts is mainly due to the content of phenolic compounds [27]. The results presented by the study authors [28] [29] suggest the idea that essential oils from different Thymus species, having antimicrobial properties, can be used in the food industry.

Tepe *et al.* [30] studied the antioxidant properties of two varieties of *Thymus sipyleus*, reporting different constituents in their essential oil. Dorman *et al.* [31] established that there is no direct relationship between the antioxidant efficacy of an extract and its total phenolic compound content. Another study by Sun *et al.* [32] established that there is an apparent relationship between the antioxidant potential of *Thymus zygis* extracts and the total phenols they contain. Thyme phenols are characterized by redox properties and neutralize free radicals [1] [33]. Essential oils rich in phenolic compounds have antimicrobial properties [34]. Factors that influence the microbial activity of thyme oils are: low temperatures, anaerobic conditions and low pH. Gram-positive bacteria appear to be less sensitive to thyme action than gram-negative bacteria [2] [35]. Evans and Martin [36] reported antimicrobial activity of thyme on *Salmonella*, *Staphylococcus*, *Escherichia coli*, *Klebsiella*, *Pseudomonas and Enterococcus*.