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SHEIF LIFE EXTENSION OF MEAT BY USING EXTRACTION PLANT

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ABSTRACT

This study aimed to examine the performance of extraction plants prepared from (thyme and bay) to extension the shelf life of minced meat in the local markets of Amarah city from by testing the microbial contamination which included total aerobic plate count, total coliform, psychrophilic bacteria and *Staphylococcus aureus* for 10 days at 5C, The results showed bacterial growth average were reduced with extracts plants addition increasing (0.5,1,1.5%), extract plant (thyme) inhibited the growth of bacteria at 1.5% and the logarithm no. reached 4.79, 4.42, 3.23 and 3.12, /g meat respectively after 10 days of cold storage comparing with the control which were 8.79, 6.86 6.65 and 5.72 log /g meat and (bay) inhibited the growth of bacteria at 1.5% and the logarithm no. reached 4.91, 4.55, 3.46 and 3.21, /g meat respectively after 10 days of cold storage comparing with the control which were 8.85, 6.94, 6.75 and 5.83 log /g meat respectively.

Keywords: meat, extraction plants, storage

INTRODUCTION

Meat and its products are highly perishable and can human, resulting in serious health problems, The most spoil very easily if they are not store properly. Once they important pathogenic bacteria associated with meat spoiled, they become unhealthy to eat due to microbial products are *Salmonella spp.*, *Staphylococcus aureus*, growth and chemical changes by enzymes, Essential oils and their extracts can be used as natural 4 °C. Such materials can extend the shelf life those oils on the growth of bacterial pathogens such as of meat and their products and control/inhibit the *S. aureus, S. enterica, E. coli* and *P. aeruginosa* in raw microbial growth. Antibacterial, antifungal and antioxidant effects . The essential oils are good sources of natural antioxidants such as phenolic, flavonoids, alkaloids, tannins and phenolic acids (Alsaiqali *et al.*, 2016).

Thymus ***(Thymus vulgaris)*** *Thymus vulgaris* L. (thyme), locally known“zaatar” or “zaitra’, a member of the family Lamiaceae, is widely used in Morocco folk medicine for its expectorant, antitussive, antibroncholitic, antispasmodic, anthelmintic, carminative

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and diuretic properties. The aromatic and medicinal properties of the genus *Thymus* have made it one of the most popular plants all over the world (Imelouane *et al.*, 2009). *Thymus* species are commonly used as herbal tea, flavoring agents (condiment and spice) and medicinal plants The extracts of many Thymus species (Lamiaceae family) native to Mediterranean basin are widely used in pharmaceutical, cosmetic and perfume industry, and for flavouring and preservation of several food products .The essential oils of *Thymus* species are rich sources of phenolic monoterpenes such as thymol and carvacrol (El Ouariachi *et al.*, 2011). Thymol and carvacrol constituted the main phenolic compound of Thyme oil. The major non-phenolic compounds were linalool and p-cymene been reported that its essential oils possesses numerous biological activities including anti-worm, antiseptic, antispasmodic, antimicrobial and antioxidant (Agili, 2014).

Bay *(Laurus nobilis)* The Lauraceae comprise 32 genera and about 2000-2500 species. Laurus nobilis L., (bay) a member of the family named Apollo's Laurel in mythology, is a plant native to the Southern Mediterranean region including Hatay (Antioch) Turkey. The leaves of L. nobilis L. are traditionally used orally to treat the symptoms of gastrointestinal problems, such as epigastric bloating, impaired digestion, eructation, and flatulence (Kivcak and Mert, 2002). The chemical composition and antimicrobial activities of the essential oil of Laurus nobilis L. has been analyzed before The essential oil of leaves have antimicrobial properties and it is used as an antirheumatic, antiseptic, diaphoretic, digestive and diuretic. It is also used as a fragrance component in the cosmetics and food industry (Ozcan *et al.*, 2010). it contains about 1.3% essential oils and polar flavonoids mono and sesquiterpenes, alkaloids glycosylated flavor-noids and megastigmane and phenolic components. It is known to have various pharmacological effects, including antimicrobial, cytotoxic and immune modulating. The dried leaves are used extensively in cooking, and the essential oil is generally used in the flavourings industry .Laurel essential oil, also called laurel leaf oil or sweet bay essential oil, is also used for the preparation of hair lotion due to its antidandruff activity and for the external treatment of psoriasis (Barla *et al.*, 2007; Karima, 2016). The components present in bay leaf essential oil were 1, 8 cineole, Tricyclene, limonene, γ-Terpinene, Sabinene, α-Pinene, Eugenol, Linalool, p-Cymene, α-Phellandrene, Camphene, β-Pinene, Camphor, Terpinene-4-ol, α-Terpineol, α-Thujene, Myrcene, α-Terpinene, erpineolene, Sabinol, Borneol, γ-Cadinene, β-Elemene, Germacrane A, Germacrane D-4-ol, α-Humulene (Chahal *et al.*, 2017). The chemical composition of *L. nobilis* volatile oil from different locations has been studied by different researchers. In all studies, 1,8-cineole was the major component with percentages ranging between 26.70% and 68.48% [14, 30]. Moreover, *alpha*-terpinyl acetate with percentages ranging between 0.65-25.70% and terpinen-4-ol with percentages ranging between 1.50-4.56 (Kivrak et al., 2017).

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MATRRIALS AND METHODS

Preparation of simple

Leaves plants were collected from local city markets in Amarah city /Iraq (thymus, bay). The plant material was thoroughly washed with clean water to remove soil and other dirt and Mill the leaves in miller for powder and putting powder both plant in tins glassy of time the extraction.

Preparation of Plant Extracts

The air-dried plant materials were separately extracted twice at room temperature with ethanol 95% (500 ml/100 g of plant material each run). The final ethanol extract of each plant part was filtered using filter paper (Whatman) and was evaporated under vacuum at 40°C using rotary vacuum evaporator resultant residues from the different plants parts and were stored at -20 °C for further analysis (Mahasneh, 2002).A grand total of thirty random samples of fresh minced beef were collected from market in Amara city. The samples were taken and transferred directly to the laboratory under complete aseptic conditions without undue delay. The samples were divided into untreated (control) and treated samples. The treated samples were homogenized with thyme and bay extract in 0.5%, 1% and 1.5% concentrations for each extract (Amany *et al.*, 2010). Each sample was packed in polyethylene bag, labeled and stored at 4 ºC. Each sample was analyzed promptly at 3 days intervals during storage as follows:

Microbiological examination:

1. Determination of aerobic plate count (APC) which was performed according to ICMSF (1996).

2. Determination of total coliforms count which was done according to APHA (1985).

3 Enumeration and identification of *Psychrophilic bacteria* which was performed according (Andrew ,1992).

4. Determination of total *Staphylococcus aureus* count which was performed according to Oxoid (1986).

Statistical Analysis: Data regarding two parameters (concentration and medicinal plants) were analyzed statistically using SAS program with completely randomized design (CRD).

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RESULTS AND DISCUSSION

Shown in Table (1) and (5) The mean values of total aerobic counts of different untreated and treated minced beef samples during cold storage. The control samples showed the highest counts comparing to others containing thyme. The relatively high initial counts of control samples may be attributed to the grinding process, which compounds the problem by introducing the pathogens into the interior of the meat and contributes to the increase of total viable counts of meat (Nychas *et al.*, 1991; Mead and Griffin, 1998). APC counts were gradually increased during cold storage for all samples with different ratios depending on the concentration of extract. The incremental pattern in can be arranged in a descending order as follows: samples treated with thyme and finally bay extract at 0.5%, 1% and 1.5% concentration levels, respectively. In general, as the concentration of extract decreased, APC increased as discussed by Marino *et al.* (2001).

As shown in table Table(2) and (6), it could be observed that the control samples had the highest counts of total coliforms count bacteria at any time of cold storage compared to other treatments. It is clear that thyme, bay extract at concentration 1.5% have strong effects against the growth of coliforms count bacteria, and as the concentration of these extract plants increases, the counts of coliforms count bacteria reduce.

As shown in table Table (3) and (7), it could be observed that the control samples had the highest counts of Psychrophilic bacteria count at any time of cold storage compared to other treatments. It is clear that thyme, bay extract at concentration 1.5% have strong effects against the growth of coliforms count bacteria, and as the concentration of these extract plants increases, the counts of coliforms count bacteria reduce.

Data presented in table Table (4) and (8) showed *Staphylococcus aureus* counts of different treated and untreated minced beef samples during cold storage. As demonstrated by the different treatments, the treated samples with thyme and bay extracts at concentration 1.5% respectively showed the lowest counts different treatments 0.5%, 1% and 1.5% concentration cold storage compared with sample control.

Effective against food borne pathogens and spoilage bacteria when applied directly on foods ready to be used, containing a high protein level at acidic pH, as well as, lower levels of fat or carbohydrates. This significant rate of antibacterial activities is mostly attributable to the phenolic compounds (cavracrol) and to the hydrocarbons which can be bactericidal or bacteriostatic depending on their effective concentration (Bozin *et al.*, 2006; Yassin – Nessrien and Abou – Taleb, 2007). The chemical composition of bay leaf essential oil varied with the plant part from which it was extracted such as seed, leaf and flower. Some broad variations were

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seen in the relative amounts of the main components of the essential oils from different parts of bay Minor qualitative and major quantitative variation of some compounds of bay leaf 1, 8-cineole (48.01, 31.78 and 17.64%), α-pinene (7.69, 11.69 and 17.96%), β- pinene (3.91, 6.91 and 9.51%), sabinene (2.93, 4.49 and 3.37%), limonene (1.43, 2.42 and 2.89%) and linalool (0.40, 0.24 and 0.24%) in the sea coast, the mountains and the plains respectively, The main sources of volatile oils are medicinal and aromatic plants, which are widely used since ancient times in medicine, cosmetics and preserving and improving the flavor of foods. Especially in recent years, there are numerous artificial chemical-free productions, mainly cosmetics, due to the increased interest in natural products (Chahal *et al*., 2017; Kivrak *et al*., 2017).

Table1: Added concentrations different from extract thymus in aerobic plate count in minced meat (ucf/g) during the storage 5c

concentrations		Time of storage (day)					
		0	2	4	6	8	10
control		5.19	5.45	6.25	7.01	8.11	8.79
Concentrations of extract thymus	0.5%	5.12	5.28	5.59	5.78	6.22	6.78
	1%	4.13	4.43	4.63	4.89	5.34	5.87
	1.5%	3.36	3.56	3.76	3.96	4.45	4.79

* Significant differences as a result of extracts plant thymus treatments (P< 0.05)

Table 2: Added concentrations different from extract thymus in of total coliforms count bacteria in minced meat (ucf/g) during the storage 5c

concentrations		Time of storage (day)					
		0	2	4	6	8	10
control		4.29	4.54	5.12	5.71	6.02	6.86
Concentrations Of extract thymus	0.5%	4.12	4.43	4.86	5.21	5.52	5.82
	1%	3.25	3.45	3.78	4.15	4.44	4.91
	1.5%	2.31	2.56	2.79	3.74	4.11	4.42

* Significant differences as a result of extracts plant thymus treatments (P< 0.05)

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Table 3: Added concentrations different from extract thymus in Psychrophilic bacteria count in minced meat (ucf/g) during the storage 5c

concentrations		Time of storage (day)					
		0	2	4	6	8	10
control		4.13	4.37	4.95	5.71	5.87	6.65
Concentrations Of extract thymus	0.5%	4.07	4.22	4.74	5.02	5.48	5.76
	1%	3.14	3.36	3.58	3.81	3.99	4.26
	1.5%	2.11	2.32	2.54	2.68	2.98	3.23

* Significant differences as a result of extracts plant thymus treatments (P< 0.05)

Table 4: Added concentrations different from extract thymus in of total *Staphylococcus aureus* count bacteria count in minced meat (ucf/g) during the storage 5c

concentrations		Time of storage (day)					
		0	2	4	6	8	10
control		2.45	2.87	3.72	4.41	4.89	5.72
Concentrations Of extract thymus	0.5%	1.87	2.32	2.79	3.67	3.92	4.58
	1%	1.55	1.86	2.34	2.73	3.97	4.14
	1.5%	1.16	1.38	1.59	1.98	2.51	3.12

* Significant differences as a result of extracts plant thymus treatments (P< 0.05)

Table 5: Added concentrations different from extract thymus in aerobic plate count in minced meat (ucf/g) during the storage 5c

concentrations		Time of storage (day)					
		0	2	4	6	8	10
control		5.34	5.62	6.39	7.25	8.47	8.85
Concentrations Of extract bay	0.5%	5.24	5.48	5.65	5.87	6.38	6.94
	1%	4.25	4.55	4.77	4.95	5.46	5.92
	1.5%	3.46	3.67	3.89	4.16	4.65	4.91

* Significant differences as a result of extracts plant bay treatments (P< 0.05)

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Table 6: Added concentrations different from extract thymus in Psychrophilic bacteria count in minced meat (ucf/g) during the storage 5c

concentrations		Time of storage (day)					
		0	2	4	6	8	10
control		4.34	4.62	5.19	5.84	6.23	6.94
Concentrations Of extract bay	0.5%	4.22	4.54	4.93	5.31	5.61	5.89
	1%	3.36	3.51	3.85	4.33	4.56	4.96
	1.5%	2.42	2.64	2.91	3.87	4.26	4.55

* Significant differences as a result of extracts plant bay treatments (P< 0.05)

Table 7: Added concentrations different from extract thymus in of total coliforms count bacteria count in minced meat (ucf/g) during the storage 5c

concentrations		Time of storage (day)					
		0	2	4	6	8	10
control		4.21	4.43	5.24	5.82	6.22	6.75
Concentrations Of extract bay	0.5%	4.18	4.32	4.93	5.29	5.63	5.91
	1%	3.19	3.45	3.64	3.93	4.29	4.47
	1.5%	2.23	2.49	2.71	2.89	3.17	3.46

* Significant differences as a result of extracts plant bay treatments (P< 0.05)

Table 8: Added concentrations different from extract thymus in of total *Staphylococcus aureus* count bacteria count in minced meat (ucf/g) during the storage 5c

concentrations		Time of storage (day)					
		0	2	4	6	8	10
control		2.53	2.92	3.81	4.55	4.99	5.83
Concentrations Of extract bay	0.5%	1.91	2.41	2.88	3.73	3.98	4.61
	1%	1.65	1.92	2.39	2.82	4.11	4.23
	1.5%	1.24	1.45	1.67	2.08	2.67	3.21

* Significant differences as a result of extracts plant bay treatments (P< 0.05)

CONCLUSIONS

In conclusion, some extracts plants (thymus and bay) tested in this study could be used as natural preservatives to extend the shelf-life of beef minced meat. The effect of extracts plants on the count bacterial in meat.

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