

## Jamaican Spices as Food Preservatives

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### ABSTRACT

The present review is a compilation of the spices commonly used in Jamaica for preserving foods especially meats. These include: *Allium cepa* L. (onion), *Allium fistulosum* L. (Escallion), *Allium sativum* L. (Garlic), *Capsicum annum* L. (Scotch bonnet), *Capsicum frutescens* L. (Bird pepper), *Curcuma domestica* Valetton (Turmeric), *Cinnamomum zelanicum* Nees (Cinnamon), *Pimenta dioica* (L.) Merr (Pimenta), *Plectranthus amboinicus* (Lour) Launert (French thyme), *Rosmarinus officinalis* L. (Rosemary), *Thymus vulgaris* L. (Thyme) and *Zingiber officinale* Roscoe (Ginger).

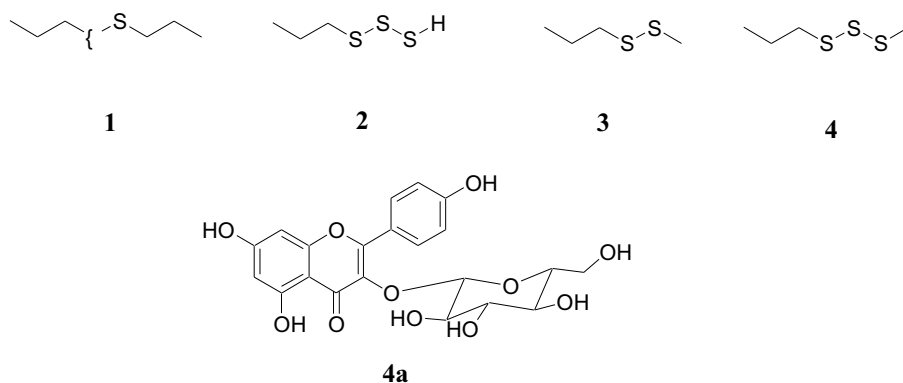
*Keywords:* Antioxidant, antimicrobial, oleoresin

## INTRODUCTION

Spices are used for the preservation of foods by preventing rancidity which could be linked to the processes of enzymic hydrolysis, autoxidation, bond cleavage and enzymic decarboxylation (Pokorny, 1999). Spices often possess dual modes of action. Some may be antioxidative and/or antimicrobial in nature, e.g. *Cinnamomum zeylanicum* (Cinnamon), *Curcuma longa* (Turmeric) and *Pimenta dioica* (Pimento) are antioxidants (Williams, 2006), while garlic (*Allium sativum*) and thyme (*Thymus vulgaris*) are antibacterial in nature (Marino *et al.*, 1999; Sasaki *et al.*, 1999).

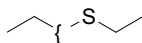
### *Allium cepa* L. (Onion)

Onion is a spice widely used in meat preservation. The spice has antimicrobial (DE WIT *et al.*, 1979) and antioxidant activities (Ingunn and Rune, 2008). The plant contains the following sulphur compounds; (1) propyl disulphide, (2) propyl trisulphide, (3) methyl propyl disulphide and (4) methyl propyl trisulphide which are responsible for its antimicrobial activity (IN-HO *et al.*, 2007). (4a) Kaempferol-3-O-glucopyranoside (Astragalin) a known antioxidant has been reported to be present in *Allium cepa* (Muminova *et al.*, 2006).

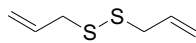


*Allium fistulosum* L. (Escallion)

The *Allium fistulosum* which is used for cooking is rich in sulphur compounds, e.g. (5) diethyl disulfide and (6) diallyl disulfide. These are known to possess an antimicrobial activity (Tada *et al.*, 1988).



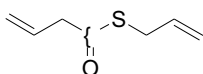
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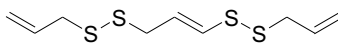
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*Allium sativum* L (Garlic)

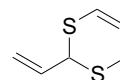
Garlic consists several compounds known for their anti-hypertensive and antimicrobial activities. These compounds include (7) allicin, (8) ajoene, 2-vinyl-4H-1, (9) 3-dithiine, (10) diallyl trisulphide and (11) methyl allyl trisulfide. This spice is used as an antimicrobial agent in preserving meat (Sasaki *et al.*, 1999).



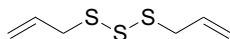
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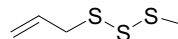
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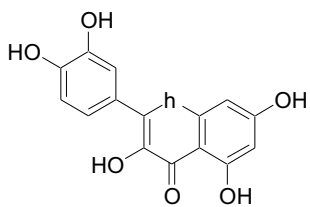
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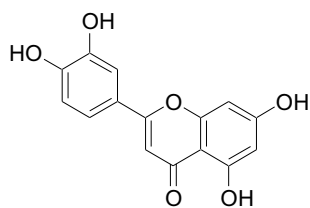
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*Capsicum annum* L. (Scotch Bonnet) and *Capsicum frutescens* L. (Bird pepper)

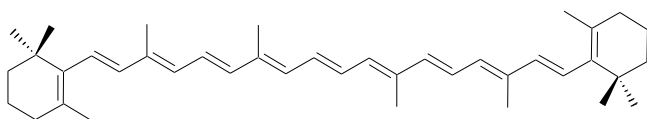
*Capsicum annum* and *Capsicum frutescens* are used in the cooking of meats and soups. They possess antioxidant property which may be linked to the polyphenols that they contain, e.g. (12) quercetin, (13) luteolin and (14)  $\beta$ -carotene (Sun *et al.*, 2007). In addition, the extracts of *C. annum* and *C. frutescens* contain (15) capsaicin and (16) capsanthin, which are known to possess antioxidants (Sun *et al.*, 2007).



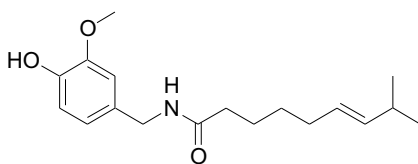
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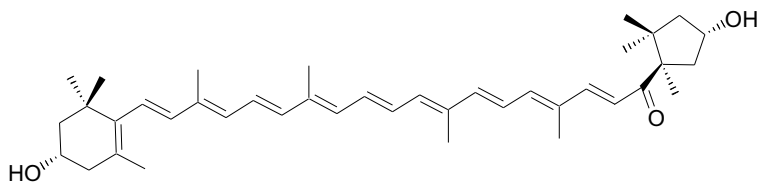
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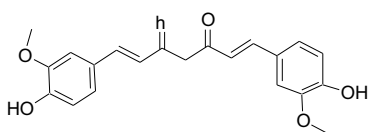
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*Cinnamoum zeylanicum* Nees (Cinnamon).

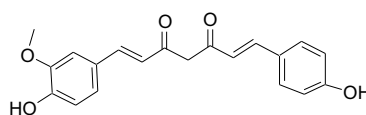
Cinnamon is a spice used in cooking, the baking of cakes and cookies and for flavouring. The oleoresin of *C. zeylanicum* consists of alcohols, aldehydes, ketones, phenols, terpenes, sesquiterpenes esters, lactones and ethers (Jayaprakasha *et al.*, 2002). *C. zeylanicum* is a spice that has high antioxidant activity as it is dominated by the phenols (Williams, 2006).

*Curcuma longa* Valetton (Turmeric)

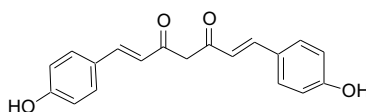
*C. longa* is a spice used in the preparation of curry (dried powder of *C. longa*). The oleoresin of *C. longa* consists of curcuminoids which are antioxidative in nature and are used as preservative in foods. There are three major curcuminoids present in *C. longa* namely; (17) diferuloyl methane (curcumin), (18) demethoxy curcumin and (19) bisdemethoxy curcumin (Jayaprakasha *et al.*, 2006).



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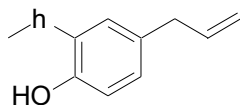
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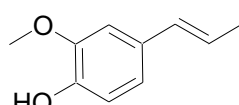
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*Pimenta dioica* L. (Pimenta)

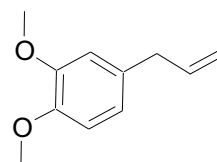
*P. dioica*, commonly known as 'all spice', is used for preserving meats. The oleoresin of *P. dioica* contains a high percentage of (20) phenyl propanoids, eugenol, (21) iso-eugenol and (22) methyl eugenol (Brown *et al.*, 1998). These compounds are antioxidant and antimicrobial in nature (Vasques E.A., 2000; Kurkin, 2003).



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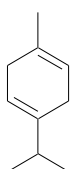
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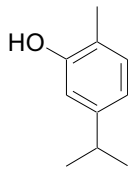
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*Plectranthus amboinicus* Lour (Launert) (French thyme)

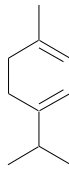
French thyme is a spice used in cooking. The oleoresin of *P. amboinicus* consists of the (23) monoterpenoids  $\gamma$ -terpinene, (24) carvacrol, (25)  $\alpha$ -terpinene, (26) limonene and the (27) sesquiterpenoid  $\beta$ -caryophyllene with low (approximately 23 %), antioxidant and antimicrobial activities (Williams, 2006).



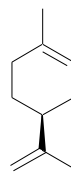
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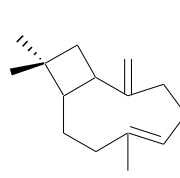
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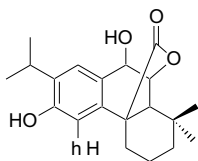
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*Rosmarinus officinalis* L. (Rosemary)

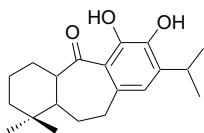
*R. officinalis* is a spice, whose oleoresin contains several compounds such as, (28) rosmanol, (29) rosmaridiphenol, (30) rosmarinic acid, (31) carnosol, (32) carnosic acid and (33) ursolic acid that are ideal for meat and oil preservation (Offord *et al.*, 1995; Hibbert *et al.*, 2006).

*Thymus vulgaris* L. (Thyme)

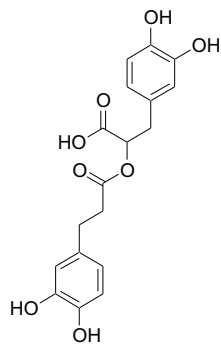
Thyme is a spice with antibacterial activity used for preserving meat (Marino *et al.*, 1999). The oleoresin consists of the (34) monoterpenoids cineol, (35) *p*-cymene, (36)  $\alpha$ -pinene, (37) thymol methyl ether, (38) carvacrol and (39) thymol. The named compounds are known for their antimicrobial activity (Marino *et al.*, 1999).



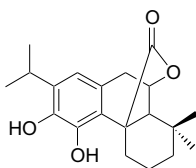
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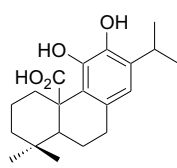
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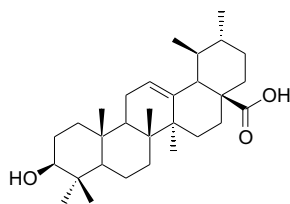
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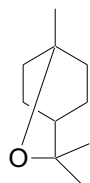
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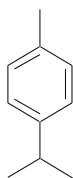
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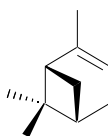
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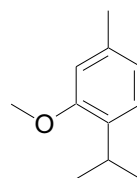
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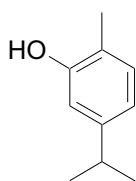
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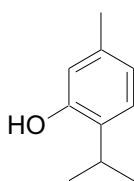
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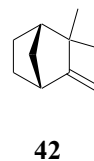
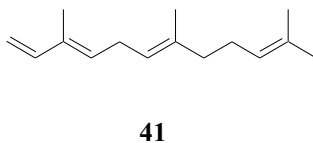
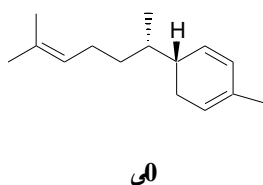
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Zingiber officinale Roscoe (Ginger)

Two varieties, namely, blue and yellow ginger are used in cooking throughout Jamaica. The main composition of the essential oils of the blue and yellow varieties are: (40) zingiberenE, (41)  $\alpha$ -farnesene and (42) camphene. Shogaols and gingerols are the main composition of the oleoresin in both varieties (Lantz *et al.*, 2007). These compounds are responsible for the biological activities of ginger, for instance, antioxidant activity and medicinal properties (relief of stomach ache and nausea) (Bailey-Shaw *et al.*, 2008).



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