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ISOLATION AND IDENTIFICATION OF MOLDS PRESENT AS CONTAMINANTS IN ROQUEFORT CHEESE. (With 2 Tables)

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عزل وتصنيف الفطريات الملوثة للجبن الروكفورت

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أجريت هذه الدراسة على أربعين عينة عشوائية من الجبن الرقفورت، عشرون عينة من كل من الجبن المصنع محليا والجبن المستورد ، جمعت من مدينة أسيوط لعزل وتصنيف الفطريات الملوثة لها غير *P. roquefortii* ومن النتائج أمكن التوصل الى تلوث الجبن الروكفورت المصنع محليا بـ ٢٩ نوع من الفطريات تعزو الى ٨ أجناس واكثر هذه الفطريات تواجدا هو فطر *Aspergillus* بنسبة ٥٥,٣٠% ممثلا أساسا في *A. niger* ، *A. flavus* بنسبة ١٣,٩٠% ، ٢٧,٧٠% على التوالي. بينما أمكن التوصل الى عزل وتصنيف ١٧ نوع تعزو الى ٦ أجناس من الفطريات في الجبن الرقفورت المستورد وأن فطر *Aspergillus* وجد بنسبة ٦٤,٧٢% ، فطر *Penicillium* بنسبة ١١,٧٦% وكلا الفطرين كانا الاكثر تواجدا في كلا نوعي الجبن ومن هنا دلت النتائج على أن الجبن الروكفورت المحلى اكثر تلوثا بالفطريات من الجبن الروكفورت المستورد. هذا وقد تم مناقشة تأثير الفطريات العزولة على الصحة العامة والاشتراطات الصحية الواجب توافرها لمنع تلوث هذا المنتج بالعديد من الفطريات حفاظا على صحة المستهلك.

SUMMARY

Fourty random samples of roquefort cheese including 20 each of local and imported cheese were collected from different localities in Assiut City for isolation and identification of foreign molds as contaminants. The obtained results indicated that, twenty-nine species belonging to eight genera were existed in local roquefort cheese samples. *Aspergillus* found to be the most prevalent genus (55.30%). It was represented mainly by *A. flavus* (13.90%) and *A. niger* (27.70%) while in imported samples seventeen species belonging to six genera were identified. 64.72% of the isolates were *Aspergillus*, 11.76% were *Penicillium* and 23.52% for the other genera. The public health importance of the isolated mold and the suggestive measures were discussed.

Keywords: Isolation, identification, molds, contaminants, roquefort cheese.

INTRODUCTION

Mold growth on cheeses is a common, occurred during aging and

storage even at low temperature (FOSTER *et al.*, 1958 and FRAZIER, 1967). Cheese may get contaminated

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with molds from different sources. Although, some species of molds are used in manufacturing and ripening of certain varieties of cheese, yet others are responsible for certain defects and can produce toxic and carcinogenic metabolites, proliferation of these organisms on foods must be regarded as a potential health hazard.

The mold species used in the manufacture of mold-ripened cheese varieties can produce mycotoxins. *Penicillium roquefortii* produces at least six metabolic products which have been found to be toxic. In animal experiments, SCOTT (1981) reported that, the toxicity of such products could be strong (*Penicillium roquefortii* toxin), moderate (Patulin and penicillic acid), slight (roquefortin) or very slight (isofumigaclavin A and mycophenolic acid) in their effect. Many strains of *P. roquefortii* produce non of the previously mentioned mycotoxins, therefore, they are preferred as starter cultures.

Owing to the role played by molds whether from economic or public health point of view, advanced countries considered mold counts as a standard for checking factory sanitation (FOSTER *et al.*, 1958). BODINI *et al.* (1969) isolated 39 strains of molds from soft cheese. The prevalent genera were *Mucor*, *Penicillium* and *Aspergillus*, while SHIH and MARTH (1972) found that, *A. flavus* produced aflatoxin in cheese stored at 29°C for 14 weeks and *A. parasiticus* after one week storage.

It was reported that, 82.2% of the molds found on refrigerated cheddar cheese were belonged to *Penicillium* spp., 6.6% *Aspergillus* spp. and 1.1% to *Fusarium* spp. Some species belonging to these genera are capable of mycotoxin production (VAN WALBEEK, 1973 and BULLERMAN and OLIVIGNI, 1974). EL-SAYED (1981) isolated 14 genera of molds from processed cheese. The most common species were *Aspergillus* and *Penicillium*. LEISTNER and ECKARDT (1979) examined 80 strains of *P. roquefortii* for their ability to produce mycotoxins. They found that, 93% of them (74 strains) were firmly toxigenic whereas the rest produced unknown toxins. While BULLERMAN (1981) pointed out that, cheese is an excellent substrate for mold growth but a poor substrate for mycotoxin production and for this reason even foreign molds produce only relatively small quantities of mycotoxine in cheese.

This work was undertaken to isolate and identify foreign molds contaminating roquefort cheese.

MATERIAL and METHODS

Collection of samples:

Fourty random samples, of local and imported roquefort cheese (20 each) were collected in their packages from different localities in Assiut City for mycological evaluation.

Preparation of samples:

Was adopted according to A. P.H.A. (1978).

Identification of the isolated strains:

Suspected mold on malt extract agar (Harrigan and McCance, 1976) were identified according to *RAPER and FENNELL (1965)*, *ELLIS (1976)*, *BOOTH (1977)*, *PITT (1979)*, *DOMSCH et al. (1980)*, *SIVANESAN (1984)* and *MOUBASHER (1993)*.

RESULTS

The obtained results were summarized in Tables 1 and 2.

DISCUSSION

It is apparent from the results in Table (1) that, *Aspergillus* was the most prevalent genus encountered in local roquefort cheese samples comprising 55.30% of total molds. The genus is represented mainly by *A.flavus* (13.90%) and *A.niger* (27.70%) of total molds, respectively. *A.flavus* var *columnaris*, *A.parasiticus* and *A.versicolor* were recorded in rare frequency of occurrence.

Penicillium represented by three species, *P.Corylophilum*, *P.duclauxii* and *P.waksmani* was ranked second in the number of cases of isolation constituting 13.70% of total molds. *Penicillia* were the most predominant in Egyptian (*ABDEL-RAHMAN and EL-BASSIONY, 1984* and *IBRAHIM, 1987*, *SWISS (BULLERMAN, 1976 and 1980)*, Australian (*KING et al., 1981*), Greece (*ZERFIRIDIS, 1985*)

and Turkish cheeses (*ARAN and EKE, 1987*).

Alternaria alternata, *Aphanoascus fulvescens*, *Circinella muscae*, *Cochliobolus specificer*, *Fusarium moniliforme* and *Mucor racemosus* were infrequently encountered. These species were nearly isolated from various types of foods (*HARTOG, 1981*; *SAMSON et al., 1981*; *LEISTNER, 1984* and *PITT and HOCKING, 1985*).

Inspection of results in Table (2) reveals that, 17 species belonging to 6 genera were existed in samples of imported roquefort cheese. Percentage of 64.72% of the isolates were for *Aspergillus* and 11.76% for *Penicillium* and 23.52% for the other genera, which included one isolate each of *A.alternata*, *Emericella variecolor*, *Fusarium oxysporum* and *Mucor hiemalis*.

In fact, presence of molds belonging to *A.flavus* in cheese, might constitute a potential hazard to human health.

BULLERMAN and OLIVIGNI (1974) isolated *Fusarium* spp. (1.1%) from cheddar cheese. In addition *SUTIC et al. (1979)* reported that, *Alternaria* and *Fusarium* were found in 11.8% and 8.5% of milk and milk products including cheese, respectively.

Dairy products should have desirable flavour and free from pathogenic microorganisms and other potentially harmful agents, and the molds used for ripening should be neither pathogenic nor toxic.

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Table 1: Incidence of molds as contaminants, recovered from local roquefort cheese

Mold genera and species	*NCI	%
<u>Aspegillus</u>		
<u>A. flavus link</u>	4	13.90
<u>A. flavus var columnaris</u> Raper & Fennell	1	3.45
<u>A. niger</u> Van Tieghem	8	27.70
<u>A. parasiticus</u> Speare	1	3.45
<u>A. versicolor</u> (vuill.) tiraboschi	2	6.80
<u>Alternaria</u>		
<u>A. alternata</u> (Fr.) Keissler	1	3.45
<u>Aphanoascus</u>		
<u>A. fulvescens</u> (cock) Apinis	3	10.40
<u>Circinella</u>		
<u>C. muscae</u>	2	6.80
<u>Cochliobolus</u>		
<u>C. spicifer</u> Nelson	1	3.45
<u>Fusarium</u>		
<u>F. moniliforme</u> Sheldon	1	3.45
<u>Mucor</u>		
<u>M. racemosus</u> Fresenius	2	3.45
<u>Penicillium</u>		
<u>P. corylophilum</u> Dierckx	2	6.80
<u>P. duclauxii</u> Delacroix	1	3.45
<u>P. waksmanii</u> Zaleski	1	3.45
Total	29	100.00

* NCI = Number of cases

Table 2: Incidence of molds recovered from
imported raquefort cheese

Mold genera and species	*NCI	%
<u>Aspegillus</u>		
<u>A. flavus</u> link	4	23.54
<u>A. flavus</u> var <u>columnaris</u> Raper & Fennell	1	5.88
<u>A. nivens</u> Blochwitz	1	5.88
<u>A. niger</u> Van Tieghel	5	29.42
<u>Alternaria</u>		
<u>A. alternata</u> (Fr.) Keissler	1	5.88
<u>Emericella</u>		
<u>E. varicolor</u>	1	5.88
<u>Fusarium</u>		
<u>F. oxysporum</u> Schlecht. Fr.	1	5.88
<u>Mucor</u>		
<u>M. hiemalis</u>	1	5.88
<u>Penicillium</u>		
<u>P. corylophilum</u> Dierckx	1	5.88
<u>P. jenseni</u> Zaleski	1	5.88
Total	29	100.00

* NCI = Number of cases