Moulds are ubiquitous in nature, their spores are found in large numbers in the atmosphere. Thousands of different kinds have been described in foods. In our country mouldiness of foods is a problem as it occurs mostly in foods kept at room temperature and sometimes in those kept in the refrigerator. This tempted the authors to study the fungi that naturally infect food articles. Moreover the artificial inoculation of some fungi in certain foods was also attempted, to determine the most proper conditions which favour the growth of such contaminants.

Mouldy foods examined were lemon, orange, grape fruit, goyave, pears, mandarine, tomato, cucumber, cauliflower, soft cheese, hard cheese, yogurt, ice-cream, caviar, frozen mutton meat, fresh beef meat, fresh sausage, dry sausage, Pastirma, native bread, dry toast, soft toast and home-made cake. Such foods were found either in our homes or in the laboratory.

I. Identification of fungi found naturally on foods

A small portion of the fungus-mat was inoculated on the surface of Sabouraud's plates and incubated at room temperature for 5—10 days. Fungus colonies obtained were examined directly under the microscope and also by making microcultures.

Photo 1: A piece of native bread showing colonies of Penicillium sp.
Photo 2: Toast showing black patches (Aspergillus niger) and greyish patches (Penicillium sp.)

Photo 3: Penicillium sp. on a piece of Pastirma

mykosen 11, Heft 9 (1968)
Studies on mould contamination of different foods in Egypt

Photo 4: Penicillium sp. isolated from Pastirma and grown on Sabouraud's glucose agar

Photo 5: Microscopic picture of Penicillium sp. isolated from Pastirma

mykosen 11, Heft 9 (1968)
Results and discussion

It was interesting to note that a Penicillium species was found in most foods examined.

In the meantime Penicillium was found in the atmosphere as revealed from the Sabouraud's plates exposed for few minutes.

With regards to the cake it was completely masked by a wide variety of fungi which imparted a technicolour to the cake and made it impossible to recognize it.

Five different types of Aspergilli could be identified in addition to a Thamnidium species and a Mucor. The five Aspergilli could be identified as A. niger, A. candidus, A. oryzae, A. flavipes and A. glaucus. No Penicillium was detected in the cake.

![Photo 6: Heavy growth of Penicillium sp. on the exposed surface of Pastirma](image)

II. Experimental infection of foods

Artificial inoculation of different foods was made using the Penicillium species, A. niger and A. candidus previously recovered, as well as other Penicillium sp., Aspergillus flavipes, Hormodendrum, Stemphylium, Trichothecium, Monilia, Pullularia pullulans and Chaetomium which were isolated from the atmosphere.

Different treatments were made with regard to fruits and vegetables. Some were washed and dried, others washed and left moist and the rest were left untreated. Surface as well as stab inoculations were performed in each sample. Some were inoculated at room temperature, others were left in the refrigerator. With regards to lemons, some were put in closed containers. On the other hand a portion of the meat was put in the refrigerator (5°C) and another in the freezer (— 4°C) whereas Pastirma was kept at room temperature.

Few drops of water were added to the containers of vegetables and fruits kept at room temperature to provide a certain degree of humidity. Control samples were kept under the various conditions.

mykosen 11, Heft 9 (1968)
Results and discussion

Only two types of foods (lemon and pastirma) showed a fungal growth. Only two fungi, a Penicillium sp. and Aspergillus niger, were able to grow on some foods.

Lemons kept in the refrigerator as well as those left at room temperature in open containers did not show fungal growth. The temperature in the first case and the dryness in the second were probably unfavourable for its growth. On the other hand those kept in closed containers showed growth of a Penicillium sp. and an Aspergillus niger which started first at the intact surface then spread to other parts.

Concerning Pastirma (salted meat) it showed only a Penicillium growth which started at the inoculated sites and exposed surfaces and specially on the border or coating, then it spread all over the piece as well as the lower surface which is in close contact with the container. Although Pastirma contained a preservative (NO₂ 500 p. p. m.) the growth of the fungus continued even in the refrigerator so that within two weeks the pieces of Pastirma were completely overgrown by the fungus.

Moulds are likely to grow on meat-products that are salted and dried, provided that a suitable temperature and a certain degree of moisture exist.

Frozen mutton, fresh beef, fresh mutton and fresh sausages did not show any fungal growth whatsoever when artificially inoculated.

Moulds can grow in the presence of high concentration of salt or sugar and does not require a large amount of surface moisture for growth. Although the spores of moulds may have an ubiquitous existence and often float about in the air attached to particles of dust, they cannot germinate without moisture, to prove this toast and lemons which were dry did not show any mould growth though kept under the same environment.
It was noticed that a heavy fungal growth of Penicillium was found on the outer layer (coating) of the Pastirma that consists of red pepper and garlic which are antimicrobial substances.

To avoid mould growth it is recommended that a proper air circulation is necessary to maintain the surface of the food, foodcontainers and environmental facilities in a dry condition.

It is advised that fruits and vegetables are to be kept in the refrigerator, if this is not possible they have to be washed and thoroughly dried with a cotton towel and newer to be pilled on each other.

Moulds on meat may therefore be prevented if the temperature and the atmospheric humidity are kept low and for this reason proper ventilation in refrigerating and storage chamber is necessary so that circulating air may dry the surface of food and containers. All foods should be kept away from dust.

Also fluctuation in temperature will cause atmospheric condensation on the meat surface so intermittent freezing of a refrigerator chamber are common predisposing causes to mould growth and therefore this should be avoided.

N. B. Pastirma is a spalted meat commonly eaten in our country.

Zusammenfassung


Resumen

El problema del hallazgo de hongos en los alimentos es por muchas razones de gran importancia. Hongos pueden provocar la descomposición de los alimentos, producir toxinas que causan enfermedades, y además puede tratarse de hongos capaces de proliferar sobre o en el cuerpo humano.


La infección experimental de diversos alimentos se logró especialmente con Aspergillus niger y una especie de Penicillium. Es necesario realizar investigaciones en gran escala.

References


Address: Vet. med. Faculty, Cairo University, El-Gizeh, U. A. R.