Pilze in Lebensmitteln:

From the Faculty of Veterinary Medicine, Cairo University, Giza, Egypt

The use of some disinfectants as fungicides

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Fungi and their spores find good media in food industry factories leading to its deterioration or spoilage. In meat industry, they grow on ripening roasts for permanent sausage (Dauerswurst). The temperature and relative humidity in chilling and freezing rooms are harmful for most microorganisms other than fungi. Bate-Smith and Morris (1952) reported that molds attacking meat include Mucor species, Sporotrichum spp, Penicillium spp and Cladosporium herbarum. Fungi grow mainly on the surface of meat although the mycelia of Cladosporium herbarum can penetrate and grow up to 4 mm deep (Brooks and Hansford, 1923).

In milk industry, fungi cause disturbance in milk cooling-rooms and in the maturation room for hard and soft cheese.

Few molds are known to cause diseases as aspergillosis in man and poultry; others produce toxins in contaminated foods leading to mycotoxicosis.

As fungi and their spores find a good medium in meat and milk factories specially in cold stores, therefore, it seems important to study the effect of some available disinfectants on some common Aspergillus species.

Experimental

The effect of available disinfectants on some prevalent species of fungi (Aspergillus species) were tried. Serial dilutions of 1 to 3% were prepared from each of the following disinfectants:

- Izal (P. L. Albers — Münster, Germany)
- Tego 51 (Th. Goldschmidt A. G., Chemische Fabriken, Essen, Germany)
- Rohmultisep “22 % active chlorine” (Chemische Fabriken Marienfelde, Germany)
- Antigerm 50 (Pfizer)
- copper sulphate
- ferrous sulphate.

Cultures of Aspergillus species (Asp. flavus, Asp. fumigatus and Asp. niger) were prepared.

Experiment I

The fungicidal effect of each disinfectant was determined when left to act at room temperature (25 ± 2°C) and a relative humidity (65—70%).

Experimental procedure: Two standard platinum loopful from each of Aspergillus species (Asp. flavus, Asp. fumigatus and Asp. niger) were suspended in 2 ml sterile normal saline solution from which 0.5 ml was transferred to a sterile petri dish. 9.5 ml from each dilution of the disinfectant were added to the inoculum in the petri dish and thoroughly mixed.
Inoculated plates were kept at room temperature (25 ± 2°C) for various durations ranging from 1 to 30 minutes. Controls were also prepared using the same inoculum of Aspergillus suspensions in 9.5 ml sterile normal saline solution. Tubes of SABOURAUD glucose broth were inoculated from each plate after being held at the prevailing temperature for a duration of 1, 2, 5, 10, 15, 20 and 30 minutes. Inoculated tubes were incubated at 30°C for 5 days. Any detectable growth was confirmed by plating on SABOURAUD agar medium. Results obtained are given in table I.

Table I: Effect of various disinfectants on Aspergillus species at room temperature

<table>
<thead>
<tr>
<th>Disinfectant</th>
<th>1</th>
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</table>

a = A. flavus
b = A. fumigatus
c = A. niger
d = Control

+ = normal growth
(+) = weak growth
− = no growth

Experiment II

As holding temperature is a factor affecting the efficiency of fungicides, therefore the work outlined in experiment I was repeated leaving the disinfectant to act at 0°C and 85% relative humidity (Kottermann refrigerator). Detection of viable Aspergillus species surviving treatment for 1, 2, 5, 10, 15, 20 and 30 minutes consecutively was done as in experiment I. The results obtained are tabulated in table II.

mykosen 11, Heft 11 (1968)
Table II: Effect of various disinfectants on Aspergillus species at ± 1° C for 10 minutes

<table>
<thead>
<tr>
<th>Aspergillus species</th>
<th>Izal 1%</th>
<th>Tego 51 1% 2% 3%</th>
<th>Rohmultisept 1% 2% 3%</th>
<th>Antigerm 50 1% 3% 5% 1% 3% 8%</th>
<th>Copper sulphate 1% 3% 8%</th>
<th>Ferrous sulphate</th>
<th>Control</th>
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<td>A. flavus</td>
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<td>+ (+) —</td>
<td>++ +</td>
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<td>+ (+) —</td>
<td>+</td>
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<td>A. fumigatus</td>
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<td>— — —</td>
<td>+ ++</td>
<td>++ —</td>
<td>+ + +</td>
<td>+ (+) —</td>
<td>+</td>
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<td>A. niger</td>
<td>—</td>
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<td>+ ++</td>
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</tr>
</tbody>
</table>

+ = normal growth
(+ ) = weak growth
— = no growth

Results and Discussion

The data presented in Table I show that Izal in concentration of 1% at room temperature kills both Asp. flavus and Asp. niger within 5 minutes, while Asp. fumigatus was killed within 10 minutes. On the other hand, it destroyed all Aspergillus species within 10 minutes when left to act in the refrigerator (0°C) (Table II).

"Tego 51" in 1% concentration (25 ± 2°C and relative humidity 65—70%) kills Asp. fumigatus within 10 minutes, Asp. niger 15 minutes and Asp. flavus within 30 minutes. In a concentration of 2% it destroyed the different species within 10 minutes at 0°C (Table II). The results obtained as regard Tego 51 agree to some extent with those given by Papavassiliou (1959) who recorded that by using Tego 51 in concentration 1%, Asp. glaucus and Asp. niger at 20°C were killed in one minute.

Antigerm 50 was found to be effective on Aspergillus species in concentration of 2% for 30 minutes and in concentration of 3% for 15 minutes at 25 ± 2°C. When used in a concentration of 3% and at 0°C it destroyed Aspergillus species after 10 minutes. This results concerning Antigerm 50 (Pfizer) approximately agree with instructions firma reported.

Ferrous sulphate has a destroying effect on Aspergillus species in concentration of 8% after 10 minutes exposure at 25°C and 0°C (Table I & II). On the contrary, Rohmultisept 3% and Copper sulphate 8% have failed to produce their fungicidal action on Aspergillus species.

It could be concluded that Izal, Tego 51, Antigerm 50 and Ferrous sulphate in a concentration of 1%, 2%, 5% and 8% respectively can efficiently destroy Aspergillus species if left to act at 0°C for 10 minutes.

Antigerm 50 excelled to others as it has a deodorizing effect as it kills most germs that cause odours. Moreover, it is neither poisonous nor have any objectionable odour.

Concerning the disinfection of chilling rooms the authors recommended the following technique:

1. Old paint, especially where there is mold infection should be removed.
2. Walls are washed with water before applying the disinfectant (Polachow 1960).
3. 250—1000 ml of the disinfectant are required for every one square meter. The disinfection should be applied thoroughly.
4. Treated room should be left close for 3 hours to ensure its disinfection before use.

mykosen 11, Heft 11 (1968)
Summary
1. The effect of available disinfectants on some common Aspergillus species was investigated.

2. Izal 1%, "Tego 51" 2%, "Antigerm 50" 5% and ferrous sulphate 8% could be applied with success as fungicides at 0°C for 10 minutes exposure, while Rohmultisept 3% (22% active chlorine) and Copper sulphate 8% were found to be ineffective.

Zusammenfassung
Unter den Pilzen, die auf und in Lebensmitteln vorkommen, befinden sich auch solche, die als Erreger von Mykosen bei Mensch und Tier in Frage kommen; andere können Mykotoxikosen hervorrufen.


Folgende Ergebnisse wurden erzielt: Izal tötet in 1%iger Lösung alle 3 Pilze innerhalb von 10 min ab. Die Schädigung beginnt bereits nach 1 min.

Tego 51 wirkt fungizid in 1%iger Lösung gegen Asp. fumigatus und Asp. niger in 15 min; gegen Asp. flavus in 30 min; die 2%ige Lösung tötet Asp. fumigatus und Asp. niger in 10 min, Asp. flavus in 15 min; die 3%ige Lösung tötet Asp. fumigatus in 5 min, Asp. flavus und Asp. niger in 10 min.

Rohmultisept ist wirkunglos gegen alle drei Pilze in den Konzentrationen 1%, 2% und 3%.

Antigerm 50 tötet in 2%iger Konzentration alle 3 Aspergillen in 30 min bei Zimmertemperatur, in 3%iger Konzentration in 15 min; in 5%iger Konzentration bei etwa 0°C in 10 min.

Kupfersulfat ist in den Konzentrationen von 1 bis 8% wirkunglos sowohl bei Zimmertemperatur als auch bei 0°C.

Eisensulfat tötet in einer Konzentration von 8% in 10 min Asp. fumigatus und Asp. niger bei Zimmertemperatur, in 15 min auch Asp. flavus; bei 0°C Temperatur wurden alle 3 Aspergillus-Arten innerhalb von 10 min abgetötet.

Kühltürme, in denen Lebensmittel gelagert werden, lassen sich infolgedessen mit den als wirksam bekannten Desinfektionsmitteln pilzfrei halten. Bei der Desinfektion ist zu beachten, daß alle Farbe, die schon pilzbefallen ist, vorher entfernt wird; die Wände sind vor Beginn der Desinfektion mit Wasser abzuspülen. Die gründlich desinfizierten Räume sind noch etwa 3 Std geschlossen zu halten, bevor sie wieder gebraucht werden.

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References

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mykosen 11, Heft 11 (1968)