

CORONA DISCHARGE INFLUENCE ON MICRO-ORGANISMS

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It is known, that the electric discharge can be used for micro-organism killing. Presented paper describes first qualitative results of atmospheric corona discharge influence on moulds (*penicillium digitatum*) experimental study. It seems, that the atmospheric corona discharge inhibits the fungi growth only. It seems, it does not kill both the living organism of mould and the spores. Preliminary experimental results indicate, that the ozone generated by atmospheric corona discharge does not influence the fungi, too.

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INTRODUCTION

As published [1], the electric discharge has bacteriocid effect, but it is interesting how the electric discharge influence on moulds. New method of moulds killing has multilateral usage. The transported tropical fruits or the seed so sowing are treated by chemical resources for the mould defence, what is expensive and unwholesome. For medical and food industry it is very interesting to find new and low-cost methods of the fungi killing. The paper presents results of study of atmospheric corona discharge conceived fungicid influences on the mould *penicillium digitatum*. The used experimental equipment and method are described below.

GROWTH AND REPRODUCTION OF THE MOULDS

Moulds are eukaryotic, nonphotosynthetic organisms. Body of it is made of tiny filaments or tubes called hyphae, which contain cytoplasm and nuclei. Tangled mats of hyphae are known as mycelium (Fig. 1 [3]), they grow rapidly from the tips by cell division.

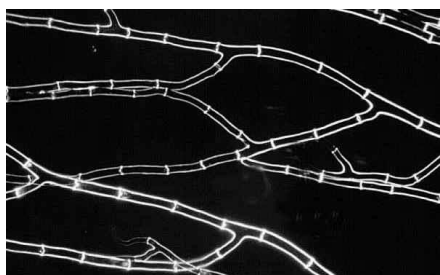


Fig. 1. Mycelium of mould [3]

The reproduction of moulds may be asexually or sexually, the asexual reproduction produces genetical identical organisms and is the most common method used. Near it, the mould began fruit by modification of the ends of its hyphae and the spores are produced (Fig. 2 [3]). The spores are transported by wind, water or other way and when spore lands on moist surface, new hyphae are formed.

APPARATUS SETTING

The scheme of the experimental apparatus is shown in figure [3]. It consisted from a box (cca 1l) where were inserted two samples under study. In the box burns the corona discharge on the tip of one electrode with voltage 4-6kV (determined by the distance between electrode and

sample) and current 0.01mA. One sample was put into the discharge (6-7mm from the tip of electrode), the second one was the reference sample. Near and in the burning corona, there were created some free radicals. These radicals had decomposed in the neighbourhood of the first sample. Together with creation of radicals developed ozone. Generated ozone spread in the whole space of the box. We were studying both influence of corona discharge and ozone on samples.



Fig. 2. Spores of mould [3]

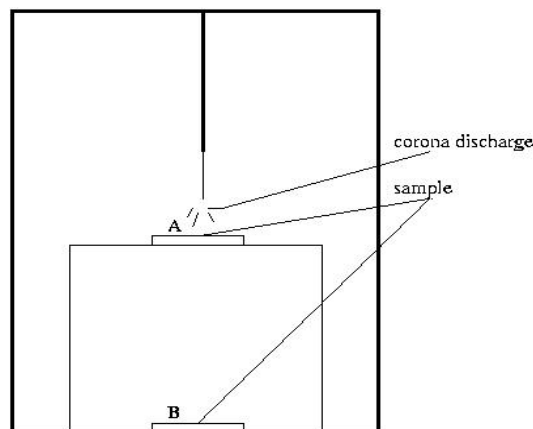


Fig. 3. Apparatus setting

EXPERIMENTS

We were studying the influence of corona discharge in described apparatus on the moulds, following experiments were proceed:

- The spores of *penicillium digitatum* placed on a metal plate were exposed to atmospheric corona discharge and ozone or ozone only for about two days (on described two places in box). Then the treatment was stopped and spores were seeded in the cultivating medium. Their growth did not exhibit any difference from untreated ones.

- Subsequently other spores of penicillium digitatum inoculated in the cultivating medium were exposed to corona discharge and ozone or ozone only for about two days. Two days is a typical time of spores sprouting and growing to visible size [2]. The spores exposed by corona discharge and ozone did not sprout during the treatment, but the sprouting started after removal of the discharge. On the other hand the growth of spores in medium exposed only to ozone did not exhibit any difference (see Fig. 4).

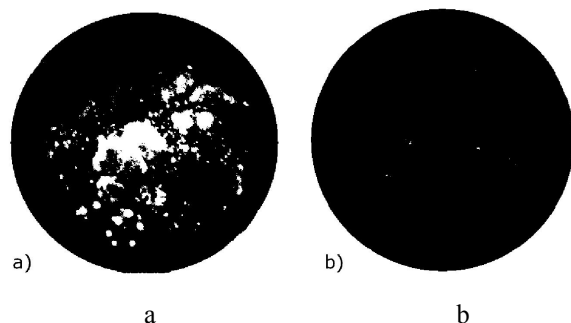


Fig. 4. Cultivating medium with penicillium digitatum. Exposed for two days to ozone only (a) and to corona discharge and ozone (b)

After this we know, that the corona discharge only inhibit the growing of the mould spores. We were looking for some transient line of the growth inhibition and following experiment was proceed:

- The spores of penicillium digitatum inoculated in relatively large space cultivating medium were exposed to corona discharge for about two days, apparatus is shown on figure 3. The fotography of the result is shown on firuge 4. It is visible, that the boudary between inhibited and non inhibited area is sharp.

THE RESULTS

The ozone generated by corona discharge did exhibit no or very limited influence on moulds sprouting and growth. The moulds treatment by corona discharge stopped the moulds sprouting only, but did not kill the spores.

For more detailed explanation further experiments are necessary, especially determination of ozone concentration dependent conditions of moulds killing and determination of sprout inhibition mechanism.

ВЛИЯНИЕ КОРОННОГО РАЗРЯДА НА МИКРООРГАНИЗМЫ

В. Шольтиц

Известно, что электрический разряд можно использовать для уничтожения микроорганизмов. В представленной работе описаны первые качественные результаты экспериментального исследования влияния атмосферного коронного разряда на плесенный грибок (penicillium digitatum). Представляется, что коронный разряд лишь препятствует росту грибков, но не убивает ни живущий организм плесени, ни её споры. Предварительные результаты эксперимента показывают, что озон, который генерируется атмосферным коронным разрядом, также не влияет на грибки.

ВПЛИВ КОРОННОГО РОЗРЯДУ НА МІКРООРГАНІЗМИ

В. Шольтиц

Відомо, що електричний розряд може бути використаний для знищення мікроорганізмів. В роботі, що надається, описані перші якісні результати експериментального дослідження впливу атмосферного коронного розряду на плісневий грибок (penicillium digitatum). Здається, що коронний розряд лише перешкоджає зросту грибків, але не вбиває ані організм плісені, що живе, ані її спори. Попередні результати експерименту вказують, що озон, який генерується атмосферним коронним розрядом, також не впливає на грибки.



Fig. 3 The apparatus with relatively large space cultivating medium exposed to corona discharge



Fig. 4. The fotography of cultivating medium after two days. It is wisible, that the boudary between inhibited and non inhibited area is sharp

ACKNOWLEDGMENT

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