بسم الله الرحمن الرحيم

شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

شبكة المعلومات الجامعية

جامعة عين شمس

التوثيق الالكتروني والميكروفيلم

قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها

علي هذه الأفلام قد أعدت دون أية تغيرات

يجب أن

تحفظ هذه الأفلام بعيدا عن الغبار

في درجة حرارة من ١٥-٢٥ مئوية ورطوبة نسبية من ٢٠-٤٠%

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بعض الوثائـــــــق الاصليـــــة تالفـــة

بالرسالة صفحات
لم ترد بالاصل

EFFECT OF STRESSED ENVIRONMENTAL CONDITIONS ON THE VIABILITY OF *ESCHERICHIA COLI* AND *ENTEROCOCCUS FAECALIS*

By

HABIBA MOSTAFA AHMED

B.Sc. (Agric. Biochemistry),
Fac. Agric., Ain Shams Univ. 1977
M.Sc. (Agric. Microbiology),
Fac. Agric., Ain Shams Univ. 1988

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Approval Sheet

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ABSTRACT

Habiba Mostafa Ahmed. Effect of Stressed environmental conditions on the viability of *Escherichia coli* and *Enterococcus faecalis*. Unpublished Ph.D., University of Ain Shams, Faculty of Agriculture, Department of Agricultural Microbiology, 1997.

The stress of some environmental conditions usually practised for water treatment or food processing, such as exposure to heating, freezing, preservatives or disinfectants, leaves some of surviving bacterial cells damaged. These injured cells are still viable, though their recovery by normal enumeration procedures is negatively affected. Thus, bacterial populations may be seriously underestimated when a selective medium is used for enumeration of specific bioindicators, causing error and consequently health hazard.

The aim of the present work is to study the effect of some stressed environmental conditions on the death and injury of two universal bioindicators; *Escherichia coli* and *Enterococcus faecalis*, and recovery of the injured cells by different methods.

Liquid cultures of the tested organisms were subjected to several stress conditions including heating (at 60 C for 4-10 min), freezing (-20, -40, -78C for 1 hr), high concentrations of sugar (10-60%) or salt (5-15%), sodium benzoate, sodium nitrite (0.02-0.1%), acetic acid, lactic acid (0.25 - 1.0%), hypochlorite (2-10 ppm chlorine). Data revealed that the lethality percentages of both tested organisms were directly proportional to treatment intensity, meanwhile injured cells were induced in most treatments and their rates were not corresponding with stress intensity. Consequently convenient method should be used for repairing such injured cells to grow on the selective media.

Effect of exposing *E. coli* and *Enterococcus faecalis* to sublethal stress on some metabolic properties was also studied. It was found that stress conditions led to decrease the activities of dehydrogenase and dissimilatory nitrate reductase enzymes in both tested organisms. Furthermore, the reactions of IMVIC tests were found to be slower in the stressed *E. coli* cells than in the normal ones. The type of cellular damage was determined to be to protein synthesis, RNA or cell wall by using specific antibiotics such as chloramphenicol, actinomycin D and penicillin. The plasma membrane leakage was determined by measuring the 260 & 280 nm absorbing materials.

Effect of processing steps of carbonated beverage production on the bioindicators was examined, as a model of food processing. Results exhibited very high rate of lethality, meantime a ratio of injured cells was recorded in all treatments.

Different nutritional combinations were tried as recovery suspending media to repair the injured cells to find out the best one. A simple method for recovery was suggested. It was performed by applying membrane-filter technique with a recovery suspending medium consisting of pyruvate, glucose and phosphate for 3 hr at 25 C; then adding trypticase soy-yeast desoxycholate broth for counting *E. coli* or adding KF broth for counting *Enterococcus faecalis*.

Key words: *Escherichia coli*, *Enterococcus faecalis*, stressed bacteria, damaged bacteria, injured bacteria, recovery of injured bacteria, carbonated beverage.

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CONTENTS