

EFFECTS OF SUBLETHAL TEMPERATURE STRESSES
ON THE CULTIVABILITY AND MORPHOLOGY OF
Staphylococcus aureus

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EFFECTS OF SUBLETHAL TEMPERATURE STRESSES ON
THE CULTURABILITY AND MORPHOLOGY OF *Staphylococcus aureus*

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EFFECTS OF SUBLETHAL TEMPERATURE STRESSES ON THE
CULTURABILITY AND MORPHOLOGY OF *Staphylococcus aureus*

By

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FAKULTI AGROTEKNOLOGI DAN SAINS MAKANAN
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PROJEK PENYELIDIKAN I DAN II**

Adalah ini diakui dan disahkan bahawa laporan penyelidikan bertajuk:

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Staphylococcus aureus
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oleh SHARIFAH FATIMAH ZAHRA SD AGIL, No.Matrik UK11470
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telah diperiksa dan semua pembetulan yang disarankan telah dilakukan. Laporan ini
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DECLARATION

I hereby declare that the work in this thesis is my own except for quotations and summaries which have been duly acknowledge.

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ABSTRACT

Temperature is one of the most important preservation methods in food industry. The objective of this study was to determine the effects of the sublethal temperature stresses on the culturability and morphology of *Staphylococcus aureus* ATCC 25923. The pure culture of *S. aureus* was grown in Tryptone Soya Broth before being subjected to three different temperature stresses (20°C, 40°C and 45°C) after reaching the log phase (6 hour) and stationary phase (16 hour). The survival of the bacteria in terms of cell injury on non-selective agar TSA and TSAS (TSA with added 4% NaCl) at these different temperature stresses were examined. Standard growth curve at optimal temperature (37°C) and the survival curves of *S. aureus* after subjected to different temperature stresses were obtained and the percentages of cell injury were also calculated. Results obtained showed that *S. aureus* is more heat resistant at 20°C during the log phase rather than at higher temperature stresses (40°C and 45°C). The apparent of biphasic curves were observed during the stationary phase of *S. aureus*. The percentage injury was higher at log phase rather than stationary phase where the highest percentage injury occurred after 9 hour of exposure at 20°C. The morphological changes observed under light microscope with an imaging system showed that the occurrence of clumping phenomenon during the stationary phase at 20°C and 45°C. The reported results described the culturability and morphology of pathogenic Gram-positive *S. aureus* under different temperature stresses.

ABSTRAK

Suhu merupakan salah satu kaedah pengawetan yang penting dalam industri makanan. Objektif kajian ini adalah untuk menentukan kesan tekanan suhu 'sublethal' terhadap keupayan kekulturan dan morfologi *Staphylococcus aureus* ATCC 25923. Kultur bakteria asli dihidupkan didalam kaldu soya tripton sebelum dikenakan pada 3 suhu tekanan yang berbeza (20°C, 40°C dan 45°C) pada fasa yang berlainan iaitu fasa eksponensial (jam ke-6) dan fasa statik (jam ke-16). Kemandirian bakteria dalam istilah kecederaan sel di atas agar '*non-selective*' TSA dan TSAS (di tambah 4% NaCl) pada suhu tekanan berbeza dikaji. Carta pertumbuhan pada suhu optimum (37°C) dan carta pertumbuhan pada tekanan suhu berbeza diperolehi bersama dengan peratusan kecederaan sel juga dikira. Keputusan telah menunjukkan *S. aureus* lebih merintang haba pada suhu 20°C, pada fasa eksponensial berbanding suhu tinggi (40°C and 45°C). Terdapat dua keluk pada carta pertumbuhan statik *S. aureus*. Peratusan kecederaan adalah lebih tinggi pada fasa eksponensial berbanding fasa statik dengan bacaan tertinggi pada jam ke-9 inkubasi pada suhu 20°C. perubahan morfologi yang dilihat menggunakan mikroskop cahaya dengan sistem penggambaran menunjukkan terdapat 'clumping' pada fasa 20°C dan 45°C. Keputusan yang diperolehi menggambarkan sifat kekulturan dan morfologi Gram-positif patogen *S. aureus* pada tekanan suhu yang berlainan.