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YOGHURT PRODUCTION USING LOW DOSE IRRADIATED STARTER CULTURE

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Abstract. The aim of this work was to study the effect of low doses of radiation on bacterial starter culture microorganisms. The viability and vital activity of microorganisms (*Streptococcus thermophilus, Lactobacillus bulgaricus)* were evaluated during the yogurt production process. Processed dairy products consumed by humans for centuries are fermented dairy foods and beverages. Dairy products are processed or fermented by adding suitable bacteria to animal milk and incubated to reduce the pH. The most widely known fermented dairy products are yogurt, cultured cream and buttermilk, cheese and kefir.[1] Among the numerous products derived from milk, yoghurt is one of the most widely consumed products. It is produced by fermenting milk using lactic acid bacteria (*Lactobacillus, Streptococcus* etc.). These bacteria convert lactose in milk into lactic acid and aromatic compounds. The consumption of yoghurt is increasing because it has high nutritional value, good therapeutic properties and easily digestible. People who are lactose intolerant tend to consume yoghurts without any complications because it is lactose free.[2]

Microorganisms such as bacteria experience a lot of stress from the environment ranging from radiation, temperature and pH fluctuations, starvation, osmotic pressure etc. They are likely to suffer from metabolic disorders and even death during changes in environmental conditions. Many microorganisms have developed to survive and adapt to harsh environmental conditions. They have undergone evolution over time to improve their growth conditions for enhanced cellular functions.[3] Bacterial when exposed to higher doses of radiation experiences cell inactivation or death. However, in this study, we irradiated starter culture microorganisms with low doses of radiation (60-120 cGy) to study whether such exposure could activate or inhibit certain biochemical pathways within bacteria. The irradiated bacteria were used for yoghurt production. Their vital activity was evaluated, the time it used in the fermentation compared with non-irradiated bacteria. The results of the study revealed that non-irradiated bacteria have lower fermentation time (5 hrs.) compared to the irradiated bacteria (about 6–6.5 hrs). The viability of microbial cells was assessed by the ability to form a colony on a suitable agar medium (CFU in yoghurt samples). It was discovered that the *Streptococcus* bacteria viability decreases with the growth of irradiation dose from 2.645×10^9 to 1.355×10^9 CFU/ml during one-day storage, from 2.51×10^{10} to 1.66×10^9 CFU/ml during 7-day storage and from 3.175×10^{10} to 3.09×10^9 CFU/ml during 14-day storage respectively. Similar regularity was also determined for the *Lactococcus* bacteria viability.

References

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