Application of two level factorial design to study the microbe growth inhibition by pineapple leaves juice

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Abstract:
The yield of Ananas comosus (pineapple) is susceptible to microbial infection such as fusariosis which normally affecting the fruits and the leaves. Usage of chemical pesticides to control these diseases has been often associated with negative impacts on the environment and human health. Since pineapple leaves are one of the lavishly organic waste materials which contains total phenolic content (TPC) with antimicrobial properties, it was desired to gain deeper knowledge on the potential of pineapple leaves as microbial growth inhibitor. The objective of this research is to study the factors that affect microbe growth inhibition using pineapple leaves juice (PLJ). The factors evaluated were; reaction time between mixtures of PLJ with microbe (0.5 – 5 hours), concentration of TPC in PLJ (0.2563 – 0.5127 mg GAE/mL), reaction temperature (26 – 37°C), and ratio of microbe to PLJ (M/PLJ) (1:1 and 1:3). A two level factorial design was adopted to assess the effect of the above mentioned factors on the microbial inhibition by PLJ. The results showed that the most contributing factor of 1.55% was reaction temperature, meanwhile the highest contribution factor for interaction effect was between reaction time between mixtures of PLJ with microbe and M/PLJ at 4.26%. The best condition for microbe growth inhibition of 20.90% was found to be at reaction time of 0.5 hour, TPC in PLJ of 0.5127 mg GAE/mL, reaction temperature of 37°C, and M/PLJ at 1:1. Further study to optimize the conditions of the PLJ to achieve higher percentage of microbial inhibition is therefore inevitable. This study demonstrates that pineapple leaves could be exploited as valuable sources of natural products that could be used as microbial growth inhibitor and thus become one of the cheap and green alternatives for more expensive chemical pesticides.

Keywords : Pineapple Leaves; Total Phenolic Content (TPC); Antimicrobial; Two-Level Factorial Analysis (TLFA)

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