不同季節與地區產台灣蜂膠之抗菌活性及其 DPPH 自由基清除能力

The Antibacterial and DPPH Radicals Scavenging Effects of Taiwanese Propolis Obtained from Different Regions and Seasons

[摘要]

蜂膠是蜜蜂蒐集特定植物樹皮或葉芽所分泌的樹脂，混入蜜蜂分泌之酵素，並結合蜂蠟及花粉所製成的膠狀物質。本研究探討台灣不同地區(北-台大，中-南投名間鄉，南-屏東枋 寮鄉)、不同季節(六月、八月、十~十一月)所收集蜂膠之抗菌活性及其清除 DPPH 自由基之能力。 結果發現，蜂膠之香膠(balsam, 80%酒精萃出物)含量、抗菌效果及 a-diphenyl-b-picryl- hydrazyl (DPPH)自由基的清除能力因產地、產季之不同而有差異。大致而言，無論其產地，香膠含量以六月產者最高，十~十一月產者最低。此外名間產者其香膠含量最高。不同病原菌對蜂膠的敏感性也不同，Staphylococcus aureus 及 Listeriamonocytogenes 對 蜂膠較為敏感，而對 Salmonella typhimurium 及 Escherichia coli O157:H7 則否。大致而言，以六月產台灣蜂膠之抗菌效果較佳。在所有蜂膠樣品中則以名間六月產蜂膠之抗菌活 性最強。進一步對 Sta. aureus 測試顯示，蜂膠酒精萃出物在 37℃時所表現之抗菌效果比在低溫時(4、25℃)佳。且其抗菌效果在酸性環境下(pH 5.0、6.0)亦比在高 pH 環境下(pH 8.0、9.0)強。菌齡影響 Sta. aureus 對蜂膠酒精萃出物之敏感性，其敏感性依序為對數期中期、末期及定常期之菌體。此外，蜂膠酒精萃出物會造成 Sta. aureus 胞內 260 nm 吸光物質(核酸 、DNA、RNA)的洩漏。蜂膠中的抗菌物質具有良好的熱安定性。蜂膠亦具 DPPH 自由基清除之能力，所測試之台灣產蜂膠中以六月產者具有較佳之 DPPH 自由基清除能力。

關鍵字: 蜂膠 propolis、地區 regions、季節 season、抗菌活性 antibacterial activities、DPPH 自由基 DPPH radiacals

[摘要]

Propolis is a resinous substance collected by honeybees from buds andleaves of trees and plants, mixing with pollen, bee wax as well as enzymessecreted by bees. In the present study, the antibacterial activities and DPPH (a- diphenyl-b-picryl-hydrazyl) radicals scavenging effects of Taiwanesepropolis obtained from various regions (NTU, Mingchien and Fangliao) at different seasons (June, August, and October-November), was examined. Results showed that the balsam content, antibacterial activities and DPPH radicals scavenging effects of the propolis were varied with theharvesting regions and seasons. In general, the balsam content of propolis obtainedin June was the highest, while those collected in October-November was the lowest, regardless of harvesting regions. The balsam content of propolis obtained from Mingchien in June

was the highest. The pathogens tested showed various extents of susceptibility to ethanolic extract of propolis (EEP). Staphylococcus aureus and Listeriamonocytogenes were found susceptible while Salmonella typhimurium and Escherichia coliwere resistant to propolis. The Taiwanese propolis collected in June possesseda higher antibacterial activity than those collected in other seasons, andthe Mingchien propolis collected in June exhibited the highest antibacterial activity among all of Taiwanese propolis tested. Further test on Sta. aureus revealed that EEP showed strongerantibacterial activity at 37℃ than at 4℃or 25℃, in acid environment (pH 5.0 and pH6.0) than in higher pH environment (pH 8 and pH 9). Cell age also affected the susceptibility of Sta. aureus to EEP. Cells in the mid-exponential phasewere most sensitive, followed by the late exponential phase cells andstationary phase cells. In addition, it was also noted that EEP caused the leakage of260-nm-absorbing materials (nucleotide, DNA, RNA) from Sta. aureus cells and possessed good thermal stability. Furthermore, EEP showed scavengingeffect on DPPH radicals. Among the propolis tested, the Taiwanese propolis collectedin June exhibited the highest DPPH scavenging activity.