The Antibiotic Activity and Honey Preservation by Enterococcus avium within the Social Stomach of Apis mellifera and Its Potential as a Cure for CCD

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Honeybees store nectar in the crop(social stomach) and share it with nestmates through trophallaxis. This behavior seems to increase the risk of infections by colony members sharing contaminated nectar, which could harm the entire colony's health and lead to CCD, a worldwide problem where honeybee colonies suddenly disappear or die. This research aimed to determine the role of crop normal flora in protecting the crop from infections and its potential as a treatment for CCD. Crops were separated from A mellifera. 17 bacterial strains were identified, 12 in NA and 5 in MRS. 6 strains showed growth independent to honey, meaning they affected honey quality less than the others, which showed radically increased growth in 10% honey. The supernatants of these 6 strains effectively repressed the growth of other crop bacteria and E. coli. The 6 strains also did not alter honey sugar content as much as the others. In order to determine their effect on honeybee health, A. mellifera groups were fed sugar cubes each treated with strains b, c, 6, their supernatants, E. coli, and untreated cubes and ones treated with NB, MRS as controls. Of the groups, the group treated with E. coli died quickest, only after 3 days. The control groups all showed survival up to 10 days. The groups treated with the crop bacteria survived longer, and the groups treated with the supernatants of b and 6 lived up to 17 days. Nucleotide sequencing showed that all 3 strains are E. avium, which was identified once to synthesize antibiotic bacteriocin in honeybee larvae. The results show how E. avium is important in maintaining honeybee health and the quality of communal nectar. If E. avium strains were treated to honeybee colonies, it would help maintain colony health and serve as a potential cure to CCD.

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