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Study of Growth Behavior of Some Bacterial Fish Pathogens to Combined Selected Herbal Essential Oil

Authors : Ashkan Zargar, Ali Taheri Mirghaed, Zein Talal Barakat, Alireza Khosravi, Hamed Paknejad

Abstract : With the increase of bacterial resistance to the chemical antibiotics, replacing it with ecofriendly herbal materials and with no adverse effects in the host body is very important. Therefore, in this study, the effect of combined essential oil (Thymus vulgaris-Origanum magorana and Ziziphora clinopodioides) on the growth behavior of Yersinia ruckeri, Aeromonas hydrophila and Lactococcus garvieae was evaluated. The compositions of the herbal essential oils used in this study were determined by gas chromatography-mass spectrometry (GC-MS) while, the investigating of antimicrobial effects was conducted by the agar-disc diffusion method, determination of minimum inhibitory concentration (MIC) and minimum bactericidal concentration (MBC), and bacterial growth curves determination relied on optical density (OD) at 630 nm. The main compounds were thymol (40.60 %) and limonene (15.98 %) for Thymus vulgaris while carvacrol (57.86 %) and thymol (13.54 %) were the major compounds in Origanum magorana. As regards Ziziphora clinopodiodes, α-pinene (22.6 %) and carvacrol (21.1 %) represented the major constituents. Concerning Yersinia ruckeri, disc-diffusion results showed that t.O.z (50 % Origanum majorana) combined essential oil was presented the best inhibition zone (30.66 mm) but it was exhibited no significant differences with other tested commercial antibiotics except oxytetracycline (P <0/05). The inhibitory activity and the bactericidal effect of the t.O.z, unveiled by the MIC= 0.2 µL /mL and MBC= 1.6 µL /mL values, were clearly the best between all combined oils. The growth behaviour of Yersinia ruckeri was affected by this combined essential oil and changes in temperature and pH conditions affected herbal oil performance. As regard Aeromonas hydrophila, its results were so similar to Yersinia ruckeri results and t.O.z (50 % Origanum majorana) was the best between all combined oils (inhibition zone= 26 mm, MIC= 0.4 µL /mL and MBC= 3.2 µL /mL, combined essential oil was affected bacterial growth behavior). Also for Lactococcus garvieae, t.O.z (50 % Origanum majorana) was the best between all combined oils having the best inhibition zone= 20.66 mm, MIC= 0.8 µL /mL and MBC= 1.6 µL /mL and best effect on inhibiting bacterial growth. Combined herbal essential oils have a good and noticeable effect on the growth behavior of pathogenic bacteria in the laboratory, and by continuing research in the host, they may be a suitable alternative to control, prevent and treat diseases caused by these bacteria.

Keywords : bacterial pathogen, herbal medicine, growth behavior, fish
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