

Identification of Antimicrobial Components from Plants on Food Poisoning Bacteria and Application to Food Preservation

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Ethanol extract of 80 species of edible and medicinal plants were examined on their growth inhibition for 5 strains of *L. monocytogenes* ATCC 19111, ATCC 19112, ATCC 19113, ATCC 19114 and ATCC 15313 by optical density using Bioscreen C. The ethanol extract of *Dryopteris crassirhizoma* Nakai, *Commiphora molmol* Engl. exhibited comparatively strong growth inhibition effect on 5 strains of *L. monocytogenes* at 1000 ppm level in broth. The most effective antimicrobial extracts or components from plants were also tested for inhibition effect on *Vibrio parahaemolyticus*, *Bacillus cereus*, *Salmonella typhimurium*, *Staphylococcus aureus*, *E. coli* O157 : H7 and *Salmonella enteritidis*. The main effective components from each extract were identified and applied to food preservation.

1. The ethanol extract of *Dryopteris crassirhizoma* Nakai showed strong growth inhibition at concentrations of 100~500 ppm and the minimum inhibitory concentration (MIC) of hexane fraction was 20 ppm. The purified substance, D8-2-5 fraction, was isolated by silica gel column and preparative thin layer chromatography from hexane fraction of *Dryopteris crassirhizoma* Nakai. The D8-2-5 fraction showed a strong bactericidal activity on 5 strains of *L. monocytogenes* at 20 ppm level in tryptic soy broth medium. At the level, the viable count was reduced to 4~6 log cycle compared to initial cell number. The hexane fraction of *Dryopteris crassirhizoma* Nakai showed strong growth inhibition at 50 ppm on *V. parahaemolyticus* and *B. cereus*, and at 25 ppm on *S. aureus*. The purified antimicrobial substance, D8-2-5 fraction, was identified as plavaspidic acid by $^1\text{H-NMR}$ and $^{13}\text{C-NMR}$.
2. The ethanol extract and hexane fraction from *Commiphora molmol* Engl. showed MIC of 50 ppm and 25 ppm, respectively, on 5 strains of *L. monocytogenes* for 72 hr at 32°C. The purified substance, D3-3-2 fraction, was isolated by silica gel column and preparative thin layer chromatography from hexane fraction of *Commiphora molmol* Engl. The C3-3-2 showed a strong bactericidal activity on 5 strains of *L. monocytogenes* at 10 ppm in tryptic soy broth medium. At the concentration, the viable count was reduced 5~6 log cycle compared to initial cell number. The hexane fraction of *Commiphora molmol* Engl. showed strong growth inhibition at 25 ppm on *B. cereus* and *S. aureus*, and also at 50 ppm in broth on *S. enteritidis*, and at 500 ppm on *V. parahaemolyticus*. The purified antimicrobial substance, the C3-3-2 fraction, was identified as *m*-nonylphenol by $^1\text{H-NMR}$ and $^{13}\text{C-NMR}$.
3. On application test using minced Alaska pollack and ground beef, the C3-3-2 fraction which was purely isolated from *Commiphora molmol* Engl. at 100 ppm were applied at 32°C and 5°C. At 32°C storage condition, the antimicrobial substances did not reduced *L. monocytogenes* ATCC 19113, meanwhile at 5°C storage condition, *L. monocytogenes* ATCC 19113 was reduced in viable number. Of the all, at 5°C storage condition, we could conclude that the antimicrobial effect of the C3-3-2 fraction from *Commiphora molmol* Engl. on ground beef was the most effective than any other treatments. But antimicrobial effect of C3-3-2 fraction was lower than that of broth condition, as was assumed that *L. monocytogenes* may have protective actions in food system.