



**CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY**

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| Name(s) Adam J. Protter | Project Number S1522 |
| Project Title Phytopharmaceutical Assay of Antimicrobial Properties of Piper (L.) Genus with a Novel MIC Protocol for Oil Extracts | |
| <p style="text-align: center;">Abstract</p> <p>Objectives/Goals Misuse of antibiotics has increased the number of drug-resistant germs. Though there is some evidence supporting the use of herbal medicines as antibiotics, scientific studies in this field are in their infancy. Researchers are now looking at indigenous medicine. The present study was designed to evaluate the antimicrobial properties of ethanol and CO₂ extracts of various Piper genus plants.</p> <p>Methods/Materials Aqueous, ethanol, and supercritical CO₂ crude extracts of Piper genus were screened for antimicrobial activity against Staphylococcus Epidermis (Gram positive), and E. coli (Gram negative), using the disk diffusion method of Kirby-Bauer where sterile plates were prepared and spread with cultures against which the antibacterial activity is to be evaluated. The antimicrobial activity of each extract was expressed in terms of the mean diameter of zone of inhibition (ZOI) produced by each extract at the end of the incubation period. All experiments were performed in triplicate. Minimum Inhibitory Concentration of the extracts was determined by a novel serial dilution agar method.</p> <p>Results In the disk diffusion trials against E.coli, P. Nigrum oil exhibited significant antimicrobial activity yielding a ZOI 33% larger than that of Amoxicillin. P. betel oil yielded a ZOI comparable to that of Amoxicillin. The supercritical CO₂ Piper aduncum exhibited intermediate effects against E.coli with a ZOI of 9mm, 42% smaller than that of Amoxicillin. On the gram positive trials using Staphylococcus epidermidis, there were several active compounds. The CO₂ extract of Piper aduncum exhibited significant activity against S.epidermidis yielding a zone of inhibition of 20.6mm, 6.7% larger than that of Vancomycin, the last resort antibiotic. The oil of Piper betel gave a ZOI of 8.5mm, 44% smaller than that of Vancomycin.</p> <p>Conclusions/Discussion This investigation reveals the antimicrobial nature of extracts of the Piper genus. Extracts of ethanol, aqueous, and CO₂ were used for extraction of antimicrobial metabolites. Out of the extracts used Piper betel was most effective against Gram-negative and Piper aduncum was most effective against Gram-positive.</p> | |
| Summary Statement This study evaluated the antimicrobial properties of ethanol and CO ₂ extracts of various Piper genus plants. | |
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