5. Final Comments

State your facts as simply as possible, even boldly. No one wants flowers of eloquence or literary ornaments in a research article.

- R. B. McKerrow
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- This work attempted at evaluation of antioxidant and/or antibacterial potential of seeds from eight different plants belonging to different families.

- Microwave assisted extraction (MAE) was employed for preparing extracts of seeds in solvent of varying polarity. Two parameters namely (a) seed:solvent ratio, and (b) extraction time, were optimized by taking A. squamosa seeds as the sample. A seed:solvent ratio of 1(g):50(mL) was found to be most suitable. Total heating time required to complete the extraction ranged from 50 s to 5 min for different solvents, which is much lesser as compared to traditional Soxhlet method. Among all seeds, highest extraction efficiency (29%) was achieved for S. cumini seeds in ethanol (50%).

- Antioxidant assays were performed on 20 extracts of four seeds. Among them maximum total antioxidant capacity was exerted by Chl:MeOH extract of M. zapota seeds, whereas water extract of C. limon proved best in DPPH radical scavenging assay. In general, Polar extracts were found to possess higher antioxidant activity.

- Total phenol content was found to be moderately correlated with antioxidant capacity, but the flavonoid content was not.

- Hexane and acetone proved efficient in extracting flavonoids, as opposed to water. Water extracts proved good at scavenging DPPH free radical.

- Extracts were tested for their antibacterial action against 13 different gram-positive (four) and gram-negative (nine) bacteria, through disc diffusion and broth dilution assays.

- Disc diffusion assay identified methanol extracts of S. cumini and M. zapota, acetone extract of T. indica, and Ethanol extract of S. cumini as effective against majority of
test organisms. *S. paratyphi A*, *V. cholerae*, and *S. flexneri* were found susceptible to most of the extracts tested against them. *S. pyogenes* and *S. aureus* were not inhibited significantly by any of the extracts.

- None of the extracts was found to be active against drug-resistant strains- *S. paratyphi A* (GU-R3) or *B. subtilis*.

- Potent extracts as identified in DDA were subjected to broth dilution assay for MIC determination. MIC values of crude extracts ranged from 53-656 µg/mL, lowest being recorded by methanol extract of *T. indica* against *S. epidermidis*.

- Highest total activity (1883.11 mL/g) was exerted by ethanolic extract of *S. cumini* seeds against *S. epidermidis*.

- Ethanol extracts of *S. cumini* and *P. sylvestris*, and methanol extract of *S. cumini* exerted a broad spectrum of bacteriostatic action. Whereas methanol extract of *T. indica* and acetone extract of *M. zapota* exhibited a bactericidal action. In total, five extracts were identified with a broad spectrum of activity (i.e., effective against both gram-positive and gram-negative bacteria), and two with bactericidal action.

- Active extracts were subjected to UV-vis spectroscopy and phytochemical screening, which revealed presence of different classes of metabolites in different extracts. Phenol and flavonoid contents were quantified too, in extracts of *T. indica* and *S. cumini*.

- Successful separation of three of the active extracts (methanol extracts of *S. cumini* and *T. indica*, and ethanol extract of *S. cumini*) on TLC plates was achieved. Fractions separated on TLC plates were also tested for their antibacterial action.
- Fraction (R$_f$ 0.1) from *T. indica* methanol extract proved almost two times more potent than the crude extract in DDA., and 1.3 times less potent than streptomycin. It showed a bactericidal activity against *S. epidermidis* at a concentration of 48 µg/mL.

- Through TLC seven fractions were isolated from methanol extract of *S. cumini* seeds, and three from its ethanol extract. One fraction with (R$_f$ 0.72) was common in both the extracts. All the seven fractions from methanol extract of *S. cumini* displayed varying degree of activity against *P. oleovorans* and *S. epidermidis*. Fraction-6 registered the lowest MIC (167.5 µg/mL) against *P. oleovorans*.

- TLC fractions of *S. cumini* methanol extract were also subjected to HPLC. This established presence of quercetin in fraction-7. Gallic acid was identified as a constituent of fraction-1 and 2. Identification of quercetin and gallic acid in respective fractions was also confirmed by the data generated through TLC and UV-vis spectroscopy.

- Thus this study identified various seed extracts with potent antioxidant and/or antibacterial action. Further investigation for isolation and identification of the phytoconstituents responsible for their activity is desirable. Active constituent(s) once isolated and purifies, can be subjected to compatible techniques such as IR, MS, and NMR spectroscopy for structural studies.

- Such findings can contribute to the increasing database of the medicinal plants and may be of importance in varietal improvement, food preservatives, nutraceuticals, cosmetics, and biopharmaceuticals in a race with various diseases and infections.