Chapter 1 deals with synthesis of betulinan C and its analogs and explores these as potential candidates for bio-film inhibition and antibacterial activities. Recently, betulinan C is reported for its antioxidant, cytotoxicity and PDE4B2 inhibition activity. The increasing resistance of antibiotics in clinically pathogenic bacteria leads to need for new bio-film inhibitor candidates. Betulinan C and its analogs were seen found to be potent for above mentioned activities. The synthesis of betulinan C has not yet been reported.

Synthesis of betulinan C and its analogs were effectively achieved except analog with $t$-butyl substituent; Compounds 3-Chloro-2,5-diphenyl-$p$-hydroquinone and 2,5-Di-$t$-tert-butylhydroquinone exhibited significant bio-film inhibition properties against $P. \text{aeruginosa}$ O1 and afforded IC$_{50}$ value less than 25 $\mu$M. Quinone and hydroquinone having phenyl group are pragmatically found active against $P. \text{vulgaris}$ and $S. \text{aureus}$. The following scheme can be further investigated for the analogs of betulinan C as new bio-film inhibitor candidates.

\[
\begin{align*}
\begin{array}{c}
\text{OH} \\
\text{Ph} \\
\text{OH} \\
\text{Ph} \\
\text{Cl}
\end{array}
\xrightarrow{\text{KBrO}_3, \text{Cat. Conc. H}_2\text{SO}_4, \text{ROH}}
\begin{array}{c}
\text{OH} \\
\text{Ph} \\
\text{OH} \\
\text{Ph} \\
\text{OR}
\end{array}
\end{align*}
\]

Chapter 2 explores synthesis of farinomalein and its analogs; exploring Stobbe condensation and Haval-Argade Contrathermodynamic Rearrangement for synthesis of farinomalein. Farinomalein is isolated from $\text{Paecilomyces farinosus}$ HF599 by Nahira et al. in 2009. Farinomalein is potential antifungal agent against plant pathogen Phytophthora sojae P6497. The maleimide scaffold containing farinomalein is one of the synthetic challenges. Haval-Argade Contrathermodynamic Rearrangement has not yet been deployed for the synthesis of alkylmaleimide bearing acid functionality in its structure.

Evaluation of individual and synergetic bioactivity of betulinan C and farinomalein and their analogs with eugenol isolated from $O. \text{tenuiflorum}$ against clinically pathogenic Gram positive $\text{Staphylococcus aureus}$ and Gram negative
Proteus vulgaris was carried out. Synthesis of farinomalein and its analogs were successfully accomplished. Haval-Argade Contrathermodynamic Rearrangement strategy was originally deployed for synthesis of the alkylmaleimide bearing acid functionality in its structure. Empirically, phenyl analog was found to be active among other analogs of farinomalein against P. vulgaris and S. aureus.

Chapter 3 reviews therapeutic activities of the O. tenuiflorum and hence utilization of eugenol as a natural product for bioactivity studies. Eugenol derivatives were investigated as potential drug candidates by in-silico experiments. In-silico experiments later were found practically insignificant as they lacked rationality.

Eugenol was isolated from hydro-distillate of O. tenuiflorum and used for bioactivity studies. Qualitative phytochemical analysis of hydro-distillate of O. tenuiflorum leaves by LC-MS/MS Q-TOF techniques reveal two novel trace metabolites using XCMS protocol. Qualitatively, goshuyic acid synonym: (5Z,8Z)-tetradecadienoic acid and 10-methyl-1-dodecanol were identified by LC-MS/MS Q-TOF technique. Goshuyic acid has been reported for its isolation from Evodia rutaecarpa a traditional Chinese medicinal plant and well known for its anti-inflammatory activity. The gigantic LC-MS Q-TOF data from the chromatographic analysis of leaves extract of O. tenuiflorum was analyzed by the Agilent® MassHunter software. This data was classified in a number of classes and subclasses such as alkaloid, aromatic acid, benzoic acid derivative, benzopyran, choline, carotenoid, chromone, clavulones, fatty acid, fatty alcohol, fatty aldehyde, fatty amide, flavan derivative, glucuronide, glycerolipid, glycerophospholipid, hormone, hydantoin, hydroxy fatty acid, hydroxy quinone, indol, limonoid, monoterpenoid, natural product, peptide, phenol, prostaglandin, quinone, retenoids, short chain keto acid, sphingoid base, steroid, sterol, sulfoglycosphingolipid, unnatural amino acid, vitamin D3 and miscellaneous metabolite. The mass spectral details are compared with that of METLIN, Lipid gateway and other such databases. The tentative assignments of the structure of the compounds were made and reported.

...End of summary