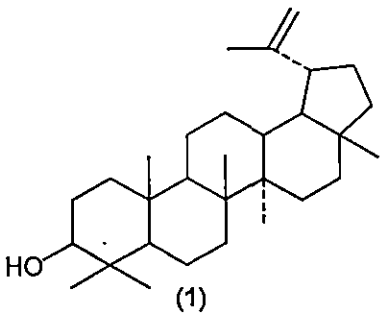
SUMMARY

The investigation embodied in the present thesis entitled "Studies on the antimicrobial activity of some available triterpenoids and its derivatives from some medicinal plants" was initiated under the supervision of Dr. A. Saha, Department of Botany and Dr. P.Ghosh, Department of Chemistry, University of North Bengal, Siliguri,India. The study consisted of: (i) Isolation and characterization of natural compounds. (ii) Preparation of derivatives from natural compounds, their characterization and screening of their antimicrobial activity against some well known fungal and bacterial pathogens of economically important plants. In the present work three medicinal plants (*Xanthoxylum budrunga, Bischofia javanica* and *Quarcus suber*) were selected for extraction of triterpenoids.

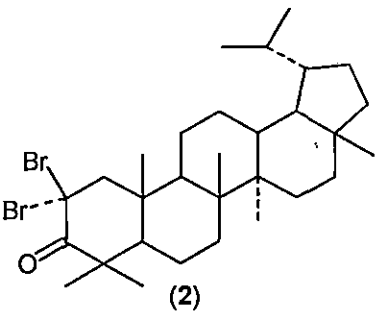
Following a short Introduction, the whole work was divided into four chapters. **Chapter-I** dealt with a comprehensive review of literature in concord with the present line of investigations. **Chapter-II** dealt with *Xanthoxylum budrunga* and contained two sections. **Section-1** described details of the isolation and characterization techniques of the compounds (including derivatives) with required experimental data, their analyses and discussions. **Section-2** dealt with antimicrobial efficacy of the compounds. **Section-2** included materials and methods, results and discussion in details. **Chapter-III** dealt with the plant *Bischofia javanica* and **Chapter-IV** dealt with the plant *Quarcus suber*. Like **Chapter-II the Chapter-III** and the **Chapter-IV** each was consisted of two sections.

Chapter-II (section-1): *Xanthoxylum budrunga* was selected to isolate lupeol. Triterpenoid, Lupeol was isolated and characterized. Antimicrobial assay of the compound was performed against some fungal and bacterial plant pathogens. Lupeol, the mother compound (triterpenoid) was coded as compound-A and was isolated with chloroform in soxhlet apparatus. several fractions were obtained from the soxhlet. From those fractions, some derivatives were prepared by the processes like Jone's oxidation method, treatment with N-bromosuccinimide, dehydrobromination of 2α-bromolupanone with lithium bromide-N, N-dimethylformamide, treatment of lithium-ethylenediamine and microwave assisted cyclisation of dioxime. The derivatives were commonly called as 2,2-dibromolupanone (coded as compound-B), 2α-bromolupanone (coded as compound-

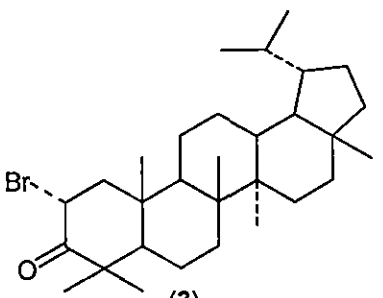
C), lup-1(2)-en-3-one (coded as compound-D), and Lupan[2,3-C]-1′,2′,5′-oxadiazole (coded as compound-E). The structure of these compounds was determined by chemical and spectral data in comparison with that of spectral data of already reported compounds. The structures of the compounds are as follows:



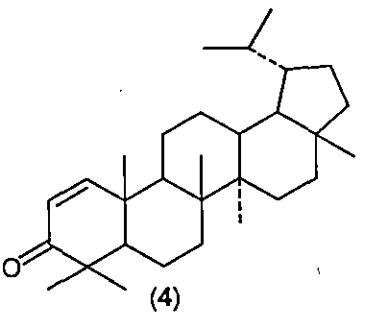
(1)
Lupeol



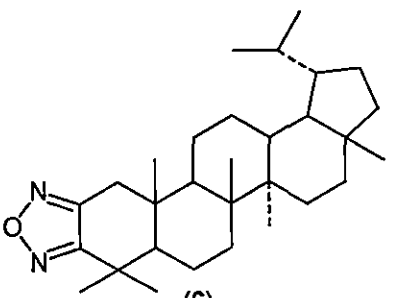
(2)
2,2-dibromr lupanonel



(3)
2α-bromr lupanonel



(4)
Lup-1(2)-en-3-one

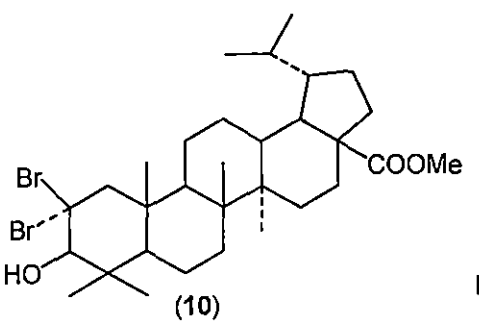


(6)
Lupane-[2,3-C]-1′,2′,5′-oxadiazole

Chapter-II (Section-2): Finally, the mother compound lupeol and its five derivatives (in five different concentrations viz.100, 200, 300, 400 & 500ppm) were subjected to

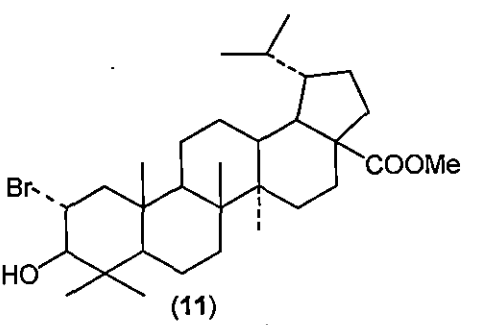
bioassays against three fungal and four bacterial plant pathogens. Materials and methods, Results and discussions related to the antimicrobial efficacy of the compounds were also described in details in this section.

Chapter III (section-1) dealt with the plant *Bischofia javanica* which belongs to the family Euphorbiaceae. Betulinic acid, the natural triterpenoid was isolated from the trunk bark of the plant and was characterized. Like chapter-II some derivatives of betulinic acid were also prepared following procedures like estarification of betulinic acid, Hydrogenation of methyl betulinate, Jone's oxidation of lupanol, and treatment of methyldihydrobetulonate with N-bromosuccinimide, dehydrobromination of 2α-bromodihydromethylbetulonate, and cyclisation of dioxime. The obtained derivatives were 2,2 dibromomethyldihydrobetulonate (coded as compound-F), 2α-bromomethyl-dihydrobetulonate (coded as compound-G), 28 carbomethoxylup-1(2)-en-3-one(coded as compound-H) and 28 carbomethoxylupan-[2,3-C]-1′,2′,5′-oxadiozole (coded as compound-I). Structures of the compounds are as follows:



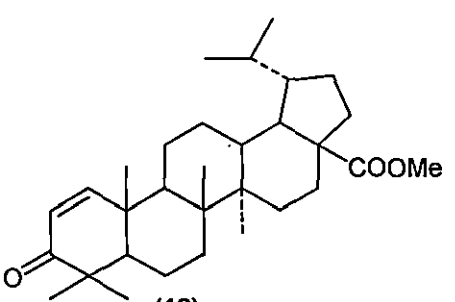
(10)

2,2-Dibromomethyl dihydrobetulinate



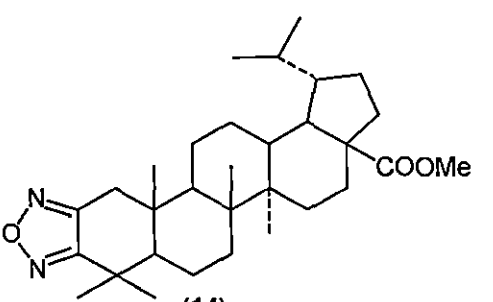
(11)

2α–Bromomethyl dihydrobetulinate



(12)

28-Carbomethoxy lup-1(2)-3-one

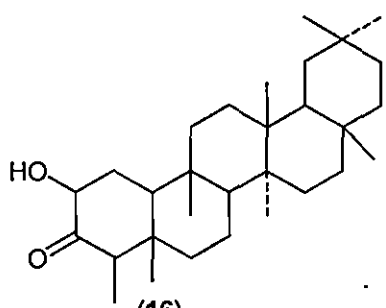


(14)

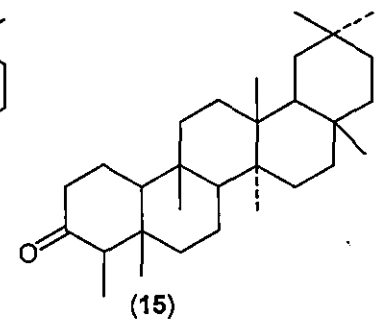
28-Carbomethoxy lupan [2,3-C]-1′,2′,5′-oxadiazole

Chapter III (section-2): Here, the mother compound betulinic acid and its three derivatives (in five different concentrations viz.100, 200, 300, 400 & 500ppm) were subjected to bioassays against the same three fungal and four bacterial plant pathogens. Materials and methods, Results and discussions related to the antimicrobial efficacy of the compounds were also described in details in section-2 of chapter II.

Chapter IV (section-1) dealt with the plant *Quarcus suber* which belongs to the family Fagaceae. Two derivatives Cerin and Friedelin were prepared from the cork of the plant. Detailed extraction process was given in this section of the chapter IV. Structures of the compound are as follows;



(16)
Cerin



(15)
Fridelin

Chapter IV (section-2): In this section antifungal and antibacterial activity were performed by the two compounds (Cerin and Friedelin) in five different concentrations (100,200,300,400,500ppm) as in the other cases done. The same three fungal pathogens and four bacterial pathogens were used to test the antifungal efficacy of the two compounds. Details of the materials and methods, results and discussion related to the antimicrobial efficacy of the compounds were also included in this section. On the basis of the experimental evidences, Friedelin proved to be more effective than cerin.

Implication of the results was discussed in the respective discussion portions of section-2 of the chapters II, III and IV. The result was encouraging since natural triterpenoid compounds and their derivatives were potential to control fungal and bacterial pathogens. On the basis of phytotoxicity tests, it was found that 100ppm concentration of all the 11 compounds were not phytotoxic. From the present study, it has been observed that several plant pathogens can be control by the compounds tested which

are effective in controlling pathogens at 100 ppm concentration and are also phytotoxic may be recommended for controlling the plant pathogens *in vivo* or in field condition. Considering all the evidences of experimental data, it can be concluded that *Colletotrichum gloeosporioides*-may be controlled by compound F and Cerin , *Fusarium equiseti*— may be controlled by compound G and Cerin, *Curvularia eragrostidis*- may be controlled by compound B, *Ralstonia solanacearum*- may be controlled by compound B, *Xanthomonas sp*- may be controlled by compound B and F,*Pseudomonas syringae*- may be controlled by compound H, *Erwinia carotovora*-- may be controlled by compound B.