Development of Agrochemicals

New processes for the synthesis of ethofenprox®, pyrithiobac®, were standardized and transferred to *Godrej* Agrovet company for further scale up and commercialization.

Abundant plants from Euphorbiaceae, Rutaceae and Meliaceae were screened for insecticidal, antifeedant, insect growth regulator and herbicidal activities.

Meenakshi and **Sujata V. Bhat**, **1998**, A process for the preparation of herbicidally active phenyl-thio-pyrimidine and salts Indian Patent 539/BOM/98. 24th, Aug.

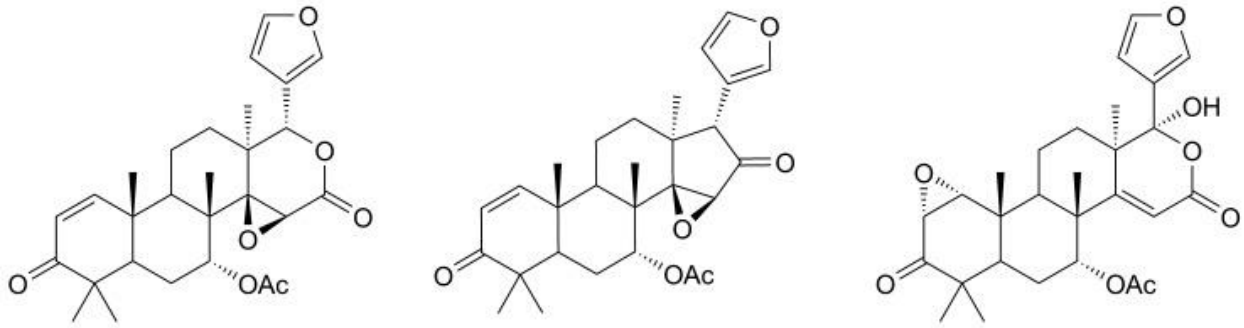
New molecules from Neem as Insect control Agents

Azadirachta indica (Fam. Meliaceae) commonly known as neem**,** nim tree or Indian lilac.

Its fruits and seeds are the source of neem oil. Neem is a key ingredient in non-pesticidal management (NPM), providing a natural alternative to synthetic pesticides. Several terpenoids and sulphur-containing molecules are known to be present in the neem oil.

For insect control Dr. Bhat isolated several tetra-nor-triterpenoids of Neem seed oil and modified these molecules semi-synthetically and studied insect-control activity.

Tetra-nor-triterpenoids from Neem as Insecticides



Gedunin Epoxyazadiradione Epoxynimolicinol

The major non-azadirachtin limonoids tetranor-triterpenoids such as gedunin, epoxyazadiradione, epoxynimbocinol, and nimolicinol from *Azadirachta indica* A. JUSS ('neem') and their derivatives were evaluated for their toxic action against fourth instar larvae of *Aedes aegypti* L. and *Culex quinquefasciatus* SAY. Gedunin exhibited 100% toxic

action against both the mosquito larvae at 50 and 10 ppm. Epoxyazadiradione and epoxynimolicinol also showed significant toxicities (≥50%) against larvae of both mosquito species at 50 ppm. These neem limonoids can have benefits in mosquito-control programs.

Five new tetranortriterpenoids, 1*R*,2*R*-epoxy-17α-hydroxyazadiradione , 1*R*,2*R*-epoxynimolicinol , deacetylnimolicinol, nimbocinol and epinimocinol have been isolated from a methanol extract of neem oil (*Azadirachta indica*, seed oil) along with the known compounds epoxyazadiradione, 17α-hydroxyazadiradione, gedunin, nimbin, and nimolicinol. Spectral studies and chemical transformations were used to establish the structure of compounds. The characterization of the epoxides 1 and 2 in neem oil is of biogenetic significance, as they may be considered as intermediates between olefinic and hydroxy derivatives.

Dr Bhat supported *Godrej* Agrovet Pvt Ltd in Neem studies during their development of *NEEM-Urea* formulation development. Gedunin and hydroxyl-gedunin had appreciable insecticidal and larval antifeedant activities.

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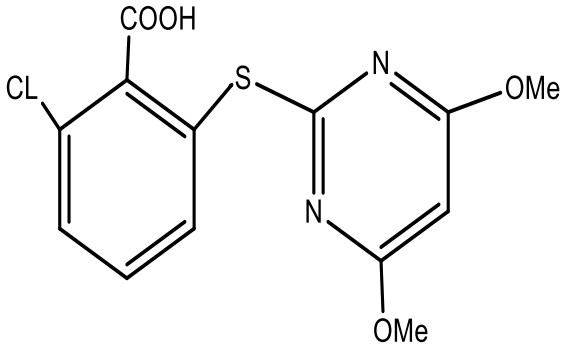
Chemistry and Biodiversity, 6, 897-902, **2009,** 9422(90)85378-S

Pyrimidine Herbicide Synthesis



Sujata V. Bhat and S. Meenakshi,
Indian Patent IN 183808 B (2000) rights assigned to *Godrej* Agrovet Pvt Ltd, Mumbai