

# The Analytic Aspect of Phyto-Chemicals of *Azadirachta indica* Medicinal Plant of Khetri Region, Rajasthan

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**Abstract:** The area under study i.e. Khetri Region is located in South-eastern part of Jhunjhunu district, Rajasthan state with its geographical extension in between 27° 40' 24" to 28° 17' 12" N latitude and 75° 39' 59" to 76° 12' 59" E longitude. The district consists of three rivers which are seasonal by their nature of water stream flow point of view viz; Basai river, Kantli river, and Chandravati river.

## RESEARCH AREA

All these rivers fall under the pattern of the total area under internal drainage system of the district. The area under study is facing the problem of excess of fluoride contents in the water which has average value of 7.5 ppm and suffering from the disease of Fluorosis at many places which are scattered throughout the area under study.

## REVIEW OF LITERATURE

Being an applied researcher I feel my prime most duty to present here the specific interpretation of the studies who have carried out the research work of the analytic aspect of the nature, contents and details of available phyto-chemicals which are investigated or traced out within the applied parts and portion of medicinal plant species, with specific reference to my study area i.e. Khetri region of Rajasthan.

With the end of third decade of 20<sup>th</sup> century, the study on analytic aspect of phyto-chemicals of medicinal plants had already been started, during that period in 1929-30 Chopra, R.N. and Chosh, S. studied on "Medicinal Plants Used in Indigenous Medicine", Further in this context in 1984 studied in 1956-58 Chopra, R.N. on "Medicinal Plants" whereas in 1984 Basu, B.D. and Kirtikar, K.R. studied on "Indian medicinal plants", respectively.

It will be very interesting to mention here a descriptive account of certain medicinal plant species analytic aspect of available phyto-chemicals by some researchers, are being

illustrated here in the following paragraph which alphabetically covers the medicinal plant.

Phytochemicals of applied parts and portion of medicinal plant - *Albizia lebbek* (A tree species) was studied by Tripathi, S.N. et al. in 1978, Tripathi, R.M. et al. in 1979, and Das, P.K. et al. in 1983. Another medicinal shrub/ tree species i.e. *Adhatoda vasica* was studied in 1983 by Kanwal, P. et al. *Asparagus species* (Herb species) was studied by Inamdar, A.C. and Mahabale, T.S. in 1980. *Azadirachta indica* (Neem tree) a multipurpose medicinal plant species was studied by several researchers but the phyto-chemicals analytic aspect studied by K.C. Sinha et al. in 1984 with specific reference to Neem Oil is worthwhile to mention here.

*Boerhavia diffusa* (herb species) was studied by Srivastava, K. et al. in 1980 for its phyto-chemicals contents. In 1980 Dennis, T.J. et al. and in 1984 Pachnanda, V.K. et al. studied the phyto-chemicals of *Boswellia serrata* (Medicinal tree species). In 1981, the phyto-chemicals of *Corchorus depressus* (Medicinal herb species) was studied by Vohara, S.B., et al. in 1981. A very important multipurpose medicinal shrub species - *Commiphora mukul* was studied by some researchers from phyto-chemicals analytic aspect point of view which are as - Baldwa, V.S. et al. in 1978, Mester L. in 1978, Bordia, A. and Chuttani, S.K. in 1979 and Kotiyal J.P. in 1979. Sharma, H.K. et al. studied the phyto-chemical of *Cassia species* in 1982.

*Occimum sanctum* - a under shrub medicinal plant species phyto-chemically was studied by Bhargava, K.P. and Singh, N.

in 1981. Phyto-chemicals of *Solanum nigrum* in 1982 was studied by Brindha, P. et al. In very early during 1932-33 Pandse, G.P. and Dutt. S. worked out the phyto-chemicals of an important medicinal climber species - *Tinospora cordifolia*.

In earlier studies, Venkataraghavan S. et al. in 1980 traced out the phyto-chemicals which are found in applied parts and portion of two plant species namely - *Boerhavia diffusa* and *Withania somnifera* - a multi-purpose medicinal shrub species was phyto-chemically studied by some researchers which are as - Kuppurajan, S. et al. in 1980, Singh, N. et al. in 1982, Verma, V. in 1983 and Sharma, M. K. in 2007.

Although all of them as above mentioned researchers, botanists and authors contributed their valuable work from time to time but none of them upto now presented their work on exact lines of the analytic aspect of phyto-chemicals of Aloe vera medicinal plant of Khetri Region, Rajasthan.

### OBJECTIVES

Being a field of applied phyto-researcher with specific reference to the study of medicinal plants, naturally it become a significant aim to illustrate the applied parts and portion of medicinal plants which are being used to cure certain disease. Further in this context, the research study objective also covers the illustration of analytic aspect of phyto-chemicals of the applied parts and portion of medicinal plants i.e. in other words to say phyto-chemistry descriptive interpretation due to which the particular medicinal plant has applied values as drug to cure certain kind of diseases for the welfare of healthy environment of human beings.

### HYPOTHESIS

1. I also hope that there may be a marked variation in the percentage of vegetational group of medicinal plants and their families. Naturally, the author presume that all parts of

every medicinal plant should not be useful as drug but some specific parts and portion should be useful, it may be traced out during the course of study of research work details of analytic aspect of phyto-chemicals in this concerned.

2. The author may find or trace out that the region may include many medicinal plant species which may be useful according available phyto-chemicals one side for the cure of one disease particular, and another side many single medicinal plant species which may be useful as drug in the cure of many different kind of diseases.

### METHODOLOGY

Phytochemical study of the crude medicinal plant parts, several of these medicinal herbs will be chemically analysed and their biologically active chemical compounds recorded Literatures will be searched to know those chemicals which give them their medicinal properties. The chemicals searched for would mainly their Alkaloid, Steroid, Glycoside, Saponin, and Tannin contents for the area under investigation i.e. the Khetri region of Rajasthan.

### INTRODUCTION AND MORPHOLOGY

*Azadirachta indica* is generally found as a full sized tree, and it belongs to the family - Meliaceae. It belongs to the vegetational group of 'tree,' from life-form point of view it falls in the life-form group of 'meso-phanerophyte', and from leaf-class point of view it falls under the leaf-class of 'microphylls', it is deciduous nature of tree species. From xerophytic categorization point of view it's leaves are with waxy coated (neem oil) surface and has more sunkum stomata.



**Plate : Azadirachta indica Tree**

It has 'poly-climax' distribution in nature, or in other words to say the may be observed in more than one Habitat i.e. sandy plains Habitat, gravel formations, stony and rocky Habitat and also on riverine Habitat. It has no occurrence over the tops of sand dunes as well as on hills top surface.



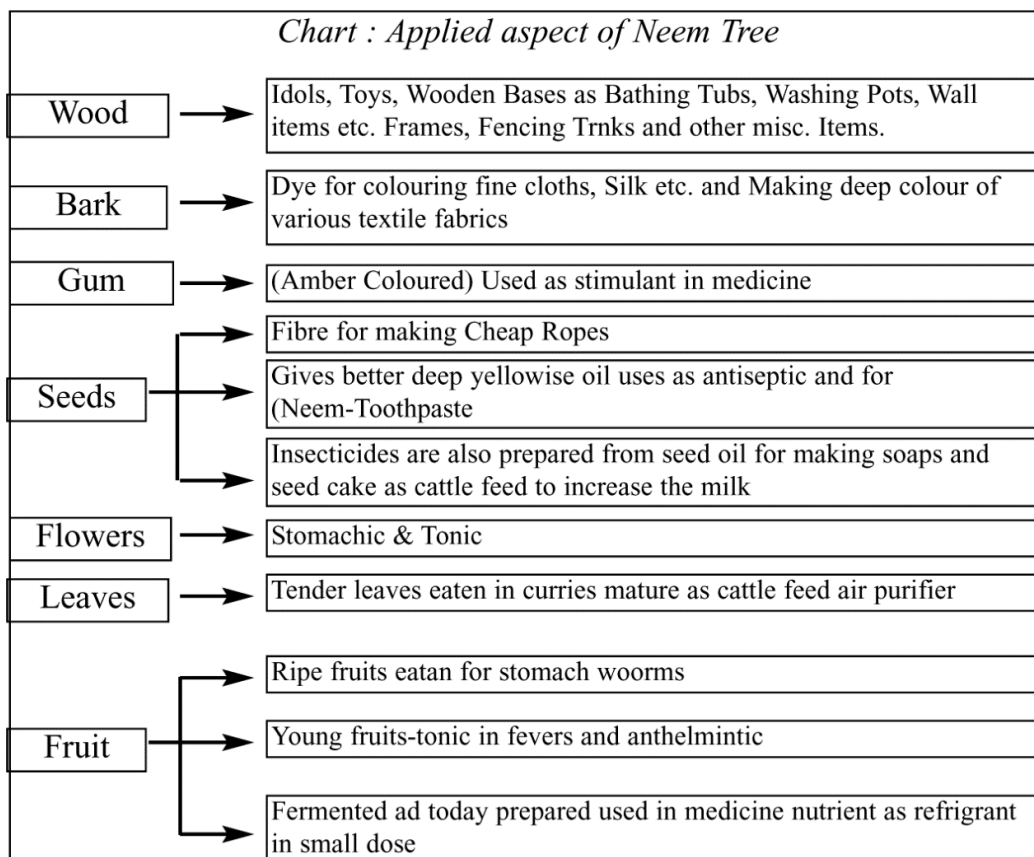
**Plate : Azadirachta indica Fruits**

The tree species shows uneven distribution in Khetri Region. It has frequent pattern of phytogeographic distribution in sand dunes Habitat. In riverine Habitat of Basai river it has rare occurrence at Dadafatehpura (stony and rocky Habitat) of the area under study.

**PHYTO-CHEMICAL (MEDICINAL) USES :**

The tree as a whole by its each and every part and portion (except its roots) is medicinally useful. From Phyto-chemical applied aspect point of view, see the Chart for the applied aspect of Neem Tree.

At the name of parts and portion of the neem tree's Phyto-chemical uses for the cure of diseases, the neem fruit's and leaves are used mainly as anti-septics and insecticides. Neem oil, nimbin and nimbidin are active against various fungi. The anti-insect principles have been commercialised in the form of vapaside and margosides. The drug is also attributed antifertility and anti-viral properties, and is being screened for efficacy in treatment of Aids.



**PHYTO-CHEMICAL ANALYSIS OF APPLIED PARTS AND PORTION**

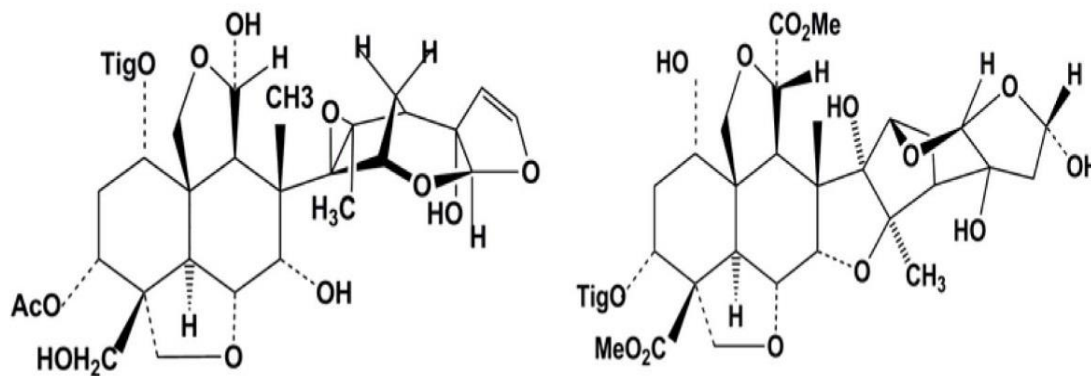
The statistics of commercial evaluation of folklore of neem trees covers the importance (as an antiseptic - whole life worship), Production - seed 10 kg./ tree/ year which has evaluation of Rs. 50/- kg., barkgum 2 kg./ tree/ tree year which has evaluation of Rs. 20/- per kg., leaf condiment 10 kg./ tree/ year which has evaluation of Rs. 10/- kg., and flower Essence - 1 kg./tree/year which has evaluation worth of Rs. 2000/- kg.

The different part of Neem tree contain different constituents. Among them the active ingredients are azadirachtin, salannin and meliantriol. The neem leaves contain nimboesterol and quercertin. The seeds contain azadirachtin, salannin meliantriol and meliacin. The trunk bark contains nimbin, nimbinin, nimbidin, nimboesterol and a bitter principle called margosine. Neem oil is expressed from seeds and it contains chiefly glycosides of oleic (50 percent) and stearic (20 percent) acids.

Many workers made their research studies on the particular tree species. DMRC, Jodhpur has a Research Project at the name of Neem's medicinal as well as economic uses. Sinha et al. In 1984 also published his research work on Neem Oil as a vaginal contraceptive properties.

*Azadirachta indica* elaborates a vast array of biologically active compounds which are structurally complex and chemically diverse. The extracted chemical constituents of

different parts of *Azadirachta indica* tree contained many biologically active compounds, including triterpenoids, alkaloids, phenolic compounds, flavonoids, carotenoids, ketones and steroid. The most biologically active compound is azadirachtin. This compound belongs to the C-seco limonoids which was classified as tetranortriterpenes. It is actually a mixture of seven isomeric compounds labelled as azadirachtin M and azadirachtin N (Figure 1).

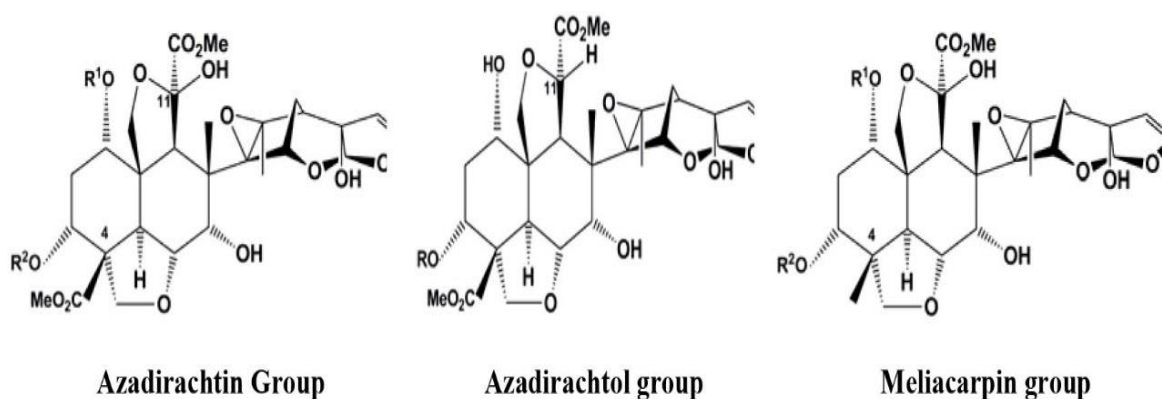


**Fig. 1 :** Two compounds of azadirachtin analogues collected from seed kernels of *Azadirachta indica*: Azadirachtin M was identified as 29-oxymethylene-11-demetoxy carbonyl-11 $\alpha$ -hydroxyazadirachtin, Azadirachtin N was identified as 22,23-dihydro-23 $\alpha$ -hydroxy-3-tigloyl-11-deoxyazadirachtinin.

These two compounds is more effective and play major role in medicinal activities when compared against second-instar larvae (L2) of *Plutella xylostella* L.

The structure of chemical compounds of *Azadirachta indica* is complex. Therefore, many years of study and research were

done to elucidate the exact structure of azadirachtin. In 1968 Azadirachtin was first isolated by Butterworth and Morgan. Since that, more than 100 related compounds had been isolated from the neem tree, and these could be assigned to one of three groups: azadirachtols, azadirachtins, and meliarcarpins (Figure 2).



**Fig. 2:** Three groups of natural products isolated

The four best limonoids compounds were included Azadirachtin, Salannin, Meliantriol, and Nimbin. Limonoids contain insecticidal and pesticidal activity which lead to its role

as an antifeedants, repellents, growth inhibitors, attractants, chemosterilants or as insecticides (Figure 3).

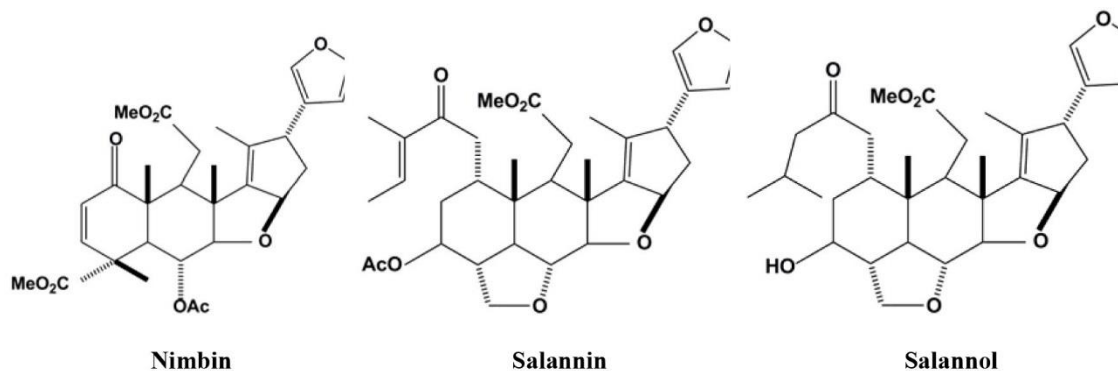


Fig. 3: Some of the limonoid compounds isolated from *Azadirachta indica*.

The phytochemistry screening of Neem saponins, flavonoids, alkaloids, glycosides, samples from leaves extracts also revealed reducing sugars, polyphenols, HCN and some different chemical constituents terpenes in the ethanolic leaf extract compared to other plant parts. The obtained ethanolic extract of neem's leaves results showed the presence of tannins, also showed the composition of fibres, vitamins and micronutrients.

## RESULTS AND DISCUSSION

Historical evidences showed the relation between humankind and *Azadirachta indica* tree and also it showed *Azadirachta indica* application in health care systems from ancient times to the modern medicine. It has portraits a clear description of *Azadirachta indica* tree and its broad bio-potential activity. It has provided a new vision into the exploration and utilization of *Azadirachta indica* tree as a source for development of new therapeutic molecules.

it seems a little bit unpleasant for the users. Interestingly, the *Azadirachta indica* trees are an excellent alternative for modern tooth care products. Besides, the leaves of the *Azadirachta indica* tree are also used as natural treatment for acne sufferers.

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