INTRODUCTION
Scientific strategies for the study of plant products have changed substantially in the past few years for a number of reasons, including advances in technology, new molecules of substantial interest, changing ethical principles for organism collection and heightened awareness of the chemical and biological potential of the tropical rain forests [1].

There has been a resurgence of interest in the development of new drugs from plant sources. In spite of tremendous advances in synthetic chemistry, natural products continue to play a major role in developing new drugs in many countries and in several areas of biological activity. Drug discovery groups who are also accessing plant materials on a broad basis, routinely use botanical gardens and taxonomists at universities to assist them in their sourcing of plant biodiversity [2,3].

Medicinal plants which have been in past centuries a main therapeutic resource for treating a wide variety of diseases, still account with their derivatives for 20% of all medical prescriptions in industrialized countries and for 80% in developing countries. The medicinal plants used as sources for extracts or pure products for therapeutic use represent a rapidly expanding area.

Ever increasing importance of pure substances or purified and standardized extracts which persist better analytical characterization and so meet the quality, efficacy and safety requirements with which every modern drug whether natural or synthetic must comply. In any case, many traditional remedies are still in therapeutic use including drugs as such or extracts prepared in accordance with the pharmacopoeia of the counter requirements of use in the pharmaceutical forms for which they are intended [4].
Developments in Medicinal Plant Research

In the past few years, approaches to the study of biologically active natural products have changed so dramatically. Aspects of the tremendous changes of conducting plant research include isolation techniques, structure elucidation, biological evaluation, semi synthesis, dereplication and biosynthesis. Finding medicinal plants in grave sites dates back to at least the middle Paleolithic period 60,000 years ago [6].

Since more than 80% of the world’s population use plants as their primary source of medicinal agents [6]. Traditional remedies are closely guarded secrets held only by Shaman or Curandero and passed on slowly to tribal apprentices [7]. The area of science, which has to discover biologically active natural products from, plants in ethano-botany. Several authors have reviewed aspects of these developments [8-11]. The CIBA foundation recently organized a follow up symposium [12] entitled “Ethanobotany and the search for new drugs” demonstrating the substantial rise in activity and acceptance of using an ethanobotanical approach for drug discovery. In this symposium the approach of Shaman Pharmaceuticals towards drug discovery was given by King and Tempesta [13,14].

In recent review, Phillipson and Anderson [15] mentioned about the contribution that plants had made to western medicine. Cox and Balick both former students of Richard Schultes, who is regarded as the “Father of ethanobotany” have also described their approach to ethanobotanically based drug discovery [16]. Holland [17] has suggested that an alternative approach to drug discovery with collaboration between classicists (Greek and Latin) and scientists.

A broad based programme of biological evaluation/screening of medicinal plants was initiated at CDRI, Lucknow in 1963, and the results were reported in 1968 [18]. The programme continues and results check over 3,000 plant materials have been published [19,20,21,22]. Whether the target is a biological (e.g. Insecticide, herbicide) or a therapeutic one, no area of natural product discovery has changed as much in past 10 years as biological evaluation [23,24,25]. A book [26] and several recent conferences attest to the high
level of interest in the biological evaluation of natural product samples, particularly in highly automated, high volume screens. The books bring together a wide range of bioassays, including those for antifungal [27], antibacterial [28], anticancer [29], anti-malarial [30], plant insect interaction [31], hepatotoxic [32], and platelet aggregation [33]. The natural products screening are through chemodiversity obtained either from existing in-house or purchased chemical libraries or through combinatorial libraries [34,35,36].

The burgeoning natural product literature has also spa concerned several current awareness services, including those of chemical abstracts. The Royal Society of Chemistry and Phytochemical analysis for natural product chemistry, a significant development in having a source such as the dictionary of natural products (CD-ROM. Network) of the chemical abstract service with more and more of the primary literature being available directly on-line (www.Biomed.com, www.google.com). One can imagine that while strategies for publishing and accessing the chemical literature on natural products have changed substantially in the recent past.

The principal active constituents present in plants are (i) essential oils (ii) fixed oils (iii) glycosides (iv) carbohydrates (v) alkaloids (vi) proteins (vii) coumarins (viii) tannins (ix) coloring matters etc. It is well known that plants are a source of food, industrial products, medicines and their demand is ever increasing. In the present study, the plant products have been analysed for proteins, fixed oils, carbohydrates and glycosides and their alcoholic extracts and petroleum ether extracts have been screened for antimicrobial, anthelmintic and insecticidal properties from the seeds of Bignoniaceae and Leguminosae family plants.
Fixed oils

Fats and oils are a concentrated source of energy. Fats in the diet are necessary for good health. The use of olive oil as lubricant by Egyptians as early as 1400 B.C was mentioned by Klemgard. The energy supplied by fats (9 cal/gm) is more than double that of proteins and carbohydrates. Some deposits of fats exert an insulating effect to the body, other provide padding to protect the internal organs. Historically fatty acid production is associated with soap and candle making. The industrial application of fatty acids is mentioned by Scott Patterson. Acetic acid can be used to synthesize cholesterol, which in turn can give rise to hormones. Cyclic fatty acids (e.g. chaulmogric acid) are used in the treatment of leprosy.

Apart from their use as food, they are also used in making protective coatings, soaps, lubricants, pharmaceuticals, illuminants, detergents, paints, cosmetics, rubber, textiles, plasticizers, adhesives, thermoplastics and agrochemicals. With increasing population and growth of above markets, domestic agriculture and forestry offer a long term solution to problem. Although petroleum based chemicals are most used, animal fats, vegetable oils and other natural products, still play a significant role in the industry. Since petroleum is non renewable, search for new promising oil seeds is a must.

Unsaponifiable matter is an important part of fixed oil, which consist of mainly sterols. small quantities of alcohols like tocopherols and hydrocarbons like squalene etc. Sterols have profound importance in animal metabolism as hormones, co-enzymes, bile acids and pro-vitamin D. Sterols can be applied as anti-fertilitic agents, anti-inflammatory agents, for haemolytic diseases, as sedatives and tranquillizers and endocrine properties of steroids to cure exaggerated effects.

Proteins

Proteins derived their name from their primary presence and great importance in all forms of living matter. They have many important functional forms, like enzymes, haemoglobin, hormones, viruses, genes, antibiotics and nucleic acids. They also comprise the basic component of connective tissue (collagen), hair (keratin), nails, feathers, skin
etc. They are synthesised by plants largely because of the nitrogen fixing ability to certain soil bacteria. A number of proteins have been synthesised, notably the hormone insulin. Proteins are essential component of the diet, occurring chiefly in meat, eggs, milk and fish. Edible proteins suitable for human food as well as cattle feed can be produced from microorganisms grown in carbonaceous or nitrogenous media to form yeast like materials. Industrial applications of proteins include plastics, adhesives, paints, photographic films. Fibres derived from casein and soya bean protein have been used in recent years. Special forms in which proteins are commercially available include textured protein for food products, and protein hydrolysate and liquid pre-digested protein, both for medical use.

**Carbohydrates**

Carbohydrates are among the most abundant constituents of plants in which they serve many useful functions. They are a source of energy (Chart 1). They form supporting tissues of plants and some animals. Two growth factors ascorbic acid and inositol are related to common carbohydrates while other carbohydrates have unique biological activity. Polysaccharides form the skeletal structure of plants and some constitute reserve sources of simple sugars.

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![Chart 1](image)
Polysaccharides are immunologically active also, as demonstrated by Dochez, Avery and Heidelberg. Vitamin C, inositol, heparin and hyaluronic acid are physiologically active carbohydrates. Carbohydrates are also useful in segments of industries like sugar, paper, textile, plastics, drugs, vitamins, etc. Carbohydrates are precursors of various other natural products such as fatty acids and certain amino acids. They are responsible for transport of various organic constituents of plants by combining with them. As carbohydrates are one of the three greatest classes of food, new sources of carbohydrate rich food stuffs will be a boon to the human diet and hence solve food shortage problem.

**Glycosides**

Glycosides are a diverse group of compounds. They are very reactive and hydrolysed into aglycone and sugar moieties. The aglycone part is usually phenols, alcohols, anthraquinones, steroids, triterpenes or flavones and the sugars are hexoses or pentoses.

Glycosides of steroidal and triterpenoidal types are mostly saponins. Though saponins cause haemolytic effect when they enter into blood stream causing much toxicity, these are non-toxic when taken orally probably because of their non-absorption by the intestine. Saponin bearing plants have been used as fish poisons, expectorants, anticonvulsant, antisyphtilitic agents and diuretics. They are extensively utilized in industries as textile auxillaries and wetting agents.

Saponins in which aglycone and sugar units are linked through oxygen atom, have pharmaceutical uses as antitumor, anti-HIV, antiinflammatory, hypotensive, hypoglycemic, antiallergic, antimicrobial, antifungal, antifertility, antihistamine and antidandruff. Triterpenoidal saponins possess remarkable physiological activity and used as cleaning agents, for nervous disorders, in vascular frigidity, etc. Cardiac glycosides are very important and used in cardiac therapy.
The flavonoids are fascinating and versatile plant constituents. They are one of the numerous and wide spread groups of natural products. Hence, they are of importance and many scientists have reviewed these plant products.\textsuperscript{[50-60]}

**Heterocyclic compounds**

A revolution has taken place during the past decade in conceptual approaches to the design of drug products. The theoretical structures of new pharmaceutical substances have been greatly enlarged and strengthened by the prompt and extensive publication of research performed in academic and industrial laboratories. However, putting theory in to practice has been virtually the exclusive domain of scientists. Their efforts have translated new design concepts into new and improved drug products. A new dimension to drug product design began when pharmaceutical scientists and others became fully aware of the broad range of therapeutically significant effects attributed to the design or to the method of producing new products. Many diseases like in metabolic, vascular, rheumatism, cancer, virus, and AIDS etc. can be treated today successfully with drugs.

Heterocyclic compounds are very widely distributed in nature as pyrimidine and purine bases of DNA, amino acids, vitamins and haemoglobin. There are vast number of pharmacologically active heterocyclic compounds and many of these are life saving drugs. Some of these are natural products like penicillin, cephalosporin and vinblastine. A large majority is the synthetic heterocyclics, which have found wide spread use as drugs and pesticides. Some of them are valuable intermediates in organic synthesis. The successful application of heterocyclic compounds in many ways and their appeal as materials in applied chemistry and in more fundamental and theoretical studies ensures a limitless scope of structurally novel compound with a wide range of physical, chemical, biological properties and broad spectrum of chemical reactivity useful in the synthesis of specifically functionalized structures.

The chemistry of heterocyclic compounds is challenging but at the same time a handsomely rewarding field for study. Each year witnesses the growing inclusion of
many thousands of heterocyclic compounds in literature, both on account of their intrinsic chemical interest and on the basis of their therapeutic, biological and industrial potential. The routes adopted for the synthesis of the new entrants to this large family varies from time honored methods and variations of old themes to entirely novel procedures. Any modification of an existing method or a new synthetic route of these compounds is, therefore of interest and merits a detailed study.

**Biological Activities**

Number of plants from bignoniaceae family have been mentioned in horticulture, medicines, poisons, food, timber and also used in rituals. Bignoniaceae plant extracts exhibited good action against drug resistant *plasmodium falcifurum* in the treatment of malaria. Medical practitioners employ these plants in Nigeria in the treatment of diarrhea and other backache, gout, sciatica, pyrexia common stomach disorders. These plant extracts were used as a good antiseptic and antifungal substances. In modern Ayurveda a drug “Dasamula kvatha” (extracts of ten Bignoniaceae plants) having anti-inflammatory and antipyretic activities including pains, pleurodynia, inflammation and oedema (6T). A recent drug in Ayurveda from Radermachera xylocarpa (Bignoniaceae) named as Nagpatla for snakebite.

Biological screening of leguminosae extracts shows various activities. The methanolic extracts of Bignoniaceae plant exhibits analgesic and anti-inflammatory activity. “Rohitaka” in Ayurveda is the alcoholic extract of T. undulata is an excellent drug for liver disorders. Stem, bark and fruit extracts of *K. pinnata* (Bignoniaceae) showed activity against melanoma and renal carcinoma cell lines, antimicrobial and antidiarrhoeal activities. Bignoniaceae plants showed good activity in vitro KB cell culture. These crude extracts contain quinones and exhibit antitumor activity.

There are vast number of heterocyclic compounds which are found to possess wide range of biological activities. Thiazole derivatives include pencillin, one of the most powerful drug up to now in the treatment of various infections. Quinolines derivatives
are well known drugs for the treatment of malaria \cite{79}. Oxacillin is a powerful semisynthetic antibiotic is also is a derivative of isoxazole \cite{80}. Quinolines found associated with number of activities viz. antidepressant \cite{81}, hypoglycemic \cite{82}, gastric secretion inhibitors \cite{83}, antiherpetic \cite{84}, gastric ulcer inhibitors \cite{85} and also active against HIV-1 integrate \cite{86}. Various derivatives of compounds like pyridines \cite{87}, acridines \cite{88}, pyrazolines \cite{89} etc exhibit good activities.

Besides above activities heterocyclic compounds possess various activities like local anaesthetic \cite{90}, antidiabetic \cite{91}, diuretic \cite{92}, cardiovascular agents \cite{93}, antiviral \cite{94}, antiparkinsonian \cite{95}, African sleeping sickness \cite{96}, herbicides \cite{97}, anticonvulsant \cite{98}, muscle relaxant \cite{99}, antineoplastics \cite{100}, antihypertensive \cite{101}, antihistamine \cite{102}, antispasmodic \cite{103}, tranquilizers \cite{104}, antiulcer \cite{105} etc.

**Analytical techniques**

The ability to separate, elucidating the structure and decreasing amounts of natural products from complex matrices or synthetic compounds have been major factor from the past few decades with the help of chromatographic and spectral methods. Some of the techniques are discussed.

**Chromatographic techniques**

Chromatography is by far the most applicable technique \cite{106}. The separation achieved, by the differences in the rate of mobility of various constituents of substances through a porous medium (called stationary phase) under the influence of some solvent or gas (called moving phase) based on the nature of stationary or moving phase.

Column chromatography is the oldest separation technique used in a Phytochemical laboratory and in the classical sense is only used for preparative purpose. It is used for separations based on adsorption, partition, ion exchange, gel filtration and gel permeation. The separation, enrichment or fractionation of a mixture can be
performed by elution analysis, displacement or partition e.g. alumina, starch and cellulose used for the separation of glycosides[107], saponins[108], essential oils[109], fatty acids[110], amino acids[111] and carbohydrates[112].

Paper chromatography is the widely used technique for the separation of various substances where the sample is applied on the specially designed filter paper. Different constituents of the sample mixture are carried along by the solvent to different distances depending upon their respective solubilities e.g. amino acids[113,114], carbohydrates[115,116], steroids[117], saturated and unsaturated fatty acids[118].

Thin layer chromatography also serves as a great tool for the separation of various complex organic mixtures. In this technique, stationary phase is made by coating a slurry of adsorbent on a glass plate as a thin and uniform layer. It is a rapid technique and separation is very sharp. Its sensitivity of detection is very high. This technique successively separates the methyl esters of saturated and unsaturated fatty acids[119-121], heterocyclic compounds purity[122-126], flavonoids[127-130] and amino acids[131-132].

Gas chromatography will be the method of choice for the separation of plant extracts or synthetic mixtures containing volatile compounds in micro level. The tentative identification of compounds achieved with different specific retention times. Here the mobile phase used is gas and the stationary phase employed is liquid. This technique is most important and widely used for the separation of fatty acids[133-135], carbohydrates[136-137], amino acids[138], terpenes, essential oils[139] and many other oxygenated compounds.

Spectral methods

Ultraviolet, infrared, nuclear magnetic resonance spectroscopy and mass spectrometry are among the most important spectroscopic techniques that the organic chemists now uses routinely to gain information about a particular substance[140-144].
Ultraviolet spectroscopy is applied for identification of compounds containing conjugated double bonds and extent of conjugation. This can also help for impurity detection, quantitative analysis, and determination of molecular weight and for the study of equilibrium in the solution. This technique is used for determining the structure of naturally occurring flavonoids, estimation of amino acids and sugars, saponins, heterocyclic compounds and polynuclear hydrocarbons.

In the structure elucidation of various organic compounds especially for the presence of functional groups, IR spectral technique is very reliable. This technique is depending on the vibration and rotation of atoms of molecules. Bellamy and Rao have reviewed the applications of IR spectroscopy. This technique is most widely used for the identification of all kinds of organic compounds.

Nuclear magnetic resonance spectroscopy serves as a powerful tool for the structural elucidation of organic compounds. $^1$H-NMR and $^{13}$C-NMR techniques gave configurational and conformational nature of compounds. This technique is helpful in observing each and every proton and carbon atom separately in the compounds. A large number of synthetic as well as natural compounds have been studied by NMR spectroscopy.

Mass spectrometry helps in establishing the molecular weight of the chemical compound and in distinguishing compounds with very little differences in the molecular weights. Approximate position of functional groups, determination of purity and structure elucidation of compounds has also been performed by Electron impact mass spectrum (EIMS).
Aim and Objectives of Present Work

Various plant products possess significant physiological and pharmacological activities. The red spearhead of phytochemistry lies in studies associated with biological investigation leading to the understanding of structure activity relationship. Some of the bioactive natural compounds (like Taxol etc.) can not be synthesized economically from the present of chemical knowledge or their partial synthesis from widely available natural products. Biological screening of plant medicine serves several purposes. The primary function to develop new drugs and new leads.

There are many hundreds of medicinal plants that can be grown in temperature climates and these are probable a great deal more with properties as yet undiscovered. Various plants are currently being tested as possible treatments of diseases and have nutritional properties. Much more research needs to be carried out on a whole range of plant products in order to find safer, more holistic alternatives to the drugs and serve with good nutritional values. Keeping this in view, proteins, carbohydrates, fixed oils and glycosides have been analyzed from the seeds of *Tecomax urgentia* and *Gliricidia maculata*. The biological assay of alcoholic and petroleum extracts of these seeds has been studied. The non-availability of all natural drugs and modification structure of already existing drugs led us to seek synthetic compounds.

Objectives of work

- To find new drugs from naturally occurring materials
- To discover lead molecules (essentially novel chemical moieties) which can be modified through chemical means into new drugs.
- To synthesize pharmacologically active moieties like thiazolidinones, isoxazoles, pyrazolines and imidazolinones bearing benzophenone moiety.
- To evaluate new drugs for better drug potential against different biological activities.
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SECTION A

ANALYSIS OF PLANT PRODUCTS