

# 1. PRANAHITA WILDLIFE SANCTUARY, ANDHRA PRADESH, INDIA: CHALLENGES IN PROTECTED AREA MANAGEMENT

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Pranahita Wildlife sanctuary is one of the oldest protected areas of the Andhra Pradesh, established during the year 1980, situated in Adilabad district towards northern region of Andhra Pradesh. It is located 180 Km away from Hyderabad. It is well known for the abundance of both herbivores especially the blackbuck and carnivorous fauna besides a variety of avian fauna. Sanctuary lies between latitudes 18° 41' N-19° 9'N and longitudes 79° 9'E – 79° 57' E and spreads in 136 sq. km. The Pranahita river runs towards the eastern boundary and the Godavari river towards a part of Southern boundary of the sanctuary which also forms the border of neighbouring Maharashtra state. Pranahita sanctuary is mainly established to conserve the blackbuck (*Antelope cervicapra*) population which occurs in the shrub jungle and grassland all along the Pranahita river. The blackbuck is an endangered species, listed in schedule –I (Wildlife Protection act) and also the state animal of the Andhra Pradesh. It is a perfect habitat for blackbuck with well distributed grasslands and scrub jungle located along the Pranahita river. The sanctuary harbours the endangered fauna like Four Horned Antelope, Chinkara and Leopard. All streams originate from this watershed area supply water to irrigation tanks of fringe villages in and around the sanctuary. The predominant forests in the sanctuary are of the “Southern Tropical Dry Deciduous Forests”.

The Phytosociology study was conducted during the 2006-09 to analyze the vegetation in the sanctuary. Regeneration and Recruitment of the vegetation are studied. Recently, the glory of the sanctuary is diminishing. Andhra Pradesh government approved the construction of lift irrigation project. The barrage and other construction on the river will deter tigers from crossing over from the Tadoba sanctuary in Maharashtra. The canals will fragment the habitat making it extremely difficult for the animals to move about and also pave way for bringing more shrub land under cultivation, legal or illegal. This will result in shrinking of forest land in the area falling under Jaipur, Vemanpalli, Kotapalli and Chennur mandals where environmental degradation has already devastated the teak forests. Construction work on the Nizamabad - Jagdalpur NH 16 has considerably eroded soil and increased road traffic has

disturbed the animal life. In this paper, we are going to discuss all the threats and other challenges that pose to the Pranahita wildlife sanctuary.

## 2. ELECTRONIC HERBARIUM AND DIGITAL DATABASE OF SOME DICOTS OF NAGPUR DISTRICT

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**Key Words:** Electronic Herbarium, Digital Database, Species.

Electronic herbarium is defined as “high resolution virtual images of plant specimens in digital format” (Srinivasu, 2005). The digital database of plants includes indigenously developed set of morphological characters with variable states were incorporated in the software DELTA (Dallwitz *et al.*, 2000). The digital images are then attached to the respective plant descriptions in the database.

Nagpur is one of the divisional headquarters in the Vidarbha (Maharashtra) with great biodiversity of plants. The District lies between the latitudes 20<sup>0</sup>35' and 21<sup>0</sup> 44' North and longitudes 78<sup>0</sup> 15' and 79<sup>0</sup> 40' East and covers 9930 sq km. Earlier, the Flora of Nagpur district was studied by Ugemuge (1986). However, the flora of Nagpur District has not been updated after recent industrialization and urbanization. Hence, it was thought worthwhile to undertake current study to know changes in biodiversity of Nagpur district by using new technology i.e. electronic devices, computer, software for preparation of Electronic herbarium and digital database of the flora of Nagpur District to fulfill the various needs of people. This technology has several advantages (permanent, original colors are retained, eco-friendly, no biodegradation, pathogenic/insect attack etc.) over the traditional method, which is usually followed.

The digital database of plants of Nagpur district now contains about 300 dicots belongs to 68 families were incorporated along with digital photographs till now. It includes some rare (06), endangered (01), endemic (21), medicinal plants (169) and new records to Nagpur district with plant descriptions and references, family, botanical name (ICBN) and their synonyms, common and vernacular names, distribution, current status of the plant in nature, socio-economic

(including medicinal) value of these plants. Addition of more number of plants to the existing database is in progress.

### **3. BIODIVERSITY OF MEDICINAL PLANTS AT KEETHAM LAKE AND TAJ MAHAL IN TAJ CITY AGRA**

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Depletion of plant biodiversity is occurring at a fast rate and hence massive efforts have been followed to collect and conserve of genetic wealth. Rural people have less knowledge especially about the plants which are medicinally important for curing various diseases. Some important medicinal plants have been identified and added to the existing list during last five decades.

A survey of biodiversity of medicinal plants in Agra was carried out at two sites, Keetham lake and Taj Mahal. Many species of medicinal plants have been observed in Keetham lake and Taj Mahal. Population of medicinal plants is higher at Keetham lake than at Taj Mahal site due to heavy biotic pressure exerted by grazing animals and agriculture practices besides stress and unstable environmental conditions. Human interference reduced the biodiversity of medicinal plants at reverine ecosystem. Keetham lake consists a large number of medicinal plants because soil is sandy loam, clayey, light and contain high percentage of carbon and nitrogen. There are 45 species of medicinal plant have been reported which are useful for the treatment of various human diseases, some of them are *Adina cordifolia*, *Anthocephalus chinensis*, *Nyctanthes*, *arbor-tristis*, *Madhuca longifolia*, *Cassia fistula*, *Amaranthussps*, *Xanthium stramarium*, *Albizzia labbeck*, *Vicia sativa*, *Vicia foba*, *Calotropis procera*, *Capparis sepioria* *Cassia occidentalis*, *Euphorbia hirta* , *Ficus benghalensis*, *Azadirachta indica*, *Rauwalfia serpentina* etc.

#### 4. ISOZYME DIVERSITY IN SOME PLANTS OF FAMILY ACANTHACEAE

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**Keywords-** Isozyme, Molecular Marker, Embryology, Acanthaceae

Family Acanthaceae is characterized by very diverse plants whose taxonomic position is debated. Study of various macroscopic and microscopic characters including embryological characters had been used for studying the relatedness of the various taxa. The study of Isozyme has been found very useful in establishing the taxonomic position of those species whose placement is currently debatable. Isozymes apart from other morphological and embryological data reveals obvious scenario regarding its position. Some of the plants whose isozymes were resolved were *Justicia procumbens*, *Rungia repens*, *Haplanthus verticillatus* and *Blepharis repens*. About nineteen isozymes were studied for the current work but Amylases, NAD diphorase, Esterase, Polyphenol oxidases, Ribulose biphosphate carboxylase and Superoxide dismutase showed better resolution. Most of the enzymes were resolved as clear bands and thus these Isozymes can be used as a molecular marker in establishing interspecific relationships.

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#### 5. WOODY WEALTH OF GONDWADA INTERNATIONAL BIOPARK (PROPOSED), NAGPUR (MAHARASHTRA)

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**Key words:** Woody wealth, Gondwada International Biopark, Gorewada, Nagpur.

Baseline knowledge of the bio-diversity is necessary for management of bio-resources of any forest ecosystem. Such inventories are best integrated with the timber resource inventories in order that forest management operation can be planned. In this context a study on the floristic

diversity of proposed Gondwada international bio-park, at Gorewada Forest, Nagpur, MS has been undertaken.

A total of 30 plots of 10 meter radius were laid along different forest beats in different habitats for the population database of woody wealth of the region. For determining the Important Value Index (IVI), density, abundance, frequency and their relative values for each tree species has been analyzed. Phenological patterns are particularly important in understanding the functioning of the forest ecosystem, because seasonal clues are much more pronounced

There are about 79 tree species of various families observed in our study. Also noted diversity in leafing, flowering and fruiting behavior of plants. Various threats to wild life and gaps in forest management identified during the study are discussed giving possible remedial measures and recommendations

Among these, the most dominant species observed were viz. *Anogeissus latifolia* (Roxb. Ex DC), *Gmelina arborea* Roxb., *Morinda tinctoria* Roxb., *Neolamarkia kadamba* Roxb., *Santalum album* L., *Albizia lebbek* (L.), *Butea monosperma* (Lam), *Gardenia resinifera* Roth., *Lagerstroemia parviflora* Roxb., *Mitragyna parvifolia* (Roxb) Korth., *Soymida febrifuga* (Roxb) A. Juss. etc.

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## **6. STUDIES ON USEFUL MEDICINAL TREE DIVERSITY OF NAGPUR DISTRICT USING GLOBAL POSITIONING SYSTEM (GPS)**

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**Key Words:** Medicinal trees, anti-inflammatory, antiviral, GPS location, Nagpur.

Medicinal trees have been used both in the prevention and cure of various diseases of humans and their pets. With the advent of human civilization many systems of therapies have been developed primarily based on plants, like ayurveda, homeopathy, siddha and unani which are our traditional systems of medicines. During the survey of Nagpur District, 64 plant taxa belonging to 57 genera representing 32 families were identified in the present investigation.

These 64 species in four regions of Nagpur district were located using Global positioning system (GPS). Among them, 9 tree species viz., *Careya arborea*, *Wrightia tinctoria*, *Bridelia retusa*, *Buchnanania cochinchensis*, *Chloroxylon swietenia*, *Dryptes roxburghii*, *Sapindus emarginatus*, *Stereospermum chelonoides*, *Thespesia populnea* having more therapeutic value have been analyzed for their pharmacognosy and phytochemical compounds. Nine species of 8 families were evaluated for crude drugs such as starch grains, aleurone grain, fixed oil, mucilage, calcium oxalate, anthraquinone derivatives etc. Among the tree species studied using leaf and bark powder, 88% plant species showed presence of starch grains, mucilage and aleurone grains whereas 68% plant species showed presence of calcium oxalate, lignified cell and anthraquinone derivatives. Selected species also were extensively studied for phytochemical compounds such as alkaloids, flavonoids, terpenoids, anthracene glycosides and other compounds. All species showed presence of alkaloids and tannins. About 20% plants species (bark powder) showed positive test for anthocyanin, 16% plant species showed anthracene glycosides whereas 55% plant species showed positive test for coumarins, 44% plant species showed positive test for flavonoids which are known to possess antiviral, anti-inflammatory and cytotoxic properties.

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## 7. DIGITAL HERBARIUM AND BIODIVERSITY OF MONOCOT PLANTS OF NAGPUR DISTRICT

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**Key words:** Digital herbarium, database, biodiversity, monocot plants.

Digital herbarium is defined as “high resolution virtual images of plant specimens in digital format” (Srinivasu, 2005). Biodiversity of monocots (Database) is prepared by selecting various morphological characters (>200) with a number of possible variable states as a model. This work is done using software, DELTA (Dallwitz *et al*, 2000), which is a taxonomic descriptive, identification and information retrieval package system and stores data with interactive key facility (Srinivasu, 2005).

Nagpur district lies (latitudes 20° 35' and 21° 44' North and longitudes 78° 15' and 79° 40' East) in Vidarbha region of Maharashtra and covers an area of 9930 Sq. Km (Ugemuge, 1986). The average annual rainfall is 1205 mm and average humidity is 45%. ([www.maharashtraonline.in](http://www.maharashtraonline.in)). Monocotyledons forms the major flowering group, it includes most diverse angiosperms such as grasses, sedges, bromeliads, palms, gingers, orchids, irises, lilies, yams, pond weeds, and aroids. Due to urbanization and industrialization, the floristic structure has undergone several changes. From conservation point of view, it is necessary to update and revise the existing data. The present work was initiated to prepare electronic digital herbarium and biodiversity (databases) of monocots of Nagpur district. In these databases, digital photographs of taxa in their natural habitat etc. are attached along with morphological and other information. This prevents the destruction of plants which is prevalent in conventional herbarium preparations and other benefits. Three databases namely monocot (Hydrocharitaceae -Eriocaulaceae), palm (Arecaceae), and grasses and sedges (Poaceae and Cyperaceae) are prepared due to peculiar characters of each group. In these databases, 35 species of monocots (medicinal, ornamental and economically important), 13 economically important palms species, 32 species of grasses and sedges (cereals, oil yielding, bamboos, fodder grass, and ornamentals) have been included. In total 18 families, 65 genera and 80 species have been incorporated and the work is in progress.

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## **8. DIVERSITY OF FABACEAE AND ITS MEDICINAL POTENTIAL FROM KHANDESH REGION OF MAHARASHTRA**

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**Keywords:** Fabaceae, Diversity, Khandesh.

Family Fabaceae is one of the largest families of flowering plants having great medicinal value. It is an extremely diverse family. Taxonomically and economically, the family is full of interest as the seeds of many species serve as sources of human and animal food. Legumes are second only to the grasses in providing food to world. The total world value for leguminous

crops is thought to be approximately 2 billion US dollars per annum. Looking to its great economic potential, this family is studied from Khandesh region of Maharashtra. This region comprises of 3 districts that are Jalgaon, Dhule and Nandurbar. Khandesh lies between 20° 8' and 22° 7' North latitude and 73° 42' and 76° 28' East longitude. Total area of Khandesh is 10,431 sq. miles. A part of Satpuda ranges which extended in Dhule District is considered as one of the major hotspots of endemic and genetic diversity of plants in India. Survey of Fabaceae of Khandesh has been carried out during 2006-2009. This survey has yielded presence of more than 50 genera comprising over 100 species and several varieties. The present investigation also includes a brief account of threatened, endangered, rare and endemic members of Fabaceae from region.

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## 9. DIVERSITY OF POACEAE FROM KHANDESH OF MAHARASHTRA WITH RESPECT TO THEIR ECONOMIC UTILITY

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**Keywords:** Poaceae, Khandesh, Grasses.

The grass family is not only largest family in terms of species and genera but also stand first in economic and ecological importance. Though grasses are dominant in various habitats, there are certain under explored areas in our country; Khandesh is one such regions in Maharashtra. Khandesh region comprises three districts that are Jalgaon, Dhule and Nandurbar. Total area of Khandesh is 10,431 square miles. The region exhibits very rich and diverse grass flora due to peculiar topographic and climatic features, which includes part of Satpuda ranges, which is one of the major hotspot of plants in India. Survey of grasses of this region has been carried out during period of 2006-2009. The outcome the survey gives insight that there are 94 genera comprising more than 200 species and several varieties. Of these, many are endemic, few are endangered while some are listed in red data book.

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## 10. ISOZYME AS A MOLECULAR MARKER IN THE IDENTIFICATION OF SOME TAXA OF TUBIFLORAE

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**Keywords** - Isozyme, Tubiflorae, Molecular Marker

Isozyme or allozyme is a powerful tool to study gene variability within and amongst different plant population. It is also an effective molecular marker to solve the queries of conservation biology, population biology and ecology as well. Considering one of the aspects of population biology in mind, the efforts are being made to use these markers in the taxonomic identification and to know the similarity and differences among the taxa. The work has been carried out to understand the status of six taxa belonging to five families of Tubiflorae namely *Gentelbua urens* L., and *Hygrophila serpyllum* L. (Acanthaceae), *Volvulopsis nummularius* (L) Roberty (*Evolvulus nummularius* L.) (Convolvulaceae), *Leucas biflora* (Vahl.) R. Br., (Lamiaceae), *Lindernia crustacea* (L) F. Muel. (Scrophulariaceae), *Utricularia coerulea* L. (Lentibulariaceae).

Isozyme analysis has been carried out for nearly nineteen enzymes including Polyphenol oxidases, NAD-diaphorase, Rubisco, Superoxide dismutase,  $\alpha$ - amylase etc. The isozymes pattern derived will be used further for the preparation of dendrogram, depicting the degree of relationship among the species, genus and families as well.

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## 11. DIVERSITY OF SPORODERM AND SPERMODERM PATTERN IN SOME TAXA OF ASTERACEAE

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**Kew words:** SEM, Sporoderm, Sporoderm, Exine, Sculpturing.

Sporoderm and Spermoderm pattern plays an important role in demarcating definite evolutionary level. Pollen and seed surface characters have been studied in some taxa of Asteraceae. Light microscopy and Scanning electron microscopy (SEM) have helped to study spine characters and exine sculpturing in great detail which is helpful in preparing an artificial key. Pollen characters are also of paramount importance which include number and position of furrows, number, position and complexity of apertures and the form of sculpturing of exine. The fifteen taxa have been worked out extensively where aperture status which does not deviate but the spinal characters and exine sculpturing can be conveniently used for the taxonomic consideration.

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## **12. MYCORRHIZAL STATUS OF NATURALLY OCCURRING TREES OF SEMINARY HILLS IN NAGPUR**

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**Keywords:** Arbuscular Mycorrhiza, forest trees, Nagpur

Arbuscular Mycorrhiza (AM) fungi occur in various plant species, including forest trees under different climatic conditions. They play an important role in improving the nutrient uptake and subsequent growth of plant species used in afforestation program. However, the type and frequency of AM is affected by a number of factors such as soil type, fertility level, light, temperature, rainfall, humidity and the plant population of an area. Research work in these aspects has received little attention in Nagpur. Despite the ubiquitous occurrence of AM fungi in most soils and infection in many plant species, information on mycorrhizal association is very limited and there is no work in this respect in Nagpur. Before we can effectively utilize these fungi in agriculture and forestry, we need to understand their ecology and distribution in naturally occurring plants of the area. Present study is an attempt to find the status of AM fungi in Seminary hills of Nagpur and explore the possibility of utilization of mycorrhizal technology and subsequent inoculum production of indigenous AM fungi in Nagpur.

### **13. MAINTENANCE OF AGRO-BIODIVERSITY: A GLOBAL CHALLENGE AGAINST MARKET DRIVEN AGRICULTURE WITH SPECIAL REFERENCE TO VIDARBHA, MAHARASHTRA**

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India is a predominately an agricultural country, nearly 70% of population depends on the agriculture and forestry that contribute approximately 40% to the Gross Domestic Product. Since the dawn of human civilization, agriculture activity has been found to be a main cause of deforestation and gradual loss of biodiversity. For centuries, man has given preference to only a few selected species and taken care of them because of their palatability and nutrient status and through the selection process, and other species was considered as weeds and therefore was being destroyed ruthlessly. During this course of action, many species disappeared, faunal habitats lost and the micro-ecology got affected. Since adoption of Green Revolution technologies in the field of agriculture during mid-sixties, the situation aggravated in India as mono-cropping system replaced the traditional multi-cropping system which led to various disastrous impacts on floral and faunal biodiversity, ecology, soil health and nutrient status and even on the microbial populations and their activities. The excessive application of fertilizers and pesticides affected ecosystems quite significantly and adversely affected the soil health and fertility to a great extent. The natural ecosystems hold important plant genetic resources for food and agriculture, which include endemic and threatened wild crop relatives and wild plants, are not maintained. As a consequence the natural gene pool has been eroded to a large extent.

Consequences of input intensive market driven mono-cropping agri-system has been discussed analytically in the paper with special reference of Vidarbha region of Maharashtra emphasizing biodiversity loss, inadequate food security of the resource poor farmers, ecological disasters, breakage of plant nutrient cycles, economic unsustainability, etc. The present paper also explains positive consequences of bio-diversified integrated agriculture, supported by field data of more than 5 years, which would reflect effective restoration of agro-biodiversity and attainment of sustainability in production and economic amelioration in future.

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#### 14. STUDIES ON THE VARIATIONS IN THE BIOMASS OF THE AQUATIC MACROPHYTES OF POIROUPAT LAKE, MANIPUR, NORTHEAST INDIA

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**Keywords:** Biomass, Macrophytes, Eutrophic, Poiroupat lake, Manipur.

Poiroupat Lake is situated in the Imphal East district of Manipur at a distance of 15 Km from the Imphal town. The lake is located about 881 m above mean sea level with an area of 0.16 sq km. It lies between 24°40'6.24"N to 24°40'6.71"N latitude and 93°58'9.82"E to 93°58'10.25"E longitude. It is a much aged, and eutrophic and it is one of the endangered lakes of Manipur. In the present investigation, seasonal variations in the biomass of the macrophytes in Poiroupat lake (Manipur) was carried out at monthly intervals for two years period. The study was conducted at four different study sites Viz., Site I (Sabam), Site II (Kabui Panung), Site III (Thambou Kom) and Site IV (Thaba Konjin). In all the study sites, *Ceratophyllum demersum* was recorded as maximum total biomass on monthly basis with values ranging from 24.52 gm<sup>-2</sup> (Site I) to 241.45 gm<sup>-2</sup> (Site III). This was followed by *Alternanthera philoxeroides* with values ranging from 25.74 gm<sup>-2</sup> (Site II) to 139.77 gm<sup>-2</sup> (Site II), *Utricularia flexuosa* (24.25 to 110.45 gm<sup>-2</sup>) and *Hydrilla verticillata* (21.03 to 67.00 gm<sup>-2</sup>). The total biomass varied from 72.73 gm<sup>-2</sup> to 218.00 gm<sup>-2</sup>. The total biomass of all species (combined) ranged from 130.07 to 512.28 gm<sup>-2</sup>.

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#### 15. FLORISTIC DISTRIBUTION AND LIFE-FORM ANALYSIS OF THE MACROPHYTES IN KHARUNGPAT LAKE (THOUBAL), MANIPUR, NORTH-EAST INDIA.

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**Keywords:** Life-form, Macrophytes, Phytoclimate, Biological spectrum, Kharungpat lake

Kharungpat Lake is situated in the south western portion of Thoubal District of Manipur at about 30 km from Imphal city. It lies at the intersection of 24°53'57''N to 24°60'78''N Latitude and 93°90'77''E to 93°97'37''E Longitude. The lake is located at an altitude of about 781 m above the mean sea level, spreading about 33.52 sq. km. The lake is naturally ageing and it is under heavy stress due to human encroachments and conversion of low lying areas into farms, disposal of untreated domestic garbage, and leaching of chemical fertilizers. In the present investigation, an attempt has been made to study the floristic distribution and life-form analysis of the macrophytes in Kharungpat lake, Manipur at monthly interval for a period of two years from January 2008 to December 2009. During this study, fifty four macrophytic species belongs to 28 families were recorded. *Alternanthera philoxeroides*, *Azolla pinnata*, *Ceratophyllum demersum*, *Echinochloa stagnina*, *Eichhornia crassipes*, *Enhydra fluctuans*, *Ludwigia adscendens*, *Pistia stratiotes*, *Salvinia cucullata* and *Zizania latifolia* were found in all the study sites. *Euryale ferox*, *Nelumbo nucifera*, *Nymphaea stellata*, *Oenanthe javanica*, *Potamogeton crispus* etc. were present only in site-III. The vegetation of the Lake was classified into (i) Submerged- 7 species (12.96%) (ii) Rooted with floating leaves- 6 species (11.11%) (iii) Free floating- 8 species (14.82%) and (iv) Emergent-33 species (61.11%). The macrophytic plant species were categorized into 5 major life form classes viz., Chamaephytes – 7 species (12.96%); Hemicryptophytes – 9 species (16.68%); Geophytes – 12 species (22.22%); Therophytes – 13 species (24.07%) and Errant vascular Hydrophytes – 13 species (24.07%). The biological spectrum of the lake revealed the occurrence of “Thero -Errant Vascular Hydrophytic” type of Phytoclimate.

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## 16. DIVERSITY AND DISTRIBUTION OF ANIMALS IN PROPOSED GOREWADA INTERNATIONAL BIOPARK, NAGPUR (M.S.)

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**Key words:** Animal biodiversity, Gorewada Biopark.

Indian forest consists of 350 species of mammals, 1224 species of birds, 408 reptiles, 197 amphibians, and 2546 species of fishes. Proposed Gorewada International Biopark is spread over 1881.66 sq. meter and is divided into six compartments (790 -796). Biopark was visited thrice a week at different times of the day from February – August, 2008. Animals were photographed and identified. Some invertebrates were collected, and identified in laboratory. Environmental temperature started soaring from 37°C to 44°C in summer and again declined in monsoon. The humidity however, decreased from 71 % to 22% in summer and increased during monsoon season. Total 177 animal species were observed. Among these, Insects constitute 55%, Birds 35.50 % and 4.73%. Broadly; Class Insecta comprises 32.25% Odonate *sp.*, 43% Lepidopteran *sp.*, and 12.9 % Hymenopteran *sp.* Passeriformes is dominant order among Aves which constitute 30% of avian fauna. Mammals found in biopark include mongoose, monkey, squirrel and hare etc. Compartment 790, 791 are on the side of highway which show less faunal diversity. Compartment 794, 795 and 796 are nearer to Gorewada Lake, thus they show greater diversity of insects, mollusks, amphibians, reptiles, Aves and mammals. Compartment 792 and 793 though consists of large degraded forest area, several peafowl were observed in this area. Fluctuation in the density of animals in relation to the season and some migratory birds were also noted.

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## 17. ASSESSMENT OF MORPHOLOGICAL AND BIOCHEMICAL DIVERSITY IN SAFFLOWER (*CARTHAMUS TINCTORIUS* L.) GERMPLASM OF INDIA.

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**Keywords:** Safflower, fatty acid, seed yield, oil

Safflower is a multiutility crop which yields edible oil rich in PUFA and edible dye carthamin. Apart from this it also has various medicinal values. The present survey was conducted to assess the available diversity in Indian germplasms of Safflower. For this fifty eight Safflower lines were studied for morphological and biochemical diversity. A considerable

variation was found among germplasm for plant height, number of primary branches, branching pattern, heads per plant, flower colour, 50% flowering, seed yield per plant, test weight and aphid severity. Genotypic and phenotypic variances were highest for heads per plant, seed yield per plant and plant height. By using Gas Chromatograph, fatty acids profile were studied and it is found that linoleic (67-80%) is the major component in Safflower, followed by oleic (11-23%), palmitic (1-7%), stearic (1-5%) and others in very low concentration. There were no significant differences for oil content among the genotype studied. The variability in germplasm for morphological and quality parameters will help to formulate breeding programme for Safflower improvement in future.

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## **18. IMPACT OF URBANIZATION ON NATURAL RESOURCES: A NEED OF PROACTIVE ACTIONS WITH SPECIAL REFERENCE TO UTTAR PRADESH**

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Search of livelihood and inadequate infrastructural development in rural areas has promoted the migration of rural population towards urban areas. The overall decadal population growth in between 1994-2004 in Uttar Pradesh has been about 26% in comparison of national growth i.e. about 22%, but at the same time when we talk about the trend of urban growth in Uttar Pradesh are recorded as 32% in comparison to rural growth at about 20%, that shows the faster rate of urbanization in the stali. The impact of urbanization is not only limited to space of living traffic movement, solid waste generation but as exerted problem on land, air and water environment and forest, Govt. of India has brought the EIA notification in the year-2006. Due to unplanned urban growth, the most of the cities in Uttar Pradesh are not getting adequate water supply as well as the natural water resources and flora & fauna of the area is diminishing. The gap in demand and supply of the life supporting commodities has surprised the carrying capacity of the supporting ecosystem. Looking to the scenario, the current paper has dealt with the analysis of the trend of urbanization along with spatial implications there off and its impact on land, water and air environment along with its imitative measures.

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## 19. THE HERBACEOUS DICOTYLEDONOUS AXIS FROM THE DECCAN INTERTRAPPEAN BEDS OF MOHGAONKALAN

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A fossil dicotyledonous axis appears pentangular with secondary growth of diffuse porous type. Bark 22  $\mu$  thick, made up of thick walled suberised compactly arranged parenchymatous cells, each cell measures 4  $\mu$  in size. Cork is 77  $\mu$  in thickness at the ridge and 55  $\mu$  thick at the furrow region. It is arranged in radial row of narrow thin walled rectangular cells. Each cell measures 11 to 15  $\mu$  in size. The cells of cortex are crushed during preservation, only parenchymatous cells are preserved. Secondary xylem is 183  $\mu$  in thickness, having vessels, rays, parenchyma and fibers. Vessels are mostly solitary.

## 20. COMPOSITION, DIVERSITY AND DISTRIBUTION TRENDS IN HUMAN IMPACTED INDO-MYANMAR BORDER FOREST

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**Key words:** Diversity, Distribution, Teak-Dipterocarpus forest, Composition, Indo-Myanmar Border, Phytoclimate, Human Interference.

Composition, Diversity and Distribution of Vegetation was investigated in two human impacted forest sites of Teak-Dipterocarpus forest on Indo-Myanmar border lying between  $94^{\circ}15'$  -  $94^{\circ}20'$  E longitudes and  $24^{\circ}15'$  -  $24^{\circ}25'$  N latitudes. The two sites are 5 km apart. Presence of phaenotherophytic phyto-climate was recorded at both the sites with 48 species each. Total number of families was found to be 34 with 61 genera and 67 species. Basal area of  $60.91 \text{ m}^2 \text{ ha}^{-1}$  and  $33.40 \text{ m}^2 \text{ ha}^{-1}$  were recorded in site-I and site-II. The Shanon index  $H'$  varied from 1.79 to 2.37. Most species exhibited random pattern for trees and shrubs whereas clumped pattern was recorded at both the sites for herbs. Variation in diversity and composition of species

is due to human interference and hence the need for forest conservation is emphasized in the paper.

## **21. AN INVENTORY OF HOST SPECIES FOR AERIAL MISTLETOE SPECIES (LORANTHACEAE AND VISCACEAE) IN SOME REGIONS OF MELGHAT FOREST**

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**Key words:** Mistletoes, Melghat,

Melghat, is literally a meeting place of Ghats with succession of hills and valleys with constant variation in abrupt altitude, aspects and gradient. Melghat forest is ‘Sothern Tropical Dry Deciduous’ type and is situated in Chikhaldara and Dharani tehsil of Amravati district, Maharashtra state, covering total area of 1597.23 sq. kms. In the vascular plant kingdom an estimated about 4000 species or 1% of the flowering plants are considered to be parasitic (Kuijt, 1969; Atsatt, 1983), of which approximately 1400 species are classified as mistletoes. Out of these, four species *Dendrothae falcata*, *Macrosolen parasiticus*, *Scurulla parasitica* and *macrosolen articulatum* are well distributed in Melghat Forest. Survey was made at Memna, Bori, Bela road, Madki, Tatu area and on Paratwada- Chikhaldara Road and found that these four species are growing on various host species. Sometimes, two species are growing on same host as well as two mistletoes are parasites on each other.

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## **22. ENUMERATION OF THE MACROPHYTES ASSOCIATED WITH: THE WORLD’S WORST AQUATIC PLANT**

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**Key words:** Angiosperms, Aquatic plant, Macrophytes, Pteridophytes, Water hyacinth

In the present investigation thorough study and intensive survey of thirty water bodies infested with *Eichhornia crassipes* from Bilaspur district (C.G) India was done to study the aquatic plants associated with *Eichhornia crassipes*. As a result of field and laboratory studies, 19 genera of aquatic macrophytes including 3 algae and 3 pteridophytic ferns were identified. The present composition of dicot, monocot and other groups were 31.25, 31.25, and 37.5, respectively. *Ipomea aquatica*, *Alternanthera philoxeroides* and *Lemna minor* were recorded as the most dominant aquatic species. While *Jussiaea repens*, *Salvinia molesta* and *Azolla pinnata* were the rare species. *Eichhornia crassipes* which is listed among the 100 world's worst aquatic plants serves as a very useful bio-indicator of environmental change including human induced stress factors in aquatic ecosystem. This account aims to study the plant's ecological aspect in terms of its association with other macrophytes so that it could be judged that what type of surroundings favour this weedy menace and can properly be attributed to the plant management.

### **23. FLORISTIC DIVERSITY OF LOWER HILLS OF BAIKUNTHPUR (DIST-KORIA) CHHATTISGARH WITH SPECIAL REFERENCE TO MEDICINAL PLANTS**

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The State of Chhattisgarh has about 44% of its geographical area covered with forests. The Koria district in Chhattisgarh lies between 22°58' to 23°49' North latitudes and 81° 33' to 82°45' East longitude. The average rainfall is 121.36 cm. The forest area is 81.23% of total district area. The annual mean temperature is 24°C. The temperature varies between 16.2° to 31° C. Geologically the area is dominated by upper Gondwana rocks, which are rich in coal deposits. The highest mountain ranges of the region occupy the northern part of the district.

The district Koria has a very rich flora exhibiting diversity especially of medicinal plants. There is no comprehensive description of the flora as well as vascular cryptogams of the district is available some plant species are on the verge of extinction. Keeping these

points in view the present investigation has been planned. The present paper deals with diversity of the medicinal plants of the district and their ecological status.

Vegetational analysis revealed some interesting observations on phyto-sociological characters. Shanon index of general diversity was calculated for tree, shrub and herb layers. It was 4.21637 for trees, 4.6357 for shrubs and 4.8298 for herbs.

Total 108 angiosperm plant species of medicinal importance were found distributed in 43 dicot and 9 monocot families. Two medicinally important pteridophytes have also been reported.

## **24. LIFE FORM CHARACTERISTICS OF NAMBUL RIPARIAN HERBACEOUS VEGETATION**

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**Keywords:** Nambul River, Riparian Vegetation, Herbaceous Species, Life form, Therophytes, Chamaephytes.

The Nambul Riparian Vegetation with a catchment area of 223 sq.km (approx.) played a valuable filtering zone of Nambul River (Manipur) and the terrestrial landscape. Life form characteristics of Nambul Riparian herbaceous species were studied at six different study sites. The annual life form distribution reflected the dominance of Therophytic composition followed by Chamaephytic composition. During the three seasons the Therophytes were the dominant species at most sites indicating the better adaptation of annual species.

## **25. SPECIES DIVERSITY AND ITS DISTRIBUTION PATTERN ALONG NAMBUL RIPARIAN ZONE**

Sorokhaibam Ibechaobi and Asha Gupta

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**Keyword:** Nambul River, Riparian Zone, Species diversity, Shannon's index, Simpson's index, Distribution pattern

Nambul River (Latitude:24<sup>0</sup>37'59.28"N - 24<sup>0</sup>58'15.6"N and longitude: 93<sup>0</sup>45' 6.48"E- 93<sup>0</sup>57'56.88"E) occupies a total catchment area of 223 sq.km (approx.) of Manipur, NE India with a varied distribution of species. Six selected sites viz; Mayang Langjing, Iroisemba, Waheng Leikai, Hiyangthang, Naorem Chaprau and Wangoi Makha Leikai were studied along Nambul Riparian Zone. The herbaceous species at the six study sites comprised of 27 families, 68 species and 91 species. Species diversity along the study sites was comparatively high. The Shannon's index (H') varied from 1.955 to 2.877 whereas Simpson's index( $\lambda$ ) ranged from 0.056 to 0.205. The distribution pattern in most sites during the three seasons was dominated by clumped pattern followed by random pattern and regular pattern.

## **26. STATUS AND OCCURRENCE OF BUTTERFLY SPECIES OF AMBAZARI GARDEN AND ITS SURROUNDINGS AREAS, NAGPUR CITY (CENTRAL INDIA), MAHARASHTRA STATE**

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**Key words:** Lepidoptera, butterfly diversity, Ambazari garden, Nagpur City, Status, Occurrence.

A study was conducted to record the butterfly diversity and the status and occurrence of butterfly species in the (Ambazari garden and Bare ground at Lake Side) within the Nagpur city, Central India from June 2006 to May 2009. A total of 104 species of butterflies belonging to Papilionidae (07 species), Pieridae (13 species), Nymphalidae (33 species), Lycaenidae (37 species) and Hesperidae (14 species) families with 35 new records to Nagpur city were recorded. Of all the total 104 species, 45% were occurring (47) very common, 27% (28) common, 8% (08) not rare, 15% (16) rare, and 5% (05) very rare. Most of the butterfly species were observed from the monsoon (hot/wet season) to early winter (cool/wet season) but thereafter declined in early summer (March). Among the 104 butterflies recorded, 15 species come under the protection category as per the Indian Wild Life protection Act 1972 showing that the area is rich in butterfly diversity and there is an urgent need to adapt conservation policies like development of butterfly park, cultivation and protection of larval and nectar host plant specifically used by the butterflies and protection and maintenance of mating sites of butterflies. The observations support the value of the city garden and bare ground which provide rich ground

not just for conservation but also for researches on butterfly biology and other ecology related aspects.

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## **27. A NEW VARIETY OF *SAHNIANTHUS PARAJAI* FROM THE DECCAN INTERTRAPPEAN CHERTS OF MOHGAONKALAN**

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The petrified fossil flower collected from the fossiliferous exposure of Mohgaonkalan, M.P. Flower is small, pedicellate, ebracteate, hypogynous, gynoecium longest stipitate, ovary superior, pentacarpellary, syncarpus, axil placentation, style straight, stalked, perianth lobes emerging, gynophores exceptionally long, glandular hair on epidermal layer of stalk, ovary oval, glands present on ovary wall, ovules numerous on axil placentae with respect to the above characters, the present fossil flower is a new unisexual variety of *Sahnianthus* as *Sahnianthus parajai* var *deccani*. The name of the variety is given after the peninsular region of India.

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## **28. A SINGLE-SEEDED DICOTYLEDONOUS DRUPE FROM THE INTERTRAPPEAN BEDS OF MOHGAONKALAN, M.P**

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A well preserved dicot fruit was collected from the Intertrappean beds of Mohgaonkalan, Madhya Pradesh. It is a unilocular, single seeded drupe, elongated and stalked. Pericarp with ridges and furrows is differentiated into epicarp and a prominent and massive endocarp. It contains a single large, elongated and curved seed with testa and tegmen. After comparing this with extinct and extant flora, this fruit has affinity with genus *Cassytha* of family Lauraceae. It is named as *Cassythocarpon mohgaonese* gen.et. sp.nov.

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## 29. LIFE-FORM ANALYSIS OF AQUATIC MACROPHYTES FROM IMPHAL VALLEY COMMUNITY PONDS

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**Key words:** Community ponds, macrophytes life form, biological spectrum

The present paper deals with the study of life form analysis of aquatic macrophytes recorded from the four community ponds in Imphal valley, Manipur (Latitude 23°83' N to 25°68' N and Longitude 93°03' E to 94°78' E) during the period from July 2005 to July 2006. A total of 28 macrophyte species belonging to various plant groups were recorded. The life form composition in a plant community is found to be of special interest as the same may provide information on the response of a community to particular set of environmental factors on the utilization of space and the probable competitive relations within a community. A total number of 28 species of macrophytes were recorded from all four study sites those belonged to 20 families. Maximum of 4 species are belonging to Nymphaeaceae followed by Polygonaceae (3 species). Family Cyperaceae, Pontederiaceae and Salviniaceae had contributed 2 species each, whereas other families like Alismataceae, Amaranthaceae, Apiaceae, Araceae, Arecaceae, Asteraceae, Convolvulaceae, Hydrophyllaceae, Lemnaceae, Marsileaceae, Onagraceae, Poaceae, Potamogetonaceae, Ricciaceae and Lentibulariaceae contributed one species each altogether four types of life forms were categorized namely - Therophytes, Errant Vascular Hydrophytes, Geophytes and Hemicytrophytes. The phyto-climate was designated as the 'Geo-Therophytic'.

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## 30. HYDROLOGICAL ASPECTS OF VEGETATIONS FROM TWO PROTECTED SUB-TROPICAL FORESTS OF NORTH-EAST INDIA

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**Key words:** Nutrient cycling, input-output ratio, diversity, forest composition

Understanding water flows through the canopy is important to understand the movement of material and hence the functioning of forests. These mechanisms involve transfer of nutrients and their role in nutrient cycling. Forest hydrological cycle plays an important role to control nutrient input and output fluxes in the system. Precipitation is the major source of nutrients for forest ecosystem which follow several pathways before arriving to the forest floor. Some nutrients may also be absorbed by the canopy from precipitation. Nutrients move from the forest canopy to the soil primarily through litter fall and nutrients are transferred to the forest floor by leaching on the plants and plants tissues.

This paper explores the hydrological aspects of two protected sub-tropical forests ecosystems of North- East India (Latitude 23.80° N to 25.68° N and Longitude 93.03° E to 94.78° E) with emphasis on leaching accounts and input-output ratio of various nutrients for understanding the conservation role of forest ecosystem.

It was apparent that vegetation plays an important role in forest nutrient cycle by virtue of the nutrients in its litter and nutrient washed of the foliage by rainfall. Stem flow contributed much smaller but appreciable quantity of nutrients and concentration of nutrients were found to be high. Input-output ratio revealed good retention of Nitrogen and poor retention of Potassium, Calcium and Magnesium. It was found that soil – root system efficiently retained Nitrogen and Phosphorus brought to it in litter through fall. In output it was found that in case of cation this efficiency increased in order of Calcium, Potassium and Magnesium. The highest output concentration was for Sodium, Calcium and Nitrogen. These are also the nutrients with the highest concentration in the input. By calculating input –output ratio our objective was to see whether the ratio reflected any trend in ability to conserve the nutrients under the forest canopy. Our ratios showed variation as to the effectiveness of ionic conservation mechanism which was related to diversity and composition of the forest vegetation.

### **31. LANDUSE IMPACT ON HYDROLOGICAL RESPONSES WITH REFERENCE TO BIODIVERSITY**

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Two hill catchments of Manipur (Latitude 23.80° N to 25.68° N and Longitude 93.03° E to 94.78° E) were selected to study the influence of vegetation dynamics on forest ecology and erosion control as overexploitation of forest resources in Manipur has caused serious consequences with negative impacts on biodiversity, water resources, soil and nutrient loss. Rainfall, runoff, sediment and nutrient yields were quantified with protected subtropical forest, logged subtropical forest, subtropical Pine and forest with shifting cultivation. The paper discusses the impact of land use changes on precipitation pathways, interception and evapotranspiration in forests affecting surface runoff and erosion. The hydrological responses to land use changes were investigated through analysis of rainfall-runoff relationships. There was an interaction of land use and rainfall in determining hydrological responses. The study provided evidence that increase in diversity would positively contribute to the water conservation in catchments in addition to its protected role of the environment.

### **32. IMPACT OF FLY ASH ON VARIOUS MORPHOLOGICAL TRAITS OF OILSEEDS GROWN UNDER VARIOUS PERCENTAGE OF FLY ASH**

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**Key words:** Fly ash, Utilization, oilseeds

The paper deals the impact of fly ash, which is a major pollutant emitted by thermal power plant and possibility about its utilization in the oilseed field with various percentages and its effect on morphological parameters of plants. It also reveals about the comparative study of oilseeds grown under different percentage of fly ash, major functional and applicable possibilities of fly ash percentage and productivity of seeds. It is also reveals magnitude of the problems and approaches for combating the problems.

### **33. SURVEY OF AIR QUALITY BIOMONITORING ANGIOSPERMIC FLORA FROM NUCLEUS AREA OF AMRAVATI CITY**

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**Keywords:** Biomonitoring, Air Pollution, RSPM, SPM, SO<sub>2</sub>, NO<sub>x</sub>

Now a days the hand in hand growth of population and pollution becomes an abominable problem for academicians, researchers and government officials. This imposes the search for natural wardens to tackle increasing level of pollution. One of the naturally deployed guarding systems to monitor air quality is the angiospermic flora, serving as significant biomonitors. The survey for such biomonitoring angiosperms was conducted in the central and most populated as well as polluted area of Amravati and studied for the availability of the especially an angiospermic plants and air pollution. An interaction of air quality and bioindicators, restoration strategies were also studied. Air quality study revealed the hiked level of SO<sub>2</sub>, NO<sub>x</sub>, Respirable Suspended Particulate Matter (RSPM) and Suspended Particulate Matter (SPM). The survey for biomonitoring angiosperms showed 62 plants fighting against the pollutants. The 46 plants species recorded are the tolerant to any one characteristic feature of air quality and 16 species are sensitive to the specific pollution. These species are showing specific relationship with the different air quality parameter. SO<sub>2</sub>, NO<sub>x</sub> and SPM are the chief parameter showing impact on the plants. The 25 species amongst recorded are tolerant to all the significant air quality parameter like SO<sub>2</sub>, NO<sub>x</sub> and SPM. The 11 plant species are sensitive to all these parameters. Other species are showing mixed relationship with the pollutant.

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### **34. POLLEN DIVERSITY STUDIES IN TWO MEMBERS OF APOCYNACEAE BY SCANNING MICROSCOPY**

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**Key words:** Pollen grain, scanning electron microscope, diversity

Pollen is known to have a higher energy investment per gram of organic tissue than any other plant part. No other plant part even though extremely tiny in size packed with so much information and power. Pollen characters are so varied that classification system of plant can be

built up entirely on the basis of 'Pollen Morphology'. In the present work, light microscopic and scanning electron microscopic work was carried out to study the diversity in nature, ornamentations, dimensions of the pollen grains of two closely related genera of Apocynaceae, *Catharanthus roseus* and *Allamanda cathartica*.

### **35. MITRASACME PYGMAEA R. BR. (LOGANIACEAE) – A NEW RECORD FOR MAHARASHTRA STATE (INDIA)**

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The genus *Mitrasacme* Labill. is represented by about 60 species distributed throughout the World but majority of the species are restricted to Australia, New Zealand and adjoining land masses. In India, the genus is represented by three species viz. *Mitrasacme erophilla* Leenh. is confined to Eastern India (Assam and Meghalaya), *Mitrasacme indica* Wight is reported from U.P., Bihar, W. Bengal, Assam, Meghalaya, Orissa, M.P., Maharashtra, Goa, A. P., Karnataka, Tamil Nadu and Kerala where as *Mitrasacme pygmaea* R. Br. is reported from M.P., Bihar and Orissa. However, there is no record of its occurrence in Maharashtra State so far. The authors are reporting for the first time the occurrence of *Mitrasacme pygmaea* R. Br. from Maharashtra State. During the floristic study of the Gondia District (M.S.), authors have collected *Mitrasacme pygmaea* R. Br. From Mandobai (Tah. Goregaon) and Mahadeo Hills (Tah. Amgaon) localities of Gondia District. The voucher specimens have been deposited in the herbarium, Department of Botany, Bhawabhuti Mahavidyalaya, Amgaon, Dist. Gondia (M.S.)

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### **36. LILIUM POLYPHYLLUM (KAKOLI): AN ENDANGERED PLANT FROM ASHTAVARGA GROUP OF MEDICINES IN AYURVEDA**

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*Ashtavarga* is important ingredient of various classical Ayurvedic formulations like Chyawanprash etc. *Ashtavarga* has been assigned various medicinal properties by ancient Materia Medica dealing with *Ayurveda*. In *Ayurveda*, *Lilium polyphyllum* with another seven species, i.e. *Habenaria intermedia*, *Habenaria edgeworthii*, *Malaxis muscifera*, *Malaxis acuminata*, *Polygonatum verticillatum*, *Polygonatum cirrhifolium*, *Fritillaria roylei* constitute a group widely known as 'ASTAVARGA' used for its anti-ageing and vitality properties. In ancient times, Astavarga was even rare for the mightiest of kings to possess due to the rarity of these plants. *Lilium polyphyllum* was reported to have lost 80% of its known populations in the last ten years and that it was threatened with extinction in the future. *Lilium polyphyllum* is facing severe threats, in its natural habitats, and needs immediate protection through conservation. One of the basic steps for the conservation of *Lilium polyphyllum* is to explore its every possible natural pocket in other states of India (J & K and H. P.) and in different countries where it has been reported. This would help to provide appropriate data on its global status. However, various herbal formulations available in the market claims to possess Kakoli and are using them as substitute.

### **37. STUDY ON THE BIODIVERSITY OF BAMBOO SPECIES FROM MANIPUR**

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**Key Words:** bamboo, Potential, Bio-resource, Giant grass

Bamboo, popularly known as giant grass with more than 1,575 species in 75 genera in the world is potential bioresources of tangible and intangible values for humankind. Importance of the crop as a source of raw material for industrial and domestic use with its growing demand all over the

country necessitated its cultivation in farm land as well .Tropical and sub-tropical Indian forest harbour great species diversity of bamboos. Majority of the bamboo species find favourable niche in the North-Eastern region of the country .Manipur (latitude 23.83°N to 25.68°N and longitude 93.03°E to 94.78°E) situated in the Northeastern corner of India represent rich diversity of bamboo species. Local populace specially from rural areas depend on bamboo resources for its subsistence. Bamboo occupies a prominent place in the socio-economic and cultural life of people of the state. The present paper explores the diversity of the bamboo species from Manipur.

### **38. INTEGRATED BIODIVERSITY MANAGEMENT FOR MITIGATION AND ADAPTATION**

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**Key Words:** climate change, mitigation, biodiversity, Forest rehabilitation

Creative planning for integrated biodiversity management requires local and regional action . For protecting the climate and mitigate further climate change, local and regional authorities can participate in climate protection programs that effectively reduce greenhouse gas emissions, for example through an extension of public transport, energy efficiency measures and energy sources. Besides they can invest in the planting of trees to increase carbon sequestration and provide incentives for private and corporate stakeholders to invest in renewable energy and energy efficiency.

Lastly, as climate change can no longer be avoided, local and regional authorities need to regulate and plan for the adaptation of human activity to a changing climate. This can include increasing tree cover and green space in urban areas to cool local temperatures down during the hot season and create more liveable microclimates. Rehabilitation and diversification of municipal forests and wetlands to help regulate a more evenly distributed flow in watersheds may be another measure that take climate change into account.

### 39. MATRIX MODEL FOR POPULATION DYNAMICS OF INVASIVE SPECIES AT MANIPUR

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**Keywords:** Matrix model, population dynamics, critical stage, soil parameters, seedling emergency, weed management

Invasive species are the global threat to biodiversity next to only after climate change. The paper enumerates in permanent plots with natural population over a period of two years, the population dynamics of invasive species *Portulaca oleracea*. Leslie matrix model was used to analyse growth in age structured population. An attempt was made in a matrix model to combine age and stage variable structures and analyse population dynamics of invasive species *Portulaca oleracea*. Seedling emergency was regressed on soil parameters and survival matrices revealed the critical stage in life of species giving a clue for management with the population of this invasive species. It was found that seedling stage in case of *P. oleracea* was critical indicating that the effective control of the species may be brought about by regulatory it at its respective critical stage. The transitional probabilities and stochastic processes in the population dynamics of the species is explained further.

#### **40. THE GENUS *ANABAENA* BORY (CYANOPROKARYOTE) FROM INDIA**

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The genus *Anabaena* Bory as described by Deskachary (1959) is known to have twenty five species. Our survey indicated the record of taxa may be upto 100 including 65 species and 35 varieties and forma. In recent years the genus has been segregated into several genera like *Cyanospira*, *Trichormus*, *Aphanizomenon*, *Cuspidothrix*, *Dolichospermum*. In the present study ten well defined forms *Anabaena* Planktic as well as terrestrial have been studied in detail for their morphology. The criteria for distinction include their coiled, straight, with copious mucilage or inconspicuous mucilage around their trichomes, whether attenuated or not attenuated and if attenuated gradually or sharply ending. Cells are spherical, barrel shaped or cylindrical, with or without pseudevacuoles and presence or absence of granules. Heterocysts shape and size, terminal or intercalary, and their frequency in the trichomes, Akinetes their shape, size and surface ornamentations, their origin whether number one, two or more in chains are criteria used. In the literature many species are described without clear distinction and many new varieties and forma have been created and these do not appear justified.

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#### **41. RECENT TRENDS FOR BIODIVERSITY ANALYSIS OF CYANOBACTERIA**

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Taxonomy of cyanobacteria with its underlying evolutionary assumptions, makes use of the monothetic principle of classification. All the characters of subordinate taxa must necessary be included in the definition of a superior taxon. For instance, no species is allowed to go beyond the limits is the original diagnosis to which the nomenclatural type is attached. Its further parts are all the genetic, morphological, physiological and biochemical properties of the taxon which are discovered subsequently. So far as these properties do not prove the identity of the taxon with, or the need for its fusion with another taxon, any extension of the characters of the taxon do not change its value, as established by the nomenclatural type and the original diagnosis. The procedure of numerical classification involves the politic formation of taxonomic groups, without any preliminary definition of the distinguishing features characterizing the superior taxon. The taxa are defined by means of sets of input characters. The results of this procedure do not necessarily differ substantially from the results obtained by the traditional methods. A universal marker for DNA fingerprinting is the oligonucleotide csM13. It has already been tested in a small number of cyanobacteria, and has a demonstrated ability even to discriminate strains of the same species. Techniques based on the enterobacterial repetitive intergeneric consensus (ERIC) have also been used for identification and discrimination purposes in some cyanobacteria. However, the method based on STRR and LTRR sequences is accurate in distinguishing and classifying even closely related strains of cyanobacteria. The restriction fragment length polymorphisms (RFLPs) of particular PCR products can provide signature profiles specific to the genus, species, or even strain. Genetic characterization of cyanobacterial strains has been undertaken using RFLPs of the 16S rRNA gene and of the intergenic transcribed spacer region. Random amplified polymorphic DNA (RAPD) markers are DNA fragments from PCR amplification of random segments of genomic DNA with single primer of arbitrary nucleotide sequence. Unlike traditional PCR analysis, RAPD does not require any specific knowledge of the DNA sequence of the target organism: the identical 10-mer primers will or will not amplify a segment of DNA, depending on positions that are complementary to the primers' sequence. Furthermore, by RAPD, polymorphisms can be easily analyzed by small amounts of template DNA. RAPD was used to generate unique and identifying profiles for members of cyanobacterial genera. Repetitive sequences constitute an important part of the prokaryotic genome. Despite their unknown function, and lack of knowledge about how they are maintained and dispersed, the presence, widespread distribution and high conservation of these sequences

make them methodologically important for DNA fingerprinting and allow their use as an alternative for the identification of species or strains and in diversity studies among related prokaryotes and for identification (fingerprinting) of microorganisms in general.

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#### **42. REACTION OF CHILLI HYBRIDS AND THEIR PARENTS AGAINST SEEDLING BLIGHT CAUSED BY *COLLETOTRICHUM SPP.***

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Two species, namely *Colletotrichum capsici* and *C. gloeosporioides* were known to cause anthracnose (fruit rot) in chilli and both are internally and externally seed-borne leading to pre emergence and post emergence damping-off of seedlings in nursery and field. Fungicides are mainly used to manage the disease but the control achieved is not satisfactory. Hence, the development of new hybrids with superior agronomic characters and resistance to seedling blight was attempted.

Screening for anthracnose resistance was done under natural epidemic condition. It revealed that maximum death of seedlings was observed in the experiments indicated ideal conditions for the disease development in all the four situations *viz.*, nursery, transplanted shade net house, pot and field conditions. Out of five hundred twenty one crosses, two hundred seventy seven hybrids showed death of seedlings while seventy two hybrids recorded > 50 per cent survival and ninety two crosses recorded 25.1 to 50 .0 per cent survival. Newly converted male sterile line (LCA-206 ST) recorded 100 per cent survival. Male parents LCA310A, LCA960, KDSC 210-10-1 and GCV121 showed resistance against seedling blight.

Final testing of selected genotypes / hybrids after treating the seeds with the suspension of pathogen along with susceptible genotypes under shade house condition before transplanting revealed that fifty three genotypes recorded more than 50 per cent survival of which thirteen genotypes showed cent percent survival. Six genotypes used as check recorded complete death of seedlings suggested the genotypes were resistant to isolated pathogen *C. capsici* and *C. gloeosporioides* causing seedling blight of chilli.

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### 43. STUDIES ON BIOLOGY OF *OPHIOMYIA PHASEOLI* (TRYON) INFESTING *PISUM SATIVUM*

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The Agromyzidae is a family of acalyprate Diptera found in all zoogeographical region of the world. Agromyzidae are phytophagous, the larvae feeding exclusively in the internal tissue of plants. Feeding punctures made by adult females can be particularly damaging seedling and young plants. However, our knowledge of the common Indian species of pea leaf miner *Ophiomyia phaseoli* (Tryon) is very meager, which is serious pest on the *Pisum sativum* (Linn.), which is the major cultivated crop in India. *Ophiomyia phaseoli* tend to lay eggs during the morning hours on the upper side of the leaves, often near the midrib close to the petiole. The eggs are inserted between the epidermis and spongy parenchyma. As in other mining flies, many feeding punctures are normally distributed all over the leaf. *Ophiomyia phaseoli* larvae are a cortex feeder. The first instar miners from the leaf blade to the midrib where the first mould takes place. The second instar proceeds from the leaf into the petiole and in most cases moults at the junction between petiole and stem. The survival of the pea leaf miner *Ophiomyia phaseoli* was observed at different levels of relative humidity from 65% RH to 85% RH. The maximum survival rates occurred at 75% RH of different life stages. In India *Ophiomyia phaseoli* (Tryon) is major polyphagous pest of bean plants especially *Pisum sativum*. So its biological study is necessary for protection of crops from its severe attacks. The differences in the rate of egg lying primarily depend upon the time during the course of oviposition period and variation in temperature and humidity. The fecundity is very high during early period of oviposition and gradually declines with the time. Thus, it is clear that high temperature and humidity are the responsible factors which accelerate development.

#### 44. INVESTIGATION OF AERO-ALGAE AT HUMAN BREATHING LEVEL FROM NAGPUR

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Daily aero-sampling was carried out at human breathing level for studying aero-algal forms and its impact on human health. Such attempt was made for the first time by using modified aeroscope (smaller version of Lakhanpal and Nair, 1958), was mounted on vespa scooter front. Sampling was carried out from November-94 to September-95.

Cyanophyta was found to be dominant group followed by Bacillariophyta, Chlorophyta and Euglenophyta. Total 16 algal forms were identified. Out of these algae, *Phormidium*, *Lyngbya*, *Merismopedia*, *Gloeocapsa*, *Chroococcus*, *Anabaena*, *Scytonema*, *Microcoleus*, *Fragilaria* and *Trentipholia* were reported to be allergenic to human being.

#### 45. PHYTOPLANKTON DIVERSITY OF KHAIRI LAKE, KARANJA (GH) DIST-WARDHA (M.S), INDIA.

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**Keywords:** - Phytoplankton Diversity, Khairi lake, Karanja

Phytoplanktons are pioneer organisms of an aquatic food chain. The productivity of an aquatic environment is directly correlated to the density of phytoplankton. Present investigation was carried out to study species composition and population density of phytoplankton of Khairi Lake.

The Khairi Lake is a man made freshwater reservoir which is situated about five kilometer to the north-east of Karanja, Wardha district of Maharashtra. The present study gives an idea of algal diversity of Khairi Lake. Algal flora was studied by collecting sample from different sites during rainy season (2007-2008). Various algal forms are Chlorophyceae (*Chlamydomonas*, *Eudorina*, *Stigeoclonium*, *Draparnaldia*, *Oedogonium*, *Zygnema*, *Spirogyra*, *Pediastrum* etc.); Cyanophyceae (*Microcystis*, *Oscillatoria*, *Rivularia*, *Aulosira* etc.) and Bacillariophyceae (*Cyclotella*, *Navicula*). In this study Chlorophyceae members was dominant

over Cyanophyceae and Bacillariophyceae in the following sequence, Chlorophyceae > Cyanophyceae > Bacillariophyceae.

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#### **46. CYANOBACTERIAL DIVERSITY KARANJA (GH), DISTRICT WARDHA (M.S), INDIA.**

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**Keywords:** - Cyanobacterial diversity, Karanja

Cyanobacteria constitute the most diverse group of plant kingdom. They occur in variety of habitats including terrestrial, lithophytic, epiphytic, endophytic etc. These have the ability to survive in diverse ecological conditions. They are named variously i.e. blue green algae, cyanophytes and most recently as cyanoprokaryophytes. They are also the oldest known fossils, dated back more than 3.5 billion years. The present study deals with the cyanobacterial flora of Karanja. Total 79 species of cyanobacteria belonging to 25 genera of 07 families and 04 orders have been reported from this region.

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#### **47. MICROFUNGAL DIVERSITY ASSOCIATED WITH DECOMPOSING VEGETABLE WASTE IN MANIPUR**

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**Key words :** *Microfungi, vegetable waste, decomposition.*

Microfungal diversity associated with a known equally proportioned mixed-type decomposing vegetable waste was studied for a period from Nov.,2008 to Nov.,2009 in Manipur, North-East India following nylon mesh bag technique (Bocock *et.al.*,1960) by using a combination of cultural methods: dilution plating, wash disk and surface sterilization methods. A total of 19 fungal species including 1 sterile form were isolated during the process. *Aspergillus fumigatus*, *A. niger*, *Chaetomium funicola*, *Cladosporium cladosporioides*, *Fusarium oxysporum*,

*Rhizopus nigricans* and *Trichoderma koningii* were the microfungi occurring during the initial stage while *Aspergillus niger*, *Fusarium oxysporum* and *Penicillium* sp. were the only microfungi occurring at the final stage of decomposition. The fungal diversity was highest during the mid-decomposition stage comprising of *Alternaria alternata*, *Aspergillus fumigatus*, *A. sulphureus*, *Cladosporium cladosporioides*, *C. oxysporum*, *Fusarium* sp., *Gliocladium virens*, *Humicola* sp., *Mucor heimilis*, *Paeecilomyces variotii*, *P. corylophilum*, *Penicillium* sp. and white sterile mycelia.

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## 48. THERMOPHILIC FUNGI AND THEIR DIVERSITY

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**Key words:** Thermophilic fungi, soil, occurrence.

Thermophilic fungi are inhabitants of many habitats including soil. These are diverse group of fungi having very small assemblage in the world of fungi but economically very important. Present investigation was aimed to study the diversity of thermophilic fungi from soil habitats being diverse in one or other physicochemical properties. Soil samples from dumping areas of coal mine, paper mill, fly ash and manganese mine were analyzed for physicochemical parameters and isolations were made for thermophilic fungi. Coal mine site leads with the 14 number of thermophilic and thermo-tolerant fungi. The garden soil was treated as control, 10 numbers of fungi were isolated from this soil as *Aspergillus fumigatus*, *Emericella nidulans*, *Humicola insolens*, *Thermomyces lanuginosus* and *Rhizopus microsporus* were the dominant in all the isolations made. In Coal mine soil along with *A. fumigatus*, *Myriococcum albomyces* and *Chaetomium thermophile* were also observed frequently. From 11 numbers of fungi isolated in fly ash dumping area site *T. lanuginosus* was occurred in almost all the isolations. Paper mill waste water dumping area was observed with the occurrence *Myriococcum albomyces* frequently. In the manganese mine waste soil dumping area along with *A. fumigatus*, *E. nidulans*, and *R. microsporus* were the dominant fungi. Occurrence of thermophilic fungi in particular soil is discussed.

## 49. FUNGAL DIVERSITY IN FRUITS COLLECTED FROM FRUIT MARKET OF YAVATMAL, MAHARASHTRA

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Fruit samples which were attacked by fungi were collected from fruit market of Yavatmal, Maharashtra to study fungal diversity in fruits. Fruits like orange (*Citrus reticulata* Syn.) and sweet orange (*Citrus sinensis* Linn.) Osbeck, the fungus observed was *Trichoderma*. Litchi (*Litchi chinensis* (Gaertn.) Sonn., mango (*Mangifera indica* Linn.) and pomegranate (*Punica granatum* Linn.), the fungus observed was *Aspergillus*. In Sapota (*Achras sapota* Linn.), the fungus observed was *Phytophthora*. In Strawberry (*Fragaria vascons L.*), the fungus observed was *Rhizopus*. Similarly, in banana (*Musa sapientum* L.) and Papaya (*Carica papaya* L.), the fungus was *Colletotrichum*. In apple (*Pyrus malus* L.), it was *Penicillium*. After the study, it was concluded that *Aspergillus* was found to be dominant in fruits.

## 50. DETECTION OF SAPONIN IN THE CELL SUSPENSION CULTURE OF *MALVASTRUM COROMANDELIANUM* (L) GARCCKE.

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**Key words:** *Malvastrum coromandelianum*, suspension culture, 2-4 D, TLC, Saponin,

The suspension cultures were initiated from hypocotyls explants-derived callus of *Malvastrum coromandelianum* by incubating 2gm of friable callus in 50 ml of MS liquid medium containing 2 mg/L of 2-4 D, 1 mg/L of kinetin and with 4% sucrose and were subcultured monthly. With every subculture, the filtered suspension liquid and cells were collected separately. The suspension liquid and cells were then analyzed for the presence saponin by TLC method. It was observed that cells showed less amount of saponin as compared to suspension

liquid which also signifies that the secondary metabolite has leached out into the medium. The plant has analgesic, anti-inflammatory and anti-diabetic properties which are due to presence of saponin, due to which the plant can be exploited extensively therefore, timely conservation methods are to be developed for this plant.

## **51. STUDY OF BACTERIAL DIVERSITY IN ORAL CAVITY OF HEALTHY INDIVIDUAL USING PCR TECHNIQUE**

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Oral cavity provides a wide variety of habitats for microbial colonization. The presence of nutrients, epithelial debris and secretions makes the mouth a favorable habitat for a great variety of bacteria. The bacterial diversity varies with temperature and pH of oral cavity. These bacteria play an important role in human health and diseases like dental caries and periodontitis.

The strategy used in this study included several methods in which, the sample was collected from healthy individual's oral cavity especially from the molar teeth. The microbial community DNA was isolated from the sample. Simultaneously pure cultures were isolated. The community and genomic DNA were subjected to PCR using 16S rRNA gene specific primer.

After sequencing and BLAST analysis of these isolates *Staphylococcus aureus*, *Escherichia coli*, *Paenibacillus alvei*, *Bacillus aquimaris*, *Bacillus thioparans*, *Bacillus endophyticus* and *Bacillus flexus* were found. The work also reveals the multidrug resistant pattern of bacteria which is increasing day by day in non pathogenic oral microflora. *Escherichia coli* were found to be resistant to cloxacillin, cephalothin, ampicillin and methicillin. *Bacillus thioparans* and *Bacillus flexus* were found to be sensitive to antibiotics used in this study.

The present work will help to study the antibiotic resistant factors and virulence factors in future studies.

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## **52. BEE FLORAL CALENDAR FOR NECTAR SOURCES OF GONDWANA REGION**

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**Key words:** floristic resources, honeybee, pollination.

The study was conducted for identifying the floristic resources for three honeybee species viz *Apis dorsata*, *A. florea* and *A. cerena* in Gadchiroli District of Gondwana region. Extensive survey has resulted to record total 118 plants species belonging to 47 families like Fabaceae and Caesalpiniaceae (major contribution), followed by the large number of genera belonging to Asteraceae, Malvaceae, Mimosaceae, Combretaceae, Amaranthaceae, Euphorbiaceae, Poaceae and Verbenaceae are nectar sources in the order of dominance. In most of the species, flowering was seasonal with its peak in late winter to summer. This study gives the information of botanical aspects such as basic data on floral sources of honey bees, their local name, flowering period and mode of pollination. It is also useful to enhance the production of honey.

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## **53. CONCENTRATIONS OF AIRBORNE *ALTERNARIA* AND *CLADOSPORIUM* SPORES IN RELATION WITH METEORO- LOGICAL CONDITIONS AT NAGPUR CITY (M.S.)**

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**Key words:** - allergenic, *Alternaria*, *Cladosporium*, meteorological parameters.

Monitoring of air borne allergenic *Alternaria* and *Cladosporium* spores was done by rotorod air sampler from Nagpur during February 2006 to January 2008. The daily, monthly and annual variations in spores of *Alternaria* and *Cladosporium* in air were observed. During this period a total of 1, 13, 170 spores/m<sup>3</sup> belonging to *Alternaria* and *Cladosporium* genera were recorded. Of these 54,585 spores/m<sup>3</sup> were identified during February 2006 to January 2007 and 58,635 spores/m<sup>3</sup> in February 2007 to January 2008. *Cladosporium* contributed 63.73% while *Alternaria* accounted 36.27% to the total mycoflora observed. The occurrence of these fungal spores was correlated with the meteorological parameters like rainfall, temperature and relative humidity.

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#### **54. FUNGAL SPORE INCIDENCE IN THE INDOOR ENVIRONMENT OF FCI GODOWN AT NAGPUR (M.S.), INDIA**

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**Key words:** biopollutants, intramural, meteorological parameters, fungal spores.

Aerobiological studies of grain storage godowns (FCI) at Nagpur were undertaken to find out the concentration of biopollutants, their seasonal variations and incidence of damage of cereal grains for the period of September 2006 to August 2007.

A total of 63 aerospora types were identified. Fungal spore concentration was observed to be 81.41% with other types as 18.58% which includes algal filaments (2.87%), hyphal fragments (2.58%), insect parts (7.14%), trichomes (1.48%), tracheideal elements (1.58%) pollen grains (1.70%) and unidentified spores (1.19%). The occurrence of biopollutants such as *Aspergilli* (2490/m<sup>3</sup>, 11.94%), *Alternaria* (1150/m<sup>3</sup>, 5.51%), *Helminthosporium* (785/m<sup>3</sup>, 3.76%), *Cladosporium* (2000/m<sup>3</sup>, 9.59%) and *Curvularia* (1540/m<sup>3</sup>, 7.38%) were recorded as the predominant genera. The highest incidence of fungal spores was observed during the month of May 2007 (1855/m<sup>3</sup>) and it was correlated with the meteorological parameters.

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## 55. EFFECT OF RICE HUSK ASH (RHA) ON DIVERSITY OF PHYTOPLANKTONS

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**Key words:** Phytoplankton, Rice Husk Ash (RHA).

Rice is grown on every continent except Antarctica and covers 1% of the earth's surface. Globally, approximately 600 million tons of rice is produced each year. On average 20% of the rice is husk, giving an annual total production of 120 million tons. In the majority of rice producing countries much of the husk produced from the processing of rice is either burnt or dumped as waste. This Rice Husk Ash (RHA) become environmental hazard when unscrupulously dumped, especially near by water bodies. The present investigation is based on the field and laboratory investigation of a stream, which ultimately meets the river Pangoli of District Gondia in Maharashtra state. The stream is located at Nagpur – Gondia road near Goregaon on state highway 275. Many rice mill owners dumped their RHA nearby stream. The dumped ash slowly deposited in the stream. During investigations water samples from three different locations ( Site 1 : Before mixing of RHA in stream; Site 2 : Point where RHA is mixed in stream and Site 3 : Approximate 2 -3 km away from RHA mixing point in River Pangoli) were collected to study the effect of RHA on diversity of phytoplankton.

Total 21 species of phytoplankton belonging to chlorophyceae, bacillariophyceae and cyanophyceae were identified. Some species like *Scenedesmus*, *Cosmarium*, *Selenastrum*, *Ankistrodesmus* and *Actinastrum* were observed at Site 1 but not at Site 2 and surprisingly same species were again observed at Site 3 which strongly indicates that elements present in RHA has adverse effect on phytoplankton. This is very serious environmental issue and in order to protect water bodies from this threat, Pollution control authorities should formulate stringent norms and punishment should be given to those people who violating the norms.

## 56. STUDY OF BACTERIAL DIVERSITY ON HUMAN SKIN

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A large number of commensal and pathogenic microbes inhabit the human skin that contributes to human health and diseases. The healthy human skin microbiota helps in processing the skin proteins, lipids etc. to maintain the body physiology and also prevents from the colonization of pathogenic microbes. To isolate, identify, and characterize normal skin microbiota, samples were collected from inner elbow of healthy individuals by swab method. In culture independent analysis, microbial community DNA were isolated and in case of culture dependent analysis pure cultures were isolated and amplified using 16S rRNA gene primer. After sequencing of PCR products and BLAST analysis these pure cultures were found to be *Pseudomonas stutzeri*, *Micrococcus luteus*, *Bacillus flexus*, *Bacillus thioeparans* and *Staphylococcus epidermidis*. Out of them *M. luteus* and *B. thioeparans* were found to be sensitive to all thirteen antibiotics used in present study. The remaining isolates were found to be sensitive to some antibiotics such as streptomycin, tetracycline, imipenem, amoxicillin, gentamycin etc. and some isolates were resistant to ampicillin, rifampicin, piperacillin, cloxacillin and methicillin. This study will help to direct future research to understand the role of skin microbiota in skin diseases and to facilitate novel skin therapies.

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## 57. DIVERSITY IN RHIZOSPHERE AND RHIZOPLANE MYCOFLORA OF *BRASSICA JUNCEA* CV. VARUNA

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**Keywords:** Diversity, Rhizosphere, Rhizoplane, *Brassica juncea*.

The rhizosphere mycoflora was found to be more as compared to non-rhizosphere soil during the various stages of plant growth (seedling, flowering and maturity stage). Qualitative

and quantitative differences were observed in rhizosphere and rhizoplane mycoflora of *Brassica juncea* cv. Varuna. During the investigation, the number of mycoflora was more during flowering than that of seedling and maturity stage of the plant. Important fungi isolated from rhizosphere soil are *Aspergillus* sp., *Penicillium* sp., *Alternaria* sp. and *Drechslera* sp.

## 58. DIVERSITY OF MESOPHILIC SOIL FUNGI OF LEH (LADAKH)

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**Keywords:** - Soil fungi, Mesophiles, *Aspergillus*, *Trichoderma*.

Soil is natural medium for the growth of microorganisms including fungi. The present investigation deals with the soil mycoflora of Leh (Ladakh) area, Jammu and Kashmir State in India. So far, this area in North-East frontier of our country having rich flora and fauna has not been explored extensively for the survey of soil fungi. The weather and climate of Leh (Ladakh) display great diversities. For isolation and identification of soil fungi, samples were collected in sterile bags and plated on Potato Dextrose Agar (PDA) medium. The fungi were isolated by Soil Plate method and Serial Dilution method. Twenty species belonging to ten genera were isolated from these soil samples as mesophiles. *Aspergillus* sp., *Rhizopus* sp., *Penicillium* sp., *Trichoderma* sp., *Torula* sp., *Cladosporium* sp. and *Curvularia* sp. were the mesophilic fungi.

## 59. ARBUSCULAR MYCORRHIZAL FUNGI ASSOCIATED WITH *SANTALUM ALBUM* (L.) FROM AMRAVATI

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**Key Words:** AMF, Biodiversity, *S.album*

Soil, an underground terrestrial ecosystem shows the greatest diversity of organisms. Especially rhizospheric region is the most dynamic environment that harbors Arbuscular Mycorrhizae the most dominant fungal associations. *Santalum album* (L.) is an important multi-purpose tree species, which has been the primary source of sandalwood and essential oil. A field

study was conducted to identify the AM Fungi associated with *Santalum album* in Amravati region. The rhizosphere soil samples were analyzed for AM Fungal spores. *Glomus fasciculatum*, *G. dimorphicum*, *G. etunicatum*, *G. leptotichum* and *G. maculosum* were identified as the AM Fungi associated with *S. album*. *G. fasciculatum* was the most frequent AM fungal associate of the soils studied. Proper selection of efficient AM Fungi is an important step for developing any mycorrhizal inoculation programme. The present investigation provides information to select appropriate AMF to raise multi-utility tree *Santalum album*.

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## 60. SEED BORNE MYCOFLORA OF CABBAGE AND CAULIFLOWER

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**Key words:** Cabbage, Cauliflower seeds, Seed –borne fungi, Seed germination.

Cabbage (*Brassica oleracea* var. *capitata* L.) and Cauliflower (*Brassica oleracea* var. *botrytis* L.) are important cruciferous vegetable crops and extensively cultivated in Amravati- Chandur Bazar region. The seed samples were collected from Amravati and Bhatkuli Tehsil. The fungi associated with cabbage and cauliflower seeds were investigated by employing blotter and agar- plate methods as recommended by ISTA. For seed germination study, roll-towel technique was used.

The observations of these samples revealed that they were infected with fifteen different fungal species. Four fungi viz. *Aspergillus niger*, *A. flavus*, *A. fumigatus* and *Rhizopus nigricans* were found to be in dominance. The seed mycoflora of cabbage and cauliflower showed variations in incidence of fungi with respect to storage time. The other isolated fungi were - *Actinomucor repens*, *Alternaria alternata*, *A. brassicicola*, *Aspergillus nidulans*, *Chaetomium mollicellum*, *Cladosporium cladosporioides*, *Curvularia lunata*, *Fusarium oxysporum*, *Helminthosporium tetramera*, *Mucor varians* and *Penicillium chrysogenum*. In seed germination study it was observed that, the

germination percentage of seed decreases with increase in the storage period of seed samples.

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## **61. COMMUNITIES, BIORESOURCES AND SUSTAINABLE DEVELOPMENT**

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**Key Words:** Indigenous and traditional technologies, benefits, equitable sharing, commercial applications, sustainable development

International Convention on Biodiversity mentions that the traditional knowledge and resource about biodiversity should be recognized and respected (Article 8). Further it entails that such knowledge and resource should be accessed with the approval of concerned communities with their involvement in future development. Communities should share equitably the benefits arising out of commercial applications. It further mentions that the contracting parties are also obliged to develop and use indigenous and traditional technologies to conserve biological diversity and sustainably use its components ( Article 18.4). Hence, the paper discusses certain programmes of action in the light of the International law, recognizing special relationship with the diverse bioresources communities have since prehistoric times and utilize such knowledge and practices in the rural development programme towards sustainable development

## **62. ADAPTATIONS OF GRASSLAND VEGETATION AND PRODUCTIVITY SCENARIO IN FLOATING KEIBUL LAMJAO NATIONAL PARK**

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**Keywords:** Keibul Lamjao National Park, *Cervus eldi eldi*, floating mat, lifeform, productivity.

Keibul Lamjao National Park –KLNP (Latitude 23<sup>0</sup>8 3'N to 25<sup>0</sup>86'N, Longitude 93<sup>0</sup>03'E – 93<sup>0</sup>78'E) lies in the southern side of Loktak lake, the famous Ramsar site. The park is the only

natural abode of the endemic and endangered brow antlered deer *Cervus eldi eldi* Mc. Clleland locally known as Sangai and is characterized by floating mat called 'phumdi'. Earlier the park experienced annual submergence –emergency cycle but after the setting up of Loktak National Hydro Electric Project in 1984, the annual cycle is ceased which lead to changes in hydrological regime of the park. The investigations on vegetation analysis and productivity were carried on the floating grasslands of the park. It was found that the inner sites which experienced regular burning as a strategy of park management revealed the best performance of species belonging to Hemicryptophytes and Chamaephytes. These life-forms through their adaptations like runner, stolen, rhizomes could survive in the adverse condition. The dominance of Poaceae reflected the comparatively better performance of grasses which might be the impact of burning. The evaluation of Primary Productivity and dry matter dynamics of KLNP was done and transfer through different producer compartments were analyzed. Net accumulation rates, disappearance rates and turnover were calculated.

The system transfer functions of KLNP indicated that most of the dry matter is channelized to roots and rhizomes indicating stressed condition in the park. The dominance of species with longer and vigorous rhizomes and life form composition indicated that under various biotic stresses the plants drew energy from root systems and rhizomes.

### **63. INCREASE IN FUNGAL POPULATION DURING STORAGE OF CHILLI (*CAPSICUM ANNUM L.*) SEEDS**

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**Keywords:** Genera, fungal infestation level, pathogens.

To observe the health status of farmers' chilli seeds, collections of 200 seed samples were made separately at two different periods i.e. firstly during the harvesting of crop and secondly after 6 months of storage at farmers' own levels. A sum of 48 fungal species belonging to 22 genera were detected from 200 stored seed sample collected from farmers four valley districts. District-wise total fungal infestation level (total % frequency) on stored seeds were recorded as 24% in Imphal East, 26% in Imphal West, 41% in Thoubal and 37% in Bishnupur as compared to 18.82%, 19.28%, 23.93%, and 21.70% infestations, respectively from freshly harvested seeds.

The seed samples stored at farmers' own levels were infested by a number of field and storage-fungi. Several known seed-borne pathogens viz. *Alternaria alternata*, *Aspergillus flavus*, *A. niger*, *Colletotrichum capsici*, *C. gloeosporioides* and *Fusarium moniliforme* were consistently isolated from many samples of the farmers saved seeds. Among these, *C. capsici* and *F. moniliforme* showed comparatively higher percentage of infestation on chilli seeds.

#### **64. ALGAL DIVERSITY AT THE CONFLUENCE OF RIVER WAINGANGA AND KATHANI NEAR GADCHIROLI (M.S.)**

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**Key Words-** Confluence, Chlorophyceae, Diatoms.

India is covered by large coastal area having large biodiversity of algal flora. The present study is concerned with the algal Biodiversity in freshwater at the confluence of two rivers Waingangā and Kathni near Gadchiroli (M.S.). Algal flora in both rivers showed algal biodiversity in a place of confluence. Twelve species of algae belonging to Chlorophyceae and some selected diatoms. The predominant species of algal members are – *Scendesmus*, *Pediastrum*, *Oedogonium*, *Coelastrum*, *Micrasterias*, *Zygnema*, *Spirogyra*, *Cosmarium*, *Netrium degitus*, *Cloesterium*, *Chara*, *Nitella*, *Cymbella*, *Navicula*, *Gyrosigma*.

#### **65. ASSESSMENT OF ALGAL BIODIVERSITY IN MINE WATER WITH SPECIAL REFERENCE TO WATER QUALITY, POLLUTION AND BIOINDICATORS**

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**Key words:** Vidarbha Region, Manganese Mines, Water quality, Biodiversity, Pollution, Bioindicators.

Geographically, eastern extremity of Maharashtra State is known as Vidarbha. In present investigation Kandri, Mansar, Beldongri and Gumgaon Manganese mines of Manganese Ore India Limited (MOIL) in Vidarbha Region are selected for study. Not much data is available with respect to mine water regime on environmental degradation at the studied sites, although geological aspects were well studied earlier. The present investigation includes a number of physicochemical and phycological aspects, heavy metals and pollution indicating physicochemical parameters studied continuously for one year at monthly interval on each mine. The critical analysis of biodiversity has led to the identification of algal bioindicators and their role in environment especially in mine water quality assessment.

Mine water quality of Gumgaon and Beldongri Manganese mines resemble with each other in the course of investigation while Kandri and Mansar Manganese mines with slight fluctuations also resemble with each other. However, the fluctuations and differences in water quality of mines may be due to the geological conditions prevalent in the mining area. While assessing the algal biodiversity of Manganese mines, the members of Chlorophyceae remain dominate in all the mines followed by the members of Cyanophyceae and Bacillariophyceae. Mansar Manganese mine shows less algal diversity as compared to Gumgaon, Kandri, Beldongri Manganese mines.

The results show substantial level of contamination in all segments of mine water environment and proved to be a very significant impact on the environmental health.

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## 66. EVALUATION OF ALGAL DIVERSITY IN AGRICULTURAL FIELDS POLLUTED WITH PESTICIDE CONTAMINANTS

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**Key words:** pollution, pesticides, algal diversity, bioindicator, bioremediation.

Monitoring the impact of pollution on aquatic life form is a challenging task today. The excess use of pesticides, insecticides and organic chemicals in agricultural field create a

number of public health hazards. Microalgae are the dominant form of aquatic environment. In present investigation, an effort has been made to evaluate the algal diversity in agricultural fields. Algae act as bio-indicators of various types of pollution. They play a dual role in increasing the fertility of soil and use as an agent to control pollution by the process of bioremediation. The algal genera in pesticide applied rice field an around the Nagpur have been studied and reported from the fields are as follows: *Nostoc*, *Chlorococcum*, *Aphanocapsa*, *Aulosira*, *Oscillatoria*, *Phormidium*, *Cosmarium*, *Closterium*, *Eunotia*, *Navicula* are collected for further investigation of pesticide degradation *in vitro*.

## **67. IN-VITRO CALLUS INDUCTION AND SHOOT REGENERATION IN BOERHAAVIA CHINENSIS L.**

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**Key words:** *Boerhaavia chinensis*, Callus and Shoot induction

*Boerhaavia chinensis* L. is herbaceous weed of the family Nyctaginaceae and is widely distributed in the tropics and sub-tropics. It has a long history of indigenous use by tribal people and in Ayurvedic or natural herbal medicines. Pharmacological studies have demonstrated that *B. chinensis* is also known to possess properties to cure skin and soft tissue infections. It is also a diuretic and it has antibacterial properties, which makes it a very useful medicinal plant.

In the present study the protocol for callus induction and regeneration was standardized. Young leaves and young internodal region was used as explants for callus induction. Leaves and internodes were cultured on MS medium containing 2, 4-D and Kinetin. Callus initiation was first recorded at the lamina portion of leaf after eleven days and later at internodal region after eighteen days. The calli in most of the cultures were white and globular in nature. The callus was subcultured twice on MS media. The shoots were seen on this subcultured callus after 20 days.

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## **68. TOXICITY EVALUATION OF VERMITREATED EFFLUENTS OF HERBAL AND BULK DRUG PHARMACEUTICAL WASTEWATERS BY ALGAL BIOASSAY**

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**Keywords:** Algal bioassay, vermin-filtration, pharmaceutical waste water treatment, toxicity

The research work focuses on the use of primary producers as a biological tool for evaluating the toxicity of treated wastewaters. Studies were carried out to see the feasibility of effluents to the agriculture by using algal bioassays of sp. *Scenedesmus bijugatus*. Variations of algal growth potential (AGP) within the different concentrations of effluents shows the capacity of vermin-filters to remove the toxicity of pharmaceutical waste waters.

Two types of pharmaceutical waste waters were selected for treatment by vermin-technology. Significant observations were obtained with respect to removal of colour, stabilization of pollutants and value addition to the effluent in the form of nutrients and growth promoting factors during this process. This indicates that vermifilter system can very well applied for the treatment of organically polluted industrial effluents, for their value addition and further recycling and reuse in agriculture as aerial spray or a liquid manure to increase the productivity of crop.

Hence an attempt has been made to treat the pharmaceutical waste waters by vermin-treatment technology and to assess the efficiency of the method in removing toxicity using algal bioassay test and algal growth potential test (AGP).

## 69. **IN VITRO PROPAGATION OF *CELOSIA CRISTATA* LINN. FROM SHOOT TIP EXPLANTS**

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**Key words:** *Celosia cristata*, micropropagation, shoot tip, multiple shooting.

*Celosia cristata* Linn. is commonly known as “Cocks comb”. It is sold as a potted plant, a bedding plant, or a cut flower and is widely used in Indian and Chinese folk medicine. Seedlings, which contain betalains are used as a vegetable. The present study was undertaken to standardize the conditions for micropropagation of *C. cristata*. Out of all the explants tested, only shoot tip explants could induce multiple shooting. It was found that multiple shoot induction was affected by various factors like combination and concentration of NAA & BAP, and age of explant. Moreover, it was found that the number of shoots/explant increased with the subculturing of the explant up to 10<sup>th</sup> generation. The induced microshoots were rooted over MS medium of various strength containing 2,4-D, NAA, IAA, TCA at different concentrations. Rooted plantlets were then transferred to plastic cups covered with polythene bag which provided high humidity environment. The hardened plants were then successfully established in the soil medium.

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## 70. **USE OF RAPD, ISSR AND SSR MARKERS FOR DETERMINING GENETIC DIVERSITY OF COTTON WORKING GERMPLASM**

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**Keywords:** RAPD, ISSR, SSR, working germplasm.

The present study was attempted to evaluate twenty-four working germplasms of *Gossypium hirsutum* (12 of Bacterial Blight resistant & 12 of Jassid and Bollworm resistant) for

determining genetic diversity. Three PCR based marker systems viz. 40 Random Amplified Polymorphic DNA (RAPD), 19 Inter Simple Sequence Repeats (ISSRs) and 24 Simple Sequence Repeats (SSRs) or Microsatellites were used to assess the genetic diversity. The value of similarity coefficient of dendrogram calculated by RAPD, ISSR and SSR markers ranged from 0.54-0.94, 0.39-0.98 and 0.53-0.94, respectively. All three marker systems revealed that working germplasms, BAR-1218 and CO2 showed similarity among the twenty-four working germplasms. The average polymorphic values for RAPD, ISSR and SSR were found to be 68.68%, 78.55% and 78.40%, respectively indicating that SSR marker is more informative than RAPD and ISSR.

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## **71. MICROPROPAGATION OF *GMELENA ARBOREA* ROXB. FROM SHOOT TIP EXPLANTS DERIVED FROM SEEDLINGS**

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**Keywords:** Conservation, *In vitro* propagation, explants, *Gmelina arborea*, Timber plant.

Forest trees meet human needs and contribute to natural ecosystems in unique and diverse ways. However, the overexploitation of natural vegetation has adverse effect on biodiversity. Hence, cultivation of trees for commercial use has been encouraged. For this, however, a large number of healthy saplings are required. Propagation by seeds and suckers has their own limitations. Under such situations micropropagation can play a vital role. Thus, attempt was made to standardize the conditions for micropropagation of *Gmelina arborea* Roxb. It is a source of timber and has high commercial value. Regeneration of multiple shoots via shoot tip explant was achieved on MS medium supplemented with different combinations of BAP, NAA and Kinetin. Maximum number of shoots was obtained when medium was fortified with 1.5 mg/l BAP alone. The regenerated shoots were separated and placed on the rooting medium augmented with different concentrations of IBA. Within 10 days, 76% rooting was achieved. Rooted shoots were acclimatized and established under natural condition.

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## **72. CALLUS INDUCTION IN *LYCOPERSICON ESCULENTUM* VAR. *PUSARUBI* L.**

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**Keywords:** *Lycopersicon esculentum* var. *pusarubi* L., MS medium, callus induction.

During the last two decades plant cell, tissue and organ culture have developed rapidly and become a major biotechnological tool in agriculture, horticulture, forestry and industry. *Lycopersicon esculentum* var. *pusarubi* L., commonly called as tomato is a major vegetable crop that has achieved tremendous popularity over the last century. Development of protocols for *in vitro* selection can provide new advances in the production of stress tolerant cultivars also. In the present study, techniques have been optimized for the production of haploids and somatic hybrids. Attempts have also been made to transfer the higher regenerate ability of wild varieties to cultivated tomatoes. However, the present paper deals with callus induction in *L. esculentum* var. *pusarubi* L.

Presoaking of *L. esculentum* var. *pusarubi* L seeds in water before surface sterilization causes cent percent germination of seeds. MS medium supplemented with 0.50 mg/l of NAA and 3 mg/l of BAP was found to be effective for callus induction in this plant through hypocotyls, cotyledons, and radicles. Brownish green slow growing friable callus was obtained after 16 to 20 days of inoculation. Suspension culture which was supplemented with 0.50mg/l of NAA and 3mg/l of Kinetin got 100% success in the callus induction.

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## **73. THE DIGITAL DOCUMENTATION OF POLLEN DIVERSITY OF SOME DICOT PLANTS OF NAGPUR DISTRICT**

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**Key words:** Palynology, Pollen grain, Digital documentation.

Palynology deals with morphology of pollen grains that is structure of pollen grains. This also helps a vital role in establishing systematic position of plants in taxonomy. Being an interdisciplinary science, it has diverse range of applications like aerobiology, allergy study, melissopalynology, forensic palynology and implication of pollen biology for improvement of crop production. Electronic pollen documentation is defined as “Virtual images of pollen grains in digital format. This is usually done by taking microphotography of pollen grains under microscope with help of digital camera. According to the Flora of Nagpur district the total members of dicot includes 150 families, 528 genera and 841 species. In the present investigation the pollen grain morphology of 32 families, 50 genera have been studied with the help of light microscope. The Digital documentation is based on Number, Position and Character Classification of pollen grains including 29 characters. The pollen grains of the species studied show diversity in structure such as Trizonocolporate, Spiraperturate, polypantoporate, tricolporate, pantoporate and polyads etc. Pollen grains have distinct morphology, that helps to isolate families, genera as well as species. Uniform morphology also indicates monophyly and developmental similarities of the groups.

#### **74. EFFECT OF DIFFERENT MEDIA ON THE GROWTH OF SOME ENTOMOPATHOGENIC FUNGI**

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**Keywords:** - Entomopathogenic fungi, Culture media, Sporulation.

Culture media like Malt extract agar media, Soil extract agar media, Czapek Dox agar media and Sabouraud's glucose agar media are used for the growth of Entomopathogenic fungi i.e *Beauveria bassiana*, *Lecanicillium lecanii*, and *Nomuraea rileyi*. Point inoculation method for culturing of fungi on Petri plates and the method of measuring of fungal growth is carried out to determine the increase in linear dimension on a solidified medium. The radial mycelial growth was measured with the help of measuring scale (cm).

The overall observation and on the basis of growth of fungi, it is concluded that the Entomopathogenic fungi are showing more growth on Malt extract agar media as compared to Sabouraud's glucose agar media. The sporulation was comparatively less in Czapek Dox agar media and Soil extract agar media.

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## 75. *EX SITU* CONSERVATION OF SOME ORCHIDS

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**Keywords:** *Ex- Situ* Conservation, Artificial Pollination, Tissue Culture

In present Investigation, six epiphytic and two terrestrial orchids were selected for the study. The orchids were procured from Nagpur District and adjoining areas. The terrestrial orchids were planted in the earthen pots and coconut husk was used for epiphytic orchids. They were kept in shade house and necessary microhabitat was provided. Artificial Pollination was done in all the eight species for fruit setting. Rate of success for artificial pollination was calculated by counting the number of flowers pollinated and fruit setting and comparing them with the plants growing in the nature which are pollinated by natural pollinators. Tissue culture technique was also used to raise the seedlings and callus. M.S. media supplemented with necessary growth hormones was used for this study. The raised plantlets were hardened in growth chamber / poly- house and survival rate was calculated.

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## 76. SEED GERMINATION IN *MALACHRA CAPITATA*

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**Key Words:** Dormancy, *Malachra capitata*, Scarification, Seed germination,

*Malachra capitata* L. (Malvaceae) is a common weed on the waste lands of Nagpur after the rainy season. It is herbaceous taxon which has a distribution frequency of 90-100% along with the other weeds *Cassia* sp., *Alternanthera*, *Euphorbia*, *Justicia*, *Ipomea*, *Oxalis*, *Parthenium* etc. It is annual, yellow flowers in dense heads with foliaceous involucre bracts. It flowers from September - January and fruits from Oct. - Jan. Seeds are smooth, brown-black. The plant is used as emollient and pectoral. It is popular cough remedy in Mauritius.

Seed germination has been studied under the different ecological factors like light, temperature and pH. In nature the seeds do not germinate even during the untimely rains in December or January. It has dormancy of about 10-12 months. This was critically studied by using different methods to break the dormancy with conc. H<sub>2</sub>SO<sub>4</sub> and KOH. The seeds were collected from the plants growing in natural habitats after the fruits were completely ripe. The seeds were dried under shade and then stored in air tight bottles. These seeds were subsequently used for germination studies using filter paper technique. One control and three replicates were used for each factor. The effect of red, blue and yellow light was studied for germination. The control showed 52% of germination. The germination per cent was 21% in red light, 28% in blue light and 27% in yellow light, respectively, which were lower than control. Low temperature treatment (5°C) showed 28% germination and high temp. (45°C) showed 6%. In the acidic media i.e. pH 5, the percentage of germination was 43%. As the seeds are dormant, chemical scarification was done using KOH solution for various durations (up to 24 hrs.) and it was observed that 35 min. of treatment gives 90% germination. Similarly, effect of conc. H<sub>2</sub>SO<sub>4</sub> was also observed where in, 40 min. of treatment gives 100% germination. Thus, it can be concluded that chemical scarification of H<sub>2</sub>SO<sub>4</sub> is best for increasing the percentage of germination.

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## **77. CONCENTRATIONS OF AIRBORNE *ALTERNARIA* AND *CLADOSPORIUM* SPORES IN RELATION WITH METEOROLOGICAL CONDITIONS AT NAGPUR CITY (M.S.), INDIA**

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**Key words:** - allergenic, *Alternaria*, *Cladosporium*, meteorological parameters.

Monitoring of air borne allergenic *Alternaria* and *Cladosporium* spores was done by rotorod air sampler from Nagpur during February 2006 to January 2008. The daily, monthly and annual variations in spores of *Alternaria* and *Cladosporium* in air were observed. During this period a total of 1, 13, 170 spores/m<sup>3</sup> belonging to *Alternaria* and *Cladosporium* genera were recorded. Of these 54,585 spores/m<sup>3</sup> were identified during February 2006 to January 2007 and 58,635 spores/m<sup>3</sup> in February 2007 to January 2008. *Cladosporium* contributed 63.73% while *Alternaria* accounted 36.27% to the total mycoflora observed. The occurrence of these fungal spores was correlated with the meteorological parameters like rainfall, temperature and relative humidity.

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**78. EFFECT OF MUTAGEN ON POLLEN FERTILITY AND SEED GERMINATION IN HORSE GRAM [MACROTYLOMA UNIFLORUM (LAM) VERDCOURT]**

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**Key words:** EMS, SA, NMU, seed yield, germination, lethality, pollen sterility, Horse gram.

Seeds of Horse gram were treated with various doses of EMS (0.1, 0.2 and 0.3%), SA (0.05, 0.1, 0.15%) and NMU (0.4, 0.6, 0.8%). The germination percentage, lethality percentage (15<sup>th</sup> and 30<sup>th</sup> days after sowing and at flowering) and pollen sterility were recorded for M<sub>1</sub> generation. The results indicated that reduction in seed germination percent as well as dry/fresh weight ratio was co-related with the increase in the concentration of the mutagen. It was also observed that increase in sterility percent with increase of mutagens concentration. In general, greater shift in mean and variance was observed in treatments at higher doses of mutagen. Mean values of traits increased significantly over the control and genetic parameters were recorded higher for the mutants isolated in M<sub>1</sub> generation. High values of heritability and genetic advance for the mutants indicate that further improvement could be made in next generations.

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## 79. *IN VITRO* MICROPROPAGATION OF BANANA

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**Key Words:** Micropropagation, plantlet, *Musa paradisiaca*, shoots.

Micropropagation is a technique of producing a large number of genetically identical plants by culturing plant cells, tissue or organs in an artificial nutrient medium, under germ-free or aseptic conditions. So it plays a vital role in conservation of banana germplasm by producing multiple copies of a plant in short time and limited space. The present study deals with micropropagation of banana (*Musa paradisiaca* cv. *Mahalaxmi* and *Srimanti*) which was brought out by using **BAP** and **NAA** (3.0+2.0 mg/l) in 21 days. The highest percent of explants forming shoots was 95 % and maximum number of shoots per explants were 5 to 6. By using this technique we developed disease free plantlets of banana in a large number of plants. These new products launched in the market are expected to contribute increase in the production of banana in an environmentally friendly way. Therefore the quality of the products and their availability to farmers will depend on both the improvement strategy and the progress made on genetics and genomics.

## 80. EFFECT OF ALGAL EXTRACT ON THE GERMINATION AND SEEDLING GROWTH OF RICE SEEDS

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**Keywords:** Paddy fields, Uni-algal culture, Algal Extract, *Nostoc communa*

Soil Fertility is diminishing gradually due to soil erosion, loss of nutrients, accumulation of salts, toxic elements, water logging and unbalanced nutrient compensation. Farming regions that advocate heavy chemical applications responsible for adverse environmental, agricultural and health consequences. Objectives of this work were to study the effect of algae, as soil additives and to determine the importance of biofertilizer application in order to improve the yield quality, productivity and environmental pollution.

*Nostoc communae* Vaucher ex Born et. Flah. commonly occur in most of the paddy fields of Vidarbha region. So far, the higher frequency of occurrence of this algae in the paddy fields tempted author to evaluate the effect of its extract on the germination and seedling growth of Ratna variety of Rice grown in this region.

The alga was collected in large quantities and scattered in several Petri dishes along with water. The uni-algal culture was obtained in Allen and Arnon Media (1995). This alga was used for making the algal extract of different concentrations. The seeds of Ratna variety of Rice were obtained from State Seed Testing Laboratory, Agriculture Department, Nagpur. On the basis of experiments conducted, it was concluded that *N. communae* gives a promoting effect on germination, as well as seedling growth of Ratna rice seeds. Thirty hours duration with 50-75% concentrated algal extract causes maximum beneficial effect in germination whereas 100% concentrated algal extract with 24 hours treatment gave the most enhanced growth of seedling.

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## **81. STUDY OF DEHYDRIN GENE IN PULSES**

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Drought is defined as a period without significant rainfall. Generally drought stress occurs when the available water in the soil is reduced and atmospheric condition cause continuous loss of water by transpiration or evaporation. Drought stress tolerance is seen in almost all plants but its extent varies from species to species. Water deficit is the global issues to ensure survival of agricultural crops and sustainable food production.

Dehydrins are the members of multigene family. Dehydrin are drought tolerant genes which are induced in plants when they are exposed to water deficit condition. Dehydrin can be present in the nucleus or cytoplasm and act as stabilizers of membranes or proteins under water stress condition.

In Vidarbha region water deficit condition is mostly seen. Pulses are mostly grown in this region so the presence of dehydrin genes can be expected in pulses. Members of pulses used in present study are *Vigna mungo*, *Glycine max*, *Cajanus cajan* and *Cicer arietinum*.

To check the presence of Dehydrin gene, total genomic DNA and total RNA was isolated and cDNA synthesis was done. Genomic DNA and cDNA were amplified with Dehydrin gene primer. Amplification was observed in *Vigna mungo*, *Glycine max*, *Cajanus cajan* and *Cicer arietinum*.

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## **82. STUDY OF CYANOBACTERIAL DIVERSITY IN DIFFERENT ECOLOGICAL NICHES USING MOLECULAR TECHNIQUES**

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Cyanobacteria are morphologically and developmentally one of the diverse group of prokaryotes. The Blue Green Algae i.e. Cyanobacteria are the simplest of the algae. Their diversity ranges from unicellular to multicellular, coccoid to branched filamentous forms, nearly colourless to intensely pigmented. Diversity is the parameter that one expects to determine ecological important properties of ecosystem s. It has a central ever growing role in ecological theory.

To study the Cyanobacterial diversity of different ecological niches, culture dependent and independent techniques are used.

In this present investigation, samples were collected from different ecological niches (from soil and water). Cyanobacteria were isolated and grown on BG 11 medium and identified microscopically. Genomic DNA was extracted from these Cyanobacterial isolates and was amplified using random primers

OPC 11, OPC 12, OPC 13, OPC 15, STRR1A, STRRmod and HipTG. Further DNA of these isolates was also amplified by using 16S rRNA gene specific primers for Cyanobacteria. The 16S rRNA gene amplicons obtained was sequenced.

On the basis of BLAST study of the sequences obtained, two of the isolates were identified as *Leptolyngbya* and *Oscillatoria*. The present work shows that the 16S rRNA gene study using Polymerase Chain Reaction technique and sequencing provides useful information for the study of different Cyanobacteria in diverse ecologies of Nagpur city.

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### **83. STUDY OF DEFENSIN GENE IN FABACEAE**

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Defensins are small, cysteine rich, basic, antifungal proteins found in vertebrates, invertebrates as well as in plants. Plants are continuously exposed to a wide variety of pathogens throughout their lifespan. They employ an innate immune system against such pathogens which depends upon the production of antimicrobial peptides like defensins. In plants, defensins are widely distributed and are encoded by small multigene families.

Study of plant defensin was done to check its presence in five members of Fabaceae namely *Vigna mungo*, *Glycine max*, *Trigonella foenum-graecum*, *Cajanus cajan* and *Cicer arietinum*. Total genomic DNA as well as the cDNA was isolated from the young seedlings and subjected to PCR analysis by using *Tfgd2* (defensin) gene specific primer from *Trigonella foenum-graecum*. The results showed amplified band in *Trigonella foenum-graecum* DNA.

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## **84. IN-SILICO POLLEN ALLERGY ASSESSMENT OF CALCIUM-BINDING ALLERGEN BET V 1 PROTEIN FROM *BETULA VERRUCOSA***

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**Key Words:** Pollen allergy, pollen protein, antigenicity, allergenicity, *Betula verrucosa*.

Common incidence of the allergic diseases such as sneezing, a runny nose, itchy eyes and ears, sore throat, bronchial asthma, allergic rhinitis and atopic dermatitis may be due to pollen grains present in the surrounding environment. Pollen grains on their exterior coat carry thirty to forty different proteins involved in compatibility/ incompatibility. Although the pollen proteins are having crucial role in the process of plant reproduction, some of these proteins have allergic role when they become in contact with human body causing some allergic ailments or hay fever. Therefore during the present investigations calcium-binding Bet v 3 protein from *Betula verrucosa* (White birch) was screened *in-silico* for its allergic and antigenic characters. The calcium-binding Bet v 3 protein contains five antigenic epitopes out of that 174-EKMIVSV-180 shows highest antigenic propensity. It shows 1.0263 average antigenic propensity containing 57.0732% hydrophilic amino acids and 42.9268% hydrophobic amino acids. The total linear charge density of the protein is 0.331707 and solubility of protein is 1.92211. The secondary alignment of calcium-binding Bet v 3 protein shows different percentage of alpha helix, beta sheets and coils. Antigenic motif map also shows antigenic motifs having functional relationship with MHC-I and B-cell membrane. *In-silico* predicted results are in support to elicit the allergenicity and antigenicity of calcium-binding Bet v 3 protein.

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## **85. ANALYSIS AND EVOLUTION OF GENE SILENCING SUPPRESSOR PROTEIN OF MAIZE NECROSIS STREAK VIRUS: A BIOINFORMATICS APPROACH**

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**Keywords:** si rna, maize necrosis streak virus, phylogenetic studies, gene silencing, NCBI, Ramchandran plot.

Gene silencing is a conserved biological response mediated by short interference RNA (si RNA) that regulates gene expression and is evolved in plants as a defense against viral infections. Many viruses encode protein that inhibits silencing machinery. P19 core protein of maize necrosis streak virus (mnsv) suppresses gene silencing hence its study at molecular level is important in analysis of gene silencing. Present study includes bioinformatics approach for analysis of putative p19 core protein. The sequence of p19 protein was retrieved from NCBI, analyzed its physicochemical properties were studied. The three dimensional structure of this protein was modeled using pdb id:1r94 as template. Model was evaluated by pro-check. Its domains, secondary structure and active sites are predicted. Further evolutionary relationship was studied by constructing Phylogenetic tree. Results show that p19 core protein belongs to p19 super family. Ramchandran plot statistics of modeled structure shows 80% of residues in most favored regions. Phylogenetic studies revealed that this protein is closely related to gene silencing suppressor protein of tomato bushy stunt virus, carnation Italian ring spot virus, Lettuce necrotic stunt virus.

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## **86. Molecular evaluation of Heat Shock Protein in response to temperature and salinity in *Vigna Mungo*(L).Hepper**

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**Key Words:** Heat Shock Protein (HSPs), temperature, salinity, LD-50, PAGE, etc.

The present study is carried out to evaluate various Heat Shock Protein produced by the plant during temperature and salinity stress as the plant can experience a wide fluctuation of temperature on a daily or seasonal basis. In the given study, the three day old seedling of *Vigna mungo* (L).Hepper. (Cultivar-AKU 15) are treated with various concentration of NaCl and LD-50 is recorded for the seeds presoaked in water for 12 hours and for dry seeds. The four different

doses selected for final treatment for presoaked seeds viz-0.4%, 0.8%, 1.2%, and 1.6% and that for dry seeds was 0.2%, 0.4%, 0.6%, and 0.8%, respectively. The seeds were treated for 6 hours in the given concentration of NaCl then sown in germination tray and maintained at 25<sup>0</sup>C. The three day old seedling then suspended to temperature stress at three different temperature viz- 35<sup>0</sup>C, 40<sup>0</sup>C, and 45<sup>0</sup>C for 3 hours in growth chamber. The seedlings then crushed in mortal and pestle and proteins are isolated by centrifugation at 10000 rpm for 10 min. The separation of heat shock protein is carried out on polyacrylamide gel electrophoresis and bands were evaluated on Ultra UV-tech gel documentation system for molecular weight of protein.

### **87. 16S RRNA GENE ANALYSIS OF *PSEUDOMONAS AERUGINOSA* VARIANTS ISOLATED FROM GODAVARI RIVER, NASIK, INDIA**

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Godavari River is the second largest river in India which originates from Western Ghats at Trimbakeshwar, Nasik and flows east through Andhra Pradesh into Bay of Bengal. Human interference considerably affects the microbial composition of river. Runoff water from the agricultural fields, sewage and industrial effluents contribute to the contamination of the river. *Pseudomonas* being ubiquitous organism is generally found in these contaminated water bodies. 16S rRNA gene diversity by using PCR based primer has been used to study these bacteria isolated from river.

Water and river bed soil samples from Nasik were used for isolation of *Pseudomonas aeruginosa* on Pseudomonas Isolation Agar. Genomic DNA was isolated from these pure cultures and PCR was done using Eubacterial 16S rRNA gene primer. The amplicons obtained were sequenced (Bangalore GeNei, India) and analyzed through BLAST and Multiple Sequence Alignment (MSA) by using CLC Sequence Viewer 5.1.2 and a dendrogram was prepared.

*Pseudomonas aeruginosa* variants obtained in our work can be broadly classified into four clusters. Cluster one includes six isolates showing affinity to GenBank records belonging to TJ 1, BSD 40 and MTO1A\_E12 strains. Cluster two includes 2 isolates showing maximum identity with GenBank records BHP7-6 and BSD 40 strains. Cluster three includes four isolates matching with AU2704A, AU1971B and ME 4. Cluster four having only one isolate is uniquely isolated showing maximum identity with ME 4.

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## 88. POLLINATION ECOLOGY OF *SESAMUM INDICUM* L.

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**Keywords-** Arvi, *sesamum indicum*, phenology, pollinators.

The investigations were carried out on the flowering phenology and floral biology, flower dynamics, pollen production, pollen viability, pollen: ovule ratio, stigma receptivity, nectar production, flower visitors dynamics and behaviour censuses and activity, pollen load carried out by foragers and role of insect pollination in increasing fruit set and seed yield in *Sesamum indicum*. The plants cultivated around Arvi Tahasil, Dist. Wardha (M.S.) were selected for studies. In *S. indicum* blooming starts from the second week of August and peak period was during last week of August to first week October. Flower is pinkish-purple, corolla pubescent outside. Anthesis timing was from 06.30 to 08.30 hrs. The anther dehiscence was observed between 07.30 to 08.00 hrs. The pollen production was  $3838.23 \pm 663.84$  pollen grains per flower. Percentage of pollen viability in T.T.C. was found to be 96.93%. *In vivo* pollen germination was found to be 12.98%, 30.41% and 46.17 of the first, second and third day, respectively. *In vitro* pollen germination was found to be 83.24, 88.64, 59.39, 43.35 and 34.07% in 10, 20, 30, 40 and 50% sucrose solution, respectively. Pollen : ovule ratio was 83.44. The stigma becomes receptive during the flower opening at about 09.30 to 08.30 hrs. Nectar

production was observed on the day of flower opening. Nectar quantity was found to be  $0.47 \pm 0.01 \mu\text{L}$ ,  $0.76 \pm 0.1 \mu\text{L}$  and  $0.10 \pm 0.01 \mu\text{L}$  at two hours interval from 09.00 hrs onwards. The dominant visitors were *A. florea*, *A. dorsata*, large black bee, small black bee, *Xylocopa* spp. and flying bee. The occasional visitors were moths, beetles and thrips. Pollen load carried by *A. dorsata*, flying bee and *Xylocopa* was found to be 35640, 25126 and 73923 pollen grains, respectively. Experimental pollination showed increase in number and weight of seed during open and bee pollination against the self-pollination. Yield was higher during bee-pollination than self and open- pollination.

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## **89. A REMOTE SENSING AND GIS APPROACH FOR CONSERVATION AND MANAGEMENT OF LOKTAK LAKE**

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**Key words:** Loktak, diversity, phumdis, Remote sensing, GIS, satellite data, structural components, management planning

Loktak Lake situated at the southern part of Manipur valley lying longitudes  $93^{\circ} 46'$  &  $93^{\circ} 55'$  E and latitudes  $24^{\circ} 25'$  &  $24^{\circ} 42'$  N is a shallow wetland, with varying depths of 0.5 m to 1.5 m. Though declared as a Ramsar Site in 1990, the lake is under Montreax record and one of the vulnerable wetlands among the 25 Ramsar sites of India. Loktak hydro electric project which was commissioned in the year 1983 aimed to regulate the water of the Loktak Lake by construction of Ithai Barrage. However, the construction of barrage is a controversial issue as it has altered the natural hydrological regime of the lake and caused phumdis afloat over the waters which are one of the characteristic features of the lake. Phumdis are heterogeneous mass of soil, vegetation and organic debris at various stages of decomposition that occur in all sizes with varying thickness.

A number of grasses, sedges and other plants grow over phumdis with high but varying diversity values at different sites. Using remote sensing and GIS technology, various data have been generated pertaining to different years like 1977 (before commencement of Ithai Barrage), 1990, 1995, 2000, and 2005. This gives a very vivid data on the changes taking place in this

important lake and also its catchment. The distribution of phumdis has been studied using multi-temporal satellite data from 1995 to 2005 along with other structural components.

For the long-term conservation of lake, mapping of it and creating a database is mandatory as in any management planning spatial data and information are necessary prerequisites. The paper discusses some of these aspects in the light of the changes occurring in various structural components of Loktak lake.

## 90. POLLEN PRODUCTION IN SOME MEDICINAL PLANTS

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Plant produces pollens, which leads to production of male gametophyte and male gametes. More number of pollen grains increases the chances of fertilization and seed formation. The process is also affected by mode of pollination and pollen morphology. In present investigation average no. of pollen grains produced per flower are calculated by (I) Simple method and (II) By homoecytometer method, with their Bio-statistical analysis.

Observation shows that pollen production in *Brassica compestris* is by simple method (6140) and by homoecytometer (7030); in *Ricinus communis* by simple method (138240) and by homoecytometer (130811); in *Azadirchta indica* by simple method (2100 ) and by homoecytometer (2431); in *Pongamia pinnata* by simple method (7840) and by homoecytometer (7402); in *Lawsonia inermis* by simple method (17672) and by homoecytometer (16480); in *Catharanthus roseus* by simple method (23796) and by homoecytometer (25480) and in *Momordica charatia* by simple method (178666) and by homoecytometer (36665).

Results and conclusion confirms positive co- relationship among these factors.

## 91. GERMPLASM CONSERVATION OF *PIPER NIGRUM*

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*Piper nigrum* is most important cultivated spices due to its economic value and medicinal importance. It is also known as “King of Spices”. *P. nigrum* is reputed in the local system of medicine of India. Tissue culture of *P. nigrum* can play a vital role in germplasm conservation, enhanced multiplication and genetic engineering for feasible production of bioactive compound. Liquid culture is yet to be established and reserves corner for industrial production of these active compounds.

## **92. INFLUENCE OF HERBICIDES ON NUCLEIC ACID AND PROTEIN SYNTHESIS OF WEED *PSORALEA CORYLIFOLIA* L.**

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**Key words:** Herbicides, weed *Psoralea corylifolia*, DNA, RNA, Protein

The experiments were conducted to study the effect of herbicides 2,4-D, gramoxone and glyphosate on macromolecular synthesis i.e. DNA, RNA and protein content of treated seeds of *Psoralea corylifolia* growing in wild and cultivated fields of vidarbha region of Maharashtra state. Six days old seedlings were analyzed for DNA, RNA and protein content. As the concentration of herbicides increased the percentage of DNA, RNA and protein content gradually decreased. The content of DNA, RNA and protein contents of control seedlings were  $7.20 \times 10^{-3}$ ,  $9.80 \times 10^{-2}$ , 6.35, respectively.

The content of DNA decreased from  $6.96 \times 10^{-3}$  to  $4.02 \times 10^{-3}$  pg at 100 to 1000 ppm of 2,4-D, respectively. In gramoxone percentage of DNA was decreased from  $5.72 \times 10^{-3}$  to  $5.06 \times 10^{-3}$  pg at 100 to 600 ppm, respectively. In glyphosate the DNA percentage decreased from  $5.91 \times 10^{-3}$  to  $3.64 \times 10^{-3}$  pg at 100 to 1400 ppm, respectively.

The content of RNA in treated seedling of 2,4-D decreased from  $9.18 \times 10^{-2}$  to  $3.20 \times 10^{-2}$  pg at 100 to 1000 ppm,  $3.48 \times 10^{-2}$  to  $1.06 \times 10^{-2}$  pg at 100 to 600 ppm of gramoxone and  $9.25 \times 10^{-2}$  to  $4.22 \times 10^{-2}$  pg at 100 to 1400 ppm of glyphosate, respectively.

The content of protein gradually decreased after herbicidal treatment. It decreased from 5.24 to 2.32, 3.40 to 1.50, 5.60 to 2.02  $\mu\text{g}$  were noticed at 100 to 1000 ppm of 2,4-D, 100 to 600 ppm of gramoxone and 100 to 1400 ppm of glyphosate, respectively.

### **93. INDIAN SOURCE OF CAMPTOTHECIN *NOTHAPODYTES NIMMONIANA* NEEDS CONSERVATION**

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Camptothecin (CPT), an isoquinoline alkaloid is one of the most promising anticancer drugs of the twenty first century. Its original source was Chinese tree *Camptotheca acuminata*, while later discovered in Indian tree *Nothapodytes nimmoniana*, an Icacinaceae member. According to reports the content of Camptothecin in *C. acuminata* was 0.005% as compared to 0.14-0.24% in *N. nimmoniana*. *N. nimmoniana* is a small tree, naturally distributed in many parts of India like Western Ghats including Maharashtra, Himalayan foothills and some parts of Assam. With no synthetic sources of this alkaloid and with an increasing global demand, there has been a heavy dependence on naturally existing population. Consequently in the last one decade over 20% of the population of the species has been lost from Western Ghats. Due to the extremely high pressure, the species has been declared as endangered. In all there is an urgent need to conserve the species either by developing *in vitro* production systems and there by relieving the pressure on natural population or by other means.

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### **94. SURVEY REPORT ON *LINUM USITATISSIMUM* L.**

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**Keywords:** Linseed, linolenic acid, linoleic acid, lignans, cardiovascular, biodiversity.

Linseed is a cool temperate annual herb. India and Afghanistan are the centres of origin of linseed. Linseed is a dual purpose crop. It is grown for both oil and fibre (flax). Linseed oil is yellowish brown in colour and contains 30-60% linolenic acid, 6-16% stearic acid and palmitic acid each, 13-36% oleic acid, 10-25% linoleic acid and a fraction myristic acid. Flax seed oil is a

rich source of essential fatty acids - it contains alpha linolenic acid, omega 3 essential fatty acid, and omega 6 essential fatty acid, and oil contains these 3 EFA's in just the right proportions. Linseed is also great source of Lignans, Vitamins and minerals. Omega 3 essential fatty acid prevents coronary heart disease, arthritis, cancer, skin problems and improves the response to stress. Linseed oil acts as a buffer for excess stomach acids. It soothes ulcer and irritable bowel disorders. It lubricates and absorbs toxins. It prevents toxic build up in the bowel. Flax seed oil also contains lignans that have anti-viral, anti-bacterial, anti-fungal and anti-cancer properties. Flax seeds have the richest source of lignans, 100 times more than the next best source, wheat bran. Flax seed also contains lecithin which emulsifies fat and cholesterol. These little seeds improve digestion, help stabilize blood glucose levels, fight tumor formation and enhance cardiovascular health. We used this oil since last ten months and we got the same beneficial results.

On the basis of survey we concluded that local linseed variety is disappearing from fields of Vidharba. But it is useful and maintain human health, hence, we have to conserve the local linseed for present and future use. Flax seed oil supplements are very cheap and provide health benefits, so it's definitely worthy the investment.

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## **95. SURVEY REPORT ON *LATHYRUS SATIVUS* L.(LAKHORI) OF NAGPUR AND GONDIA DISTRICT.**

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*Lathyrus sativus* (Lakhori) is one of the important annual pulse crops which is generally used in central India region. It is valued as a nutritious pulse and fodder crop due to its relatively high protein content (28-34% dry weight) which is higher than any other pulses. There are some misunderstandings related to consumption of lakhori, so, it is necessary to give right information to people about its consumption in daily diet. Farmers and general public are really happy about the government decision for removing the ban on sell and storage of Lakhori dal.

The survey on *Lathyrus sativus* was carried out in Nagpur and Gondia district of Vidarbha. The survey was carried out in 30 villages of Nagpur district and 20 villages of Gondia district.

In Nagpur and Gondia district, leaves of plant is used for preparation vegetable (65.43%) and various recipes prepared from dal are 'vada' (88.76%), 'besan' (59.80%), 'bhaje' (27.07%), 'aaran' (36.33%). People (81.74%) of both the districts uses it as 'dal' because the pulse is tastier preparations are more crispy than other pulses. Further peoples use seed coat along with coarse particles as Chunni & dried plants called 'kutar' as an animal fodder.

## 96. CYTOLOGICAL EFFECT OF HOUSEHOLD CHEMICALS ON ROOT TIP OF *ALLIUM CEPA* L.

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**Key words:** Household materials, Chromosome, mitotic index

Cytological effects of the household materials like condiments, oils, detergents, food colours, essence, hair dyes, worship equipment etc were studied on the onion (*Allium cepa* L.). The onion bulbs were dipped in appropriate concentration of the material under study for various durations (3 to 6 days). In some of the solutions like surf excel (1 gm), vanilla essence (2 ml), sunflower oil (2 ml), hair dye mixture (2 ml), harpic (0.2 ml), the roots fail to grow indicating that the mitosis is suppressed by such chemicals. Mitotic index and various chromosome abnormalities were studied. Almost all the household chemicals except Abeer, Shendoor, kum kum, showed reduction in mitotic index. The highest reduction of mitotic index was found in chilli (2gm), harpic 0.1ml, and soybean oil (1 ml) sunflower oil (1 ml). It was found that with increase in concentration and duration, mitosis was suppressed. The cell division is a biological process under normal environment, resultants to daughter cells contain diploid number of chromosomes in mitotic division and depending on temperature and specific time is taken by them. In the present study, household chemicals were subjected to the cell division and it become clear that the most of chemicals have suppressed all the effects on chromosome division. This clearly indicates that the chemicals added to food or used for cosmetic and washing purpose have drastic effect on cellular systems. Most of time, the women associated with these chemicals are likely to be affected. However, the genotoxic effect observed on the Onion chromosome may not be correlated with the effect on human chromosomes as enzymatic systems in these two organisms are different. The overall conclusion of study is that the household chemicals have much effect on the onion cellular systems and one has to be cautious in consumption of food, utilization of cosmetics and excessive use of detergents.

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## 97. CONSERVATION OF AGRO BIODIVERSITY

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Biodiversity is a fundamental basis for agricultural production and food security, as well as a valuable ingredient of environmental conservation. It evaluates a range of impacts from unsustainable agriculture.

Agro biodiversity is a subset of general biodiversity. It provides not only food and income but also raw materials for clothing, shelter, medicines and breeding new varieties and performs other services such as maintenance of soil fertility and biota, soil and water conservation, all of which are essential to human survival.

It includes all forms of life directly relevant to agriculture. Most attention is given to crop varieties which include modern and traditional varieties and to crop wild relatives. Food security and biodiversity is conserved by the community Gene-seed-Grain continuum consisting of gene bank, seed bank and grain bank.

Agro biodiversity is a rich repository of many economically useful genes. The economic content of biodiversity and public good value is deeply interlinked with lifestyles, cultural value systems and associated traditional knowledge of the people. The conservation strategies are not restricted to the local community but find an echo at the policy level.

The Biodiversity Act, 2002 establishes sovereign right over its biological resources, seeks to promote its conservation, sustainable use and entitlement for equal sharing of benefits from commercialization of biodiversity. The role of biodiversity in biotechnology in guiding responsible research in biological sciences is assuming increasing importance.

## 98. OBSERVATIONS ON IMPORTANT MICROSCOPIC CHARACTERS FOR AUTHENTICATION OF ETHNO-MEDICINAL PLANT *CLITORIA TURNATEA* LINN.

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**Key Words:** *Clitoria*, Trichomes, Resin, Tonic.

*Clitoria turnatea* Linn. belonging to family Fabaceae is widely distributed throughout India. The entire plant is medicinally important. It is astringent, hot, aphrodisiac, rejuvenating and a nervine tonic. It improves strength, digestive power, complexion, voice and cures intestinal worms, animal poisoning, skin diseases, cough, dyspnoea, diabetes, dysuria and uterine disorder.

The genus, *Clitoria turnatea* Linn. is characterized by few trichomes present on stem, rachis and leaf. They are two celled, unbranched, conical, much longer than broad and pointed at apex. Root shows the presence of starch in xylem parenchyma cells of vascular bundles. Root bark contains starch, tannins and resins. The pith cells of stem are infested with calcium oxalate crystals. In addition to this, pith region of stem contain starch and mucilage. Rachis shows the presence of conjoint, collateral vascular bundles arranged in a lower semicircle. In midrib region of leaf also has large curved vascular bundle. Leaf is amphistomatic with anomocytic stomata.

These microscopic characters are useful in identification and detecting adulteration of drug.

## **99. FORMULATION AND EVALUATION OF RICE BRAN WAX AS A TOPICAL EXCEPIENT**

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**Key words** – Excepients, Rice bran

Pharmaceutical topical dosage forms such as ointments and creams are one of the favorite dosage forms for global pharmaceutical scientists. These dosage forms that are growing at 114 % annually and it is fourth favorite dosage form, besides tablets/ capsules, liquid orals and injectables, which are first three. The topical formulation market of India is estimated around Rs.

680 crores. Some Indian pharmaceuticals (Dr. Reddy's Lab., Glenmark Pharmaceuticals and Ranbaxy Pharmaceuticals) are actively working on these formulations.

Most of these topical dosage forms contain waxes and oils as major ingredients. Although waxes are abundant in nature, a limited numbers are commercially used. During the past few decades a number of non conventional vegetable oils have been accepted as good quality edible oils in India and in other countries. Rice bran oil is one of them. It is obtained as the by-product in rice milling. It contains around 15 – 20% of oil, is now gaining importance in India due to its nutritional value and presence of vitamin E, an antioxidant. It also has an antifertility activity.

Crude rice bran wax is dark brown in color and has its own typical physical and chemical composition. The literature survey reveals that it has been used in cosmetics and toiletries. It is also utilized as an ingredient for coating candy and chewing gums. But its utilization in pharmaceuticals is meager and there are no reports in spite of its large production. Therefore, utilization of rice bran wax in pharmaceuticals is worth investigating. Hence, it is worthwhile to discuss the availability and utilization of rice bran wax in pharmaceutical industries.

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## **100. UTILIZATION PATTERN OF NTFPs BY THE LOCAL TRIBES OF GOREGAON CLUSTER, GONDIA DISTRICT.**

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**Keywords:** NTFPs, Utilization Pattern, Gondia.

The study was focused in Goregaon Cluster of the Gondia district, Maharashtra state. The major forest types in the district are moist deciduous and dry deciduous/scrub forms. The main focus of this case study was to reveal utilization pattern and economic importance of Non Timber Forest Produces (NTFPs). NTFP plays an important role in enhancing the livelihood of the forest dependent tribal communities of Gondia district. However, the people are unaware

about the potential of NTFPs for income generation because they lack access to information on its value addition. The indigenous people totally depend upon natural resource. They need NTFPs in day to day life and use them as vegetable, fruits, medicine etc.

The present paper tries to relate the usage of minor forest produces and its reflection on richness and diversity of the ecosystem. With above objects in mind, this paper brings out the role of community forest management and its impact on vegetation and sustainable development of aboriginals based on successive field work from three villages, Asalpani, Timezari (Gondi) and Bagadbandh of Gondia district of Maharashtra, India. An attempt has been made to develop a model for sustainable development and management of minor forest producing species for upliftment of locals.

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## **101. *RICINUS COMMUNIS*-A NATURAL DYE FOR TEXTILES**

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**Key words:** *Ricinus communis*, Extraction, Mordant, Fiber

*Ricinus communis*, a very common plant, is found to be a very good source of natural dye for producing various shades on silk and cotton cloth. Aqueous medium was suitable for extraction of dye from the plant. Alum, Chrome, Copper sulphate, Ferrous Sulphate with different combinations were used to get different shades of green, brown and yellow. Simultaneous mordant method is useful for good result. Green shade was found in copper sulphate, brown shade was found in combination of ferrous sulphate and sodium hydroxide and yellow shade was seen in salty medium on Silk fiber, whereas brown and green shades was observed on cotton fibers. Excellent fastness to sunlight was found in all mordant combination. Colour change was not found in all samples subjected to dry and wet crocking. This dye can be effectively used to dye silk and cotton fabrics and the technology was found to be economically viable.

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## **102. HEAVY METAL TOXICITY: EFFECT ON PLANT GROWTH AND METAL UPTAKE BY SPINACH**

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**Keywords:** Heavy metals, heavy metal uptake, phytotoxicity, spinach.

A laboratory study was conducted to investigate the toxic effects of certain heavy metals on growth and yield of spinach (*Spinacia oleracea*). The results reveal a significant reduction in both the parameters due to the influence of heavy metals. Cd was found to be the most toxic metal followed by Cu, Zn, Pb and CO, respectively. Metal uptake by plant was directly related to the application of heavy metals. Higher concentration of metals found in cases where metals were added individually rather than in combinations. The uptake of Zn is the highest in single as well as in combination of metals on vegetables. In the present study, the uptake of metals was higher in individual rather than in combinations of metals by vegetables.

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## **103. PLANT SECONDARY METABOLITES FOR GRAIN PROTECTION FROM A STORED GRAIN PEST *CALLOSOBRUCHUS CHINENSIS* (L)**

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**Keywords:** Pulse beetle, *Callosobruchus chinensis*, grain legumes, plants, secondary metabolites.

The adzuki bean weevil, *Callosobruchus chinensis* (L.) is the most widespread and destructive primary insect pest of stored grain legumes, prevalent in India. Control of pests and minimization of pest-associated losses are general practices. The synthetic pesticides have been found to have hazardous effects on human health, non-target organisms and environment. And sometimes these pests develop resistance to pesticides. Hence, it was thought to use secondary

metabolites from plants which are very good alternatives and rich storehouse of many bioactive chemicals.

The secondary metabolites are extracted, isolated and characterized from locally available plants, *Annona squamosa*, *Calotropis procera* and *Acorus calamus* and investigated their efficacy to control pulse beetle, *C. chinensis*. The biochemical trials of these metabolites on beetle suggested that they can affect various enzymes needed for survival, growth and development of *C. chinensis*. The end user formulation and strategy for post harvest grain protection was successfully tried using the plant secondary metabolites. Efficacy trials of the formulation, carried out on mung beans, for a year showed no adverse effect on nutritional parameters and germination of grains compared to control. As the plant secondary metabolites are able to provide dual effect by controlling insect as well as microbial pests during storage, their application can be a useful and sustainable strategy for the protection of stored grains from pests.

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#### **104. INFLUENCE OF BIOFERTILIZERS ON GROWTH, YIELD AND QUALITY OF COTTON.**

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An experiment was conducted to study the influence of *Azotobacter chroococcum* (AZT) and Phosphate solubilizing Bacteria (PSB) on the vegetative growth, reproductive growth, yield and quality of seed-cotton of Cotton variety Ankur Jai-Bt during the Kharif season of 2007. Experiment includes six treatments of biofertilizer inoculums and chemical fertilizers (NPK) alone and in different combinations, which are 100% RDF of NPK (125+75+25 kg/h); AZT+PSB+50% RDF; AZT+50% RDF; AZT+PSB; AZT and control. Maximum number of balls picked per plant (71.333) and highest yield of seed-cotton (19.573 Q/h) was recorded with application of AZT+PSB+50% RDF of NPK. Whereas maximum height of plant (120.48cm), maximum length of root (39.65 cm), maximum number of functional leaves (165.6), average dry

matter accumulation (146.067 g), maximum weight of seed-cotton per ball picked (3.742 g) and highest lint index (4.8g) was observed with the application of 100% RDF of NPK. Highest ginning % (35.4) of cotton fiber was recorded in the controlled treatment.

## **105. EFFECT OF EXPOSURE TO HIGHER CONCENTRATION OF COPPER ON *RHIZOBIUM JAPONICUM* WITH RESPECT TO ITS EFFICIENCY AS BIOFERTILIZER**

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Heavy metal pollution in agricultural land is well known today. Cadmium, copper, zinc etc through various sources became a part of it. Microorganisms need large number of metals in trace quantities. Some of these metals are essential for well functioning of various enzymes and co-enzymes in the cell. Each of these metals has one or more specific functions and growth is determined by presence of optimum concentration which permits the maximum growth and other metabolic activities can be assigned as optimum concentration of particular metal for particular microorganism. Although organism can be grow in the environment containing lower or higher concentration of the metal but that may affect its growth, reproduction or efficiency. Tolerance of these microorganisms may be increased to certain higher level by repetitive exposure to slight higher concentration several times.

In the present study, tolerance limit of biofertilizer, *Rhizobium japonicum* is increased from 0.07 mgL<sup>-1</sup> to 0.38 mgL<sup>-1</sup> after 40 serial sub-culturing to slight higher concentrations. The efficiency of these new tolerant species of *R. japonicum* is analyzed by plate count method and tested for nodulation.

It can be concluded from these experiments, *R. japonicum* is capable to tolerate higher concentrations of heavy metal such as copper but it affected the growth and efficiency of organism to fix nitrogen.

## **106. INFLUENCE OF BENEZENE EXTRACT OF PIPER BETEL ON DELAYED SMALL INTESTINAL TRANSIT BY CHLORPROMAZINE INVOLVING CALCIUM INNERVATIONS IN MICE**

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**Key words:** *Piper betel*, Intestinal transit, Chlorpromazine, Calcium channel.

*Piper Betel* popularly known as ‘Pan’ in India belongs to family Piperaceae. Medicinally it has stimulant, antiseptic, sialogogue activity. It is reported that calcium is involved in the initiation of contraction of smooth muscle. It increases small intestinal motility through L-Type channel. Chlorpromazine blocks the calcium channel on smooth muscle and relaxes by attenuating intestinal motility. The present study was to evaluate the influence of benzene extract of *Piper betel* (BEPB) on small intestinal motility (SIT). The study was also undertaken to evaluate the mechanism involve in SIT. BEPB (800 mg/Kg p.o) administered to 15 hrs fasted Swiss albino mice. 4% charcoal meal was administered (10 ml/kg p.o) 1hr after the drug administration and after 20 min all animals were dissected for determination of SIT. For exploration of calcium channel in gastrointestinal motility chlorpromazine (5mg/kg p. o.) was administer 30 min prior administration of drug respectively. The results of study indicate that BEPB accelerate the intestinal transit in normal mice. At 800 mg/kg dose it was found to accelerate the transit by 89.5% compared to normal mice. Chlorpromazine inhibits GI transit by 28.85% in normal mice. In presence of BEPB, it is able to reverse the effect of chlorpromazine, while the significant effect was observed only at 800 mg/kg BEPB. In presence of BEPB, chlorpromazine could able to produce up to 15.85% inhibitions of SIT which was comparable to standard Metaclopramide (10 mg/kg p.o) indicates BEPB could partly produce acceleration effect through calcium involvement as well as by some other pathway as chlorpromazine could not completely inhibit the acceleratory effect of *Piper betel* on small intestinal transit.

## **107. EFFECT OF DIFFERENT COLORS OF LIGHT ON GROWTH AND DEVELOPMENT OF WHEATGRASS.**

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**Key words:** light colors, growth, development, wheatgrass juice.

In the present investigation, effect of different colors of light on growth and development of wheatgrass were studied. Studies were made by using blue, yellow, orange, red, red-blue and silver light. Plant per cent of germination, height, dry weight, ash value, acid soluble ash, chlorophyll, protein and carbohydrate content were evaluated. The experimental result showed that due to the treatment of blue color per cent of germination, ash value, acid soluble ash and chlorophyll content were increased which are the major components of wheatgrass juice. Height of plant has increased due to orange color treatment. Plant dry weight, protein and carbohydrate content were increased by silver color treatment. The growth and productivity of plant is related to dry weight; more the dry weight excellent the growth and development of plant. On the basis of above observations it is concluded that silver color is best for growth and development of wheat but for the wheatgrass juice blue color is beneficial.

## **108. TO SOME ETHNOMEDICINAL ASPECTS.**

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**Keywords:** Warud Tahsil, Ethno-medicinal aspects.

Warud tahsil is the Eastern end of Amravati district, adjoining hilly tract of Madhya-Pradesh. Interestingly, forest vegetation is reflected due to varied climatic conditions and physiography. Extensive survey was made during the year 2007-2009 and many taxa have been collected and identified. Some of these are rare and endangered. Tribal inhabiting the forest localities have an intricate relationship with surrounding vegetation and they use these plants for various purposes. A good number of plant species are used medicinally, and some of these are conserved with care. Due to increasing demand of medicinal plants, over exploitation and anthropogenic pressure, these species are facing different categories of threat. However, ethno-medicines play an important role in enhancing the economic status of local herbal healers and thus help, indirectly, in the conservation of ethno-medicinal plant biodiversity.

## **109. OBSERVATIONS ON OCCURRENCE AND ETHNO -BOTANICAL IMPORTANCE OF *GEODORUM DENSIFLORUM* (LAM.) SCHLTR.**

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**Key words:** *Ethnobotany*, *Geodorum*, *Orchidaceae*. *nutraceuticals*

The ethno-botanical information is being prominently used for the formulation of alternative drugs and gaining much significance because of its efficacy and negligible side effects. The skill and practices nourished by tribal communities are also increasingly acknowledged by the pharmaceutical industries. The present paper reports the occurrence of a member of an Orchidaceae having distributed in Bhingara locality of Buldhana district. The plants are distributed in a restricted locality and seem to be exploited heavily for the purpose of crude formulations. They are mostly perenated by pseudo –bulbs. The tubers are found to useful as nutraceutical particularly on debility, stomach troubles and complaints related to women health.

## **110. CYTOTOXIC ACTIVITY OF PHYLLANTHUS *NIRURI* L. WHOLE PLANT EXTRACT ON *ALLIUM CEPA* L. (ONION) ROOT TIP CELLS.**

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**Keywords:** *Phyllanthus niruri*, *Allium cepa*, mitotic index, chromosome aberrations, Cytotoxicity

*Phyllanthus niruri* L.(Bhuiamla) belonging to family Euphorbiaceae, is a small erect herb, widely distributed in rainforests and tropical areas. The present study investigates the cytotoxic property of whole plant extract of *Phyllanthus niruri* L. on *Allium cepa* L. root tip

cells. The roots of *Allium cepa* were treated with a series of concentrations ranging from 2 to 8 mg. The results indicated that the plant extract reduced the mitotic indices in onion root tip cells with corresponding increase in concentration with the respect to control. Additional variations in the percentage of mitotic stages were observed. The total percentage of aberrations increased with the increasing concentration of plant extract. Different abnormalities were observed in all mitotic phases viz. Single and multiple bridges, clumped metaphases, fragments, sticky chromosomes, precocious chromosomes etc. Hence, the present study was undertaken to evaluate the cytotoxic potential of *Phyllanthus niruri* whole plant extract on *Allium cepa* root tip cells.

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## 111. TO STUDY THE AMINO ACID COMPOSITION AND TOTAL PROTEIN DIGESTIBILITY IN LEAF PROTEIN CONCENTRATE

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**Keywords:** Leaf Protein Concentrates, Protein Digestibility, Amino Acid.

Leaf protein concentrate (LPC) was extracted from green leaves of some wild and cultivated plants viz. *Brassica juncea* (L.) Czern. & Coss, *Brassica napus* L., *Brassica oleracea* var. *Botrytis* L. (cultivated) and *Chenopodium album* L, *Goniocaulon indicum*, (Klein ex Willd). C.B. CL, *Celosia argentea* L., *Vigna trilobata* (L.)Verde, *Digera muricata* (L.) Mart, *Tridax procumbens* L. and *Oscimum americanum* L. (wild) by heat coagulation method. In LPCs the content of essential amino acid like methionine, tryptophan and proline has been studied. The total protein digestibility *in vitro* was also carried out. *Oscimum americanum* exhibited highest amount of methionine (8.050 g/16gN). The lowest amount was observed in *Goniocaulon indicum* (1.284 g/16gN). The remaining plant species showed the content in the range of 5.640 g/16g N to 2.656 g/16g N. The highest amount of tryptophan was observed in *Goniocaulon indicum* (0.035 g/16g N), while minimum content was quantified in *Brassica juncea* (0.003 g/16g N), whereas remaining species were in the range of 0.025 g/16g N to 0.004 g/16g N. The proline content was found as high as in *Brassica napus* (1.001 μmole/g) while lowest amount was observed in *Celosia argentea* (0.001 μmole/g) and the remaining species showed in the range

between 0.149  $\mu\text{mole/g}$  to 0.019  $\mu\text{mole/g}$ . The total protein digestibility *in vitro* was found in the range of 84.82 % to 67.56 %, highest in *Celosia argentea*, *Vigna trilobata*, *Brassica oleracea*, *Chenopodium album* and in *Digera muricata*. The LPC extracted from these plant species was used for nutritional studies.

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## **112. APPLICABILITY OF UPFLOW ANAEROBIC SLUDGE BLANKET (UASB) TECHNOLOGY IN TREATING DISTILLERY WASTE WATER**

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This research work aims to study the efficiency of Upflow Anaerobic Sludge Blanket (UASB) technology in treating waste water having very high BOD & COD values such as distillery waste water and exploring the possibility of generation of methane rich biogas which can be used as an alternate source of energy resulting in conservation of natural resources.

Distillery sector is one of the most polluting sector, especially the molasses based distillery units. The waste water from molasses based distillery unit has BOD of 50000 – 60000 mg/L and COD of 110000 -120000 mg/L. However, the waste water is biodegradable. UASB technology is normally being applied to treat waste water having low to medium BOD & COD values such as from Brewery, Sugar, Starch, Dairy, food and other industries.

In this lab. scale research study, a Upflow Anaerobic Sludge Blanket Reactor ( UASB) of diameter 40 cm and Height 55 cm was fabricated in PVC. The anaerobic bacteria were developed from cow dung under anaerobic condition. After development and stabilization of the anaerobic bacteria, distillery waste water (after raising pH to 7.2) was fed to the reactor and performance of the UASB reactor was studied. Day wise reduction in BOD and COD was estimated.

The UASB reactor achieved BOD reduction of 84.6% and COD reduction of 67.1% and biogas generation was also reported.

Besides, significant reduction in BOD and COD values, methane rich biogas was generated which can be used as an alternate source of energy, thus, making the payback period very lucrative. Additionally, advantages of carbon credit can also be availed which makes UASB treatment more money spinning technology. Above all, more usage of such alternate source of energy will directly result in conservation of natural resources and biodiversity.

### **113. EFFECT OF PERMEABILIZING AGENT DMSO ON FLAVONOID CONTENT IN SUSPENSION CULTURES OF *BLUMEA LACERA* (BURM. F.) DC.**

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**Key words:** Permeabilization, DMSO, flavonoids, *Blumea lacera*.

*Blumea lacera* (Burm. f.) DC. is a medicinal plant belonging to the family Asteraceae. In Ayurveda, *Blumea lacera* is described as an astringent, anti-inflammatory, ophthalmic, digestive, anthelmintic, liver tonic, expectorant, antipyretic, diuretic, stimulant and memory enhancer. The plant also exhibit anti-leukemic and antiviral activities. The flavonoides of *Blumea lacera* have application against piles. The major components of *Blumea lacera* are Campesterol and flavonoides. The cell suspension culture of *Blumea lacera* was treated with 0.2, 0.6 and 1 percent concentration of DMSO (Dimethyl sulphoxide), a cell permeabilizing agent. The treatment was carried out for 1, 2 and 4 hours for all the concentrations of DMSO. The treated cells were analyzed for flavonoid content using spectrophotometric method. Maximum release of total flavonoid content (0.58 mg/g) was observed in suspension culture treated with 0.6% DMSO for 4 hour treatment duration.

### **114. ETHNOBOTANICAL SURVEY OF SOME PLANTS FROM MUNIYA RESERVE FOREST NAGPUR (M.S.) INDIA**

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A periodic survey was carried out with villagers of Muniya reserve forest Umred (Nagpur) for plants of medicinal importance. Total 40 plants were identified and enlisted for their medicinal value to cure various diseases like asthma, diabetes, diarrhoea, jaundice and skin diseases.

Plants mostly used by villagers for medicinal use are *Azadirachata indica*, *Ocimum basilicum*, *Ocimum sanctum*, *Tridax*, *Vetiveria zizanoides*, *Momordica charantia*, *Ricinus communis*, *Ficus racemosa*, *Emblica officinalis*, *Apium graveolens*, *Andrographis paniculata* etc.

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## 115. FOLK MEDICINAL KNOWLEDGE AND PEOPLE'S PARTICIPATION IN BIODIVERSITY CONSERVATION

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**Keywords:** Healthcare, medicinal plants, conservation, efficacious herbs

The indigenous people have utilized their knowledge for meeting the diverse needs of life including medicinal plants since times immemorial. In spite of government efforts modern healthcare facilities are still not accessible to every citizen whereas the local healers with rich traditional knowledge provide primary healthcare in remote rural areas and also treatment for almost every ailments by using efficacious herbs. It is pity that such valuable knowledge is eroding under modernization trends and due to rapid socioeconomic changes. With loss of such knowledge, is also lost the intricate knowledge of local surroundings, the rich natural resources of the medicinal plants growing at doorstep, the harvesting schedule practices to keep the population and species composition intact at natural level etc. As safety and efficacy of herbal product depends upon the quality of raw material, the paper provides an insight for conserving and sustainable harvesting of medicinal plants through participatory approach by involving locals who will come forward for conservation voluntarily as they will feel a scarce of legitimacy of their knowledge and belief systems. However, it is required to safeguard the traditional knowledge of the community and challenge biopiracy problem.

## **116. NUTRIENT ACCUMULATION IN MACROPHYTES OF KONGBA RIVER, MANIPUR - A MANAGEMENT PLAN FOR WATER QUALITY IMPROVEMENT**

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**Keywords:** Accumulation, nutrients, macrophytes, water quality

The present paper reports the analyses of nutrient accumulation in macrophytes Kongba River, Manipur (Latitude 23.80° N to 25.68°N and Longitude 93.03°E to 94.78°E) during the study period (2006-2007). Accumulation of nutrients in tissue depends upon absorption rate in various macrophytes from both the water and sediment. The range in N accumulation for pre and post monsoon periods from five sites of Kongba River among macrophytes was found to be between 30.8 mg m<sup>-2</sup> to 2079.75 mg m<sup>-2</sup>. Similarly, the range in P and K accumulation in macrophytes from Kongba River varied between 2.4 to 557.19 mg m<sup>-2</sup> and 16.00 to 1709.09 mg m<sup>-2</sup>, respectively. Thus the study concluded that aquatic macrophytes can be effectively used in reducing the N and P levels of nutrient enriched waters and can play a very significant role in removing N and P from water and improve the water quality of river.

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## **117. OIL EXTRACTION OF JATROPHA CURCAS FROM JHUM AREAS OF ANDRO, IMPHAL –EAST, MANIPUR**

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**Keywords:** Manipur, Jhuming, Jatropha curcas, Jatropha oil, Biodiesel, Biodiversity Conservation

Manipur (Latitude 23.80° N to 25.68°N and Longitude 93.03°E to 94.78°E) being a part of the North-east India, is one of the 4 major biodiversity hotspot regions of India. Hills comprise about ninth-tenth of the total geographical area of the state. Out of the total 22,32,700 ha (total

area of Manipur), about 4,88,799 ha are jhum areas (21.89%). Shifting cultivation or jhuming, locally known as “pamlou” or “ kanglou” in Manipuri, is a widespread agricultural practice in the hills. In the recent past, the problem of soil erosion due to shifting cultivation has become a real threat for maintaining the soil fertility. It is also considered as major cause of biodiversity loss in the state because of its characteristic clearing and burning of the forest for crop plantation. As such a practice is prevailing throughout the length and breadth of the state there is progressive loss of valuable biodiversity. If timely control measures are not taken up in such areas, then most of the biodiversity will be lost and the soil will be depleted by erosion and become barren. *Jatropha curcas* cultivation in the Jhum areas of Andro and the estimation of oil content is, therefore, taken up during 2007-2008. Hence, the present study will help in production of biodiesel and also in pollution control. Besides, the study will help in biodiversity conservation, checking soil erosion and employment generation for poor hilly peoples. The oil content of the *Jatropha curcas* found in the state is also found to be higher when compared with those found in other states of India.

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## **118. INVESTIGATION INTO THE EFFLUENT TREATMENT PROCESS (E.T.P) AT A STEEL INDUSTRY STI, DEWAS (M.P.)**

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**Keywords:** waste water, effluent, lime requirement, sludge production.

The present paper reports the complete characterization of waste water generated at Steel Tube (ST), Pickling rinse from Strip Division (SD) of M/S Steel tube of India Ltd. located in village industry Kalukhedi Tehsil, Dewas district and characterized the discharge pattern from various individual waste water generated in the division. The performance appraisal of the existing treatment plant was also ascertained by analyzing the characteristics of combined composite waste water samples of effluents to neutralization tank and supernatant from clarifier. An attempt was made to reduce the lime requirement and sludge production by combining

various waste water at different pH values generated within the industry in proportion to their corresponding discharges (after qualifying the waste waters). The finding for the rinse effluent treatment plant, concentrated effluent treatment, and domestic effluent treatment are discussed in the paper with recommendation for ETP laboratory setting.

## 119. USE OF PLANT DIVERSITY BY VILLAGERS FROM GADCHIROLI DISTRICT, INDIA

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**Key words:** Biodiversity, Made Tukum

The Rio summit (1982) emphasized the need to conserve biodiversity of globe especially the tropics. A thorough investigation of flora becomes urgent necessity for understanding present status of plant diversity. Local people have good knowledge about local plant wealth, by keeping this view in a mind periodic survey, visits were carried out with people of village Made Tukum in Gadchiroli district and information is collected about economic value of plants. Economic uses of 40 plants were discussed from terrestrial and aquatic localities.

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## 120. UTILIZATION OF DEPROTEINIZED JUICE (DPJ) FOR MICROBIAL GROWTH.

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**Key words:** Green crop fractionation, microbial growth, deproteinized juice, biomass

The process of green crop fractionation is now widely accepted all over the world. To make GCF system more economical, its all products should be used wisely. DPJ is the end product of the GCF process. Its chemical composition also reveals that it contain various nutrients which support the growth of various microorganisms. The DPJ of all selected plants showed the better growth of yeast (*Saccharomyces cerevisiae*) and penicillium (*Penicillium chrysogenum*) over the conventional media. The maximum yield of mycelia dry weight and yeast biomass was recorded on 6% DPJ of *Alysicarpus vaginalis* L. (950 mg and 560 mg/25 ml,

respectively). The results obtained were strongly support the earlier findings of several workers and the DPJ could be utilized for the growth of various microorganisms. Statistical analysis also suggested that concentration of DPJ as well as the species from which the DPJ obtained showed significant difference in their biomass.

## **121. UTILIZATION OF MAHUA FLOWERS FOR FOOD PRODUCTS**

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‘Mahua’ is cheap and easily available in India, especially in tribal region. It is a source of earning for tribals. Tribal people utilizes ‘mahua’ for their own food consumption. It is widely used for the preparation alcohol liquor, the activity which is prohibited by Government. But its potential was not explored for the utilization of commercial food products. So, our aim was to prepare ‘mahua’ based food products which tribal can prepare at their home and utilize it properly. So it will give an earning source for them. So in this study we made an attempt to prepare number of food products like Mahua squash, Mahua Jam, Mahua Chutney, Some traditional products like groundnut chikkis and sesame laddus, by using mahua pulp and mahua syrup. The formulation for the standardization of all above products based on mahua pulp and syrup were worked out, firstly sun-dried, reddish brown colored mahua flower were analyzed for proximate composition and then all prepared food products were analyzed for chemical composition. The acceptability of mahua based food products were judged trained panel of judges on 9-point hedonic scale sensory evaluation.

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## **122. NUTRITIONAL POTENTIAL OF LOCALLY AVAILABLE LESS FAMILIAR VEGETABLES**

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The present investigation was carried on with a view to find out less familiar vegetables which could act as a supplement to the daily nutritional needs of the population. Selected

nutrients of some locally available, less familiar vegetables were estimated. Vegetables selected for the study were *Coculushirsutus diels* (*Vasan* leaves), *crotalarila luncea* (*Boarus* flowers), *Cucumis callous* (*Sharni* fruit), *Cucumis melovar agrestis* (*Valuk* fruit). Results of the experiments conducted showed that iron and calcium content of *Vasan* leaves 1.84mg/100gm and 77.48 mg/100gm, respectively was more than spinach which is commonly consumed vegetable. Iron content of *Boarus* flowers, *Sharni* fruit and *Valuk* fruit was more as compared to commonly consumed vegetables. All these less familiar vegetables studied are good sources of calcium and iron. Therefore our findings suggest that these vegetables can be recommended for inclusion in the diet in rainy season, especially low income group as a good, regular and inexpensive source of nutrients.

### **123. CONTRIBUTION OF MAHUWA FLOWER IN COOKERY OF EASTERN MAHARASHTRA**

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Use of natural resources is need of the hour for sustainable livelihood. It was studied by observation method that 'Mahua' flowers are available in households of rural and tribal people of Eastern Maharashtra. These rural and tribal people collect 'Mahua' flowers during season and store for culinary purpose. On festivals 'Mahua' flowers are use as a sweetener in Stuff Roti (Puran Poli) Pumpkin Sweet Pakoda (Bonde) Sweet Sauce (lapshi), Tamarind Mahua Chutney, etc. Mahua flowers contribute its sweeteners. It also enhances the texture and flavor. It provides soluble fiber, micronutrients, and antioxidants. 'Mahua' recipes are delicious, low cost and have low glycemic index than sweet preparation made out of sugar. Such indigenous recipes are needed to be popularized to sensitize people with this locally available natural sweet food and remove misconcepts about this golden asset of the region.

### **124. SIGNIFICANCE OF PLANT SACRIFICE FOR WELLNESS**

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Health is multidimensional. Proponents of holistic health believe that the time has come to give serious consideration to the spiritual dimension. It is intangible something that transcends physiology and psychology. In Hindus celebration of rituals are highly dependent on the biodiversity. These celebrations includes offering of variety of plant, plant materials, fruits, and vegetables available in the region. Hence attempt was made with the specific objectives to explore the variety of plants and their uses in celebration of Hindu rituals. In this descriptive research data were collected with structured interview schedule from veteran women, Vaidya, and Brahmins performing rituals. Study reported that the celebration of these rituals according to specific description has artistic, aesthetic, nutritional, ethno medicinal, social, mental, spiritual, and environmental significance in maintaining overall wellness of the community.

## **125. ANTIFUNGAL PROPERTIES OF EUCALYPTUS AGAINST SOME SEED-BORNE FUNGI**

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Several seed borne fungi associated with vegetable seeds are known to cause considerable damage either directly to seed that carries them or to the crop raised from them. In storage, they change the physio-chemical properties of seeds. In the present investigation, an attempts have been made to control the growth of dominant seed-borne fungi of *Abelmoschus esculentus(L) Moensch* during storage by seed coat treatment of some crude antifungal compounds extracted from the leaves of *Eucalyptus globulus*.

The antifungal activity of leaf extract of *Eucalyptus globules* was determined against *Aspergillus niger*, *A. fumigatus*, *Alternaria tenuis*, *Curvularia lunata*, *Fusarium solani*, *Rhizopus stolonifer*, *Rhizoctonia bataticola* and compared it with 1000 ppm carbendazium. Ten gram dried leaf sample was extracted with 100 ml distilled water. Various concentrations of leaf extracts (1%, 5% and 10%) was added to distilled water in Czapek's medium, and then placed in sterilized petridishes. Another set with 1000 ppm of carbendazium was used for each organism, inoculated with 4 mm agar disc obtained from 10 days old colony and cultured at 27<sup>0</sup>C for 7 days. The percent growth stimulation or inhibition of spore production was recorded against control by measuring the colony diameter.

The data obtained in the present study indicated that leaf extract samples of *Eucalyptus globulus* possess strong antifungal property against all the tested fungi for growth and sporulation even at low conc.(1%). The least growth and sporulation inhibition was observed at higher conc. (10%) in *Rhizopus stolonifer* followed by other fungi tested. The extract was more effective than 1000 ppm of carbendazim 1% against *Rhizopus stolonifer* and 5% against *Fusarium solani*, but it was less effective against *Alternaria tenuis* and *Curvularia lunata*

## **126. ANTIFUNGAL ACTIVITY OF SOME COMMONLY AVAILABLE PLANT EXTRACTS AGAINST DERMATOPHYTIC PATOGENS.**

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An antifungal effect of different plant parts of *Azadiracta indica*, *Psoralea corylifolia*, *Andrographis paniculata*, and *Adhatoda zeylanica* was tested against dermal pathogens viz. *Trichophyton ajelloni* (MTCC.No: 4878), *Trichophyton rubrum* (MTCC No. 4296), *Microsporum canis* (MTCC. No. 3270), *Microsporum gypsum* (MTCC. No. 4493) and *Candida bombi* (MTCC. No. 1646). Extracts of leaves, whole plant, fruits and flowers of *Azadiracta indica* were found to be most effective against all dermal fungal pathogens. Extract of *Psoralea corylifolia* also exhibited significant effect. Methanolic extract of *Andrographis paniculata* also show significant effect against *Candida bombi* and *Microsporum canis*.

## **127. SUSTAINABLE UTILIZATION OF COWPEA FOR RURAL DEVELOPMENT**

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An adequate supply of protein is a central aspect of the world food problem. Protein-energy malnutrition (PEM) encompasses a range of disorders of starvation and malnutrition like marasmus and kwashiorkor are common in developing areas of Asia, Africa and South America. A revolution, similar to green revolution is needed in the production of pulses to eliminate protein malnutrition. A massive increase in vegetable protein supply in malnourished areas

presents an easy, economical and more energy- efficient prospect than boosting the supply of animal protein. Thus, increased use of food legumes throughout the world should be encouraged. Cowpea is an important legume of the tropics, with its various uses: as grains in processed foods, as a vegetable (fresh leaves, peas, and pods), and as dry haulms and fodder. It is an inexpensive source of vegetable protein, and a hardy crop well adapted to relatively dry environments. In combination or association with cereals and other grain legumes, it contributes to the sustainability of cropping systems in marginal lands of semiarid areas, with its fixation of nitrogen, ground cover, and the soil improvement it provides from plant residues. Cowpea, on the world stage, is a minor crop although cowpea fits into diverse production systems, rain fed and irrigated and notably in marginal areas with poor soils and limited rainfall.

Reviewing the potentiality and the nutritional status of the crop, Ankur research foundation has brought the variety Ankur Gomati, adaptable to the various climate and edaphic zones. Ankur Gomati proves to be a good source of protein containing essential amino acids.

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## 128. NUTRITIONAL STATUS OF *PSORALEA CORYLIFOLIA* L. (BAWCHI)

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**Key Words:** *P. corylifolia*, Root trainer seedlings, macro and micronutrients, seed yield.

The experiments on seedlings of *Psoralea corylifolia* was conducted during 2007-2008 in 150 cc volume root trainers. In this experiment, RBD with three replications were followed. Ten seedlings were taken in each replication, thus total 30 seedlings per treatments were studied.. The samples were analyzed for physio-chemical properties of soil and nutritional status of soil. Soil analysis was done at N. B. S. S., Nagpur and PGTD of Botany, Nagpur. The pH (7.4), moisture content (0.14), EC (0.04 dSm<sup>-1</sup>), N (153), P (40.20), K (260.5), Ca (33.09), Mg (25), Fe (20), Mn (40), Zn (8.30), and Cu (9.50) Kg/ha in the soil of plot was analyzed to study their influence.

After seedlings were transferred into field, individual element was supplied to field after 12 days interval in stepwise manner enabling to study its influence on growth and development of plants till they become 108 old days. Yield and Yield attributing characters and its nutrient uptake by *P. corylifolia*, the highest interaction effect of seed yield of in (F<sub>2</sub> P<sub>4</sub>) treatment was (1410.80 kg/ha), plant height (152.36 cm), average number of leaves (322.67) and average number branches (25.35) for nutrients uptake level (57.88: 75.85: 34.86: 69.03 48.60 Kg/ha, respectively for N, P, K, Ca, Mg and 1.59: 3.58: 2.89: 2.70 ppm for Fe, Mn, Zn, and Cu, respectively) at nutrient combination level (120 : 130 : 15 : 90 : 40 : 14 : 25 : 20 : 10 kg/ha N, P, K, Ca, Mg, Fe, Mn, Zn, Cu, respectively) than control (F<sub>2</sub>P<sub>0</sub>) seed yield (746.05 kg/ha), plant height (60.32 cm), no. of leaves (125) and no. of branches (10.34) for nutrients uptake level (50.13: 70.10: 28.10: 60.10: 43.10 Kg/ha, respectively for N, P, K, Ca, Mg and 0.47: 0.53: 0.64: 0.32 ppm for Fe, Mn, Zn, and Cu, respectively). The results of the field experiments indicated that the soil application combination of (F<sub>2</sub>P<sub>4</sub>) treatment gave higher production of seed yield and it is significantly superior over control (F<sub>2</sub>P<sub>0</sub>) and rest of the higher and lower treatments of macro and micronutrients.

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## **129. INFLUENCE OF MICRO AND MACRONUTRIENTS ON GROWTH AND MEDICINAL CONTENT OF *ANDROGRAPHIS PANICULATA* WALL. EX NEES.**

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**Key Words:** Root trainer seedling transplantation, Application & Uptake of macro and micronutrients, Growth, herbage yield, Andrographolide medicinal content.

The experiments on seedlings of *Andrographis paniculata* was conducted during 2007-2008 using 150 cc volume root trainers. Experiments were done in randomized block design to find out the effect of nutrients application of macronutrients and micronutrient on herbage yield, nutrient uptake and andrographolide medicinal content. The experimental soil has pH 7.2, moisture content 0.13, EC 0.04 dSm<sup>-1</sup>, Macronutrients N (96), P(35.06), K (252.1), Ca (35.08),

Mg (18) Kg/ha and Micronutrient Fe (17), Mn (37), Zn (5.80), Cu (8.36) Kg/ha. After two months, old root trainer seedlings were transferred into field and individual element was given to field after 12 days interval in stepwise manner enabling to study its influence on growth and development of plants till they become 108 old days. The seedlings were treated with combination of different concentration of chemical fertilizers N, P, K, Ca, Mg, Fe, Mn, Zn & Cu against control. Total seven treatments of macro and micronutrients were studied on the growth of *Andrographis paniculata*. In (F<sub>2</sub>P<sub>5</sub>) treatment, the highest andrographolide content was (6.85%), herbage yield (1678.61kg/ha), plant height (72 cm), no. of leaves (84) and no. of branches (25.33) for nutrients uptake level (46.03: 50.53: 41.80: 31.60: 38.56 Kg/ha, respectively for N, P, K, Ca, Mg and 1.39: 1.99: 2.73: 2.16 ppm, respectively for Fe, Mn, Zn, and Cu) at nutrient combination level (200 : 140 : 15 : 90 : 60 : 25 : 44 : 20 : 14 kg/ha N, P, K, Ca, Mg, Fe, Mn, Zn, Cu, respectively) were noted as compared to control. Similarly, in (F<sub>2</sub>P<sub>0</sub>) treatment, andrographolide content (0.73 %), herbage yield (1195.59 kg/ha), plant height (45.32 cm), no. of leaves (53.65) and no. of branches (14.33) for nutrients uptake level (24.21: 45.27: 35.35: 25.36: 36.26 Kg/ha , respectively for N, P, K, Ca, Mg and 0.28: 1.23: 1.23: 0.28 ppm for Fe, Mn, Zn, and Cu, respectively) were noted. The results of the field experiments indicated that the in soil applied combination of (F<sub>2</sub>P<sub>5</sub>) treatment was highest andrographolide content and herbage yield and was found to be significantly superior over control (F<sub>2</sub>P<sub>0</sub> ) and rest of the higher and lower treatments macro and micronutrients.

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### **130. COLLECTION AND MAINTANANCE OF CUSTARD APPLE GERMPLASM FOR LIVELYHOOD SECURITY**

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Custard apple (*Annona squamosa* L) fruit has become very popular as table fruit and as also fruits pulp in high value preparation like ice-cream, kulfi, milkshake etc. It's flowering to fruit development period lies during rainy season ready for harvesting during the October - November. Plants tend to become dormant in later period, which makes it most ideal for cultivation in rainfed/ dryland areas because of high yield potential, hardy nature of tree and

realization of need for crop diversification with livelihood security. Custard apple being an aggregate fruit, it has more number of seeds in fruit which is most limiting factor for pulp extraction and in consumption also. Less seeded custard apple is required in market for pulp extraction and people also like seedless or less seeded fruit. Pulp is the most important portion of fruit from commercial point of view and it is very difficult as well as tedious job for extraction of pulp from seeded fruit as pulp is available on the periphery of seed. Seeds contain anonin which is responsible for browning of pulp just after extraction. To meet out the above demand, survey was undertaken to find out the seedless or less seeded custard apple in Nagpur division which is available in the Kanhan and Wainganga river bank in Nagpur and Bhandara district of Vidharba during 2007-08, 2008-09 and 2009-10. These plants are located at government waste land and forest area of this region with certain pockets on 100-120 ha area. In all, 36 genotypes were collected and its physico chemical analysis was done to identify the promising genotypes for commercial cultivation in the region. Significant differences was recorded among different genotypes in respect of fruit size, fruit weight, pulp content, seed content, rind appearance, pulp colour, TSS and acidity and yield. From this rigorous survey only two genotypes identified which have fruit weight above 300 g i.e. CA-21(336g) and CA-15 (318g) and only five genotypes which have fruit weight in between 250-300 g i.e. CA-3 (278g), CA-7 (270g), CA-11 (254g), CA-17 (282g), CA-22 (276g) and CA-35 (278g). As regard the TSS, maximum TSS was recorded by CA-10 (23.6<sup>0</sup> B) and CA-18 (23.2<sup>0</sup> B) which is most important character of custard apple. Less seed content is also one of the best characters of custard apple which found in CA-19 (4.00 g per fruit).

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### **131. SELECTION OF ELITE VARIETY OF *PHYLLANTHUS EMBLICA* L.**

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*Phyllanthus emblica* belonging to Euphorbiaceae, is popularly known as ‘Amla’ or ‘Amalka’. In Sanskrit, it is Amalaki, which means ‘the sustainer’ or ‘the fruit where the goddess of prosperity presides’.

Indian gooseberry (Amla) with a fleshy fruit is one of the richest natural sources of vitamin C. Clinical tests on patients suffering from pulmonary tuberculosis have shown that this high concentrate is more quickly assimilated than the synthetic vitamin. It is an ingredient of many Ayurvedic medicines and tonics, as it removes excessive salivation, nausea, vomiting, giddiness, cooling internal body heat, menstrual disorders and is an excellent liver tonic.

The Aim of the present study is to estimate the ascorbic acid and phenol content in various fruits of 'amla' collected from different places of Nagpur (Telankhedi garden, Hanuman mandir, Buldi, Kalmeshwar, Wadi-dhaba, Saoner, Mansar, Butibori, Sakkardhara) so as to select elite (superior) cultivar of *Phyllanthus emblica* for these compounds.

The ascorbic acid found in various plants is in the range of 334.30 to 870.68 mg/ 100 gm of material. From the above results it is concluded that amount of ascorbic acid was found to be highest (870.68) in fruits collected from plants at Kalmeshwar. The phenol content was found to be highest in plants collected from Saoner.

As these elite cultivars contain more ascorbic acid and phenol values, products manufactured will have more value and it is also beneficial to the people who consume them in their daily diet for improving immune system. If such plant seeds are multiplied and supplied to local farmers, they are monetarily benefited by selling their products (fruits) with higher rate in the market. It is a great opportunity for Nursery dealers and others, are interested to multiply such cultivars. Recently National Medicinal Plants Board has started a scheme to give some financial assistance (Rs. 15,000/- per acre) to the farmers, who are interested to cultivate *Phyllanthus* spp. indicates its demand. The cultivation of this plant generate money as it can be cultivated very easily anywhere with less water demand and is much suitable for Vidharba and farmers of this region.

### **132. A VERSATILE MEDICINAL USE OF INCENSE (OLIBANUM)**

**(*Salai Guggul*)**

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Olibanum has been used in various cultures for thousands of years for medicinal purposes. In these times, it was not possible for the physician to ascertain an exact diagnosis. Medical treatment of patients happened due to visible symptoms, claimed by the patient. Today, many of the symptoms treated can be attributed to well known diseases. Interestingly, symptoms and diseases were treated with essence in traditional Indian Medicine (Ayurveda). As far as the respiratory tract is concerned, Olibanum like *salai guggul* were used to treat cough, hoarseness, coryza, dyspnea, mucous congestion and inflammation of tonsils. Diseases of the gastro intestinal tract were also targets for the treatment with essence in all periods of time. In general, *Salai Guggul* was used to treat inflammatory diseases of various organs including uterus, skin, respiratory tract, locomotor system, rheumatoid arthritis and gout, but also inflammation of eyes and ears. Especially in antiquity and middleages many reports tell us the uses of Incense in the different tumors and cancer. The list of treatments can be extended. However, in the middle of the last century in the western world, Olibanum disappeared as a remedy because lack of scientific evidence. Recently, some pilot studies suggested efficacy in ulcerative colitis, Crohn's disease, bronchial asthma, rheumatoid and osteoarthritis and even in peritumoural brain edemas. Conclusively, ancient uses/experiences can be a lead for scientific evaluation of traditional essence of natural products.

### **133. VIABILITY OF USE OF MAHUA (*MADHUCA INDICA*) FLOWER FOR ALCOHOL AND OTHER PRODUCTS**

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'Mahua', is a native of India. It is a tree of high economic value, characteristic of the dry region, grows in North and Central India. The flowers, fruits and oil obtained from the plant of Mahua are consumed in various ways. The flowers, Fruits and pulp are a rich source of sugar containing appreciable amount of proteins, vitamins and minerals whereas the dry husk makes a good source of alcohol. Edible oil, which is said to be useful for heart patients is obtained from

the seeds. Other uses including industrial and medicinal are like manufacture of washing soaps and toilet soap, culinary, hair oil, illumination which keeps body glossy and warm, treatment of enlargement of axillary gland, neurotic disorder, aphrodisiac, in cough, bronchitis, muscle fatigue, curing bleeding gums and ulcers, laxatives in habitual Constipation, Piles and Hemorrhoids. It is also used as organic manure, fish poison, and wormicide to maintain the turf.

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### **134. BIOACCUMULATION OF HEAVY METALS IN VEGETABLES: A THREAT TO HUMAN HEALTH**

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**Keywords,** Heavy metal uptake, toxicity, health hazard on human being.

Rapid growth in urbanization and industrialization has increased the levels of exposure to heavy metals in the environment and consequently in the food chain. Consumption of contaminated food by human beings and other animals may pose a serious threat to their health. Vegetables are a major portion of the human daily diet, providing micro- and macronutrients, fibers, antioxidants, vitamins, etc. Depending on the method of cultivation of vegetables, some of them have a great potential to accumulate higher concentrations of heavy metals than others. The present review describes the uptake and accumulation of heavy metals in vegetables, their role in remediation of heavy metals from contaminated areas and the negative impact of heavy metals on vegetables and human health through their consumption.

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### **135. NUTRITIONAL COMPOSITION OF EDIBLE *LEMNEA AUSTRALIS* ATKINS ( LEMNEACEAE, RHODOPHYTA) FROM MANIPUR RIVER SYSTEMS, INDIA**

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003

**Keywords:** *Lemanea australis*, rhodophyceae, freshwater, biochemical, environmental variables

*Lemanea australis* Atkins locally called as “nungsham” in Manipur (Latitude 23.80° N to 25.68°N and Longitude 93.03°E to 94.78°E), a state in the north-east corner of India bordering Myanmar is a fresh water red algae belonging to Rhodophyceae family. The alga is used to be eaten as food in Manipur and found to be distributed abundantly during cold season (December to February) in the rivers of Imphal, Iril, Thoubal and Manipur from Manipur river systems. It is thought to have essential mineral nutrients not found in other staple food items. No data on the nutrient profile of this alga is available in both national and international literature. Hence an attempt has been made to work out the nutrient profile of this rare and endangered alga. For the purpose six sites were selected from the four rivers and the alga samples were collected during December 2008 to February 2009 when it grows actively and were analyzed for moisture content, ash, organic matter, crude fibre, total protein, total carbohydrate, total lipid, total free amino acid, chlorophyll a, chlorophyll b, total chlorophyll, carotenoid, according to A.O.A.C including macro-elements such as Nitrogen, Sodium, Potassium, Calcium, Magnesium and micro elements such as Copper, Cobalt, Manganese, Zinc and Iron using atomic absorption spectrophotometer (AAAnalyst 200 model). The concentration ranges from all the six studied sites were as follow: moisture%:  $72.33 \pm 0.34$  -  $81.99 \pm 0.37$ ; ash%:  $7.9 \pm 0.02$  -  $30.45 \pm 0.93$ ; organic matter%:  $58.38 \pm 0.65$  -  $74.72 \pm 0.03$ ; crude fiber %:  $0.79 \pm 0.40$  -  $3.03 \pm 0.41$ ; total protein%:  $17.48 \pm 0.94$  -  $31.07 \pm 0.75$ ; total lipid%:  $0.82 \pm 0.02$  -  $1.83 \pm 0.02$ ; total carbohydrate%:  $19.11 \pm 1.40$  -  $48.6 \pm 1.34$ ; total free amino acid%:  $0.25 \pm 0.02$  -  $0.35 \pm 0.02$ ; chlorophyll a (mg/g fresh weight):  $1.98 \pm 0.02$  -  $3.29 \pm 0.02$ ; chlorophyll b (mg/g fresh weight):  $0.76 \pm 0.05$  -  $1.13 \pm 0.02$ ; total chlorophyll(mg/gm fresh weight):  $0.89 \pm 0.03$  -  $1.25 \pm 0.01$ ; carotenoid (mg/gm fresh weight):  $0.15 \pm 0.02$  -  $0.47 \pm 0.03$ ; macro-elements such as Nitrogen(mg/100 g dry weight):  $111.48 \pm 0.44$  -  $226.28 \pm 0.37$ ; Phosphorus(mg/100g dry weight):  $72.42 \pm 0.33$  -  $150.71 \pm 0.26$ ; Sodium (mg/100 g dry weight):  $141.90 \pm 0.36$  -  $474.78 \pm 0.28$ ; Potassium (mg/100 g dry weight):  $363.05 \pm 0.50$  -  $1003.20 \pm 0.39$ ; Calcium (mg/100 g dry weight):  $11.44 \pm 0.44$  -  $13.76 \pm 0.50$ ; Magnesium (mg/100 g dry weight):  $70.87 \pm 0.42$  -  $135.65 \pm 0.17$  and micro elements such as Copper (mg/100 g dry weight):  $8.23 \pm 0.43$  -  $13.09 \pm 0.41$ ; Cobalt (mg/100 g dry weight):  $7.98 \pm 0.37$  -  $10.74 \pm 0.19$ ; Zinc (mg/100 g dry

weight):  $1.22 \pm 0.44 - 5.25 \pm 0.37$ ; Manganese ( mg/100 g dry weight) :  $5.26 \pm 0.48 - 20.34 \pm 0.23$  and Iron (mg/100 g dry weight):  $24.38 \pm 0.38 - 34.64 \pm 0.38$ . The alga is found to contain high percentage of protein, carbohydrate and Iron and measurable quantities of 11 essential minerals. Mineral composition of *Lemanea australis* was found relatively higher as compared to other land vegetables as well as to other edible seaweeds and it is in concurrence with the recent macrobiotic recommendation for western countries. It could therefore be use as food supplement to improve the nutritive value in the omnivorous diet. Statistical analysis computed among the environmental and biochemical parameters suggests the potential role played by the abiotic parameters on biosynthetic pathways of *Lemanea* .

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### **136. TRADITIONAL FERMENTATION OF MUSTARD (*BRASSICA JUNCEA*) ENHANCES ITS NUTRITIVE VALUE**

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**Keywords:** Mustard leaves, nutritive value, fermentation

Mustard leaves are widely used as vegetable throughout the world. The nutritive value of carbohydrates, proteins, flavanoids, amino acids was assessed. Preservation of mustard leaves (*B. juncea*) is done in Manipur by fermenting it in the traditional methods. It has been found that the nutritive value of protein, ascorbic acid, flavonoids and amino acids increased considerably in the traditionally fermented form.

### **137. PHENOLIC COMPOUNDS FROM *CURCUMA ANGUISTIFOLIA* FOUND IN MANIPUR**

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**Keywords:** Phenolic compounds, *Curcuma anguistifolia*, Manipur, rhizomes

*Curcuma anguistifolia* belongs to the family Zingiberaceae along with *Curcuma longa* (turmeric). The rhizomes as well as the flowers are widely used as herbal medicine in Manipur.

The rhizomes and flowers of *Curcuma angustifolia* found in Manipur were screened for their phenolic contents. It has been found that the rhizomes contain the highest phenolic content.

## LATE ABSTRACTS:

### 138. SOIL ANALYSIS OF BRYOPHYTES HABITAT FROM MELGHAT REGION IN AMRAVATI DISTRICT.

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**Key words** : Bryophytes in Melghat, Chemistry of Soil , Soil Diversity.

Melghat i.e. “*a meeting place of ghats*” is the north western compact block of forest with a canopy spreading over 3,075 sq. km. in Amravati district of Maharashtra (old C.P. & Berar). It extends about 65 kms from north to south between latitude  $21^{\circ} 46'$  and  $20^{\circ} 11'$  north & about 95 km from east to west between longitude  $77^{\circ} 34'$  &  $76^{\circ} 38'$  east. The forest is tropical and dry deciduous but seasonal green during monsoon. The edaphic factors also show variation in soil composition like clay, alluvium, lateritic or gritty loam depending upon plain or plateau.

Bryophyte forms an integral part with forest stream ecosystem for understory vegetation, soil structure and retention of water. These small, herbaceous plants grow in packed mats or cushions on moist rocks or soil and placed in between algae and vascular plants. Bryophyte species tend to be highly specific for particular microenvironments (responding to temperature, light and water availability, substrate chemistry, etc.), making them good ecological indicator species.

Present study deals with the chemical analysis of Bryophytes with reference to its edaphic factor and possible micro floral association. About 11 Bryophytic plant species along with rhizospheric soil were collected during rainy season to winter from various localities. Identification of Bryophytic plant species was done. Analysis of physicochemical characteristics of rhizospheric soil was done on the parameters as PH, Temperature, TDS (Total Dissolved Solids), EC (Electrical Conductivity), Salinity, ORP (Oxidation, Reduction Potential), Organic

Carbon, Total Nitrogen and Phosphorus. Rich soil diversity was found and analyzed among the Bryophytic plant species showing its status as bio indicators.

### **139. PROPAGATION OF ASHWAGANDHA A MEDICINAL PLANT USING TISSUE CULTURE TECHNIQUE**

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Ashwagandha a plant of medicinal importance belong to family Solanaceae. It is widely used in the treatment of tuberculosis, rheumatism, having rejuvenative effect on the body and is used to improve vitality and aid recovery after chronic illness (Chopra et al, 1958; Suffners and Douros, 1982). Ashwagandha has many significant benefits and is best known for its powerful adaptogenic properties i.e. it helps in adaptation of mind and body in a balance way to stress.

The propagation of Ashwagandha is mainly by seeds but duration of seed viability is very short. Due to poor viability of stored seeds, there was need to have alternate method of propagation. Tissue culture is most important *in vitro* technique which has helped to propagate large number of plants under *in vitro* condition.

The present study was undertaken with the objective to evaluate different explants such as shoot tip, hypocotyls and cotyleaf against various growth regulator combinations like BAP, Kinetin, 2,4-D & NAA. Hypocotyl and cotyleaf was evaluated for callus induction and somatic embryogenesis using MS medium supplemented with different concentrations of 2,4-D, Kinetin and NAA. Results revealed that shoot tips cultured on BAP+ Kinetin combinations produce multiple shoots. The percentage response to multiple shoots was 84%. With regard to callus induction, the response of hypocotyls and cotyleaf was satisfactory. There was no regeneration, when 2,4-D or Kinetin alone was used. While combinations of 2,4-D, Kinetin & NAA leads to the induction of callus and somatic embryogenesis.

## **140. EVALUATION OF ANTIBACTERIAL POTENTIAL OF *CITRUS LIMON* L. BURM. F. FRUIT JUICE AGAINST DIFFERENT PLANT PATHOGENIC BACTERIA**

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Plants are rich source of antibacterial agents, which could be exploited in plant disease management. Considering the rich diversity of plants, it is expected that screening and scientific evaluation of plant extracts for their antibacterial activity may provide new antibacterial substances.

Antibacterial active principles isolated from higher plants is appears to be one of the important alternative approaches to contain antibiotic resistance and the management of disease.

Management of plant diseases is generally achieved by the use of synthetic pesticides and antibiotics. Synthetic chemicals commonly used to control plant diseases not only pollute the environment, but are also harmful to human health. Thus there has developed world wide interest in searching for new antibacterial agents of plant origin so that the hazardous effects of synthetic chemicals currently in use may be reduced.

Hence, in the present investigation the antibacterial activity of *Citrus limon* (Rutaceae) Fruit Juice has been demonstrated for the first time against phytopathogenic bacteria *Agrobacterium tumefaciens* NCIM 2232, *Erwinia chrysanthemi* NCIM 5213, *Pseudomonas pisi* NCIM 2204, *Pseudomonas solanacearum* NCIM 5103, and *Xanthomonas malvacearum* NCIM 2310, by agar-well diffusion method. All the tested bacteria were found to be inhibited by *Citrus limon* fruit juice.

Thus, experimentally it is concluded that *Citrus limon* fruit juice posses potent antibacterial activity in compare with standard antibiotic Streptomycin. So that to get rid from all these hazards we can suggest the use of *Citrus limon* fruit juice to control the bacterial diseases of plants in an ecofriendly way.

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## **141. EFFECT OF *IN VITRO* CHITOSAN APPLICATION ON GERMINATION AND GROWTH OF *COLCHICUM LUTEUM* BAKER CORM.**

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**Keywords:** chitosan, *Colchicum*, corm, *in vitro* germination, growth, MS basal medium.

Corm and the above ground parts of the yellow meadow saffron (*Colchicum luteum* Baker) have been proposed for the isolation of colchicine and colchamine in our country. Corms are collected and stored in large quantities for the extraction which result in rapid depletion of the raw material sources. In order to investigate the effects of chitosan on germination and growth of corms of *Colchicum luteum* Baker, corms were treated *in vitro* with soluble chitosan at different concentrations including 0, 0.005, 0.015, 0.05, 0.15, 0.5, 0.75 and 1 g/l added to the MS tissue culture basal medium. Germinated corms were evaluated for growth parameters *in vitro* only. At the concentrations of 0.75 and 1 g/l of chitosan, the culture medium failed to solidify. Application of 0.5 g/l of chitosan increased the germination percentage, shoot fresh weight as compared to untreated, but its lower concentration did not significantly affect this trait ( $P < 0.05$ ). The 0.015 and 0.5 g/l of chitosan led to a significant increase in shoot length and dry weight of *in vitro* plantlets. The present results indicate that soluble chitosan can be successfully incorporated into culture medium for *in vitro* germination of *Colchicum* corms stored at room temperature over period of one year.

## **142. EFFECT OF BIOFERTILISERS AND NPK ON *ABELMOSCHUS ESCULENTUS* (L.) IN RELATION TO FRUIT YIELD**

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**Key words:** biofertilizer, macronutrients, micronutrients, yield.

A field experiment was conducted to find out the effect of biofertilizer and NPK revealed that yield attributes, fruits per plant increased up to 10921.0 kg/ha (10.921t/ha) at 30N:30P:30K kg/ha with the combination of dual inoculum of biofertilizer viz, *Pseudomonas striata* and *Azotobacter chroococcum* which was significantly superior than control, the yield was 4521.4kg/ha (4.52t/ha). Whereas with chemical fertilizers i.e. NPK (50N: 50P :50K kg/ha), the yield was 8000.93kg/ha (8.93t/ha). Thus the application of two strains of biofertilizer viz, *Pseudomonas striata* and *Azotobacter chroococcum* with NPK, results into higher yields i.e.10.91 t/ha. In *Abelmoschus esculentus* (L.).

### 143. SOIL-VEGETATION RELATIONSHIPS FROM NONGMAICHING HILL, MANIPUR

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**Key words:** Vegetation, Nutrient, Nongmaiching, Biochemical, Ecosystem, Profile.

Soil and vegetation form an integral part of the forest ecosystem. The nature of the soil is largely a function of vegetation it supports and the vegetation influences the physico-chemical properties of the soil to a great extent. Total concentration of major element in the soil is a good indicator of their availability to the plants. Their presence in soil profile provides good information towards the knowledge of nutrient and biochemical cycling of the soil- plant ecosystem. A study conducted at four plots of Nongmaiching hill forest revealed the presence of sandy clay loam, sandy loam, clay loam and sandy clay under different vegetation cover. The pH value ranged from 5.12 to 6.21, conductivity from 3.26  $\mu$  Mhos  $\text{cm}^{-1}$  a maximum to 8.7  $\mu$  Mhos  $\text{cm}^{-1}$  whereas the bulk density of surface soils ranged between 1.00-1.46  $\text{gm cm}^{-3}$ . The soil moisture content increased with season in the order R>W>S. The organic Carbon and Nitrogen values ranged from 1.20% (summer) to 3.69% (rainy) and from 0.151% (summer) to 0.316% (rainy), respectively. The value of soil phosphorous and potassium ranged from 0.005% (summer) to 0.018% in (rainy) and from 0.043% (summer) to 0.099% (rainy), respectively. The paper discusses the physico-chemical properties of soil in relation to vegetation structure and diversity present in the different forest types.

## 144. ASSESSMENT OF SOIL RESPIRATION UNDER VARIOUS LAND USE IMPACTS - A CASE STUDY FROM MANIPUR, NORTH-EAST INDIA

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**Key words:** Soil respiration, microbial respiration, root respiration, weather variables, CO<sub>2</sub> evolution

The evolution of carbon dioxide (CO<sub>2</sub>) from the soil is termed as soil respiration. Biological processes like microbial respiration, root respiration and micro-faunal respiration along with non-biological processes like chemical oxidation which is produced particularly at high temperatures are mainly responsible for release of CO<sub>2</sub> in the soil atmosphere. Soil micro-organisms such as bacteria and fungi play major roles in releasing CO<sub>2</sub> by metabolizing organic debris. In general, the rate of soil respiration is a measure of the metabolic activity of the soil and the study leads to the assessment of the organic matter input in the ecosystem, the flow of energy through microbial compartment and the rate of mineralization. Most of the reports on soil respiration have been conducted in temperate countries with only a few studies from tropics. In an experiment, soil respiration through an annual cycle was measured for Manipur, North East India (Latitude 23.03°N to 25.68°N and 93.03°E to 94.78°E) with four different land uses. Seasonal variation in rates of CO<sub>2</sub> evolution, the effects of vegetation and time of enclosure of ground area on the rate of soil respiration was determined. The relationship of soil respiration to certain weather variables was brought about and contribution of root respiration to total soil respiration was determined. Also the effect of alkali solution as well as absorption area on the amount of CO<sub>2</sub> trapped during the measurement of soil respiration was determined using alkali absorption method. It was found that there is a significant effect of concentration as well as the volume of absorbing solution on the measurement of soil respiration. A statistical method based on the relationship between the soil respiration and abiotic environmental factors was given. It was found out that calculated values of soil respiration simulate our results in most important aspects.

## **145. A COMPARATIVE STUDY ON SECONDARY METABOLITES & ANTIMICROBIAL ACTIVITIES OF NEEM LEAVES & NEEM SEEDS**

***(Azadirachta indica)***

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Neem plant belongs to Meliaceae and derived from Persian word “azadhirakt” which means “noble tree”; found in everywhere in the plains of India. Each part of the tree has some medicinal property and is thus commercially exploitable. Evaluation of antibacterial activity of different extract (prepared in chloroform, ethanol, methanol, distill water and n-Hexane solvent) of neem leaves and seeds against 10 organisms (*E. coli* 9002, *E. coli* 2567, *S. aureus*, *B. pumilus*, *B. subtilis*, *B. cereus*, *L. plantarum*, *S. epidermidis*, *S. abony*, *P. aeruginosa*) was done by well plate method. Along with biochemical screening of secondary metabolites and bitterness value assay with the help of different extracts were also performed and compared. It was observed that three extracts that were chloroform and ethanol extract of neem leaves as well as methanol extract of seeds observed higher antibacterial activity than other extracts. Biochemical test also clearly indicates the biochemical levels of neem leaves and seeds. Saponin was more in seeds than leaves whereas cardiac glycoside was more in leaves than seeds. Similarly tannin and flavanoid were present in leaves and terpenoid was present in seeds. In bitterness value assay, seed extract (1% bitterness value) was found more bitter than leaf extract (0.32% bitterness value). So this finding is in confirmatory with the existing data.

## **146. GENOTOXIC AND ANTIMUTAGENIC EFFECTS OF LEAF EXTRACT OF WITHANIA SOMNIFERA IN ALLIUM CEPTA TEST SYSTEM**

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The genotoxic and antimutagenic effects of petroleum ether leaf extract of *Withania somnifera* was evaluated using *Allium cepa* test system. Root tips of *Allium cepa* were treated with 5, 10, 15 and 20 mg/100 ml leaf extracts in petroleum ether as solvent for 3 hours. Distilled water was used as control. The germinated root tips were fixed in Carnoy's fluid I for 24 hours, squashed under coverslip for mitotic index and chromosomal aberration studies. The mitotic index frequency in control was 11.26% and in extract treatment, it was recorded as 5.51%, 6.50%, 7.61% and 8.62%, respectively. The cytological abnormalities recorded were chromatid bridges, clumped metaphases, arrested telophases and precocious chromosomes at telophases. The frequencies of chromosomal aberrations were 3.27%, 4.17%, 4.31% and 5.29%, respectively.

The mitotic index was significantly decreased in leaf extract of *Withania Somnifera* in petroleum ether as solvent compared to that of control. Chromosomal aberrations were significantly increased in 20 mg concentration. The data were analysed by T-test (independent samples). This assay may be used as an easy and inexpensive method to evaluate the antimutagenic potential of agents that could be useful for the development of new drug leads to combat cancer diseases.