

7.2. – BEST PRACTICES

7.2.1 RESEARCH CONSTITUTION :

Objective : To nurture Research demenor among students

Context : This practice is very well premediated by faculty of Dept. of Microbiology

Practice : Students are guided to conduct experiments based on recent projects as a project, keeping in view of requisite for publishing their work. This practice will continue in the coming academic year.

Evidence : Few students guided by faculty completed their project and content is published in renowned journals.

Problems encountered : No major issues

ASPIRING BOTANISTS CLUB:

Aspiring Botanists Club : This club is recently formed on 6th December, 2022. Students joining in this club are very active, regularly conduct activities for students in the college campus to create awareness about environmental, recycling methods conservation methods.

The club members adopt several trees on the campus, ensure proper watering, care during the dry months of summer. Weak saplings are preferred for adoption over healthy trees.

Aspiring Botanical club members arrange small coffee tables in SITKAMER (Small open spaces) and keep environment related books and beautiful pictures of plants, animals etc., herbariums, so that it helps the non – science students to know the beauty of environment surrounding them and how to protect and conserve it.

They take up the activity of clearing the tables and rearranging them everyday.

They arrange a board with a new plant everyday titled “KNOW THE PLANT” in an attractive manner which brings every ones attention towards it.

Science Everyday is another attractive and informative board setup by members the club, they write science related articles and news everyday.

RESEARCH CONSTITUTION :

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Sector - Environment
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'SWITCHING TO BIOFUELS'- A PROMISING ALTERNATIVE TO FOSSIL FUELS

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Any fuel that is derived from biomass is called as 'Biofuel'. The biomass includes plant or algae material or animal waste. Since such feed stock material can be replenished readily, biofuel is considered to be a source of renewable energy, unlike fossil fuels such as petroleum, coal, and natural gas. Thus, it can be a promising alternative fuel to fossil fuels. The reason to switch to biofuels is, the biofuels consumption and production ensures the natural carbon cycle to be 100%. Continuous increase in concentrations of carbon dioxide and other vehicular gases in the atmosphere have the greatest effect on the environment and lead to global warming. Biofuels can decrease the threat of global warming. If we take the example, a crop of plants used to produce a barrel of fuel will absorb exactly the same amount of carbon dioxide as emitted from burning the barrel produced. Types of biofuels include first generation biofuels-bio alcohol, biodiesel, vegetable oil, biogas, syngas and solid biofuels, in which bio alcohol and biodiesel are of importance. Production of biodiesel, biogas and bioethanol from various feedstock, several kinds of wastes, biomass and agricultural residues, is ecologically viable and a sustainable option. The involvement of biofuel in worldwide transportation fuels seems to be revolving



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286

TOXICITY OF METALS

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The metals belonging to the first transition series namely Cr, Ni, Zn etc. are very important with respect to their presence in any water bodies. Although some of these metal ions such as Cr, Zn and Mn are required as trace elements in the biological systems as they act as cofactors in some of the crucial enzymes, however when these metals are present in considerably higher concentration in water bodies they tend to act as toxicants. The toxicity of many metal ions may be so high that at times they become fatal.

Metals such as Pb, Hg, Cd, Al, Be etc. does not have any biological function and are highly toxic. These metal ions have the capacity to disrupt the bodily functions to very large extent by accumulating in vital organs and glands. In case of human body these metals have tendency to accumulate in liver, brain, heart, kidney and bone. Some of the metal ions have capacity to show displacement reactions where in other metals are replaced in the enzyme reaction. For example calcium can be displaced by lead or cadmium resulting in severe disruption of enzyme reactions involving calcium. Many metals possess the capacity to cause genotoxicity or immunotoxicity. Leonard S.S et al. have shown that metal can cause genotoxicity by affecting the DNA resulting in genomic instability that can induce cancer

Chromium, the metal ion under present study, can be detected in earth's crust in considerably small quantity; however, it is generally associated with other metals, particularly iron. Chromium can find its presence in the environmental waters through anthropogenic sources. Many human activities are the principal cause of the



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about blending percentage over the next decade. But many studies put forward that biofuel may share up to a one fourth of transport fuel supplies by 2050.

Globally consumption of energy has been almost doubled up in recent times and fossil fuels share more than 80 percent. As fossil fuel reservoirs are depleting fast, the exploitation of renewable resources for biofuel production is of utmost importance and may have lot of potential. Alternative cheap and environment friendly energy is the hot issue in today's world. Fossil fuels account for over 80.3% of the primary energy consumed in the world, and 57.7 % of that amount is used in the transport sector. The economics of biofuel is majorly determined by the value of the feedstock used for their production. For first-generation biofuel raw material price accounts approximately between 60 and 90% of the total production. The price competitiveness of biofuel to petroleum counterparts varies between countries and with the feedstock used. The "factory gate" price of Brazilian ethanol remained lesser than the "re-finery gate" price of gasoline in last decade. Both Brazilian and US ethanol remains expensive than gasoline on an energy equivalent basis. Sugarcane derived Brazilian ethanol is better competitive than US ethanol, but is still usually more expensive than gasoline. In case of biodiesel, it is more expensive than diesel, even though a liter of biodiesel provides around 14% less mileage than diesel.

Unlike petroleum, ethanol comes from renewable resources. It keeps cleaner burning characteristic as compared to gasoline; thus produces less greenhouse gases. Use of agro-industrial residues as raw material for ethanol fermentation, provides alternative substrates and also reduces carbon dioxide emissions with solution of their disposal problems. As ethanol is a biodegradable and comparatively highly soluble in water, has low toxicity risk. In case of any large spillage, far less danger for the environment than those associated with conventional oils. The potential of bioethanol production in totally non-aseptic environment makes the process easier to apply at industrial scale.

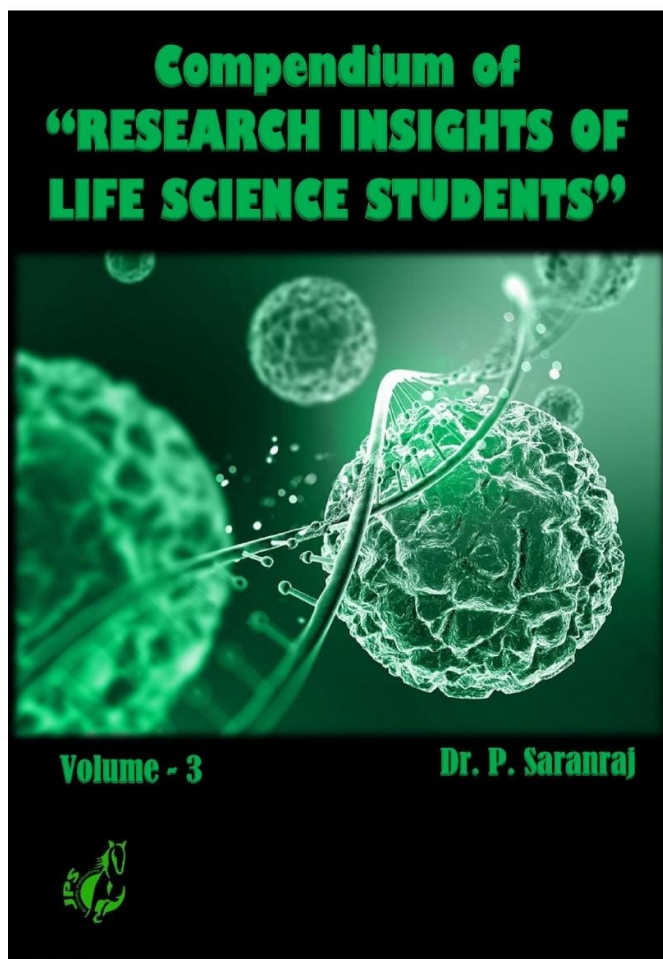
Advantages of using biofuels include biofuels like (bioethanol and biodiesel) can contribute to increased fuel efficiency, affordability, emissions, renewable, durability of engines like small engines found in mowers and chainsaws can use ethanol blends up to 10 % without problems, cars trucks can run on biodiesel. Nonetheless, there are some disadvantages of using biofuels which include production of carbon emissions certain studies have been conducted to analyse the carbon foot print of biofuels, and while may be cleaner to burn, there are strong indications that the process to produce the fuel including the machinery necessary to cultivate the crops and the plants to produce the fuel have hefty carbon emissions, food prices, food shortage, water use etc. Since traffic is one of the largest sources of

greenhouse gas that is carbon emissions, substituting fossil fuels with renewable alternatives like biofuels is an efficient way to reduce these emissions. Hence, biofuels help to enhance and safeguard energy security by reducing the world's reliance on fossil energy sources such as bio fuels.

presence of chromium in the water bodies. Leather tanneries, metal processing and chromium plating are responsible for the presence of chromium in the water bodies. Huang *et al.* have reported that electroplating factories, alloy preparation, wood preserving, petroleum refining, manufacturing of automobile parts and textile manufacturing units are also responsible for presence of chromium in water bodies apart from tanneries, metal processing and chromium plating units. The entry of chromium into ground water principally occurs by leaching from soil. Heavy metal such as Pb and Cd are not only toxic to human beings and other animals but are also toxic to Cyanobacteria and Algae. It is also suggested by them that Pb causes toxicity by binding on to the thylakoid or mitochondrial membranes. It is suggested that the membrane gets damaged resulting in a direct effect on photosynthetic activities.

Vymazal has given a different explanation of toxicity of Pb wherein he has attributed the Pb toxicity to the interaction of Pb ion with polyphosphate in the cells. The formation of Pb phosphate, which is insoluble in nature, results in its precipitation there by leading to loss of phosphate nutrients. The mechanism of toxicity of Pb and Cd are quite different from the mechanism of toxicity caused by the chromium. There are no reports of toxicity of chromium on cyanobacteria and algae. According to Adach and Cieslak - Golonka, Chromium (III) interacts with DNA, proteins and small molecules such as glutathione. This metal forms stable complexes with the ligands of the molecules of DNA and proteins. DNA polymerase processivity is increased by the DNA templates bound with Chromium (III), similarly Chromium (III) bound DNA templates results in decreased DNA replication fidelity. Such alterations in DNA function are implicated in adverse actions as they greatly increase DNA damage; hence these activities suggest the probable pro-mutagenic effect of Chromium (III) bound DNA. Human body and its metabolism are very unique therefore different metal ions have different toxic effects on human body. The increase anthropogenic activities and concomitant rise in consumerism has led to higher exposure of different metal ion to human beings. Aluminum is one metal that is in contact with human body through their presence in anticid, cigarette filters, dental amalgam and toothpaste, baking powder and beer etc. The excess exposure to aluminum may lead to neurofibrillary degeneration as well as neurodegeneration. As a result of this many diseases such as Alzheimer's, Anemia, Dementia, Neuromuscular disorder, Parkinson's disease, Kidney and Spleen disorder may occur. Another metal ion arsenic is also present in day to day useful items. For example, arsenic is found in coloring agent of wallpapers and toys, insecticides, rat poison and in the mixture to protect timber and hide from termites.

The exposure of arsenic is extremely toxic to human beings. The increase level of arsenic may lead to increase in the permeability of blood vessels, necrosis of intestinal mucosa and it may also interfere with the mitochondrial enzyme systems resulting in severe abdominal pain, anorexia, vomiting, liver, lung and skin cancers. Cadmium is comparatively less toxic than arsenic. Its presence can be seen in batteries, cigarette smoke, incineration of tyres, tyres remolding, plastic wares and soft drinks. Excess of cadmium exposures may cause liver and kidney damage, prostate dysfunction, bone disease and cancer. Other metal ion such as mercury, nickel, lead and zinc may also cause different levels of damages and toxicity for example mercury exposure may lead to adrenal dysfunction, damage to central nervous system and may cause hypothyroidism and nerve fiber degeneration. Exposure to nickel may cause kidney dysfunction, malfunctioning of hormone and lipid metabolism and at times may also cause intestinal cancer. Lead poisoning causes more severe neuro and psychological problems. The toxicity of lead may result in loss of coordination and concentration, decrease in IQ, long term memory loss, mood swing, sterility and infertility.



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All the best for his / her future endeavors

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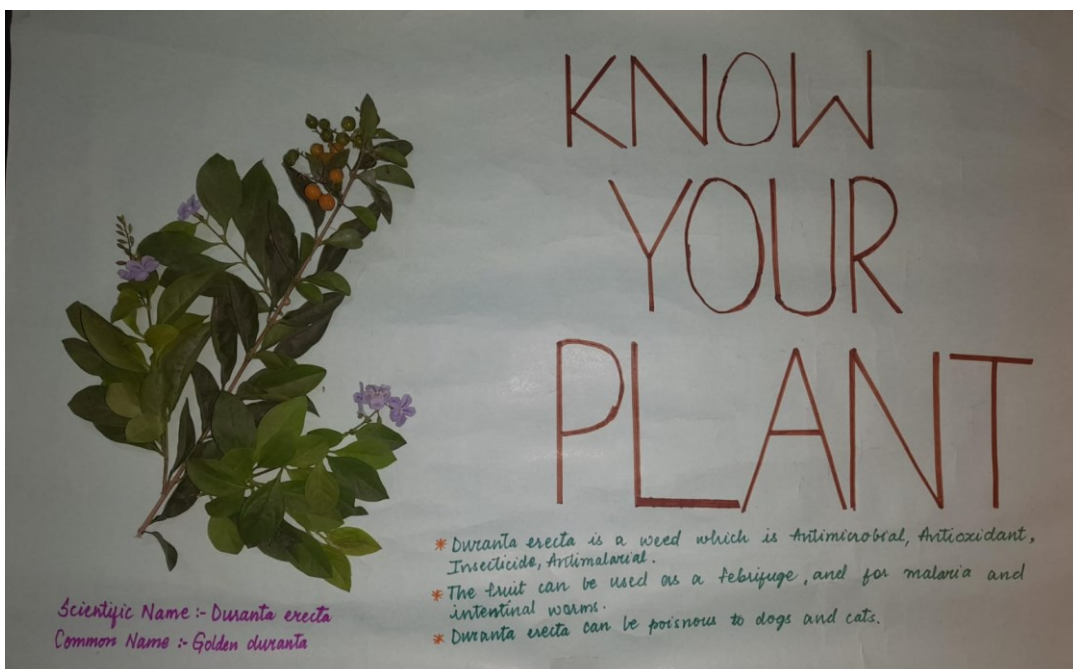


ASPIRING BOTANIST CLUB

Plant Adoption




Know Your Plant



Herbarium Sheets

15. Crossandra infundibuliformis



Herbarium Specimen
Dept. of Botany

Name of the College: IPGDC (Women) Nampally
S.no: 15 Date: 22/05/2022
Common name: Fire Cracker flower/Kanakambaram
Botanical name: Crossandra infundibuliformis
Natural order: Lamiales
Family: Acanthaceae
Collected by: T. Ramya Sri
Class: Bsc life science Ist year [Bt.B.2]
Locality: At home


8. Tecoma stans



Herbarium Specimen
Dept. of Botany

Name of the College: IPGDC (Women) Nampally
S.no: 8 Date: 24/05/2022
Common name: Yellow trumpet
Botanical name: Tecoma stans
Natural order: Lamiales
Family: Bignoneaceae
Collected by: T. Ramya Sri
Class: Bsc. life science Ist year [Bt.E
Locality: At home


6. Syzygium cumini



Herbarium Specimen
Dept. of Botany

Name of the College: IPGDC (Women) Nampally
S.no: 6 Date: 24/05/2022
Common name: Malabar or black plum/Neredu
Botanical name: Syzygium Cumini
Natural order: Myrtales
Family: Myrtaceae
Collected by: T. Ramya Sri
Class: Bsc life science Ist year [Bt.B.2]
Locality: Field


27. Nerium Oleander



Herbarium Specimen
Dept. of Botany

Name of the College: IPGDC (Women) Nampally
S.no: 27 Date: 22/05/2022
Common name: Oleander/Nerium
Botanical name: Nerium Oleander
Natural order: Gentianales
Family: Apocynaceae
Collected by: T. Ramya Sri
Class: Bsc. life science Ist year [Bt.B.2]
Locality: At home

28. Oxalis stricta



Herbarium Specimen
Dept. of Botany

Name of the College: IPGDC (Women) Nampally
S.no: 28 Date: 22/05/2022
Common name: Yellow wood sorrel
Botanical name: Oxalis stricta
Natural order: Oxalidales
Family: Oxalidaceae
Collected by: T. Ramya Sri
Class: Bsc. life science Ist year [Bt.B.2]
Locality: At garden

25. Bougainvillea Spectabilis



Herbarium Specimen

Dept. of Botany

Name of the college: IPGDC (Women) Nampally
 S.no: 25 Date: 22/05/2022
 Common name: paper flower/Bougainvillea
 Botanical name: Bougainvillea Spectabilis
 Natural order: Caryophyllales
 Family: Nyctaginaceae
 Collected by: T. Ramya Sri
 Class: BSc Life Science Ist year
 [Bt. B. 2]
 Locality: Garden

28. Rosa damascena celsiana



Herbarium Specimen

Dept. of Botany

Name of the College: IPGDC (Women) Nampally.
 S.no: 22 Date: 22/05/2022
 Common name: Rose
 Botanical name: Rosa damascena Celsiana
 Natural order: Rosales
 Family: Rosaceae
 Collected by: T. Ramya Sri
 Class: BSc. Life Science Ist year
 [Bt. B. 2]
 Located by: at home



HERBARIUM SPECIMEN
 DEPARTMENT OF BOTANY
 College IPGDC W
 S. No. 09 Date 17-06-20
 Common Name Hibiscus
 Botanical Name Hibiscus syriacus
 Natural Order Malvales
 Locality Street
 Collected by P. Meghana
 Hall Ticket No. 1101216003

Models on Environment

