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NESA Annual Award 2020 Notification No. 3 APPLICATIONS ARE INVITED date is extended to 30th Sept. 2020



(1) NESA FELLOWSHIP AWARD

AGE 45 and above. The recipients shall get Citation, Certificate, Memento and a Gold plated medal, and can suffix F.N.E.S.A. after their names.

(2) NESA EMINENT SCIENTIST AWARD

AGE 40 and above. The recipient shall get Citation, Certificate, Memento and a Gold plated medal.

(3) NESA SCIENTIST OF THE YEAR AWARD

AGE 35 and above. The recipient shall get Citation, Certificate, Memento and a Gold plated medal.

(4) NESA ENVIRONMENTALIST AWARD

AGE Up to 35 and above. The recipients shall get Citation, Certificate, Memento and a Gold plated medal.

(5) NESA GREEN TECHNOLOGY INNOVATIVE AWARD

AGE 35 and above. The recipients shall get Citation, Certificate, Memento and a Gold plated medal.

(6) NESA YOUNG SCIENTIST AWARD

AGE : Up to 35. The recipients shall get Citation, Certificate, Memento and a Gold plated medal.

(7) NESA JUNIOR SCIENTIST AWARD

AGE : Below 35. The recipients shall get Citation, Certificate, Memento and a Gold plated medal. a Gold plated medal.

PRESCRIBED APPLICATION FORMS

The application forms could be downloaded from www.nesa-india.org

Separate application form should be submitted for separate awards. The application forms are non-transferable and it can also be obtained by sending a bank draft of **Rs. 1000/- only** (per form). Drawn in favour of **NATIONAL ENVIRONMENTAL SCIENCE ACADEMY** payable at NEW DELHI.

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सतत शहरी भविष्य के लिए निर्मित आद्रभूमियाँ

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एक शुष्क रेगिस्तान के बंजर, हल्के रंग के निष्प्राण पर्यावरण में, एक जल स्रोत का दृश्य उतना ही सुखद लगता है जितना की किसी सूखे रेगिस्तान में राहगीर को ओएसिस का दिखना, जो उसमें उल्लास भर देता है। प्रकृति में झीलें, तालाब, कृत्रिम जल स्रोत, दलदल भूमियाँ तथा पीट भूमियाँ, आद्रभूमि पारीतंत्र हैं जो पर्यावरण में अभूतपूर्व सेवाएं प्रदान करते हैं, जिनका सही आकलन अभी किया जाना है। सभी शहरी क्षेत्रों में, आद्रभूमि क्षेत्र मानव जनित क्रिया-कलापों जैसे कि जनसंख्या वृद्धि, अत्यधिक उपभोग, प्रदूषण तथा विकास कार्यों के कारण घट रहे हैं। आद्रभूमियों के इर्द-गिद रहने वाले लोगों की बदलती जीवन शैली के कारण भूमिनीकरण की वजह से निचले क्षेत्रों में गाद का लगातार जमना तथा कई अन्य उतार-चढ़ावों ने आद्रभूमियों का क्षेत्र न केवल कम कर दिया है, परन्तु उन्हें प्रदूषण इकाइयों में भी बदल दिया है। शहरी क्षेत्रों में आद्रभूमियों की स्थिति चिंता का विषय है। पर्यावरण प्रबंधक, जीव-वैज्ञानिक संरक्षक तथा परिदृश्य डिजाइनर बहुत मेहनत से इन आद्रभूमियों के पुनः नवीकरण में कार्यरत हैं तथा इनकी निम्नीकरण प्रक्रिया को वापिस आद्रभूमि की स्वस्थ स्थिति की ओर मोड़ने का प्रयास कर रहे हैं।

शहरी क्षेत्रों में आद्रभूमियों का प्रयोग इस हद तक हुआ है कि विभिन्न निवेशों के बावजूद ज्यादा सुधार नहीं हो पाया है। अतः विश्व के कई स्थानों में आद्रभूमियों की संकल्पना को और सुधारने का कार्य लगातार गति पकड़ रहा है, तथा निर्मित आद्रभूमियाँ शहरी मास्टर प्लानों की आवश्यक घटक बन गई हैं। सभी शहरी प्लानों, नई विकास योजनाओं तथा परिदृश्य डिजाइनों में निर्मित आद्रभूमियाँ एक महत्वपूर्ण अंश के रूप में शहरी लेआउट प्लान तथा डिजाइन का हिस्सा बन गई हैं।

निर्मित आद्रभूमियों का निर्माण उन लैंड फार्मों में किया जाता है जहाँ सतही जल को छिछले पानी के बेसिनों में इकट्ठा करके, उनकी निचली सतह को अभेद्य बनाकर रिसने से रोका जाता है ताकि कई पारिस्थितिक एवं आर्थिक प्रकार्य हो सकें। उन स्थानों पर जहाँ केवल ऊँची इमारतें, औद्योगिक इकाइयाँ और सड़कें हैं निर्मित आद्रभूमियाँ इन क्षेत्रों की एकतानता तोड़ते हुए, इस साइट योजना का प्रमुख हिस्सा बनती हैं। इन्हें कृत्रिम रूप से इस प्रकार इंजीनियर किया जाता है कि वे प्राकृतिक आद्रभूमियों के समान विशेषताओं की हो सकें एवं प्रकार्य कर सकें, साथ ही विविध पेड़-पौधों, जीव-जंतुओं और माक्रोबियल समष्टियों का आवास बन सकें। कई क्षेत्रों में छोटी-छोटी आद्रभूमियों की निचली सतह को जल के प्रति सील की गई बेसिनों में वर्ष भर के लिए इकट्ठा किया जाता है। इन निर्मित आद्रभूमियों को आकर्षक बनाने के लिए, उनका डिजाइन उनकी प्राकृतिक साइट की परिरेखा के मुताबिक वक्र आकार का बनाया जाता है।



वर्तमान संदर्भ में निर्मित आद्रभूमियाँ अधिकतर उन शहरी तथा शहरी क्षेत्रों में बनाने की आवश्यकता है जहाँ मानव बस्तियों के कारण वहाँ की प्राकृतिक आद्रभूमियाँ विलुप्त के कगार पर पहुँच चुकी हैं। इस प्रकार बनाई गई आद्रभूमियाँ ठोस कचरा प्रबंधन तथा अन्य प्रदूषकों के विघटन में सहायक हो सकती हैं। भू-जल रिचार्ज तथा प्रदूषण भार कम करना-निर्मित आद्रभूमि का अति महत्वपूर्ण कार्य है। इसके अतिरिक्त, सीवेज जल का उपचार तथा कृषि क्षेत्रों से ठोस एवं तरल अपशिष्टों का भी निपटान सुनियोजित प्रकार से किया जा सकता है। निर्मित आद्रभूमियाँ प्राकृतिक पारिस्थितिकी तथा अनुक्रमण के अनुसार कार्य करती हैं तथा इनमें वित्तिय निवेश भी बहुत कम होते हैं। इसमें लागत केवल आद्रभूमि निर्माण प्रोजेक्ट के आरंभ में होती है जिसमें क्षेत्र का सटीक माप, गहराई तथा अन्य हाइड्रोलॉजिकल मापदंडों को नोट किया जाता है।

निर्मित आद्रभूमि का डिजाइन हाइड्रोलॉजी के सिद्धांतों के अनुसार इस प्रकार किया जाता है कि आद्रभूमि में होने वाली प्रक्रियाएं एक दूसरे से ठीक उसी प्रकार हों जैसे की प्राकृतिक आद्रभूमि में होता है। यह मुख्य सिद्धांत किसी भी निर्मित आद्रभूमि की सफलता या विफलता का प्राथमिक कारण है। यदि निर्मित आद्रभूमि का क्षेत्र बड़ा है, तो यह ध्यान में रखना ज़रूरी है कि उसकी उथली गहराई में मिट्टि का जमाव तथा सबस्ट्रेट लेवल की लगातार मानिट्रिंग की जाए। निर्मित आद्रभूमियों में मैक्रोफाइट्स तथा माइक्रोफाइट्स इसका पारिस्थितिक मूल्य बढ़ाते हैं। निर्मित आद्रभूमियों में जितने अधिक विविध प्रकार के पेड़-पौधे होंगे, उसके परिदृश्य का मूल्य उतना ही बढ़ेगा। निर्मित आद्रभूमियों में लैंडफार्म के किनरों पर लगाए गए विविध आकार, रंग, साइज़ एवं छितराव वाले पेड़-पौधों से आद्रभूमियों का सौंदर्य काफी बढ़ जाता है। पिछले कुछ दशकों से निर्मित आद्रभूमियों के निर्माण में नई तकनीकों का उपयोग हुआ है जिससे आद्रभूमि के जल के शुद्धिकरण की दर को बढ़ाया जा सका है। इस प्रकार निर्मित आद्रभूमियाँ अब लगभग स्थाई इकाइयाँ बन गई हैं जो कि न केवल प्रदूषण उपचार इकाइयों का कार्य करती हैं, साथ ही उनसे दृश्य अपील भी बढ़ी है जिससे लोगों को काफी मानसिक सूकून मिलता है।

समकालीन परिदृश्यों में निर्मित आद्रभूमियाँ शहरी क्षेत्रों में हुए निर्माण के कारण हीट आइलैंड प्रभाव, तथा ग्लोबल वार्मिंग को कम करने में मदद करती हैं तथा वायु की गुणवत्ता भी बनाए रखने में सहायक हैं। यह लाभ दोनों स्पष्ट तथा अस्पष्ट हैं। आने वाले समय को ध्यान में रखते हुए, निर्मित आद्रभूमियों के निर्माण एवं रख-रखाव के लिए पारिस्थितिक कविदों, इंजीनियरों तथा रणनीतिक योजनाएं बनाने वालों के सुझाव तथा मार्ग दर्शन ज़रूरी हैं। इन लाभों को देखते हुए क्यों न आद्रभूमि दिवस को निर्मित आद्रभूमि के रूप में मनाएं?

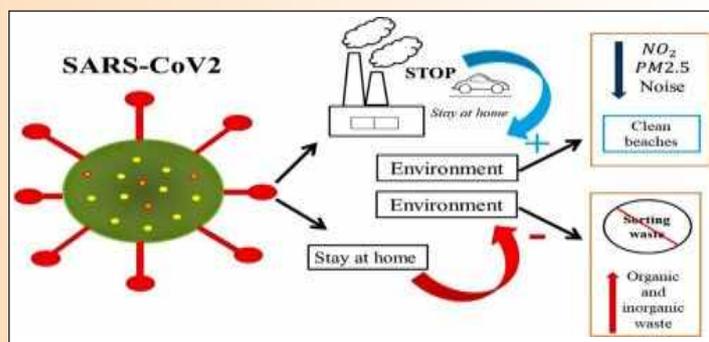
CORONAVIRUS PANDEMIC: ITS IMPACT ON THE ENVIRONMENT

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COVID-19 is the highly contagious disease where CO stands for Corona, VI stands for Virus, D stands for Disease and 19 is the year of existence of coronavirus in this world. The COVID-19 has had a noxious impact on human beings. This disease proliferates through direct and indirect contact by one person to another person. It has a deleterious impact on the respiratory system of the human body. The ordinary symptoms of COVID-19 are incommodious breathing, fever, nausea, fatigue and coughing. This disease can lead to cytokine storm, pneumonia, septic shock, respiratory failure and even irretrievable damage, death also. The only method of preventing this disease is to protect oneself from any direct exposures and practice respiratory and hand etiquettes. Research, in today's day and age with the latest technology available, is going on at a fast pace to discover the medicament and specific vaccines for the treatment of COVID-19.

In this universe, everything has it is positive as well as negative impacts too. The environment around us plays a major role in the health and well being of an individual. Living in a clean and healthy environment is the perfect solution for a healthy life but man due to his activities and indiscriminate activities have destroyed the environment largely to make his own life miserable." WITH " Living in a clean and healthy environment is the perfect solution for a healthy life but man due to his destructive and indiscriminate activities have destroyed the environment largely to make his own life miserable.



<https://www.sciencedirect.com/science/article/pii/S0048969720323305>

POSITIVE IMPACT OF PANDEMIC

Decreased pollution level: The level of pollution in the environment is massively lessened. As reported by the World Health Organization (WHO), globally the death of about seven million people has been attributed to pollution. Pollution is the introduction of impure materials into the environment which makes it filthy, causes noxious effects and leads to atrocious alterations. The atmosphere is immaculate, water in the water bodies is pristine, boosting in the air quality and reduction in the unwanted noises.

Conservation of fossil fuels: Fossil fuels are used for the unceasing running of the machines. The functioning of industries, airlines, public transportation and marine transportation has been interrupted which has led to a decrease in the emissions due to fossil fuels. They have drastically dropped by 10 per cent globally.

Decrease in concentration of greenhouse gases and carbon dioxide: According to the report by the World Meteorological

Organization (WMO), a short-term reduction of the greenhouse gases in the environment has been observed. The sharp decrease in the concentrations of nitrogen dioxide globally has been about 40 per cent. Countries like China, Spain, Italy, the United Kingdom and the United States of America have reported the drop in the concentration of nitrogen dioxide. There has also been a massive fall in the emissions of carbon dioxide in the environment. The emissions of carbon dioxide in China is reduced by 18 per cent and globally, the emission of carbon dioxide has reduced by about 17 per cent. A major contribution to this reduction is the decreased consumption of fossil fuels.

Immaculate beaches: Beaches are the crucial assets for the visitors and native for roaming on the coastal areas. People are banned for stepping out to go on the beaches during this pandemic. The business on the beaches is closed which has led to no more trash on the shores. There is a decrease in plastic pollution along the shores and thus the beaches are immaculate.

NEGATIVE IMPACT OF PANDEMIC

Plastic pollution: Plastic production is getting booster day by day during this pandemic. Plastic itself is a threat but now it's gotten worse after this pandemic. During the lockdown phase, the use of packaged goods has multiplied. The production of plastic is more than what is being recycled. The empty plastics bottles, packing stuff and other plastic materials are of no use and only accumulate to a waste. Plastic sustains in the environment for long durable times.

Soil pollution: As factories have shut down thus there is no recycling process in progress. The accumulated waste is dumped as trash in the soil. The deposition of waste on the land leads to abandonment of the soil. The garbage remains there for longer periods which affects the environment. The soil of the land becomes infertile over a period of time. During this pandemic, there is a minimum number of ways to dispose of garbage (other than recycling) except landfills.

Air pollution: For the treatment of corona victims, the doctors and medical staffs wear gown, gloves, masks and face shields. This personal protective equipment (PPE) is worn only once, as it can carry infection to others if used repeatedly. In advanced countries, the incineration method is being used to dispose of this PPE. They are burnt at very high temperature of approx. 850-1100C through gas disinfection equipment. The combustion of PPE is a convenient and economical method but can be the cause of air pollution.

Water pollution: The wastewater treatment plants are shutdowns due to this pandemic, so water disinfection and purification process are restricted. The wastewater is directly drained into the water bodies without actual treatment. The hazardous household waste such as household cleansers and body cleansers containing different chemicals, enter water bodies causing water pollution.

Increased waste production: The production of medical waste has achieved its heights during the pandemic. Some countries like China, Wuhan generated about 40-240 tons of waste per day. The waste materials include disposable waste like aprons, gowns, masks, gloves, boots, face shields, tissues, sanitizer and empty IV containers from the hospitals on a daily basis which are used only once as well as the household waste which includes hazardous and non-hazardous discharge from the houses. The purchasing of grocery products and online shopping has proliferated which generates a lot of packaging waste material.

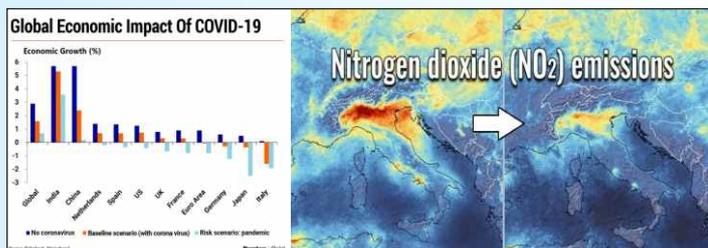
Impact on Education: As reported by the United Nations Educational, Scientific and Cultural Organization (UNESCO) data, the closures of school in about 190 countries have affected over 1.57 billion students. The half of world students population

is not able to attend their colleges, schools, institutions and universities due to this pandemic. The students who want to go to other countries for higher education are affected. To reduce this impact on education and academic delivery the educational institutions have started working towards the conduct of online classes. This also causes mental stress as well as stress on students' eyes due to continuous watching on the screens for a long duration.

Impact on wildlife: The wildlife sanctuaries, national parks and marine life are left unmonitored as the safety guards must stay back at their homes due to the restrictions being imposed. In some of the countries, it has been reported that the animals were found wandering around the streets. The consequences of the decrease in monitoring in these areas cause an increased risk of illegal hunting of wildlife and fishing.

Increase in unemployment: As estimated by the International Labour Organization (ILO), jobs of more than 25 million employees globally, are threatened. The rise in the rate of unemployment is at a peak in the developing countries, especially in India. In our country, the lockdown phase has had a drastic impact on jobs which lead to poverty and other concerns which indirectly affect the environment.

Economic crisis: According to the United Nations Department of Economic and Social Affairs (UNDESA) analysis, an overall 1 per cent reduction in the worldwide economy has been predicted for this year. International trade and supply have been restricted globally by the almost 100 countries during the unprecedented



Dissecting COVID-19

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On December 31 2019, hospitals in Wuhan, Hubei province, China reported on a cluster of cases suffering from pneumonia of unknown cause. Two weeks later new variant of corona virus was identified, which was named 'severe acute respiratory syndrome corona virus 2' (SARS-CoV-2). Over the next few weeks, it spread to 18 countries and on January 30, 2020, the World Health Organisation (WHO) declared the outbreak to be a Public Health Emergency of International Concern (PHEIC). Subsequently, on 11th March, it was declared a pandemic as it had spread to 113 countries.

Corona virus is a positive-single stranded RNA virus having a crown like appearance seen under electron microscope due to the presence of spike glycoprotein on the envelop. The first stage of infection involves binding of viral spike proteins with specific receptors expressed on host cell surface. Mutation rate of Corona virus is very high because of



lockdown. The startups and small business have also been brought to a halt due to the coronavirus crisis.

CONCLUSION

The positive impacts of the coronavirus on the environment is temporary, not long-lasting. Although the positive impacts are boosting to the environment which is possible only after shutting all factories. The negative impacts of coronavirus are also huge which will carry a long-term impact for the times to come. These negative impacts are having a terrible effect on the environment as well as human beings. We need to work towards a long-lasting betterment of the environment and its impact on living beings to be able to survive the pandemic and the life after that.

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constantly developing transcription errors and RNA dependent RNA-polymerase jumps. When it infects any animal host it uses its own reverse transcriptase to convert the RNA into DNA to cope up with the animal system. The virus does so in human system too.

Common symptoms of COVID infection are fever, dry cough and tiredness. But people who do not have those symptoms does not means you are not affected, there are a lot of COVID positive cases has been found with no such symptoms. So to protect ourselves from infection we have to take some preventive measures. The virus resides at throat after entering our body then gradually it reaches our lungs. But if we drink lots of water then it will enter the stomach where the acidic environment is efficient enough to kill the virus. Normally NaCl solution is isotonic, but if we add a bit extra salt in water it becomes hypertonic. If we gargle regularly with such hypertonic solution it will exclude out the virus from throat region and prevent it to reach lungs. Again maintaining social distancing and self quarantine is also important. If going out from home is extremely necessary do not forget to wear mask and gloves and body covering clothes. After coming back mask and gloves has to

be disinfected and our hands, mobiles etc has to be sanitized.

Two most important things to focus on to deal with a pandemic is firstly, how to control the pandemic right now and secondly, how to prevent it from further occurrence. In case of COVID-19 pandemic invention of medicine can serve the first purpose and to deal with the second one inventing vaccine is important. So by judging the current situation when the virus has already affected almost 4.5 million people the first priority is to discover the medicine.

As the mutation rate of COVID is too high first important thing is to find out which part of its gene is not mutating by studying each and every case of mutation. If any gene sequence is found which is not changing then the function of that specific sequence in viral action has to be determined. It is a RNA virus so for its functional enzyme is a must. By blocking it, the viral severity can be prevented. Different base analogs and drugs has to be tested to see their impact on RT enzyme of COVID. The thinking can be like

this for designing a medicine. Again, another important thing to be remembered while designing a medicine is that the medicine has to be antiviral as well as antibacterial, to prevent co infection of bacteria along with virus.

The virus mainly reside in upper respiratory tract and affect proper lung function along with the fact that there are some patients for whom injecting the drug through blood is difficult. So keeping everything in mind the medicine can be given to the patient through pumps like inhalers. If medicine is given in this way its action against virus should be fast too.

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EACH ONE PLANT ONE



E-WASTE: DISPOSAL AND ITS IMPACT ON HUMAN HEALTH

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Introduction

Electronic industry is the world's largest and innovative industry for its kind. Every year tons of electronic items are shipped over oceans, however, after their usage time they are become a complex



waste matter which consists of many hazardous heavy metals, acids, toxic chemicals and nondegradable plastics. Many are dumped, burnt or exported to recyclers. However, about 75% of e-wastes are uncertain for their use or finding ways to use them which includes refurbishment, re-manufacture and reuse their parts for repair etc.

While others are junks occupying usable space at houses, apartments, firms and industries. Most e-recyclers were exporting the toxic materials such as leaded glass, circuit boards, and mercury lamps usually to China, Africa and India. Dismantling process takes much labor, in countries like China and some parts of India there are tones e-wastes junked and dismantled; dismantling is not only involve in unscrewing but also shredding, tearing and burning. The smoke and dust particle consists of carcinogens and other hazardous chemicals which causes severe inflammations and lesions including many respiratory and skin diseases. Circuits are burnt to hunt the valuable metals such as gold, platinum, cadmium but the wire coat of those consists of PVC and PCB which may produce erotic smoke, and carbon particles from the toners are carcinogens, they may lead to lung and skin cancer (Kevin *et al.*, 2008).

Table 1: Classification of e-waste in India.

S. No	Category	Equipment
1.	Information Technology and Telecommunication Equipment	Centralized data processing, mainframes, mini computers, personal computers (including CPU), laptops, notebook, notepad, printers including cartridge, copying equipment, electrical and electronic typewriters, telex, facsimile, telephones (including mobiles and cordless)
2.	Consumer electrical and electronics.	Television sets (including, LCD and LED screens), refrigerator, washing machine, airconditioners, centralized air-conditioning plants.



Disposal methods of e-waste

Currently following methods are used to get rid of e-wastes. They are Incineration, Acid baths, Landfills

Landfills: E-wastes ending up as landfills are described as toxic time bomb. They may release to the environment after several years by natural means, and there is a possibility of leaching of wastes such as batteries releases acids and heavy metals mercury, nickel and cadmium, electronic circuits have lead, zinc, Nickel, Copper, Mercury and cadmium. These may reach the land water and reaches animals and humans, and mixes with other fresh water sources such as rivers and streams. Almost half the e-wastes of US and Australia are dumped as landfills while the rest are exported to Asia and Africa.

Acid baths: Acid bath method is used to extract Copper, here the circuit board is submerged in to Sulfuric acid for about 12 hours to dissolve Copper then solution is boiled, precipitated Copper Sulfate is taken and remaining solution is added with scraped particles, subsequently Copper smudges are removed. Acid baths also used to dissolve the lead and in the extraction of Gold and Silver.

Incineration: Incineration also includes pyrolysis; substances generated during incineration are likely to be more toxic than its ordinary form, pyrolysis heating the substance in the absence of oxygen, here the burning does not occur but the substances are converted to fumes, oils and charcoal. However, in gasification limited air is given to convert the substances into fume, ash and tar. Incineration is a commonly used method of the dispersal of e-waste in China, Africa, India and Pakistan. When heating the plastic or PVC circuit board it releases erotic fume consists of Polycyclic aromatics (PCA), polychlorinated dibenzo-para-dioxins (PCDDs) and polychlorinated dibenzofurans (PCDFs) which are known carcinogens and gases such as carbon monoxide, sulfur dioxide, nitrogen oxides. Smoke also consists of minor quantities of oxides of following heavy metal residues antimony, lead, thallium, arsenic, copper, manganese, mercury and nickel, reminder ended up in the ashes.

Impact of products from e-waste in human health

There are chances of accidents like cuts and burns during the dismantling, shredding, acid baths and incineration process, in addition, exposure to following chemicals have many long-term effects. Phthalates such as DEHP in tis monomer form effects the development of testis, Butylbenzyl phthalate (BBP) and dibutyl phthalate (DBP) also hazardous to reproduction exposure to phthalates in pregnancy reduces ano-genetal index in male child (distance between anus and genitals) (Swan et al. 2005), DINP and DIDP (diisodecyl phthalate) effects liver and kidneys. Chlorinated

compounds includes Polychlorinated biphenyls (PCBs), PCB accumulates in fishes and other organisms and undergo bioaccumulation which result in high value in top level carnivore such as humans, PCB also absorbable via skin and inhaled or ingested causing neurotoxicity, liver damage, tumors, immunosuppression and behavioral changes, and reproductive disorders, abnormal sperms (Allsopp *et al.* 1999).

Chlorobenzene causes acute and chronic effects in mammals, effects CNS (central nervous system), liver and thyroid. Increasing degree of chlorination such as tetrachlorobenzenes also affects kidneys. Hexachlorobenzene(HCB) are group 2B carcinogens it damages immune system, liver, thyroid, CNS, kidney and nervoussystem (van Birgelen 1998). It is also reported the bioaccumulation of HCB. Polybrominated diphenyl ethers (PBDEs) is an environmentally persistent compound, which is also reported in bioaccumulation, it causes abnormal brain development during the initial development of a fetus, it also associated with impacts on learning, memory, behavior and thyroid, oestrogen hormone systems and effecting the immune system (Legler & Brouwer 2003).

When PBDEs are burnt they produce brominated dioxins/furans which are similarly hazardous. Triphenyl phosphates (TPP) are a contaminant in human blood (Jonsson et al. 2001), potent inhibitor of a key enzyme (monocyte carboxyl esterase) in human blood cells (Amini& Crescenzi 2003). Heavy metals such as lead may produce irreversible effects; it affects nervous system, blood, reproductive system and kidneys, it affects brain development in children (Canfield et al., 2003). Cadmium is a toxicant which can accumulates in tissues, exposure may affect kidneys and bones (WHO 1992), it disrupts calcium mechanism, causing hypertension and heart diseases Cadmium oxide in fume affects the respiratory system (WHO 1992), in addition it is a carcinogen causing lung cancer. Antimony is a toxic compound causing dermatitis, affecting skin cells and respiratory tract and affects the immune mechanism (Kim et al., 1999). It is also stated as possible carcinogen by International Agency for Research on Cancer (IARC 1989). Mercury results in respiratory and skin disorders and causing chronic damage to brain. Chromium is a known carcinogen it affects the DNA and causing asthmatic bronchitis. Barium causes damage to heart, spleen and liver also causing muscle weakness, Beryllium is a carcinogen causing lung cancer inhalation also causes chronic disease beryllicosis and resulting skin warts (Ramachandra and Saira Varghese, 2004), free Carbon radicles are carcinogens.

Conclusion

Public awareness and cooperation of manufactures are essential for the advancement of e-waste management system. And also it is the responsibility of governments to allocate sufficient grants and protecting the internationally agreed environmental legislations within their borders. Licensing of certification like stewardship may ensure the security to prevent illegal smugglers and handlers of e-waste. Basel Action Network is now working at their best to stop or control trans boundary e-waste movements, they also involved in conducting public awareness programs to enlighten the world community and opening research areas to find better methods or alternatives. As e-wastes are the known major source of heavy metals, hazardous chemicals and carcinogens, certainly diseases related to skin, respiratory, intestinal, immune, and endocrine and nervous systems including cancers can be prevented by proper management and disposal of e-waste.

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FLOWER POWER OF MEDICINAL PLANTS

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Medicinal plants, also called medicinal herbs, have been discovered and used in traditional medicine practices since prehistoric times. Plants synthesise hundreds of chemical compounds for functions including defence against insects, diseases, and herbivorous mammals. Numerous phytochemicals with potential or established biological activity have been identified. However, since a single plant contains widely diverse phytochemicals, the effects of using a whole plant as medicine are uncertain. But when we take a commercial look we concentrate towards single part of the plant such as leaf, flower, fruit, bark, root etc. which has higher concentration of phytochemical of human interest. For several centuries, medical practitioners have long acknowledged the therapeutic properties of certain flowers. More than just spanning time, this knowledge also spans many cultures around the world. One of the greatest advantages is that flowers and plants offer completely natural medicinal properties, often without the scary side effects that modern pills and medications bring on. Furthermore, remedies made from flowers can be much cheaper than drugs marketed by pharmaceutical companies.

Medicinally important flowers:

Abutilon indicum/Abutilon asiaticum (Indian abutilon, Indian mallow)

It is a small shrub in the family Malvaceae, native to tropic and subtropical regions and sometimes cultivated as an ornamental. It

is found in Karnataka and Tamil Nadu. The flowers are used to increase the volume of semen in men. Flower paste is applied to boils and ulcers. (Patel et al. 2013)

Acacia arabica (Babul)

Belongs to the family Mimosaceae, is a tree 5-20 m high with a dense spheric crown, stems and branches usually dark to black coloured, fissured bark, grey-pinkish slash, exuding a reddish low quality gum. The flowers are yellow in colour. The flowers are reported to reduce the body temperature. These are also used in earache and as a tonic, antidiarrhoeal, antidiysentary.



Rosa damascina:

In herbal medicine, we use the petals and fruit (rosehips) of the rose. Rose petals are mildly sedative, antiseptic, anti-inflammatory, and anti-parasitic. They're also mild laxatives, a good supportive tonic for the heart, and great for lowering cholesterol. The antiseptic nature of rose petals makes them a wonderful treatment for wounds, bruises, rashes, and incisions. Taken internally, their anti-inflammatory properties make them a wonderful treatment for sore throats or ulcers. They can stimulate the liver and increase appetite and circulation.



Aromatherapy

Aromatherapy, also known as essential oil therapy, is a holistic practice that uses plant extracts to promote health and well-being. Practitioners of aromatherapy believe that inhaling essential oil or absorbing it through the skin transmits signals to the limbic system (a region of the brain responsible for emotions and memories). Doing so can induce physiological effects, including a reduction in blood pressure, heart rate, and respiration as well as an increase in "feel-good" hormones like serotonin and dopamine.



Rose oil is one of the most commonly used essential oils that some believe have anxiolytic (anxiety-reducing) and aphrodisiac properties. When applied to the skin, rose oil may help relieve pain and inflammation while improving the overall quality of the skin. Rose oil is also one of the most

widely used essential oils in the manufacture of perfumes and fragrance products

Jasminum spp.

The *Jasminum* species, primarily represented by *Jasminum officinale* L., and royal jasmine, *Jasminum grandiflorum* L., are an important source of natural fragrances. Poet's jasmine, also known as white jasmine, is native to the Himalayas of western China. The vine-like plant reaches a height of 10 meters, and has ovate leaves and clusters of fragrant white flowers that bloom in summer and fall. Royal jasmine, also known as Catalonian and Spanish jasmine, grows similarly to poet's jasmine but has leaflets of a different size, shorter branches, and larger flowers. This jasmine is most valued for its fragrance and is the most extensively cultivated. As a medicinal plant, jasmine has traditionally been considered an aphrodisiac and calmative. The oil contains benzyl acetate, terpineol, jasmone, benzyl benzoate, linalool, several alcohols, and other compounds. Jasmine is generally recognized as safe for human consumption as a plant extractive or essential oil.



Nelum bonucifera Gaertn.



It is a potential aquatic crop grown and consumed throughout Asia. All parts of *N. Nucifera* have been used for various medicinal purposes in various systems of medicine including folk medicines, Ayurveda, Chinese traditional medicine, and oriental medicine. Many chemical

constituents have been isolated till the date. However, the bioactive constituents of lotus are mainly alkaloids and flavonoids. Flowers were used to treat diarrhea, cholera, fever, and hyperdipsia. The stamens of the flowers are used for bleeding piles and debility and weakness in children. The flowers with stamens and juice of flower stalk are used for diarrhoea, cholera, fevers, liver complaints, and as a cardiac tonic. The flower is made into syrup and given for coughs, dysentery and to check haemorrhages from bleeding piles. The ground petals are administered for syphilis in Malaya. The milky juice of the leaves and flower stalk is given for diarrhoea. In China and Malaya the dried petals and stamen of the pink flower variety are used as a cosmetic to improve the complexion. Also, the flowers are used as cooling and astringent agents. The flower beverages are used to treat cancer, weakness and body heat balance.

Chrysanthemum indicum:

These flowers are used to treat stomatitis, burning sensations, urinary discharges, gleet, lumbago, in obstructive affections of the brain and calculus and to remove depression states. It has been used in conjunction with black pepper for gonorrhoea. Flower heads infusion is said to be frequently applied as collyrium in eye affections. Also administered for sore eyes and for the internal or external abdominal inflammations. The flowers are applied on the skin to treat leprosy. It also used as a heat-clearing and detoxifying herb.



Cochlospermum gossypium

The flowers consist of stimulant properties. The powdered flower is given to children in empty stomach to improve immunity and memory power in children.

Hibiscusrose-sinensis

The flowers possess anti-spermatogenic, androgenic, anti-tumour, anti-diabetic and anticonvulsant activities. Shoe flowers are used as an expectorant for bronchitis, paralysis, dysmenorrhoea and cough. Flowers are eaten with papaya seeds to cause abortion.



Impatiens balsamina (Jewel weed)

The flowers are having cooling, demulcent and tonic effect, anti-anaphylactic and anti-hypotensive properties. The alcoholic extract of flowers has antibiotic activity against, *Fructicola* and other pathogenic fungi and bacteria and the methanolic extract of the flowers has anti-tumour promoting activity, peripheral and central anti-nociceptive activity.

Ixora coccinea

The aqueous flower extracts have also shown anti-diarrhoeal activity against a castor oil induced diarrhoea model in rats and alcoholic extract has shown wound healing activity in dead space wound model in rats. The methanolic extract was reported to possess the analgesic, anti-inflammatory, antiulcer, fairness and broad-spectrum anti-microbial activity



Nymphaea stellate (Water lily)

The flowers are used as an astringent, cardiac tonic and febrifuge. Filaments are graded as useful in burning sensations of the body since they possess cooling and astringent properties. These are used to treat bleeding piles and menorrhagia and constitute an ingredient of cooling medicines for cutaneous ailments. Carefully dried fragrant stamens act as diuretic and are used for flavouring tea

***Punica granatum* (Pomegranate)**

The alcoholic extract of pomegranate flowers possesses a potent free radical scavenging, antioxidant and hepatoprotective activities.

Pomegranate with durva root juice is given to stop bleeding from the nose.

The rind of the fruit and flowers combined with aromatics (clove, cinnamon etc.) Flower buds bruised are given to relieve fever, cough and bronchitis. The juice is effective in reducing burning sensation in the chest and lessening the blood heat.

Conclusion

It was revealed that there are many flowers with valuable therapeutic effects. Traditional medicine systems prevailing all over the world have made use of these flowers with therapeutic effects to cure so many diseases. The review of medicinally important herbal flowers provides knowledge and pharmacological leads which will help for the well being of the human beings. Although there are phytochemical studies done to identify the chemical compounds on some flowers, chemical composition of many flowers remains unrevealed. So further research work need to be carried out to explore the medicinally important flowers.

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FLY ASH AND ITS UTILIZATION**S. Shenbagavalli**

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India is the third largest producer of coal and coal based thermal power plant installations in India contribute about 70% of the total installed capacity for power generation. However, the bituminous and sub-bituminous coals used contain over 40% ash content. At present, 120-150 million tons of coal fly ash is generated from 120 existing coal based thermal power plants in India (Lokeshappa and Dikshit, 2011). Coal fly ash is an industrial waste generated from coal combustion process in thermal power plants. It is a fly ash, a coal combustion residue having a complex heterogeneous mixture of amorphous and crystalline phases and is generally fine powdered ferroaluminosilicate material with Al, Ca, Mg, Fe, Na and Si as the predominant elements. The coal fly ash also contains significant amounts of toxic metals such as As, Ba, Hg, Cr, Ni, V, Pb, Zn and Se characteristically enriched in coal fly ash particles (Adriano, 1980). The coal fly ashes occupy more space in the premises of



industrial plants and are mixed with water to discharge into fly ash settling ponds or landfills. Large quantities of coal fly ashes are stored in the form of waste heaps or deposits, whose contamination poses a serious threat to the environment as a major source of inorganic pollution. The behavior of many metal pollutants and the release of such metals during storage can have deleterious effects on the environment as well as on human health.

Fly Ash, an industrial by-product from Thermal Power Plants (TPPs), with current annual generation of approximately 112 million tones and its proven suitability for variety of applications as admixture in cement/concrete/mortar, lime pozzolana mixture (bricks/blocks) etc. Cement and Concrete Industry accounts for 50% Fly Ash utilization, the total utilization of which at present stands at 30MT (28%). The other areas of application are Low lying area fill (17%), Roads & Embankments (15%), Dyke Raising (4%), Brick manufacturing (2%) and other new areas for safe disposal of fly ash is in paint industry, agriculture etc [8].

FLY ASH UTILIZATION

During the last 30 years, extensive research has been carried out to utilize the fly ash in various sectors, as this is not considered as hazardous waste. Broadly, fly ash utilization programmes can be viewed from two angles, i.e. mitigating environmental effects and addressing disposal problems (low value–high volume utilization).



NESA members are requested to share more articles related to environment, water, ocean, forest, agriculture, biodiversity and other related sciences to publish in the e-newsletter. The suggestions and messages for the betterment of the society can be shared with others. Academy has more than 2000 life members and very few publish the articles. We hope that members will contribute more articles and send their suggestions/comments for the betterment of the Academy. **Editor Newsletter.**

Following are some of the potential areas of use of fly ash:-

1. Development of Fly Ash based Polymer Composites as Wood Substitute:

Fly ash based composites have been developed using fly ash as filler and jute cloth as reinforcement. The technology on fly ash Polymer Composite using Jute cloth as reinforcement for wood substitute material can be applied in many applications like door shutters, partition panels, flooring tiles, wall panelling, ceiling, etc.



This technology has been developed by Regional Research Laboratory, Bhopal in collaboration with Building Materials & Technology Promotion Council (BMTPC) and TIFAC. One commercial plant has also been set up based on this technology near Chennai.

2. Fly Ash based Cement:

As per the specifications of Bureau of Indian Standards fly ash upto 35% can be used in manufacture of Portland Pozzolana Cement (PPC), while worldwide there are examples of countries that permit upto 55% utilisation of fly ash in PPC production. Setting aside 25% of cement production for Ordinary Pozzolana Cement (OPC) for such applications, the balance 75% can be PPC with an average fly ash content of 30%. It would consume around 25 MT fly ash, replacing same amount of cement clinker and resulting in net saving Rs. 2500 crore.

3. Role of bio-amelioration of FA on soil

Recent investigations suggest that FA can find better application if combined with organic amendments such as cow manure, press mud, paper factory sludge, farmyard manure, sewage sludge, crop residues and organic compost for improvement of degraded/marginal soil. Few beneficial combined effects of FA and organic matter on soil have been found such as reduced heavymetal availability and killing pathogens in the sludge; improved soils through higher nutrient concentrations, better texture, lower bulk density, higher porosity and mass moisture content and higher content of fine-grained minerals; enhanced the biological activity in the soil; reduced the leaching of major nutrients; and beneficial for vegetation. Amendment with FA will enhance agricultural sector for crop production. Further, organic amendment application will provided anchorage and growth of the plant on a FA dumpingsite. (Saxena and Prabhakar, 2000).



4. Fly ash bricks

The Central Fuel Research Institute, Dhanbad has developed a technology for the utilization of fly ash for the manufacture of building bricks. Fly Ash can be used in the range of 40-70%. Our current clay brick production exceeds 100 billion bricks a year. In such circumstances and when fly ash brick is technically acceptable, economically viable and environment friendly, it may not be wrong to target to produce at least 2 billion fly ash bricks per year. It would consume about 5 million tonne of flyash/year, yielding a net saving of around Rs. 20 crores per annum. Fly ash bricks have a number of advantages over the conventional burnt clay bricks. Unglazed tiles for use on footpaths can also be made from it. Awareness among the public is required and the Government has to provide special incentives for this purpose.

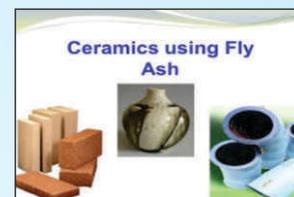


5. Fly ash in distemper

Distemper manufactured with fly ash as a replacement for white cement has been used in several buildings in Neyveli, Tamil Nadu, in the interior surfaces and the performance is satisfactory. The cost of production will only be 50% that of commercial distemper.

6. Fly ash-based ceramics

The National Metallurgical Laboratory, Jamshedpur has developed a process to produce ceramics from fly ash having superior resistance to abrasion.



7. Ready mixed Fly ash concrete

Though Ready Mix concrete is quite popular in developed countries but in India it consumes less than 5 percent of total cement consumption. Only recently its application has started growing at a fast rate. On an average 20% Fly ash (of cementitious material) in the country is being used which can easily go very high. In ready mix concrete various ingredients and quality parameters are strictly maintained/controlled which is not possible in the concrete produced at site and hence it can accommodate still higher quantity of fly ash.

8. Minefills

Nearly one third of our thermal power stations are at or near to pit heads. Most of these mines cart sand for backfilling from river beds, which are normally 50-80 kms away. Apart from the royalty, huge amount of expenditure is incurred on transportation of sand. It is estimated that about 15-20 million tonne of ash per annum can be safely consumed in minefills yielding a saving of about Rs. 150 crore a year.

9. Fly Ash in Road Construction

Fly Ash can be used for construction of road and embankment. Saves top soil which otherwise is conventionally used, avoids creation of low lying areas (by excavation of soil to be used for construction of embankments). Fly Ash may be used in road construction for: Stabilizing and constructing sub-base or base; upper layers of pavements; filling purposes. Concrete with Fly Ash (10-20% by wt) is cost effective and improves performance of rigid pavement; Soil mixed with Fly Ash and lime increases California Bearing Ratio (CBR), increased (84.6%) on addition of only Fly Ash to soil.

10. Embankment

Fly ash properties are somewhat unique as an engineering material. Unlike typical soils used for embankment construction, fly ash has a large uniformity coefficient consisting of clay-sized particles. Engineering properties that will affect fly ash use in embankments include grain size distribution, compaction characteristics, shear strength, compressibility, permeability, and frost susceptibility. Nearly all fly ash used in embankments are Class F fly ashes. In view of the growing need for development of road infrastructure in the country, conservative estimates show that about 15-20 MT ash can be used in construction of road and flyover embankments per annum. This would yield a saving of around Rs. 100 crore per year.

11. Roller compacted concrete

Another application of using fly ash is in roller compacted concrete dams. Many dams in the US have been constructed with high fly ash contents. Fly ash lowers the heat of hydration allowing thicker placements to occur. Data for these can be found at the US Bureau of Reclamation. This has also been demonstrated in the Ghatghar Dam Project in India.

12. Asphalt concrete

Asphalt concrete is a composite material consisting of an asphalt

binder and mineral aggregate. Both Class F and Class C fly ash can typically be used as a mineral filler to fill the voids and provide contact points between larger aggregate particles in asphalt concrete mixes. This application is used in conjunction or as a replacement for, other binders (such as Portland cement or hydrated lime). The hydrophobic nature of fly ash gives pavements better resistance to stripping. Fly ash has also been shown to increase the stiffness of the asphalt matrix, improving rutting resistance and increasing mix durability.

13. Fly Ash in Agriculture

Agriculture and waste land management have emerged as prime bulk utilization areas for fly ash in the country. It improves permeability status of soil; improves fertility status of soil (soil health)/ crop yield; improves soil texture; reduces bulk density of soil; improves water holding capacity/porosity; optimizes pH value; improves soil aeration; reduces crust formation provides micro nutrients like Fe, Zn, Cu, Mo, B, Mn; provides macro nutrients like K, P, Ca, Mg, S etc; works as a part substitute of gypsum for

reclamation of saline alkali soil and lime For reclamation of acidic soils; ash ponds provides suitable conditions and essential nutrients for plant growth, helps improve the economic condition of local inhabitants; crops grown on fly ash amended soil are safe for human consumption & groundwater quality is not affected.

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Pollution level during COVID-19 lockdown in India

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Recently, COVID19 has been declared a pandemic worldwide due to its infection in more than 200 countries after China, Italy, Spain, USA, India and many more. India reported having 440685 cases of COVID19 cases as of 23 June 2020¹ and out of which 248140 cases were recovered and 14015 deaths occurred. Apart from several precautions, social distancing and standard actions², a nationwide public curfew (1 day) and lockdown (21 days) and further more lockdowns were declared by govt. of India to break the growth cycle and combat against the Corona virus. During this lockdown, almost every activity was closed except several basic needs like medical facilities and provision supply.

During this period, air pollution level in various major cities of India shows the relations of pollution and various anthropogenic activities. A significance reduction in air pollution load was observed during the lockdown period (Fig.1). As on March 29, 2020, a total of 91 cities were under 'Good/Satisfactory' category, with 31 cities with 'Good' AQI values and no city is under 'Poor' AQI category. Substantial improvement in air quality of Delhi NCR is noted during the lockdown period, where PM10 and PM2.5 levels

were reduced by about 35 to 40% in Delhi³.

Ambient noise level is also suddenly changed and feels extraordinary.

Appearance of surface water of Yamuna river at Delhi is having tremendous changes and it seems very transparent with nice aesthetic value, as reported some researchers/reporters⁴. Reports on Ganga river water at Hardwar and Varanasi city are also published recently, which declared the water suitable for direct drinking purpose. Even clear blue sky (Fig. 2) was also the point of concern as per these reporters⁴. Similar patterns showing drastic falls in pollution levels were seen in parts of Europe and China since their lockdowns, as industry and transport networks grind to a virtual halt.

An endangered species of dolphin has been reported in Bihar region. During this lockdown period, behavior of wild animals, birds, fish species and street animals has been reported slightly different at several places.

Anthropogenic activities like vehicular movement on roads, transportation, construction activities, manufacturing sectors, super markets, shops, and various production unites are closed due to lockdown in the entire country.

CPCB⁵ and Quartz India⁶ reported some ambient air quality parameters based air quality index (AQI) of various cities, which show the significant drop in concentrations of the variables (Tab. 1). These data indicates that the above said anthropogenic activities are the major culprit for environmental degradation. Strict norms and

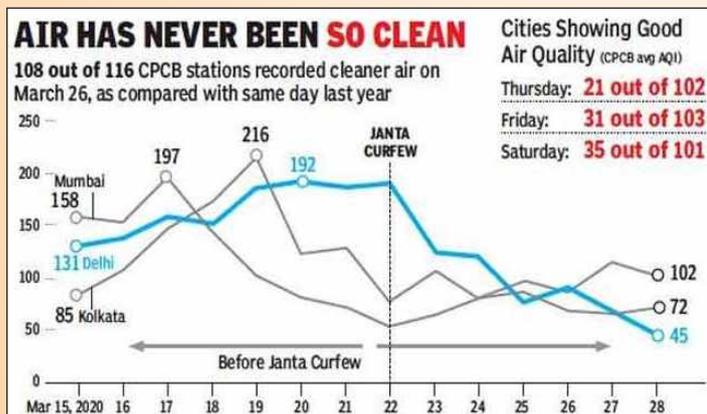


Fig.1: Showing difference in pollution load before and after Janata Curfew and Lockdown

Fig.2: Showing aesthetic beauty/clear sky after Lockdown (Pic. taken by author on 4 April 2020)

other suitable measures must be followed by these production units and/or activities once the lockdown period is over.

This lockdown period can be serve as a real control/reference conditions for various pollution assessment studies in different parts of India.

Table 1: Seven days AQI of different cities before and after Janata Curfew and Lockdown.

S.N.	City	AQI (Before Janata Curfew)	AQI (After Janata Curfew)
1	Delhi	163	103
2	Mumbai	130	70
3	Kolkata	140	95
4	Chennai	69	57
5	Bengaluru	82	70
6	Pune	102	65
7	Hyderabad	76	69
8	Kanpur	128	100

(Data: CPCB, Source: Nav Bharat Times)

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“I only feel angry when I see waste. When I see people throwing away things we could use.”
- Mother Teresa

“Progress is impossible without change, and those who cannot change their minds cannot change anything.”
- George Bernard Shaw

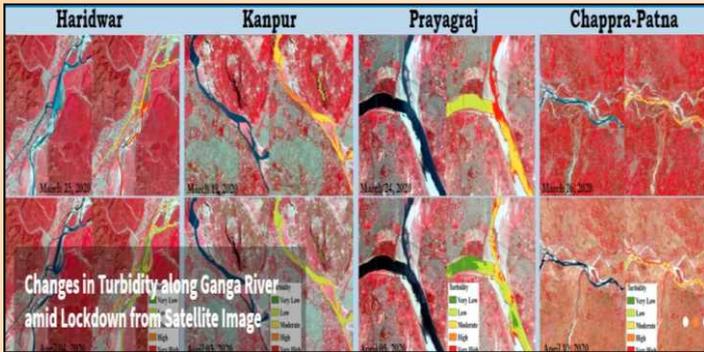
“Never doubt that a small group of thoughtful, committed citizens can change the world; indeed, it is the only thing that ever has.”
- Margaret Mead

MONITORING ENVIRONMENTAL IMPACTS OF COVID-19 LOCKDOWN THROUGH SATELLITE REMOTE SENSING

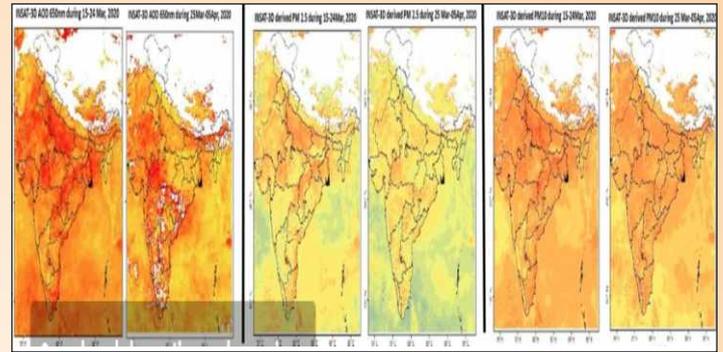
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It is read in books and magazines that environment is degraded due to human activities. For a common man, it is far from imagination that how human is really destroying the environment. Scientists and researchers have the understanding that human is the main culprit in destroying the environment. However, the experimental proof that human is destroying the environment is cleared from the COVID-19 lockdown in the world. The environmental symptoms during lockdown indicate

that quality of environment has improved during lockdown. Plants, animals, birds, water; air, mountain, sky and land all have gain health in terms of purity or gained its naturalness. Monitoring of environmental impacts through satellite remote sensing clearly indicates that air quality has become good and river water has been cleared. Studies of Indian Institute of Remote Sensing (IIRS), ISRO, Dehradun shows that air quality is good during lockdown period as well as turbidity of Ganga River water is very less during the lockdown. National Remote Sensing Centre (NRSC), ISRO, Hyderabad satellite data shows nature's beauty during lockdown. These studies indicate that human has directly degraded the environment. But it is also clear that nature has very strong cleaning and healing power i.e. during lockdown nature has cleared the human generated waste. From the lockdown human can gain message that do activities in pace with nature and follows the good things/habits gained/generated during lockdown for saving the nature. If human start taking care of nature, then nature will also care the human otherwise natural and anthropogenic disasters will combine and destroy the human regime.



Changes in Turbidity of Ganga River water during lockdown period (Acknowledgements: IIRS, Dehradun)



Air Quality (Aerosol Optical Depth (AOD) and Particulate Matter (PM)) during lockdown period (Acknowledgements: IIRS, Dehradun)



Toll Gate Airoli, Mumbai (Acknowledgements: NRSC, Hyderabad)



Akshar Dham Temple, New Delhi (Acknowledgements: NRSC, Hyderabad)

Acknowledgements: Author duly acknowledges the IIRS, ISRO, Dehradun and NRSC, ISRO Hyderabad for showing satellite data based results and images in this article. These

images are taken from their websites (www.iirs.gov.in and www.nrsc.gov.in).

RICE BLAST DISEASE: TERROR FOR RICE CROP

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Rice is the staple food for more than half of the world population and hence a key pillar for food security. In India, rice is the most important and extensively grown food crop, occupying about millions of hectares of farm lands. Rice consumption exceeds 100 kg per capita annually in many Asian countries which makes rice as one of the most important cereals on the Earth. However, with a fast growing world population, rice production can barely keep pace with consumption and should increase by more than 40 percent above the present level, if the world's food supplies are to be secured until the year 2050. Rice crop is exposed to various biotic and abiotic stresses, which causes significant yield losses. Rice blast is a destructive disease caused by *Magnaporthe oryzae* (a hemibiotrophic fungus) infection, and resulted into the significant yield loss. Rice blast disease is found across the world where rice is cultivated and become a most destructive disease in cereal. Globally, the yield reduces by 10-30 % due to this disease. *M. oryzae* is an ascomycete fungus and belongs to the family Magnaporthaceae. It is an enormously effective plant pathogen as it can reproduce both sexually and asexually to produce specialized infectious structures known as appressoria that infect aerial tissues of rice plants.

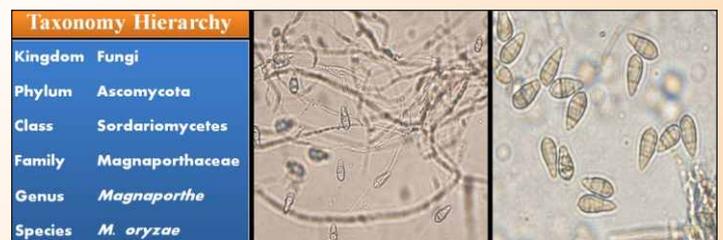


Fig 1: Taxonomical classification, hyphae growth and spores morphology of *M. oryzae*.

Infection mechanism

All the above ground parts of the plant can be attacked by *M. oryzae* fungus at any growth stage i.e. seedling, rapid tillering and flower emergence stage. The life cycle of *M. oryzae* start with conidium germinated on a rice plant and becomes attached to the leaf surface through making of spores. Thereafter, the germ tube growth, appressorium formation, penetration, and consequently invasive growth are occurs on tissue. The life cycle of *M. oryzae* is represented in Figure 2.

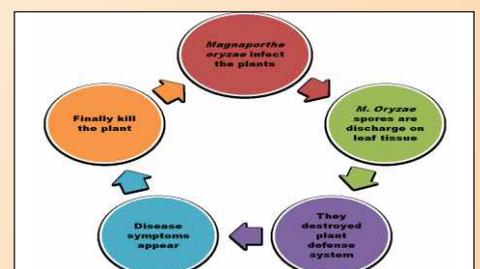


Fig. 2: Life cycle of *Magnaporthe oryzae* and pathogenesis.

Types of rice blast disease

Table 1: The rice blast disease can be categorized according to different part of plant infection.

1. Leaf blast	Eye spindle shape brown specks appear on both ends. Symptom starts from lower to upper. Enlargement of lesions and slowly kill the leaf tissue.	
2. Node blast	Black color patches and irregular lesions are occur on nodes. Lesions are blackish to brown and then break at the infected node.	
3. Panicle blast	Irregular brown lesions are appears on the branch of panicle.	
4. Collar rot	In these categories of infection, the pathogen attacks on the leaf blade and typical brown collar rot symptom appear.	
5. Neck blast	Brown lesions on neck of panicle and girdling of the neck. Due to neck blast, poor quality of grains formed.	

Management

Rice blast disease is difficult to control by chemicals or host resistance. Multiple management strategies are needed to control this disease.

- Used certified seeds blast resistant varieties for sowing.
- If possible, used a combination of resistance and susceptible rice varieties to avoid breaking of host resistance.
- Crop rotation best way to avoid blast disease.
- From time to time, weeds should be removed from the rice field.
- Used proper plant to plant gap and modified plant density to avoid warm and humid conditions.
- High tillering rice varieties should be used to avoid rice blast disease.
- All parameters and soil testing should be checked before rice farming.
- Use of fungicide should be limited.
- Developed wide crop area management strategies for the reduction of fungal attack on rice field.

Research

Rice blast disease is perhaps the most overwhelming fungal disease of rice. Efficient studies of this disease have made significant progress and identified many defense responsive genes. Broad-spectrum resistance is extremely preferred in agricultural research toward the fungal disease. The resistance® genes and defense-regulator (DR) genes confer resistance against *M. oryzae*. Targeted molecular breeding is the best way to development of blast resistance varieties of rice. At ICAR-National Institute for Plant Biotechnology (NIPB), Dr. T R Sharma (presently DDG, Crop Science, ICAR, New Delhi) and his research team contributed extensively to the improvement of rice for over 25 years. His most significant contribution is identification, mapping, positional cloning and functional validation of new rice blast resistance gene Pi54 from a unique source Tetep and other resistant wild rice species. This Pi54 gene provides resistance toward various isolates of *M. oryzae*. Recently Pi54 gene has been patented as a broad-spectrum resistant gene against rice blast disease by NIPB, New Delhi, India. Through marker assisted selection, this gene has been introgressed in many popular rice varieties like, Pusa 1612 and Pusa Basmati 1609, which are now released for large scale cultivation in farmers' field.

FINGER MILLET (RAGI OR MANDUA) A GOOD SOURCE OF NUTRITION FOR HUMAN HEALTH

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The botanical name of finger millet or Ragi or Mandua is [*Eleusine coracana* (L.) Gaertn]. Millets are small seeded, annual crops which belongs to Poaceae family and able to cultivate in less fertile soil.



Several other crops

which comes under the millet including sorghum (Jowar), pearl millet (Bajra), finger millet (Ragi), foxtail millet (Kakum), proso millet (Chena), little millet (Kutki), kodo millet (Kodon), barnyard millet (Sanwa), and brown top millet. It became a staple food for humans about 10,000 years ago already before the rise of wheat and rice. Among the millets group Ragi or Finger millet is one of the most important crop and common in several regions of India. In the tropical areas finger millet is most important crop, (12% of global millet area) and is cultivated more than 25 areas of Africa (eastern and southern) and Asia (from Near East to Far East), is a staple food grain as predominantly. It is the wonder crop and major producing countries are Uganda, India, Nepal and China. Mandua is often intercropped with legumes such as peanut (*Arachis hypogea*), cow pea (*Vigna sinensis*) and pigeon pea (*Cajanus cajan*).

Production of Finger Millet

India is a major cultivator of finger millet with a total cultivated area of 15870 km². The state of Karnataka is the leading producer of finger millet, known as ragi in the region, accounting for 58% of India's ragi production. Finger millet, sorghum and pearl millet, covering an area of 2 million hectares with annual production of 2.15 million tonnes. Currently the millet growing regions in the state of Uttarakhand are Pauri Garhwal, Tehri Garhwal, Uttarkashi, Chamoli, Rudraprayag, Pithoragarh, Champawat, Bageshwar, Almora and Nainital district. Ragi occupied 265,496 ha of land and produced 291,098 MT with the productivity of 1,096 kg/ha.

Recognized by Different Names

Ragi recognized by different names in different language of different states of India viz., Assam: maruba dhan, Gujarat: bavato, nachni, nagali, Hindi: madua/marua, mandua, ragi, Kannada: ragi; Uttarakhand- Kumaun: maddua and Garhwal: koda, "choona"; Odia: mandia, Himachal Pradesh: kodra; Punjab: mandal/mandhul/mundal, Rajasthan: nachni; rag, Sanskrit: madhulika; mattakam; nrityakundala, Tamil: aariyam, kezhvaragu, keppai, raagi, Telugu: ragi; tamidalu, Urdu: mandwa, maruwa, ragi.

Poor men's cereals

Nutrients help in the support of life and include substances with established nutritional functions. The chief classes of nutrients

are proteins, fats carbohydrates, minerals and vitamins. It is considered to be "poor men's cereals" as it does not require fertilizer input. Finger Millet is a rich source of Calcium, Iron, Protein, Fiber and other minerals and is a gluten-free food. The cereal has low fat content and contains mainly unsaturated fat. It is easy to digest and does not contain gluten; people who are sensitive to gluten can easily consume finger millet and considered one of the most nutritious cereals.

Nutritional Value of finger Millet

Finger millet is often ground to a fine powder and sold and popularly known as Millet Flour. In 100 grams of millet flour (edible portion, 12% moisture), major portion of millet flour is carbohydrate (71.30-89.50%), followed by protein (5.80-12.80%) and fiber (3.50-3.90%). It has the least amount of fat (1.30-2.70%) in them. The Fat percentage is quite less which is good. Protein and fiber content is relatively less as well. Finger millet starch is composed of amylose and amylopectin. The sugars found in finger millet grain include raffinose, sucrose, glucose, fructose and maltose. Sucrose and glucose constitute 33 and 12.5%, respectively, of the soluble sugars of finger millet grain.

Ragi has some good number of Essential Amino Acids which are essential for human body. Few of the essential amino acids in mg/g of proteins are Leucine (594 mg/g), Valine (413 mg/g), Phenylalanine (325 mg/g), Methionine (194 mg/g), Isoleucine (275 mg/g), Threonine (263 mg/g), Tryptophan (191 mg/g), Lysine (181 mg/g) and Cystine (163 mg/g). Finger millet also contains phytates (0.48%), polyphenols, tannins (0.61%) and trypsin inhibitory factors.

Health benefits of Ragi

Weight Loss

- It holds a significant place in diet programs for weight loss.
- A special amino acid, tryptophan helps in curbing appetite.
- It has a higher rate of fiber compared to any other grain or rice.
- High amount of dietary fiber combines with water and keeps for a longer period of time stomach fuller.
- Low in unsaturated fats that make it ideal cereal for those looking to lose weight.
- Heaviness dietary fiber slows down the rate of digestion thereby keeping us fuller for longer with very less calories.

Bone Strength Increases

- When it comes to calcium, there is no other plant source that comes even close to Ragi
- Loaded with calcium and vitamin 'D' that makes it a vital component for increasing bone strength
- Go natural, replace over the counter calcium supplements with Ragi porridge that works as a super calcium supplier for growing children and aging people.
- Helps in development of bones in children, maintains bone health and prevents bone erosion in adults, also works as an effective food to avert Osteoporosis

Diabetes Controls

- Regular consumption of Ragi has been found to reduce the risk of Diabetes Mellitus because of its high content of dietary fibers and polyphenols

- Higher amount of fiber as compared to cereals or any other grains
- Also have a low glycemic index that makes it an ideal snack to prevent late night food cravings and help to maintain blood sugar within safe range

Cholesterol Reduction

- Ragi has been proved to work wonders in bringing down blood cholesterol levels and is one of the best home remedies for heart health
- Controls the cholesterol level by reducing plaque formation and preventing blockage of blood vessels thereby cutting down the risk of stroke and other heart diseases
- The key amino acids Lecithin and Methionine helps in lowering cholesterol by extracting and cutting out excess fat from the liver, and the amino acid Threonine prevents formation of fat in the liver.
- Ragi, in the unripe, green form can also help in controlling high blood pressure and hypertension

Aids Relaxation

- The abundance of antioxidants, mainly tryptophan and amino acids in Ragi help in fighting damage causing free radicals and reducing oxidative stress. It works as a natural relaxant and helps in relieving stress related ailments like anxiety, hypertension, depression and headaches. It also helps in relieving sleep disorders like Insomnia along with cerebral pains and migraine.

Treats Anemia

- Ragi sprouts is one of the healthiest sprouts to eat to load up on Iron that helps in increasing blood formation in persons suffering from anaemia or low haemoglobin levels

- Vitamin C increases the level of iron absorption in the body and therefore it is best to have sprouted Ragi in the form of Ragi flour or Ragi malt

Increase Digestion

- The high level of dietary fiber in this cereal aids in proper digestion, normal bowel movement and prevents constipation. The insoluble fibers present in Ragi assists movement of food through the intestines while the insoluble fibers retain water thereby easing the passage of waste. Include it to your daily diet in order to protect your digestive system and avert risks of constipation and other digestive disorders

Increases Lactation

- Help in improving the hemoglobin levels
- Green Ragi in their daily diet in order to improve milk production.
- Enriches the milk with all the essential minerals for the body like iron, calcium and vital amino acids that is extremely important for the child as well as the mother

Reverts Skin Aging

- Ragi not only helps in maintaining proper health and keeping diseases, but also works wonders for maintaining youthfulness and vitality of skin by blocking premature aging.
- Ragi can be used to be the most effective natural anti aging drink.
- Vital amino acids Methionine and Lysine present in the cereal helps in maintenance of collagen.
- It is a substance that supports the skin tissues to make it supple and lively thereby making it less prone to wrinkles and sagging.

Table 1: A difference of nutrient components per 100 g flour in different important cereals and millets.

Crop	Nutrients				
	Protein (g)	Fiber (g)	Minerals (g)	Iron (mg)	Calcium (mg)
Finger millet	7.30	3.60	2.70	3.90	344
Pearl millet	10.60	1.30	2.30	16.90	38
Foxtail millet	12.30	8.00	3.30	2.80	31
Proso millet	12.50	2.20	1.90	0.80	14
Kodo Millet	8.30	9.00	2.60	0.50	27
Little millet	7.70	7.60	1.50	9.30	17
Barnyard millet	11.20	10.10	4.40	15.20	11
Rice	6.80	0.20	0.60	0.70	10
Wheat	11.80	1.20	1.50	5.30	41

Millet network of India-Deccan Development Society-FIAN, India



"The true meaning of life is to plant trees, under whose shade you do not expect to sit."
 "Love is like a tree, it grows of its own accord, it puts down deep roots into our whole being."
 "Until you dig a hole, you plant a tree, you water it and make it survive, you haven't done a thing."

GROUNDNUT GERMPLASM COLLECTION FROM MAJOR GROWING AREAS IN MADHYA PRADESH

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The cultivated groundnut (*Arachis hypogaea* L.), is self-pollinated, allotetraploid ($2n = 4x = 40$) with a genome size of 2891 Mbp, originated through a single hybridization and polyploidization event. Largest producer of groundnut are China and India followed by USA and Nigeria. It is grown in more than 110 countries with a global production of 42.4 Mt from an area of 25.7 Mha (FAO, 2014). Groundnut kernels contain 40-60% oil, 20-40% protein, and 10-20% carbohydrates and 567 kcal of energy can be gained from 100 g of kernels. Additionally, groundnut is a rich source of nutrients such as minerals, antioxidants, and vitamins (Vitamin E, niacin, calcium, phosphorus, magnesium, zinc, iron, riboflavin, thiamine and potassium) which are essential for good health. Among the surveyed states, the highest yield of 2,485 kg/ha was estimated for Rajasthan, followed by 1,893 kg/ha for Gujarat, 1,414 kg/ha for Andhra Pradesh, 1,268 kg/ha for Karnataka, 1,034 kg/ha for Maharashtra and 1,025 kg/ha for Madhya Pradesh. The national average yield was estimated at 1,745 kg/ha. The combined production of these six states was estimated at 60,37,905 MT which accounted for about 88% of the estimated national production. With 29,38,315 MT, Gujarat contributed 43% of the national production followed by Rajasthan (14,26,114 MT; 21%), Andhra Pradesh (7,82,484; 11%), Karnataka (4,69,875 MT; 7%), Madhya Pradesh (2,27,243 MT; 3%) and Maharashtra (1,93,875; 3%) while the joint contribution of the remaining states was estimated at 8,24,660 MT i.e. 12%. Thus, the all-India kharif 2019 production was estimated at 68,62,565 MT. In four districts of Madhya Pradesh, the highest yield (1,215 kg/ha) was estimated for Tikamgarh and the lowest (952 kg/ha) for Shivpuri and Alirajpur. The highest production was estimated for Shivpuri which also accounted for the largest acreage (33%). The total production of in-shell groundnut was estimated at 2,27,243 MT with an average yield of 1,025 kg/ha (Table 5e)

Maximum extent of sowing was done during 2 June to 15 June in Gujarat (41%); and during 23 Jun to 6 July in Rajasthan (43%) and in Maharashtra (59%); and during 9 Jun to 22 Jun in Karnataka (45%); and during 30 June to 13 July in Andhra Pradesh (42%); While in Madhya Pradesh maximum sowing was done during 30 Jun to 13 July (58%). Thus, at national level, the period of 9 June to 13 July appeared to be the period of maximum coverage. In Madhya Pradesh varieties used were Batalian, Betal, Desi, Jhumkha, Gujarat 20, 22, Jalgoan, Indori and Kanpur. In Gujarat and Rajasthan, most of the farmers (85%) applied pesticides for their crop husbandry. The extent of farmers using pesticide although quite low in Maharashtra (84%), Karnataka (80%), Madhya Pradesh (74%) and AP (67%) compared to Gujarat and Rajasthan. Compared to kharif 2018, there was a decrease in acreage in all the states covered under survey except Gujarat and Rajasthan. The maximum decrease was observed in Andhra Pradesh (-16.2%) and in Madhya Pradesh (-5.6). While it was

negligible in Karnataka (-3.2%). The increase in Gujarat was (5.8%) and in Rajasthan was minimal (4.5). On all-India basis, however, there was a minimal Increase by 1.1%.

S.No.	Name of District	Name of village
1.	Dhar	Gyanpura-1
2.	Dhar	Gyanpura-2
3.	Dhar	Gyanpura-3
4.	Dhar	Gyanpura-4
5.	Dhar	Gyanpura-5
6.	Dhar	Gyanpura-6
7.	Dhar	Himentgharh-1
8.	Dhar	Himentgharh-2
9.	Dhar	Himentgharh-3
10.	Dhar	Himentgharh-4
11.	Dhar	Himentgharh-5
12.	Dhar	Himentgharh-6
13.	Dhar	Himentgharh-7
14.	Barwani	Bagud-1
15.	Barwani	KVK Bagud-2
16.	Barwani	Bagud-3
17.	Barwani	Bagud-4
18.	Barwani	Bagud-5
19.	Barwani	Talun-1
20.	Barwani	Talun-2
21.	Barwani	Talun-3
22.	Barwani	Talun-4
23.	Barwani	Talun-5
24.	Barwani	Battajal Khurd-1
25.	Barwani	Battajal Khurd-2
26.	Barwani	Battajal Khurd-3
27.	Barwani	Battajal Khurd-4
28.	Barwani	Battajal Khurd-5
29.	Jhabua	Amkheda-1
30.	Jhabua	Amkheda-2
31.	Jhabua	Amkheda-3
32.	Jhabua	Chapri Khardu-1
33.	Jhabua	Chapri Khardu-2
34.	Jhabua	Chapri Khardu-3
35.	Jhabua	Chapri Khardu-4
36.	Jhabua	Chapri Khurd-1
37.	Jhabua	Chapri Khurd-2



Collection Site Location-Jhabua District Village Chapri Khurd



Collection Site Location-Jhabua District Village Chapri Khardu



Collection Site Location- Ghyanpura village Dhar District



Collection Site Location- Himantgharh village Dhar District



Field performance and evaluation of groundnut germplasm collected from Shivpuri district of Madhya Pradesh

AGRICULTURE WASTE MANAGEMENT: AN OPPORTUNITY FOR A BETTER ENVIRONMENT AND EMPLOYMENT

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India is a country where agriculture is strongly practice and due to increasing population and food scarcity there is increase in agriculture practice which leads to increase in generation of agro-waste. Agriculture waste is a waste generated as a outcome of various agriculture actions, the waste is composed of harvest waste, organic waste (animal excreta in the form of slurries and farmyard manure), fertilizer run-off from fields, pesticides that entre into water, air or soil etc. Generally waste generated from Agriculture are burnt that pollute the air or the liquid wastes are drained into river or lake that contaminate the water. Due to increase in agriculture waste and its bad effect on human beings and environment it needs to be managed and disposed properly. Agriculture Waste Management System helps to maintain a healthy environment for farm animal and it can also reduce the need for commercial fertilizers while providing other nutrients needed for crop production. So Agriculture Waste Management System (AWMS) is an organized system in which all the important components of the system is installed and managed. It's consists of different steps which control and use by-product of agriculture in a manner that sustain enhances the quality of water, soil, air. Different types of waste require different management techniques and handling equipment, this waste may be in different form that is liquid, semisolid, solid or slurry. There are many cases in India where the people are managing agriculture waste in different ways, best ways to utilize agricultural waste is:

1. The biomass (straw, sawdust, crop stalk, peanut shell, corn cob and rice husk) can be used to make pellets and briquettes that can used as an alternative to coal, cooking gas and coal.
2. We can turn the waste into ethanol as an alternative to fossil fuels.
3. We can use biomass to generate electricity.



Figure 1: Management of recycling agro-wastes

A recent Case was seen in Karnataka, India where biomass from agriculture was converted into electricity. This was revolution in the field of Agriculture Waste Management and by using advance technologies. It has become possible to use biomass as a valuable source of energy. In past, the biomass that was considered as a waste, burned and off no use, has suddenly become valuable and increases the income of the local farmers. This project is pinpointed in Karnataka, India and the main purpose of this project is to use the biomass generated in the field of agriculture and convert it into efficient fuel for energy production. Many benefit of this project is that it created employment, generation of fuel from waste and deplete the air, land and water pollution. In this project the waste has been burned in the power plant, the ash generated is utilized as a and the farmers who buy this fertilizer are encouraged to practice biological agriculture.

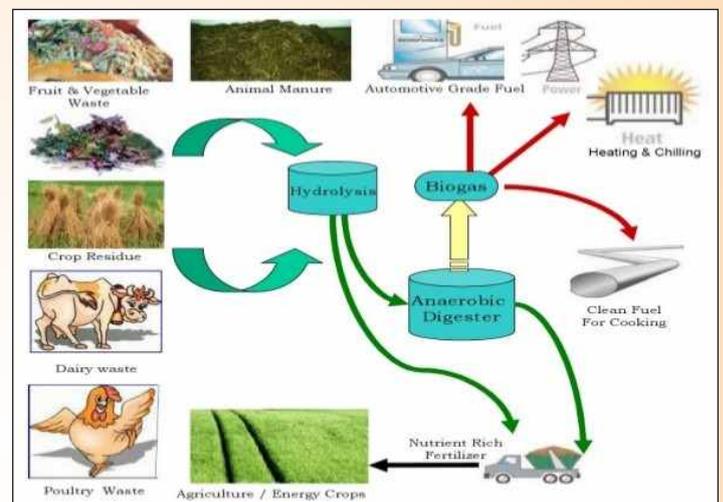


Figure 2: Recycling of agricultural wastes.

In Bangalore there is a company that utilizes agriculture waste to make eco-friendly food packaging. Kurian Mathew along with his two partners runs a pilot plant for Bio-lutions a Germany company in Bangalore. The motive of this company is to utilize the agricultural waste and convert it into useful product and reduce the air pollution from burning the crop and landfills and waterways clogged with plastics and other waste. They use to take tons of mulberry leaves, every month from the farmer which was earlier burned and causes air pollution are now converted into biodegradable packaging. What they do is they take the leaves, dried them for two days in the front yard of small factory. In second step they take the dry leaves, clean it, mixed them with water and put all the raw material into patented machine and convert the leaves into self-binding fibers. Third step involves converting self-binding fibers into pulp by applying more water and centrifugal force, the pulp was then passed through a foaming machine and hot press at the end packaging tray for vegetables and fruits were ready for sell and use. Not only mulberry leaves but other waste such as wheat and rice straw, sugarcane leaves, banana stems, pineapple leaves, and tomato plants all can be processed into packaging.

Farmer need to realize that agro-waste that they burn cause air pollution, can be used to earn money. A large amount of agro-waste is generated every year and its need to be managed. The government can also create the awareness among people and help them by setting up units to process these waste into fuel or useful product and buying them from the farmers. In this way the waste will be utilize into something useful and farmers will also be benefited.

From the Editor's

Dear Readers,

I wish my warm wishes!!

In July issue, we recount the articles involving corona, pollution and plant improvement against blast published from authors from diverse field to recount the status on various activities. This issue includes Annual awards by Academy for its members actively involved in their field or events and activities organised by the Academy. NESA is well known for its environmental awareness activities.

I express my sincere and huge thank to all the persons who contributed writing the wonderful and inspiring articles, without which there wouldn't have been this newsletter issue. Please continue sharing such articles and share with your friends also. I would like to thank President and General Secretary, NESA, New Delhi, and the Editorial team including Print, Designer and Publication committee for their nonstop support and efforts throughout this edition.

We hope this edition makes an interesting read. Please feel free to offer any suggestions for improvement.

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