EXPERIMENTAL INVESTIGATION AND ANALYSIS OF CRITICAL SPEED OF SHAFT

[1]Rahul N Dixit, [2]Mithun Raghunandan, [3]Dr Tulsidas D

[1,2]Undergraduate Students, Department of Mechanical Engineering, Sapthagiri College of Engineering, Bangalore, India
[3]Associate Professor, Department of Mechanical Engineering, Sapthagiri College of Engineering, Bangalore, India

Abstract: One of the methods to determine natural frequency and the mode shapes of an object is by using modal analysis. In the present work, analysis of a 1m length shaft of diameter 6 mm is performed experimentally for two different boundary conditions and first two modes are extracted for fixed-free and free-free boundary condition. The critical frequency of the shaft is determined and the results are compared with theoretical results. The shaft is analyzed using ANSYS software with pre-determined boundary conditions and mode shapes are extracted. A Campbell diagram is plotted to determine the shafts response as a function of its oscillation.

Index Terms **- Natural frequency, Modal Analysis, Critical speed, Campbell diagram, ANSYS Workbench.**

I. INTRODUCTION

Rotating machinery such as compressors, turbines, pumps, jet engines, turbochargers, etc., are subject to vibrations. These vibrations are broadly classified as synchronous (due to unbalance) or nonsynchronous such as caused by self-excited rotor whirling. The three major areas of concern are rotor critical speeds, system stability and unbalance response. Critical speeds are the un-damped natural frequencies of the rotor system. As a first step in turbo rotor design, an analysis is performed to determine the system critical speeds, mode shapes and energy distribution.

The objective of this paper is to determine the critical speed of a shaft of 6mm diameter and study the mode shapes under different end conditions using fixed and flexible bearings. The modal analysis has been carried out additionally in ANSYS Workbench 15.0 and the critical speeds are determined for the different end conditions. The modal analysis was helpful in accurately visualizing the mode shapes and their corresponding natural frequencies. The experimental results are confirmed by theoretical calculations using Dunkerley's equation to calculate natural frequency and critical speed. The geometry modeling of the shaft was done using CATIA V5.

II. LITERATURE REVIEW

Thorough literature survey was done on the procedure to obtain critical speed of shaft, analyze the shaft using ANSYS and the past studies done.

Ankit J. Desai et al [1] measured the critical speed of shafts of various diameters and have also evaluated the self-excited motion based on the change of amplitude ratio with respect to frequency ratio.

Mr. Balasaheb Keshav Takle [2] has obtained the natural frequency of shafts of different diameters and has validated them experimentally and has also determined the critical speed of shaft theoretically.

Shelar Santosh Ashok et al [3] studied and obtained the critical speed of shafts of different lengths and diameters by using analysis method.

Dr. C. M. Ramesha et al [4] carried out modal analysis of a single cylinder engine crankshaft and the natural frequencies for two conditions were found and harmonic response of crankshaft was studied.

Do-Kwan Hong et al [5] analyzed rotor dynamics of a rotor with shrink fit by using 3D FEA method. The 3-D rotor dynamics analysis and Campbell diagram considering shrink fit are examined for the critical speed of rotor

III. OBJECTIVES

- Determine critical speed of shaft experimentally.
- Obtain mode shapes experimentally for different end conditions.
- Calculate the critical speed theoretically using Dunkerley's formula.
- Perform modal analysis using ANSYS Workbench 15.0 to determine critical speed.
- To plot rotating speed of shaft against natural frequency (Campbell Diagram).

IV. CRITICAL SPEED/ WHIRLING SPEED OF SHAFT

The critical speed of a rotating shaft is the speed at which the shaft starts to vibrate violently in the transverse direction. Critical speed is also called 'whipping' or 'whirling' speed. The main reason for the whirling speed is the mass unbalance of the shaft when the shaft centre does not coincide with the geometric centre.

When the shaft vibrates with maximum amplitude i.e. when the working frequency is equal to the natural frequency, we get the first mode shape and the corresponding speed is called the first critical speed. Fig.1 shows the 1st mode shape.

When the working frequency is equal to the second natural frequency, we get the second mode shape and the corresponding speed is called the second critical speed. Fig.2 shows the second mode shape.

17-18

Vol. 1, Issue 2 (2017)

Design of fixture for gear cover component machining on VMC

Author(s): Megha G Hegde, Shakunthala IC, Gangadhar Hegde, Prof. Anil Kumar PR, Prof. T Venkate Gowda

Abstract: Gear cover is very important part of the gear transmission system, where the gear gets fixed inside firmly. It should be accurately machined with the acceptable tolerance. Also the fluctuations of dimensions in work-piece to work piece should be minimum so That it will be easier to assemble the gears inside the gear cover perfectly. This casted gear cover component requires machining (Facing, Drilling, Tapping, Boring, Counter Boring operations as per the requirement at each faces) on four sides. At present the industry is utilizing 3 separate fixtures for machining of all four sides of the die casted Aluminium gear cover component. Due to this, the maintenance of accuracy of the machining becomes the burden on the operator to adjust the fixtures each time. This increase the setting time, handling time, tool change time. Also the cost per component increases. The aim of this project is to design and development of a single new fixture connected to turret which replaces the old three fixtures for machining operation using designing software's i.e. Pro ENGINEERING, AutoCAD and analysis using ANSYS, which can eliminate the said problems. Also costing analysis is carried out by comparing old and newly designed fixture. The production rate will also increase up to 50% and cost per component machining decreases, which is quite objective. Thus, we are designing the fixture for such gear cover component machining for 2-wheeler excel TVS vehicle.

PAGES: 22-26 | 1473 VIEWS 926 DOWNLOADS

DOWNLOAD (659KB)

RESEARCH JOURNAL IMPACT FACTOR IMPACT FACTOR RJIF 5.54 2017

DOI

doi.org/10.22271/engineer

ABBREVIATED TITLE

Int. J. Adv. Eng. Technol.

ISSUE

Archives

Current Issue

MAIN MENU

Home

Editorial Board

Instructions

Indexing

Contact Us

PUBLICATION GUIDELINES

Publication Ethics

Instructions to Reviewer

Publication Policy

Publication Frequency

Publication Year

Publication Regularly

Plagiarism

Open Access

International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
Vol. 6 Issue 06, June - 2017

"Effect of Fiber Volume on Mechanical Properties of Alkaline Treated Unidirectional Long Kenaf Fiber with Egg Shell Powder Reinforced Polymer Matrix Composite"

Abhishek S.A [1] Deemanth Gowda TM[2]
Koushik Raj A R[3] Hemanth R[4]
[1,2,3,4] U. G. Students,
Department of Mechanical Engineering,
Sapthagiri College of Engineering, Bangalore,
Visvesvaraya Technological University,
Belgavi, Karnataka.

T. Venkate Gowda[5] Anil Kumar P R[6]
[5,6]Assistant Professors,
Department of Mechanical Engineering,
Sapthagiri College oF Engineering, Bangalore,
Visvesvaraya Technological University, Belgavi, Karnataka.

Abstract - **Recently due to increasing interest in eco-friendly materials, studies on ecofriendly fiber obtained from nature have been actively conducted to the area of composite. Natural plant fibers like Jute, Sisal, Coir, Kenaf, Flax, Hemp, Sugarcane Bagasse, Bamboo pineapple leaf and Banana are typically used in composites as a reinforcing material either as continuous (very long) or discontinuous (chopped) fibers due to their low cost, high tensile strength, low thermal expansion, high strength to weight ratio, renewability, biodegradability and exponential growth. Although, the natural fiber has less strength than the synthetic fiber such as carbon fiber, it has similar strength to glass fiber. Accordingly, it can apply as very advantageous composite when an appropriate resin has been selected. Environmental concerns are now driving demand for recycled polymer (Thermoplastics) such as Polypropylene (PP), Poly Ethylene (PE), Polystyrene (PS), Polyethylene Sulphide (PPS), and Polyolefin etc. For various applications, especially in automotive and aircraft industries. The specimens are prepared according to ASTM standards and the different values are observed. Here filler material used is Egg powder which enhances the tensile property of the material.**

1.0 INTRODUCTION

The composites industry has begun to recognize that the commercial applications of composites promise to offer much larger business opportunities than the aerospace sector due to the sheer size of transportation industry. Thus the shift of composite applications from aircraft to other commercial uses has become prominent in recent years. Increasingly enabled by the introduction of newer polymer resin matrix materials and high performance reinforcement fibers of glass, carbon and aramid, the penetration of these advanced materials has witnessed a steady expansion in uses and volume. The increased volume has resulted in an expected reduction in costs. High performance FRP can now be found in such diverse applications as composite armoring designed to resist explosive impacts, fuel cylinders for natural gas vehicles, windmill blades, industrial drive shafts, support beams of highway bridges and even paper making rollers. For certain applications, the use of composites rather than metals has in fact resulted in savings of both cost and weight.

1.1Definition of Composite

A composite material is defined as the combination of two or more macro constituent materials, which are essentially insoluble into each other such that the properties of the combination are better than the sum of the properties of each constituent taken separately. The objective of this combination is to derive the best qualities of the constituent materials. These composites exhibit desirable qualities, which the constituents themselves may not possess.

1.2types of Composites

In a broad way composite materials can be classified into three groups in the basis of matrix materials. They are:

1. Metal matrix composites (MMC)
2. Ceramic matrix composites (CMC)
3. Polymer matrix composites (PMC)

1.2.1metal Matrix Composites:

These composites have many advantages over monolithic metals like higher specific strength, higher specific modulus, better properties at elevated temperatures, and lower coefficient of thermal expansion. Due to these attributes metal matrix composites are under consideration for wide range of applications.

1.2.2ceramic Matrix Composites:

One of the main objectives in preparing ceramic matrix composites is to increase the toughness. Naturally it is hoped and also it is found that there is a contomitant improvement in strength and stiffness of ceramic matrix composites.

1.2.3polymer Matrix Composites:

Most commonly used matrix materials are polymeric. In general the mechanical properties of polymers are inadequate for many structural purposes. Generally their strength and stiffness are low compared to metals and ceramics. To overcome these difficulties other materials are reinforced with polymers.

Two types of polymer composites are:
Fiber reinforced polymer (FRP)
Particle reinforced polymer (PRP)

International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
Vol. 6 Issue 06, June - 2017

1.2.4fibre Reinforced Polymer

Common fiber reinforced composites are composed of fibers and a matrix. Fibers are the reinforcement and the main source of strength while matrix glues all the fibers together in shape and transfers stresses between the reinforcing fibers. The fibers carry the loads along their longitudinal directions. Sometimes filler might be added to smooth the manufacturing process, impact special properties to the composites, and to reduce the product cost. Common fiber reinforcing agents include asbestos, carbon/graphite fibers, beryllium, beryllium carbide, beryllium oxide, molybdenum, aluminum oxide, glass fibers, polyamide, natural fibers etc. Similarly common matrix materials include epoxy, phenolic, polyester, polyurethane, polyetheretherketone (PEEK), vinyl ester etc.

1.3particle Reinforced Polymer

Particles used for reinforcing include ceramics and glasses such as small mineral particles, metal particles such as aluminum and amorphous materials, including polymers and carbon black. Particles are used to increase the modules of the matrix and to decrease the ductility of the matrix. Particles are also used to reduce the cost of the composites. Reinforcements and matrices can be common, inexpensive materials and are easily processed. Some of the useful properties of ceramics and glasses include high melting temperature, low density, high strength, stiffness; wear resistance, and corrosion resistance.

1.4natural Fibres

Natural fibers are made from plant, animals and mineral sources. Fibers are a class of hair like materials that are continuous filament similar to pieces of thread. They can be used as a reinforcement of composite materials. Thermosetting plastics have been used as a matrix in polymer composite because of its uniqueness and attractive properties. Polyester resin is most important matrix which possess strength to weight ratio that far exceeds any of the present materials.

Natural fibers can be defined as bio-based fibers of vegetable and animal origin. This definition includes all natural cellulosic fibers (kenaf, banana, cotton, jute, sisal, coir, flax, hemp, abaca, ramie, etc.) and protein based fibers such as wool and silk. Practically in all countries natural fibers are produced and used to manufacture a wide range of traditional and novel products from textiles, ropes, nets, brushes, carpets, mats, mattresses to paper and board materials. The growing environmental concern on global warming have inspired the automobile, structural, construction, packing industries etc., to search for sustainable materials that can replace conventional synthetic polymeric fiber. Natural fibers seem to be a good alternative since they are readily available in fibrous form and can be extracted from plants at very low costs.

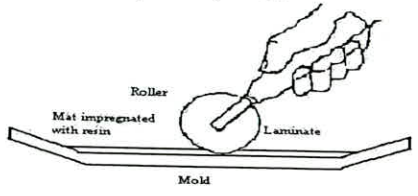
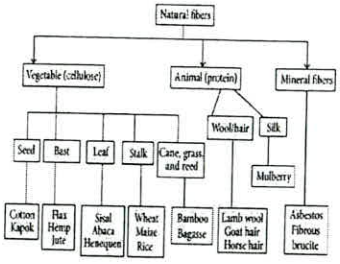


Figure 1.0: Hand lay-up

1.5classification of Natural Fibre Composites:



1.6 Fabrication Method & Preparation of Kenaf Fibre Reinforced Polyester Composite Specimen

Each layer of fabric was pre-impregnated with matrix material which is prepared by mixing general purpose polyester resin, accelerator and catalyst in the weight ratio of 1:0.02:0.026 respectively and these layers were placed one over the other in the mould with care to maintain practically achieved tolerance on fiber alignment. Casting was cured under light pressure for 2 hours before removal from the mould.

Hand lay-up technique is used to prepare specimen as shown in Figure. 1.0. The working surface was cleaned with thinner to remove dirt and a thin coat of wax is applied on the surface to get smooth finish. Then a thin coat of polyvinyl alcohol (PVA) is applied for easy removal of mould. Kenaf fiber is cut to the required dimensions for test specimen pre-impregnated with matrix material and placed one over the other in the mould. Casting was cured under light pressure for 2 hours before removal of mould. All test specimens were molded and prepared according to ASTM-D standard to avoid edge and cutting effect, thereby minimizing stress concentration effect.

Specimen length, width, gauge length, depth and configuration for each test and required cross head speed are clearly specified in the Table 1.0.

Sl. No.	Specimens Tested	ASTM-A370 Standard	Length a (mm)	Width b (mm)	Depth d (mm)	Gauge length e (mm)
1	Tensile	638	165	20	3	54
2	Bending	790	80	12.7	3	---

Table 1.0

1.7 Course Work

EGG Shell Powder is selected as the filler material to the matrix . From the various reference and study it was found that there will be a desirable increase in the property of the tensile specimen and also hardness up to certain extent .

FABRICATION AND EXPERIMENTAL INVESTIGATION OF MECHANICAL PROPERTIES OF GRAPHENE/SILICA EPOXY NANOCOMPOSITES

Bharath L[1], Girish V Gowda[2], Kushal K[3] , Diganth G.S[4]

[1,2,3] *U.G. Student, Department of Mechanical Engineering, Sapthagiri College of Engineering, Bangalore, Visvesvaraya Technological University, Belgavi, Karnataka, India.*

Abstract - *The attractive properties of graphene and its composites have led to the study of numerous applications such as transistors, biosensors, energy storage devices, nano-electro-mechanical systems and others; the past decade has witnessed the rapid growth of carbon nanotechnology. More research in the area will help the development of next generation graphene based composites and hybrid materials. In this study, samples composite materials used for manufacturing by hand stirring technique which casted into rectangular plate. The matrix materials of these composites are: epoxy resin, reinforced with graphene particles which are added in constant percentage 6% wt and nano silica which are added in percentages of (0,4,8,12 and 16)% to the matrix. Tests of Shor-D hardness, Tensile strength and Bending strength for all the samples are conducted. It is found from the results there is improvement in tensile strength and hardness, with the tensile strength increasing up to the 12% wt and the hardness increasing for all the % wt of the samples that were reinforced with graphene and nano silica.*

Key Words: **Graphene, Epoxy, Reinforcement, Tensile, Hardness.**

1. INTRODUCTION

A composite material is defined as a material which is composed of two or more materials at a microscopic scale and has chemically distinct phases. Thus, a composite material is heterogeneous at a microscopic scale but statistically homogeneous at macroscopic scale.

In general, the following conditions must be satisfied to be called a composite material:

1. The combination of materials should result in significant changes in property. One can see significant changes when one of the constituent material is in fibrous or platelet from.

2. The content of the constituents is generally more than 10% (by volume).

3. In general, property of one constituent is much greater (>5 times) than the corresponding property of the other constituent.

The matrix material experiences combined effects of strength and low weight. Most commercially produced composites use a polymer matrix material often called a resin solution. There are many polymers available depending upon the starting raw ingredients. The most common are known as polyester, vinyl ester, epoxy resin, phenolic, polyamide, polypropylene, and others.

In matrix-based composites, the matrix has two functions namely binding the reinforcement material in fixed position and deforming to distribute the developed stresses among the constituent reinforcement materials under the influence of the forces applied.

Graphite is available in large quantities as in the form of both normal and synthetic sources and is economical. The main graphite derivatives include EG, graphite oxide, graphene Nano platelets (GNP), graphene oxide (GO), reduced graphene oxide (RGO), and graphene.

Silicon dioxide, also known as silica (from the Latin silex), is a chemical compound that is an oxide of silicon with the chemical formula SiO_2. Silica is one of the most complex and most abundant families of materials, existing both as several minerals and being produced synthetically. Notable examples include silica gel, fused quartz, fumed silica, and aerogels.

In this paper, the way in which the mechanical properties of epoxy composite materials were affected by addition of graphene and nano silica was studied. The same epoxy resin (Araldite LY556) and graphene was used in all experiments, while other parameters were changed.

1.1 Materials and Specimen Preparation

The materials used in preparation of specimens are graphene particles (10nm size), nano silica of the fumed type (35nm size). The epoxy resin used is Araldite- LY 556 and hardener used is Amine-HY 951. Epoxy resin and hardener are mixed in the ratio of 10:1. Graphene is kept constant at 6% wt in all the samples, owing to the fact that graphene provides very good dispersion characteristic and good mechanical properties at the taken % wt. This was the chosen value upon studying of the past research and investigations.

Firstly, the graphene particles and nano silica powder is weighed accordingly. Epoxy is also weighed. The graphene, nano silica mixture is poured into the epoxy polymer. Now, this mixture is stirred constantly for about 10 minutes. Hardener in the ratio 10:1 wt% of epoxy is added to this mixture. Finally, the entire mixture is stirred for about 2-3 minutes and poured into the mould cavity which was priorly prepared with mould releasing wax spread on the top plate and bottom plate of the mould cavity. After the samples were completely cured it is more suitable to start testing after keeping them at room temperature for a whole day.

1.2 Material Characterization

Tensile Test - Tensile testing was carried out using Tensometer instrument according to the ASTM D638 test standard. The sample size was 165mm x 19mm x 3mm. The test specimen before and after fracture is as shown in Fig -1 and Fig -2.

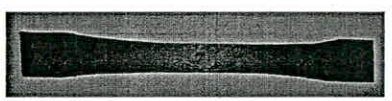


Fig -1: Tensile Test Specimen

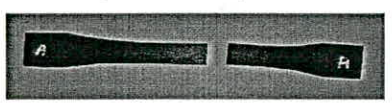


Fig -2: Tensile Test Specimen after fracture

Bending Test - Three point flexure properties were also according to ASTM D790 with dimensions (100mm x 12.7mm x 3mm). Here the specimen is supported on two knife edges as a simple beam and load is applied at its mid-point. The test specimen before and after fracture is as shown in Fig -3 and Fig -4

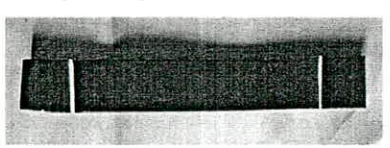


Fig -3: Bending Test Specimen

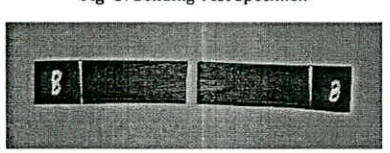


Fig -4: Bending Test Specimen after fracture

Hardness Test - Shore D hardness test was conducted as per ASTM standards (ASTM D2240). Durometer is one of several measuring instrument of the hardness of a material. Durometer is typically used as a measure of hardness in elastomers , polymers, and even rubbers. Durometer, like many other hardness tests, measures the depth of an indentation in the material created by a given force on a standardized presser foot. The standard applied load being 4.55 kg. The test specimen is as shown in Fig -5.

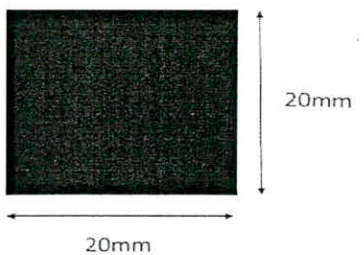


Fig -5: Hardness Test Specimen

2. RESULTS AND DISCUSSION

The following table shows the results of the Graphene Silica reinforced Epoxy Nano Composite.

Table-1: Composition of the test specimens and the corresponding results obtained

Specimen	Combination(Epoxy-Graphene-Nano Silica) in %	Tensile Strength (MPa)	Flexural Strength(MPa)	Hardness
A	94-6-0	91	176.6	57
B	90-6-4	93.6	167.2	60
C	86-6-8	96.3	154.3	65
D	82-6-12	104.7	147.7	70
E	78-6-16	91	141.1	72

Selection for Design Innovation Clinic (DIC)

1 message

Design Clinic CMTI <cmtidesignclinic@gmail.com> Sat, Mar 9, 2019 at 2:55 PM
Bcc: Deekshith9916@gmail.com

Dear Student,

Congratulations, your project has been selected for Design Innovation Clinic (DIC) event organized by CMTI. In this regard, please confirm your team presence for the DIC event.

1. Each team is requested to present the concept for 10 minutes to the Jury on 16th March 2019. Based on the presentations on your concept & novelty of your work on 16th March 2019, twenty teams will be shortlisted for 17th March & 18th March 2019 programme.
2. Please indicate the list of tools/items required from CMTI for the prototype development. General Tools will be provided by the CMTI and it will be published in the website or email at the earliest.
3. Limited accommodation for refreshing will be provided at CMTI guest house for the out station students.
4. Each team should pay Rs.500 at the time of registration.
5. Shortlisted teams (20 teams) will be paid Rs.2500 for reimbursement of hardware/tools against their original bills.
6. Each team should come with laptop for their project work.
7. Don't touch or break any items during lab visits & while prototype development.

ral Guidelines

- Please carry your laptops for project related activities (web search, presentation slides, etc.)
- Dress code is smart casual on all 3 days.
- Participate in all sessions and activities; be prepared for late nights.
- Take responsibility for your part of the team project, and make sure team expectations are met.
- Get timely feedback from mentor(s) for your team project from initial concept to final presentation.
- Keep your project work area neat and dump waste into designated bins. Return the tools to stations.
- Take photos and video clips of your team on all days; some of these can be used for presentation.
- Take care of your valuables (mobile, wallet, laptop). CMTI will not be responsible for any loss or theft.
- Network or unwind during mid-morning tea, working lunch, afternoon tea and dinner.
- Explore, experiment and enjoy every moment of the Camp with team members and mentors.
- Take notes and maintain a diary of your experience for sharing with friends in your organization.
- Share your daily experience, photos and videos on social media

Please contact for any queries: Anil-9986107099, Tom Thampy-7795318360, Sunil-9901979857

Regards,

Anil Kumar K, CMTI

schedule.pdf

Principal
Sapthagirl College of Engineering
14/5, Chikkasandra, Hesara...
Bengaluru - 5

14	Jss Science Academy & Technology University	Auto Switching Hybrid Two Wheeler Vehicle	Sidha Kumar Kothari K Shashank Nambiar Chethan C Keerthan S
15	Reva University	Wireless Power Transmission	Sushma S Matanavar Supriya K S Aditya Varma NA
16	Reva University	Monitoroting Highway Wind Power Parameter And Controllinghighway Light Through Iot	Ajith S Devadiga Hariprasad B Darshan Gowda B P Rajesh J
17	Reva University	Vehicletheftdetectionandtracking basedongsmandgps	Chaitra H Bhavyashree R Bhoomika D Brunda B
18	Reva University	Cell Phone Signal Jammer	Mohammed Farhan Murali N Mahesh B Naveen N
19	Reva University	Advanced Footstep Power Generation System	Bhanushree G C Chandrima Harsha B S Sahana
20	Reva University	Smart Irrigation System Using Iot	Naveen N Nagaraj Shivabasappa Naregal Nandeesh B K Anoop G Kopade
21	Atria Institute Of Technology, Bengaluru	Prediction & Prevention Of Leakages In Hydraulic Machines	Surya Murugan Tejesvi Chakravarthy Harshavardan.S Anil T
22	Atria Institute Of Technology, Bengaluru	Prediction And Analysis Of An Industrial Electromagnetic System	John Karamchand Gagan Gowda Dinakaran P Lokesh
23	GSSS Institute Of Engineering & Technology For Women, Mysuru	Predictive Maintenance System Using Iot For Manufacturing Sectors	Priyanka R Priyadarshini Pushpa K Priyanka B M
24	Shri Dharmasthala Manjunatheshwara College Of Engineering And Technology.	Online Form Measurement	Pratik S Vishwaroop Ankush Naik Devavrat Gadkar Akash Kalal
25	Sapthagiri College Of Engineering, Nite Meenakshi Institute Of Technology,Unversity Visvesvaraya College Of	Automatic Alcohol Detection And Vehicle Locking System	Devanth G Dharshan L Kushal M R Vinayaka Hegde
26	Jawaharlal Nehru National College Of Engineering	Iiot Based Process Automation	Shreyas B Sowjanya Jain Vasuki H A Shambhu Rohith Kumar B N
27	Jawaharlal Nehru National College Of Engineering	Monitoring Of Cutting Tools By Thermal Imaging	Prateek Saraf S Mayur V Sumukha Y Pawar Sumukh M S
28	Reva University	Rechargeable Power Banks	Vinay S V Vinay Singh G Sotu Chowdhury Shivesh Shukla

Professor & Head
Department of Mechanical Engineering
Sapthagiri College of Engineering
Bengaluru - 560 057.

Principal
Sapthagiri College of Engineering
14/5, Chikkasandra, Hesaraghatta Main Road
Bengaluru - 560 057

Design & Fabrication of Remote Controlled Solar Lawn Mower

Akshay S[1], Dhananjaya V[2], Galvin Ignatius Menezes[3], Prof. Anil Kumar P R[4]

[123]Student, Department of Mechanical Engineering, Sapthagiri College of Engineering, Bengaluru, Karnataka, India
[4]Assistant Professor, Department of Mechanical Engineering, Sapthagiri College of Engineering, Bengaluru, Karnataka, India

---

Abstract - A remote controlled solar lawn mower is a device which reduces the work load on humans for trimming lawn. Rapid growth of various high-tech tools and equipment makes our work comfortable, accurate and time efficient. This project considers the implementation of a device which can be operated wirelessly with the help of a remote. Every action of the lawn mower is controlled by IR relays. The project also aims at fabricating a lawn mower in which, the motors run with the help of solar energy.

The requirement of electricity around the world is increasing at an alarming rate due to industrial growth, which in turn leads to increased and extensive use of electrical gadgets. Solar energy is the best alternative source, which is both renewable, and an eco-friendly source of energy. This project will reduce environmental and noise pollution caused by conventional lawn mowers. This prototype is user friendly, cost efficient and environment friendly.

***Key Words*: Robot, IR relays, Pollution, Renewable, Electrical gadgets.**

1. INTRODUCTION

A lawn mower is a machine that uses cutting blades or strings to trim lawn at an even height. The working principle of a lawn mower is: High speed of rotation of cutting blades provide the force required for effective and accurate trimming of lawn. Lawn mowers have become very essential in our daily life. More and more lawn mowers have been manufactured and used in the last few years. When we put all this together, a lot of power is being consumed by lawn mowers. Also, we can observe that lawn mowers have been the cause for a lot of air and noise pollution around the globe. This has led to consumers seeking for ways to reduce and solve their own carbon footprints. Also, there are government regulations limiting the pollution level of the device to a certain maximum level, which is decreasing over the years.

Our three member project team have observed this, and decided to design and fabricate a remote controlled solar lawn mower, which not only reduces air and noise pollution and dependence on non-renewable energy sources, but also reduces the work load on laborers and speeds up the work. This lawn mower integrates a conventional lawn mower with solar panels, remote controlled operation and a storage unit for collecting trimmed lawn. We have incorporated all these features in our lawn mower at the lowest price possible, without compromising much on quality of the product. We hope to see this device as the future of lawn mowers around the globe in the years to come.

2. LITERATURE REVIEW

2.1 Self-Efficient and Sustainable Solar Powered Robotic Lawn Mower. (December 2015)

Srishti Jain, Amar Khalore and Shashikant Patil

This paper proposes a solar powered vision based robotic lawn mower which is an autonomous lawn mower that will allow the user the ability to cut the grass with minimum effort. Unlike other robotic lawn mowers in the market, this design requires no perimeter wires to maintain the robot within the lawn and also with less human effort in the manual mode operation. Through an array of sensors safety takes major consideration in the device, this robot will not only stay on the lawn, it will avoid and detect objects and humans. Here they used a 12V 310mA solar panel in their project. There are 24 solar cells on the solar panel, each contributing to 0.5V each. They could attach a battery but as the lead acid rechargeable battery used is rated 12V 1.2Ah, it won't be overcharged due to the small output of solar panel. To detect the obstacles, they used IR sensors which has 1m 555 IC. There are two sensors, one on each side. This is because in case the obstacle is on the left then it will move in right direction and if the right sensor detects the obstacle then it goes towards the left. [1]

International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 06 Issue: 04 | Apr 2019 www.irjet.net p-ISSN: 2395-0072

2.2 Automated Solar Grass Cutter (February 2017)

Ms. Rutuja A. Yadav, Ms. Nayana V. Chavan, Ms. Monika B. Patil, Prof. V.A. Mane

In this paper they are trying to make a daily purpose robot which is able to cut the grasses in lawn. The system will have some automation work for guidance and other obstacle detection and the power source that is battery and a solar panel will be attached on the top of the robot because of this reduces the power problem. The grass cutter and vehicle motors are interfaced to an 8051 family microcontroller that controls the working of all the motors. It is also interfaced to an ultrasonic sensor for object detection. The microcontroller moves the vehicle motors in the forward direction in case no obstacle is detected. If in case obstacle is detected by the sensor, then the microcontroller stops the grass cutter motor so as to avoid any damage to the object/human/animal coming. [2]

2.3 Design and Implementation of Automatic Solar Grass Cutter (April 2017)

Bidgar Pravin Dilip, Nikhil Bapu Pagar, Vickey S. Ugale, Sandip Wani, Prof. Sharmila M.

This paper describes manually handled device is commonly used for cutting the grass over the field which creates pollution and loss of energy. Automatic solar grass cutter which will reduce the effort required for cutting grass in the lawns. Also solar power will be used to provide the driving force for the cutter and various sensors will be used to detect and avoid the unnecessary objects in the field during operation. It consists of microcontroller arduino ATmega328p, IR sensors, LCD display for better response and understanding to the user. This paper will analyze the operation and working principle of the Automatic Grass Cutter. The other objective is that the automatic lawn cutter has to differentiate between grass and concrete while monitoring its surroundings continuously. They wanted an ultrasonic sensor to sense it the lawn cutter was heading into an object. Safety is the main concern while designing the lawn cutter. As it has blades they wanted their lawn cutter not to be in operating mode if it was being held in the air by the user. The design contains a microcontroller, multiple sensors and a solar charging system. Adding these elements together, they got their robotic lawn mower. Knowing that the user would be randomly holding the robot they needed a sensor to detect orientation. They decided to go with the one that work best with solar charging. The nickel-metal hydride (NiMH) was found to be the best because given a low charging current, it will not overcharge. [3]

2.4 Solar Based Grass Cutting (January-June 2017)

Ms. Bhagyashri R. Patil, Mr. Sagar S. Patil

For human enlargement in many countries there are studies and trials going on the solar energy and the wind energy, so they made their new concept solar power grass cutting machine. In this concept they cut the grass on the agricultural land or small plants in lawns and gardens. The design of solar powered agricultural equipment will include direct current (DC) motor, a rechargeable battery, solar panel, a stainless steel blade and control switch. The automatic grass cutting machine is going to perform the grass cutting operation by its own which means no manpower is mandatory. The purpose of the project here is to design and build a remote controlled grass cutter. They have used many components for preparing grass cutter like DC Motor for rotating the wheels and blade, wheels, battery, Solar panel, IR sensor, Collapsible blade. There are two main components such as transmitter and receiver. Transmitter continuously transmits the rays if any obstacle come in front of grass cutter then the rays are reflected back towards the receiver. The receiver receives the signal in the serial form from encoder but microcontroller requires parallel data for communication so receiver sends data to decoder to convert data in the parallel form and then it is passed to microcontroller. [4]

3. BLOCK DIAGRAM

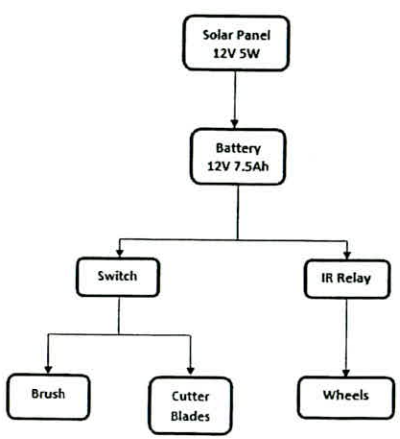


Fig (1): Block diagram of working

4. PROJECT OBJECTIVES

The device which we have developed is a lawn mower which runs electrically by using DC motors which directly power the wheels, rotating brush and the cutter threads. The motors are powered using lead acid batteries which can be charged with the help of renewable solar energy. IR relays are used for controlling the movements of the device. The entire device is focused on lowering the fabrication and manufacturing costs to make it affordable to common man.

The main objectives of our project are:

1) To build an economic remote controlled solar lawn mower.

2) To develop a user friendly control system.

3) To design, fabricate and analyse the remote controlled lawn mower.

5. COMPONENTS USED IN SOLAR LAWN MOWER

5.1 DC WIPER MOTOR: It is a device which converts electrical form of energy into mechanical form. There are many kinds of DC motors such as separately excited DC motor and self-excited DC motor. DC motor is powered by DC current. There are various ways in which DC motors are advantageous when compared to AC motors, one of which is that DC motors provide excellent control of speed. We have used 12V 60rpm motor for wheels, 12V 80rpm for rotation of brush and 12V 150rpm for rotation of cutter threads.

Fig (2): DC Wiper motor

5.2 IR RELAY: A relay can be defined as a switch that is applied with electrical signal which in turn connects or disconnects another circuit. An IR relay is a device in which the relay can be operated wirelessly by a remote, with the help of Infrared signals. IR technology requires a line-of-sight between the transmitter and receiver units. We are using 2 sets of 4 channel IR relays in our project.

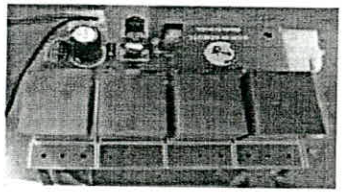


Fig (3): IR 4 channel relay

5.3 CUTTER THREAD: The rotation of the cutter thread provides the force required to trim the lawn efficiently and evenly. We have used a nylon wire of 3 mm diameter for the purpose. The projected length of the wire is 40 cm.

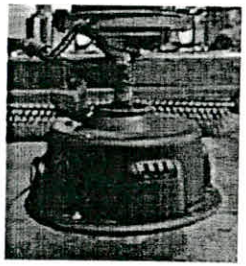


Fig (4): Cutter thread

5.4 BATTERY: Battery will provide the energy required for working of the device. The battery connected to any component should provide enough power to drive the component under load. We have used three batteries of 12V 15Ah each: Two to drive the wheels, and another to drive the cutter thread and rotating brush.

Fig (5): Battery

5.5 WHEELS: These will be required for motion of the lawn mower. The choice of wheels used largely depends on the shape and size of the lawn. It will also depend on the ground clearance of the lawn mower. We have implemented rubber wheels of 18cm diameter in our project.

Fig (6): Wheels

5.6 ROLLER BRUSH: It is used for collecting the lawn which has been trimmed by the motor. As the brush rotates, it guides the trimmed lawn into a storage unit. We have used a roller brush of length 33cm and 10cm diameter.

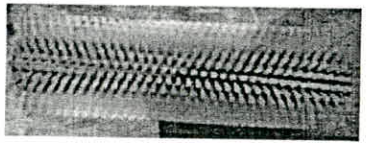


Fig (7): Roller brush

5.7 STORAGE UNIT: The trimmed lawn, with the help of a rotating brush is guided into a storage unit. The storage unit we have used is of length 34cm, breadth 14cm and height 12cm. Collecting trimmed lawn improves the ambience of the area, as trimmed lawn dries quickly and spoils the scene of green lawn by forming lumps of dried grass throughout. The collected lawn can be dried, converted into compost and used as manure for a variety of vegetation.

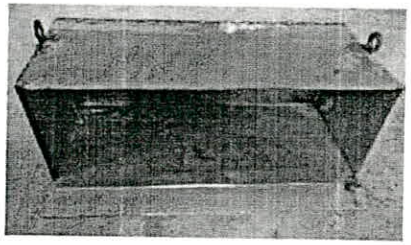


Fig (8): Storage unit

5.8 CHASSIS: Chassis is the internal frame that supports the entire device. It is the back bone of the device. All the systems and components such as the motors, IR relays, rotating brush, batteries, wheels, storage unit, solar panel and cutter thread are held together as one by the chassis. The overall strength of the device is greatly affected by the design and material used in the construction of the chassis. Chassis also provide protection to some delicate components. The rods used in the construction of the chassis in this project are of mild steel material of one inch square cross-section. The chassis is of 2.5 x 1.6 feet dimensions. The shaft connecting the two front wheels is circular with an external diameter of two inches, and this shaft too is made of mild steel,

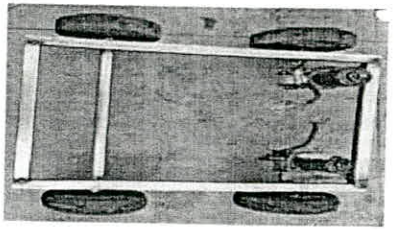


Fig (8): Chassis

5.9 SOLAR PANEL: The solar panel is bolted onto a supporting bar which is attached to the frame. This supporting bar is located at the rear end of the device, and is inclined at an angle of 20°. Electrical wires are used to connect the solar panel to the batteries for charging purpose. We have made use of a 12 V, 5 W solar panel in this project. This solar panel charges a battery to full capacity in a time duration of about 18 hours. Thus, this device can be used for gardening at home, where there is no requirement for daily usage of the device. The solar panel can be inclined to face the sun directly, for maximum utilization of sunlight.

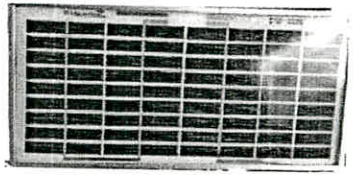


Fig (9): Solar Panel

6. PHOTOVOLTAIC PRINCIPLE

Conversion of light energy into electrical energy is based on a phenomenon called photovoltaic effect. Photo-voltaic effect can be observed in nature in a variety of semiconductors. When photons from the sun are absorbed in a semiconductor, it creates free electrons with high energy levels. There must be an electric field to induce these high energy electrons to flow out of the semi-conductor to do useful work. A junction of materials, which have different electrical properties, provides the electric field in most solar cells for the photon interaction in a semiconductor. A solar cell consists of

1) Semi –conductor in which electron hole pairs are created by the absorption of incident solar radiation.
2) Region containing a drift field for charge separation.
3) Charge collecting front and back electrodes.

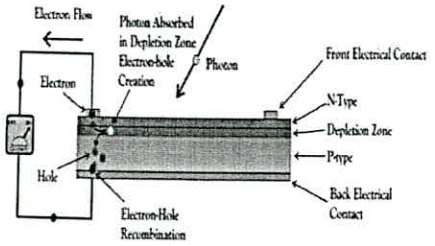
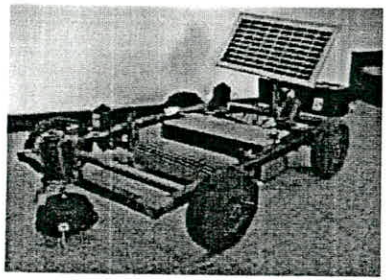


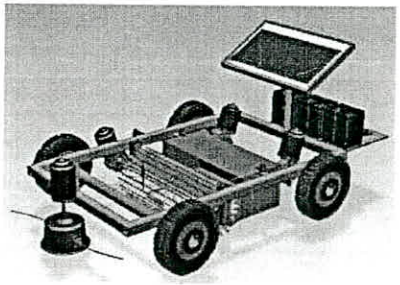
Fig (10): Photovoltaic principle

7. FABRICATED MODEL v/s DESIGNED MODEL

7.1 FABRICATED MODEL



7.2 3D MODEL DESIGNED USING UG-NX SOFTWARE



8. OBSERVATIONS & CALCULATIONS

8.1 OBSERVATIONS OF THE LAWN MOWER

1)	Wheel diameter, d	= 18 cm
2)	Rotation speed of wheels, N_1	= 60 rpm
3)	Rotation speed of brush, N_2	= 80 rpm
4)	Rotation speed of cutter thread, N_3	= 150 rpm
5)	Mass of the lawn mower, m	= 30 Kg
6)	Length of storage unit, l	= 34 cm
7)	Breadth of storage unit, b	= 14 cm
8)	Height of storage unit, h	= 12cm
9)	Diameter of blade, d_2	= 3 mm
10)	Mass of the cutter, m_2	= 0.5 Kg
11)	Length of blade, l_2	= 40 cm
12)	Power capacity of solar panel, P'	= 5 W
13)	Voltage rating of battery, V'	= 12 V
14)	Storage capacity of battery	= 7.5 Ah

8.2 CALCULATIONS OF THE LAWN MOWER

Speed of lawn mower

Circumference of wheel

$C = 3.142 \times d = 3.142 \times 18 = 56.54$ cm

Speed of movement of the device

$= (N_1/60) \times C$

$= (60/60) \times 56.54 \times 10^{-2} = 0.57$ m/s

$= 0.57 \times 18/5 = 2.052$ km/hr

Power required to drive the lawn mower

Force $F = m \times g = 30 \times 9.81 = 294.3$ N

Power, $P = F \times V = 294.3 \times 0.57 = 167.751$W

Power produced by wheel motor

Effective mass on each motor, $m' = m/2 = 30/2 = 15$ kg

Force $F = m' \times g = 15 \times 9.81 = 148$N

Radius of the wheel, $r = d/2 = 0.18/2 = 0.09$ m

Torque produced $T = F \times r_1$

$= 148 \times 0.09 = 13.32$ Nm

Power $= (2 \times \pi \times N_1 \times T)/60$

$= (2 \times 3.142 \times 60 \times 13.32)/60 = 83.7$ W

Total power produced by both wheels

$P = 83.7 \times 2 = 167.4$W

Volume of the storage unit

Volume $V = l \times b \times h = 34 \times 14 \times 12 = 5712$ cm³

Angular velocity of the blade

$\omega = 2\pi N_3/60 = 2 \times \pi \times (150)/60 = 15.70$ rad/sec

Torque produced by the blade

Area of cross section of the cutter thread

$A = \pi d_2^2/4 = \pi \times (0.3)^2/4 = 0.07$cm²

Volume of the cutter thread $V = A \times l_2$

$V = 0.07 \times 40 = 2.8$ cm³

Weight of the cutter $W_2 = m_2 g =$

$0.5 \times 9.81 = 4.9$N

Torque $T = W_2 \times l_2/2 = 4.9 \times 0.4/2 = 0.98$Nm

Force produced by the blade

$F_c = m_2 (l_2/2) \omega^2 = 0.5 \times (0.3/2) \times (15.7)^2 = 18.5$N

Battery charging time

Current produced by solar panel $I = P'/V' = 5/12 = 0.416$A

Charging time = Battery capacity/current

$= 7.5/0.416 = 18$ hrs

9. WORKING

1) The solar powered lawn mower has solar panels mounted in a particular arrangement at an angle of 45 degrees in order to receive maximum solar radiation from the sun.
2) These solar panels convert solar energy into electrical energy as studied earlier. This electrical energy is stored in batteries by using a solar charger.
3) The main function of the solar charger is to increase the current from the panels while batteries are charging. It also disconnects the solar panels from the batteries when they are fully charged and connects them when the charge in batteries is low.
4) The electrical energy stored in the battery is transmitted to various motors through connecting wires.
5) From the motors, the power is transmitted to the wheels, brush and cutter threads.

10. PERFORMANCE FACTORS

The device has to be evaluated on some factors to find out its working efficiency, and if it is convenient practically or not. Some of the factors are:

1) **Cutting Time:** It is one of the basic factors, which effects the performance of the device to a great extent. It is defined as the time required by the lawn mower to trim lawn in a unit area. As time is the most valuable resource in the present days, this factor becomes most important in determining the usability of the device.

2) **Trimmed lawn condition:** Whether the cut made to the lawn is clean or not, and if the height of the trimmed lawn is uniform or not are two very important factors in determining the performance of the device. The desired outcomes are uniform and clean trimming of lawn.

3) **Movement Pattern:** Movement pattern is an important factor. If the lawn mower moves over a previously trimmed area, it leads to wastage of energy and time. Hence, the movement pattern must be decided before-hand to avoid this un-necessary wastage of resources.

4) **Power requirements:** Power requirement decides the efficiency of the device. The power requirement of the device decides the energy consumed for trimming a unit area of lawn. More the power requirement, more is the energy required to trim unit area of lawn.

11. ADVANTAGES

1) The device reduces work load on humans.
2) It has simpler design than most commercial mowers.
3) This lawn mower is cheaper than most commercial lawn mowers.
4) It can be operated wirelessly from a distance.
5) It aids elderly users or those with disabilities.
6) The collected lawn can be used as fertilizers for a variety of vegetation.

12. CONCLUSIONS

Our project entitled "Design and Fabrication of Remote Controlled Solar Lawn Mower" is successfully completed and the results obtained are satisfactory. This prototype can be further modified for commercial use by increasing its efficiency and reducing its cost. This project is has many advantages when compared to a conventional lawn mower, for instance: No fuel cost, no pollution and no fuel residue, less wear and tear because of less number of moving components, and the devices can be operated wirelessly. The device can be easily handled and reduces burden on humans. India is a country with abundance of sunlight. Hence it is important that we make use of this renewable source of energy in replacement for other non-renewable sources which get depleted over time. Solar energy is also pollution free, and hence doesn't harm the environment. The only drawbacks in using solar energy are that the initial investments and the time required to charge the device are high,

At present, in order to curtail global warming and ozone depletion, the Government of India is offering subsidy for the solar equipment. Industries are producing these solar equipment in a mass scale. This leads to reduction of cost of the system over time. So in the near future, there iis going to be much more use of solar energy around India.

13. REFERENCES

[1] Self-Efficient and Sustainable Solar Powered Robotic Lawn Mower. (December 2015) *Srishti Jain, Amar Khalore and Shashikant Patil*

[2] Automated Solar Grass Cutter (February 2017) *Ms. Rutuja A. Yadav, Ms. Nayana V. Chavan, Ms. Monika B. Patil, Prof. V.A. Mane*

[3] Design and Implementation of Automatic Solar Grass Cutter (April 2017) *Bidgar Pravin Dilip, Nikhil BapuPagar, Vickey S. Ugale, SandipWani, Prof. Sharmila M.*

[4] Solar Based Grass Cutting (January-June 2017) *Ms. Bhagyashri R. Patil, Mr. Sagar S. Patil*

PP1-14

THE ROLE OF PESTICIDES IN FOOD CONTAMINATION IN PRESENT ERA

Priyanka R*, Bhagyalakshmi K S*, Sushmitha R*, Ananda H V, Dr.Ananda S****

**Department of Biotechnology, Sapthagiri College of Engineering, Bangalore, Karnataka, India
* Department of Biotechnology, Sapthagiri College of Engineering, Bangalore, Karnataka,India

ABSTRACT

Pesticides is a chemical or biological agents that kills or blocks the growth of pests. These pesticides are used as plant protection products in agricultural plantations which protects the plants from being attacked by certain weeds, fungi or insects. As the human population is increasing day by day there is an increased demand for food production in large quantity, so to increase the crop yield the use of certain pesticides in agricultural field came into practice. As a result of common use of pesticides for plant protection and animal hygiene, the residues of these pesticides gets deposited in crops and meats. So on consumption of these products by humans may cause food poisoning which is caused due to contamination of food. The adverse effects caused by consumption of these products depends on the toxicity of pesticides.

Keywords: Food contamination, pesticides, pesticide toxicity.

PP1-11

"A REVIEW ABOUT MICROBIOLOGICAL EFFECTS IN THE TREATMENT OF PESTICIDES IN AQUAPONIC SYSTEM"

Vineetha Mohan*, Akshatha Ganesh*, Pavithra K Shanmugham*, Ananda H V**

* Department of Biotechnology, Sapthagiri College of Engineering, Bangalore-560057,Karnataka,India
**Department of Biotechnology, Sapthagiri College of Engineering, Bangalore-560057, Karnataka,India

ABSTRACT

Pesticides consists of insecticides, herbicides and fungicides which are extensively used for the controlling weeds. Pesticides are used to obtain disease free plants which started after Second World War. To obtain high agricultural yield crops are sprayed with pesticides in order to control the harm of pests. Currently physical, chemical, biological and enzymatic approaches are used to degrade pesticides. In this study microorganisms are used for degradation of pesticides since microbial pesticide remediation is cost effective and thermodynamically more affordable.

Microorganisms utilise carbon and sulphur for its metabolic activity from the pesticides. Microbes such as actinomyctes and fungi degrade chlorinated pesticides, polycyclic aromatic hydrocarbons. Bacterial genus which are used foe detoxification and degradation are pseudomonas, Arthrobacter, Bacillus Aerobacter and fungal genus for degradation of pesticides are Aspergilus Niger and Fusarium, Penicillium. Actinomycetes are found to have potential in detoxifying pesticides.

Keywords: Aquaponic System, Microbiological Effects, Microorganism, Pesticides.

OP-9

Bio Fertilizer Production from Flower Waste Materials: Recycling of Flower Waste

Priyanka R*, Vineetha Mohan*, Ananda H V**

* Research Students, Department of Biotechnology. Sapthagiri College of Engineering, Bangalore-560057

** Assistant Professor, Department of Biotechnology, Sapthagiri College of Engineering, Bangalore-560057

Corresponding Email ID: anandahv@sapthagiri.edu.inPh No: 09964262548

ABSTRACT

Bio fertilizer' is a substance which contains living microorganism which, whenApplied to seed, plant surfaces, or soil, colonizes the rhizosphere or the interior of the plantand promotes growth by increasing the supply or availability of primary nutrients to the hostplant. Agriculture as the main source of livelihood and food security in Nigeria is facing achallenge of matching food, fodder, fuel, and fibre production with population growth. The fertility of soils is central to the sustainability of both natural and managed ecosystems.This is because it is the medium from which terrestrial production emanates. Soil organicmatter (SOM) plays an important role in maintaining soil texture, water holding capacity, themicro biomass and in nutrient cycling among others. It also helps in improving the drainageand aeration properties of the root zone and acts as a great source of nutrients to the growingplants. Thus Bio fertilizer plays a vital role in increasing the crop productivity, soil fertility andthus increasing the agricultural production. Waste gets generated from each and every activity of humans, which eventually degrades thequality of human health and accelerates the environmental degradation at an alarming rate.Flowers come as waste from various sources like hotels, marriages, gardens, temples,churches, Dargah and various other cultural and religious ceremonies, theatres, marriagehalls and in marketsThe bulk of the flowers, leaves of different plants, coconut shells,milk and curd are piled up and then disposed off exclusively in water bodies. It is an organic matter that is decomposed and recycled as a fertilizer and soil amendment itforms a key ingredient in organic farm.At a simplest level, the process of composting requires a heap or pile of organic matter,suchasleaves,flowers,food wasteand waiting for the material to break down into humus after aperiod of time.

Keywords: Data analysis, genome analysis, De Novo assembly, python scripting, SANGS .Py.

IN-SILICO SCEENING AND IDENTIFICATION OF ANTI-CANCEROUS COMPOUNDS FROM *Punica granatum* PEEL

Laxmi Singh, Shikha Venkat, Avijit Maity and Sushil Kumar Middha*

Department of Biotechnology and Biochemistry,
Maharani Lakshmi Ammanni College for Women (mLAC), Bangalore, India
Corresponding author: Sushil Kumar Middha, Department of Biotechnology, Maharani Lakshmi Ammanni College For Women, Bangalore, India
e-mail: drsushilmiddha@gmail.com, Phone: (+91) 9886098267

GM6

There is a constant demand to develop novel, effective, and affordable anti-cancer drugs from natural sources. *Punica granatum* L, a native of Iran belongs to the family Punicaceae. Studies on pomegranate peel have revealed its benefits in treating various diseases such as metabolic syndrome, cancer, anti-inflammatory and contraceptive. Her2 receptor is a family of human epidermal growth factor receptor family, is a promising target to treat breast cancer. In this study we have identified anti-cancerous targets of the potential candidate such as ellagic acid derivatives, ellagitannins present in pomegranate peel using *in-silico* methods.

An *in-silico* docking was carried out to identify the potential compounds of pomegranate inhibiting Her2 receptor using Auto dock. The potential compounds were screened using Lipinski's rule of 5. Hence, these compounds can be further investigated *in vivo* to enhance their concentration and to develop potential chemical entities for the prevention and treatment of breast cancer.

Keywords: *Punica granatum* – autodock pyrx- Discovery studio.

IN-SILICO INSIGHT IN TO *NIPAH* VIRUS PROTEOME

Saba Anjum, Nikitha S, Hema H and Prashanth Kumar H P

Department of Biotechnology, Sapthagiri College of Engineering
Corresponding author: prashanthkumar.hp@gmail.com

GM7

Nipah virus (NiV) infection is a new emerging zoonotic disease affecting both animals and humans. It is highly pathogenic, zoonotic virus which belongs to *Paramyxoviridae* family. Identifying and understanding pr in interactions are fundamental to our comprehension of the mechanism of infection and this can be used for th velopment of vaccines or antivirals. Currently, we lack therapeutic or prophylactic treatments for Nipah virus. To develop these agents one must know about the proteins, their characteristics and its biological functions. The present study, involves in identification of Nipah virus comprising of a six-gene, 18.2 kb, negative-sense single-stranded RNA (ssRNA) genome, which encodes nine proteins namely *Nucleoprotein (N), Phosphoprotein (P), the interferon antagonists W and V, the viral C protein, a Matrix protein (M), viral fusion and Glycoproteins (F and G, respectively), and a large polymerase (L) enzyme.* Scan-prosite was used to understand different sites in the protein, their positions and common amino acids making up the sites. According to The secondary structural analysis, alpha helix ranges from 15% to 56.6%, extended strands and random coils have ranges 10% to 30% and 38.7% to 62.7% respectively. From protein database, sequences were retrieved and then subjected to Protparam tool to explore the amino acid composition, their percent molar concentration and various other parameters such as hydropathicity, aliphatic index and instability index. Our study suggested that three out of nine proteins are highly unstable having high aliphatic index and

The sequenced gene was translated using bio-informatics tools and the resulted protein sequence was analyzed for variation. Present study was significant in the determination of variant amino-acids in the RFP and also its effect on fluorescence emission.

Keywords: *Mutation, RFP, Sanger's sequencing, variation, fluorescence.*

CALCIUM DEPOLARISES MITOCHONDRIA AND AMPLIFIES OXIDATIVE STRESS IN AGED RATS

Mohan Kumar B S and P Mahaboob Basha
Department of Zoology, Bangalore University, Bangalore 560 056

GM10

The mitochondrion is the central bioenergetics machine that controls much of cell function. Apart from synthesizing ATP, mitochondria is known to sequester Ca^{2+} and generate reactive oxygen species (ROS). The present study was carried out to understand the role of Ca^{2+} in the generation of ROS and mitochondrial membrane potential alterations during aging. The study was carried out in brain mitochondria isolated from 2-3 weeks, 2-3 months and 2-3 years old *Sprague Dawley* rats. Mitochondria isolated from 2-3years old rats displayed elevated levels of ROS production upon Ca^{2+} treatment, measured as a function of DCF fluorescence intensity. Alterations in mitochondrial membrane potential monitored using Rhodamine-123 fluorescence intensity showed large depolarization in mitochondria isolated from 2-3years old rats as compared to mitochondria from 2-3 weeks and 2-3 months old rats. Our experiments on ruthenium red, an effective blocker of Ca^{2+} uniporter, confirms the Ca^{2+} dependent ROS generation and membrane depolarization. Large mitochondrial depolarization observed in mitochondria isolated from 2-3 years old rats deciphers the vulnerability of the same to oxidative stress during aging.

FINDING PATHOGENIC NSSNPS AND THEIR STRUCTURAL EFFECT ON COPS2 USING MOLECULAR DYNAMICS APPROACH

Abhishek, Alekhya, Ashish, Kajal, Madhuri, Renuka,
Rishabh, Supriya, Vivek Chandramohan*
Biotechnology Skill Enhancement Programmed (BiSEP), Department of Biotechnology,
Siddaganga Institute of Technology, Tumkur – 572103, Karnataka

GM

COPS2 is a highly conserved multi- protein complex which is involved in cellular process and developmental process. It is one of the essential component in the COP9 signalosome complex (CSN).It is also involved in neuronal differentiation interacting with NIF3L1. The gene involved in neuronal differentiation is negatively regulated due to the transcription co-repressor interaction of NIF3L1 with COPS2. In the present study we have evaluated the outcome for 90 non synonymous single nucleotide polymorphisms (nsSNP's) in COPS2 gene through computational tools. After the analysis, 2 SNP's (R100W, N152K) were found to be deleterious. The native and mutated structures were prepared using discovery studio and docked to check the interactions with NIF3L1.On the basis of ZDOCK score these 2 mutations were selected (R100W, N152K). Further to analyze the effect of amino acid substitution on molecular structure of protein Molecular Dynamics simulation was run. Analysis based on RMSD, RMSF, RG, H-bond showed a significant deviation in the graph, which demonstrated conformation change and

mutations were incorporated in the protein structures obtained from PDB database and energy minimization was carried out using NAMD. The mutated structures were subjected to computational comparison with the native sequences / structures for solvation profile, protein flexibility analysis and stability. From the studies we found out certain SNPs in the coding region of CP. Different mutations were analysed by using computational tools and screening for most deleterious SNPs was done. Five mutations C276R, C338S, D544E, H837R, C874Y, C1040S were found out to be highly deleterious. The cysteine residues are generally associated with disulphide bridge formation and the mutations in the corresponding residue may cause protein destabilization. Thus, following SNPs obtained can be used as diagnostic markers for various diseases associated with the protein. Homology Modelling of the Domains was done and the domain structure of CP was constructed. These structures were mutated by using UCSF Chimera and further used for Molecular Dynamic Simulations (MDS). The RMSD Values obtained after MDS showed that domain 221-358 and the following mutations C276R and C338S were affecting the backbone of protein when compared to its native structure, indicating alteration in the protein structure. C338S that was screened from ClinVar showed Clinical significance as this mutation was responsible for ferroxidase deficiency called as Familial Aceruloplasminemia. Keyword : nsSNP, SIFT, CP, Molecular Simulation

GENOTOXICITY OF CUPROUS OXIDE (CU_2O) NANOPARTICLES ON *Lycopersicon esculentum*

Shobha G, Disha DB, Debika Chakarbarty and Ananda* S
Department of Biotechnology, Sapthagiri College of Engineering, Bangalore
Corresponding Author: Ananda S, shobhag@sapthagiri.edu.in

GPGB7

Copper and its oxide form of nanoparticles now a days are using in the field of agricultural biotechnology. Although Copper is an essential element for many biological processes in plants, doses of Cu over the required level can be toxic. Hence it is important to measure its genotoxicity in plant because they generate reactive oxygen species (ROS). To address this question genotoxicity was evaluated using classical genotoxic endpoints, DNA laddering, Comet assay, Micronucleus assay and DNA damage by TUNNEL assay was carried out. In DNA laddering a shearing effect was observed on 1.8% agarose gel. Further in comet assay leaf nuclei treated plant showed tail movement when stained with propidium iodide. The f_ nation of micronuclei induction was statistically significantly high in 1000. The nucleases degrade the hi :r order chromatin structure into fragments are detected by in situ "end-labeling" or "TUNEL" assay. All the assay showed the damage in DNA at higher concentration of 1000 ppm. The DNA damage can be explained solely by dissolved copper ions from the copper nanoparticle.

Key words: Comet assay, Micronucleus assay and DNA damage by TUNNEL assay

INCREASED CALCIUMESCALATES DYSFUNCTION OF MITOCHONDRIAL ELECTRON TRANSPORT CHAIN IN AGED RATS

Mohan Kumar B S and P Mahaboob Basha
Department of Zoology, Bangalore University, Bangalore 560 056

GPGB8

Mitochondria play an unrelenting role in bioenergetics of the cell. Apart from synthesizing ATP, mitochondrion is known to sequester Ca^{2+} and generate reactive oxygen species (ROS). Although ROS

GREEN SYNTHESIS: *IN-VITRO* TOXICITY ACTIVITY OF COPPER OXIDE NANOPARTICLES AGAINST CANCER & NON-CANCER CELL LINES

Shobha G, Priyanka P and Ananda S*

Department of Biotechnology, Sapthagiri college of engineering (Affiliated to VTU), Bengaluru - 560057, India
shobhag@sapthagiri.edu.in

BNBC2

Copper nanoparticles are well known for anticancer activity by deregulating cellular functions. In the present study, Cuprous oxide nanoparticles (Cu_2O Nps) were synthesized by a green route using an aqueous *Flacourtia montana* leaf extract and characterized by XRD, FT-IR, SEM, and EDX. The synthesized Cu_2O Nps were spherical in shape, and the XRD results show the average size of the Nps was ~45.5 nm. Peripheral blood mononuclear cells (PBMC) and MDA-MB-231 were chosen as representative normal and cancer cells models for cytotoxic effect by 3-(4, 5-Dimethylthiazol-2-yl)-2, 5-diphenyltetrazolium bromide (MTT)-based assay and genotoxicity study by Micronucleus assay. Our experimental results show that the cancer cells and normal cellsrespond to nanoparticle in different ways. Nps treatment of cancer cells showed 50% of the cells death at 91.1µg/ml and 98 % of cells death at 400µg/ml whereas no toxicity on PMBC cells. The percentage of micronucleus formation was found to be 94.08%. The study thus confirms the toxicity potential of Cu_2O Nps in cancerous cell lines.

Key words: Cuprous oxide nanoparticles, Micronucleus assay, *Flacourtia montana,* cancer cells.

ANTIBACTERIAL ACTIVITY OF GYMNEMA SYLVESTRE R. BR

Suresh Kumar C, Mohan Kumar B S and Narasimha Murthy V N

Maharani's Science College for Women, Palace Road, Bangalore 560001

BNBC3

Gymnema sylvestre R. Br., is a medicinal plant belonging to the family Asclepiadaceae. It is an important antidiabetic medicinal plant, commonly known as Gudmar. The leaf extract was prepared in soxhlet extractor using different solvents and assayed *in vitro* to test antimicrobial activity against pathogenic bacteria through diffusion method. Ethanol leaf extract of *Gymnema sylvestre* has shown zone of maximum inhibition over *Staphylococcus aureus and Escherichia coli* than the extracts prepared in hot aqueous medium or petroleum. The botanical extracts showed 70% rise in antimicrobial activity compared to disk diffusion by the commercial antibiotics such as Fluoroquinolone and Ciprofloxacin (control). The result of present investigation ascertains the value of this plant to be considered for further development of new drugs.

Medha Timmanna Bhat
Department of Microbiology, Davangere University, Davangere-577007.

PP9

'Metagenomics' is the collection of genetic materials from all the genomes present in the environmental samples and a view into the functional potential of the population. In addition to infection diagnostics metagenomics provides a functional tool to study microbial ecology of complicated disorders. Using a sequence-based metagenomics , the approach to investigate a toxic related microbial infection can be achieved. By the use of culture, advanced molecular assays, and the unbiased deep sequencing in analysing fresh or archived clinical samples has led to more comprehensive understanding of the prevalence of viruses as well as bacteria and other microorganisms in clinical environments. Discovery of several new viruses in different aquatic organisms can be done using viral metagenomics. The novel viruses identified in different aquatic organisms include Fishes, Molluscans, Turtles, Crustaceans and some marine mammals. One such novel virus is Barbell circovirus 1 and 2(BaCV1 and BaCV2) identified in Barbell fish(*Barbus barbus*), which causes mortality within 4-6 days of hatching(Munang'andu *et. al*, 2017). Viral metagenomics has been used to directly identify novel etiological agents from tissues of diseased animals showing pathological c' nges. Diagnostic metagenomics is a universal, culture-independent upcoming method with the potential tc agnose all human and veterinary infection with pathogenic micrroorganisms.

POTENTIAL *IN-VIVO* INFLAMMATION MODELS AND ANTI-INFLAMMATORY MEDICINAL PLANTS - A REVIEW

Abhishek.E*, Arpitha.K#, Albin Joseph[1], Vibha Bhardwaj* and Middha.S.K[2]
* Sapthagiri college of engineering # The Oxford college of Engineering
[1] Department of Biotechnology, MSRIT
[2] Department of Biotechnology, Maharani Lakshmi Ammanni College for women
Corresponding author: Sushil Kumar Middha
Asst. Professor., Department of Biotechnology, Maharani Lakshmi Ammanni College for women
Email: drsushilmiddha@gmail.com

PP10

Inflammation is commonly treated by the administration of NSAIDS which reduces pain and inflammation by blocking the metabolism of arachidonic acid by cyclooxygenase (COX) enzyme, thereby reducing the production of prostaglandin. However there are many side effects. Medicinal plants play a vital role in drug dis. very. Medicinal plants are very useful for human to cure various ailments. For the best of our kn. edge medicinal plants from all over the world with anti-inflammatory properties have not been documented in a single review paper. Therefore, this review paper documents anti-inflammatory activity of approximately 144 medicinal plants from different geographical regions with intent of presenting the diversity of medicinal plants that are of traditional or therapeutic use. The activity of these plants is attributed to the presence of secondary metabolites present in them. The review also concentrated on different models used to test the anti-inflammatory activity of the plants *In vivo* and identify carrageenan induced inflammation as the most commonly used model.

Keywords: Inflammation, *Invivo,* carrageenan, secondary metabolites, PubMed

Key words : Cuprous oxide nanoparticles, Micronucleus assay, *Flacourtia montana,* cancer cells

BIOINFORMATICS PREDICTION OF TOXIN ENCODING GENE CLUSTERS FROM *HELMINTHOSPORIUM MAYDIS*

Soumya C[1], Hema J N[2], Mahima M Siddheshwar[2], Prashanth Kumar H P[1] and Y L Ramachandra[3]
[1]Faculty, Department of Biotechnology, Sapthagiri College of Engineering, Bangalore 560057
[2]Students, V semester, Department of Biotechnology Sapthagiri College of Engineering 560057
[3]Department of Bioinformatics and Biotechnology, Kuvempu University, Shankaraghatta, Karnataka, India-577451

PP13

T-toxin a secondary metabolite is secreted by *Helminthosporium maydis* which causes southern corn leaf blight in maize. The genes responsible for production of toxin are PKS1, PKS2 which encodes for polyketide synthase, DEC which encodes for decarboxylase, RED1, RED2, RED3 which encodes for short chain dehydrogenase. These genes are located on chromosomal number 6 and 12. The compound produced by the expression of these genes induces all the symptoms associated with the diseases. *H. maydis* of Race T effect the corn plant with only T -cytoplasm. It has been reported that *H. maydis* produces a host specific t n when grown in liquid culture. There is evidence that family of linear polyketides 37 to 45 carbons in l h of which the major compound is 41 carbons present in partially purified preparations of the toxin produced by *H. maydis* affects mitochondrial and membrane functions. The T-toxin production by *H. maydis* is genetically inseparable from high virulence of the fungus on Tcms corn. Therefore the present investigations on analysis of gene with respect to their molecular weight, number of base pairs, GC% and restriction mapping which helps in better understanding of genes and their role in toxin production. We utilized the *H. maydis* genome sequence to predict the PKS1, PKS2, DEC, RED1, RED2, RED3 genes and their gene clusters made bioinformatics predictions about the types of compounds produced by the clusters and identifying homologs of *H. maydis* toxin encoding Genes (i.e., PKS1, PKS2, DEC, RED1, RED2, RED3).

Keywords:*Host specific Toxin, Polyketides, Helminthosporium maydis, Southern corn leaf blight.*

CELLULOSE EXTRATION FROM WET ORGANIC WASTE AND ITS APPLICATIONS

Srilekha K #, Revathy H #, Soumya C@ and Prashanth Kumar H P@
VIII sem BT, Department of Biotechnology, @ Faculty members, Department of Biotechnology,
Sapthagiri College of Engineering (Affiliated to VTU, Belagavi), Bengaluru -560057.

PP14

The rate of global waste production is rapidly increasing from last two decades. Poor waste management in third world countries is a big threat to human health and environment. The world will produce garbage of 2.5 billion tonnes per year by 2025. Currently, in Bengaluru city, approximately 5000 tonnes of waste is been generated and this waste is collected by BBMP directly and is been disposed in landfills. Garbage mainly is of two categories, dry waste (non-biodegradable waste) and wet waste (biodegradable waste). Wet waste primarily includes garden waste, kitchen waste (peels & rotten fruits and vegetables), and other wastes which are easily biodegradable and rich in cellulose polymer. Cellulose finds a wide range of applications in many industries such as pharmaceutical, cosmetics, fabrics and so on. The main focus of this research is

Keywords-Medicinal Plants, Survey, Field visits, knowledgeable people Chirwha.

ROLE OF SELENIUM NANO PARTICLES (SNPS) AS ANTIOXIDANTS IN ROS SCAVENGING AND DNA REPAIR

Reachikaa. S *,Ramyashree.S.J *,Priyanka.V *,Sirisha. J*,
Shobha G# and Prashanth Kumar H P #
Faculty members, and * VI semester, Department of Biotechnology,
Sapthagiri College of Engineering (affiliated to VTU), Bengaluru-560057.

PP51

Selenium nanoparticles are potent chemotherapeutic agents considered vital for their anti-oxidative and inquisitive properties when compared to other selenium compounds in the field of medicine. SNPs primarily function by invading apoptotic pathways namely intrinsic and extrinsic pathways and also, arrests cell cycle in addition to ROS scavenger function. ROS scavengers are compounds capable of reacting with reactive oxidative species (ROS) and other free radicals by suppressing their oxidative properties. Cancer cells exhibit increased ROS stress which is responsible along with other oncogenic stimulants causing different types of cancer. SNPs have a promising role in enhancing DNA damage repair by reducing chromosomal breaks thus preventing the generation of oncogenes.

Keywords: Selenium nanoparticles, ROS scavenger, DNA repair, anti-oxidant.

THE FABRICATION AND CHARACTERIZATION OF NOVEL HYDROGEL BASED ON *ANTHERAEA MYLITTA* SILK SERICIN

Sheela khanapure and Shyam kumar Vootla*
Department of Microbiology and Biotechnology, Karnatak University, Dharwad, Karnataka, INDIA: 580003
Corresponding Author Email: vootlashyam@kud.ac.in

PP52

Silk Sericin(SS) a natural, inexpensive, readily available, biodegradable, and biocompatible product, has been explored for its biological effects. Sericin of *Antheraea mylitta*, a wild sericigenous polyphagus silkworm has been characterized and studied for various potential applications especially in the biomedical field because of its unique biochemical and biophysical properties. Different strategies have been applied to enhancethe physical properties of SS-based materials. Thepolar side chainsof SS with hydroxyl, carboxyl, and amino groups enable the easycross-linking, copolymerization, and blending of SSwith other polymersto yield improved biodegradable materials.PEG is a linear polyether manufactured from ethylene glycol monomers. PEG based synthetic hydrogels are among the most studied and an important type of hydrophilic polymer for various biomedical applications as, they have critical properties, such as good biocompatibility, non-immunogenicity, good andtailorable mechanical properties.PEG has been found to be nontoxic and is approved by the U.S.Food and Drug Administration (FDA).It is a biologically inert polymer, therefore both protein and cell adhesion are fairly limited in PEG based hydrogels. To improve cell attachment, proliferation, and potentially differentiation PEG can be crosslinked with a natural polymer.Thus, in this study a novel Sericin-PEG hydrogel is developed using *A. mylitta* sericin, modified with PEG and crosslinked by citric acid. PEGis blended with sericin as an effective network modifier, further crosslinked

OP-9

Bio Fertilizer Production from Flower Waste Materials: Recycling of Flower Waste

Priyanka R*, Vineetha Mohan*, Ananda H V**

* Research Students, Department of Biotechnology. Sapthagiri College of Engineering, Bangalore-560057

** Assistant Professor, Department of Biotechnology, Sapthagiri College of Engineering, Bangalore-560057

Corresponding Email ID: anandahv@sapthagiri.edu.inPh No: 09964262548

ABSTRACT

Bio fertilizer' is a substance which contains living microorganism which, whenApplied to seed, plant surfaces, or soil, colonizes the rhizosphere or the interior of the plantand promotes growth by increasing the supply or availability of primary nutrients to the hostplant. Agriculture as the main source of livelihood and food security in Nigeria is facing achallenge of matching food, fodder, fuel, and fibre production with population growth. The fertility of soils is central to the sustainability of both natural and managed ecosystems.This is because it is the medium from which terrestrial production emanates. Soil organicmatter (SOM) plays an important role in maintaining soil texture, water holding capacity, themicro biomass and in nutrient cycling among others. It also helps in improving the drainageand aeration properties of the root zone and acts as a great source of nutrients to the growingplants. Thus Bio fertilizer plays a vital role in increasing the crop productivity, soil fertility andthus increasing the agricultural production. Waste gets generated from each and every activity of humans, which eventually degrades thequality of human health and accelerates the environmental degradation at an alarming rate.Flowers come as waste from various sources like hotels, marriages, gardens, temples,churches, Dargah and various other cultural and religious ceremonies, theatres, marriagehalls and in marketsThe bulk of the flowers, leaves of different plants, coconut shells,milk and curd are piled up and then disposed off exclusively in water bodies. It is an organic matter that is decomposed and recycled as a fertilizer and soil amendment itforms a key ingredient in organic farm.At a simplest level, the process of composting requires a heap or pile of organic matter,suchasleaves,flowers,food wasteand waiting for the material to break down into humus after aperiod of time.