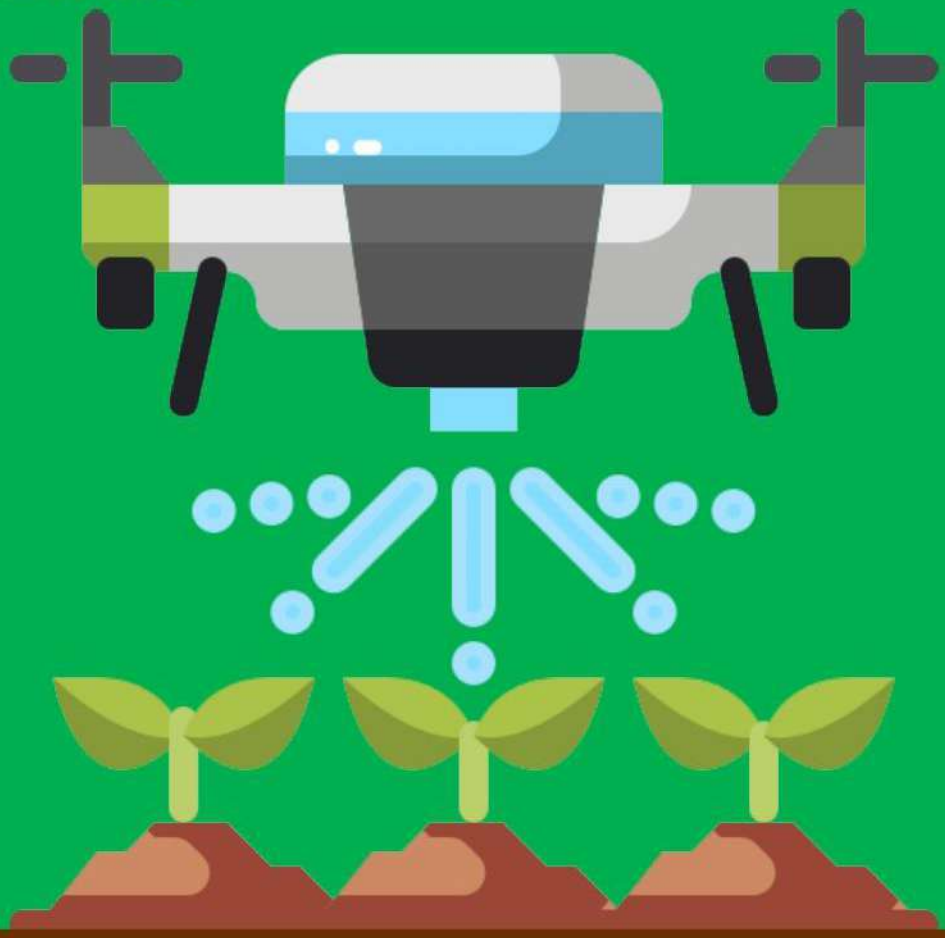
AgroTech Nexus

2022 - 2023 Volume 5 issue 2

AGRICULTURAL ENGINEERING



NANDHA ENGINEERING COLLEGE
(Autonomous)
Affiliated to Anna University, Chennai & Accredited by NAAC A+ Grade
Perundurai - Erode Main Road, Erode - 638 052, Tamil Nadu.

Department Vision and Mission

VISION

- To foster academic excellence by imparting knowledge in Agricultural Engineering to meet the ever-growing needs of the society.

MISSION

- To provide quality education to produce agricultural engineers with social responsibility.
- To excel in the thrust areas of agricultural engineering to identify and solve the real-world problems.
- To create a learner-centric environment by upgrading knowledge and skills to cater the needs and challenges of the society.

PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

The graduates of Agricultural Engineering will be

- **PEO1: Core Competency:** Successful professional with core competency and inter-disciplinary skills to satisfy the Industrial needs.
- **PEO2: Research, Innovation and Life-long Learning:** Capable of identifying technological requirements for the society and providing innovative solutions to real time problems.
- **PEO3: Ethics, Human values and Entrepreneurship**: Able to demonstrate ethical practices and managerial skills through continuous learning

PROGRAMME SPECIFIC OUTCOMES (PSO)

The students of Agricultural Engineering will be able to

- **PSO1:** Design, analyze and apply the knowledge gained on agricultural machinery, tools, implements and production technologies to increase crop production, improve land use, soil nutrient and conserve resources like water, fertilizer and energy.
- **PSO2:** Apply the comprehensive knowledge of engineering properties of agricultural products for upgrading the unit operation and developing innovative process, value-added products, and advanced engineering technologies to meet the challenges in agriculture.

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MAGAZINE

Integrated farming

S. Dharani, 3rd Year, Agri, NEC

Integrated farming refers to a sustainable agricultural approach that combines multiple agricultural activities within a single farming system. This method aims to maximize resource utilization, minimize waste, and enhance overall productivity. It involves integrating various components like crops, livestock, poultry, aquaculture, and agroforestry to create a synergistic and balanced ecosystem. The benefits of integrated farming include improved soil fertility, reduced environmental impact, diversified income sources, and better utilization of resources.

The main purpose of integrated farming is that the farming components support one another, hence, reducing external inputs. It is based on the concept that 'there is no waste' and 'waste is only a misplaced resource' which becomes a valuable material for another product.Reduction in production costs decreases farm input requirements, minimize the use of chemical fertilizer, enhanced employment generation, and pollution-free environment.Crops are grown and animals are raised on the same land. A plot of land reserved for the animal field. To raise animals or develop animal feed if a farmer chooses to raise his animals in unusually planned structures

Aquaculture

Dr. P. Komalabharathi, Associate professor, Agri, NEC

Aquaculture is the practice of cultivating aquatic organisms, such as fish, shellfish, and aquatic plants, in controlled environments. It falls within the realm of agriculture engineering as it involves the application of engineering principles to design, construct, and manage systems for raising aquatic organisms.Agricultural engineers play a crucial role in developing and optimizing aquaculture systems, including designing water circulation systems, monitoring water quality, creating sustainable feed solutions, and ensuring efficient production processes. Their expertise helps improve the overall efficiency, productivity, and environmental sustainability of aquaculture operations.Freshwater aquaculture is carried out either in fish ponds, fish pens, fish cages or, on a limited scale, in rice paddies. Brackishwater

aquaculture is done mainly in fish ponds located in coastal areas. Marine culture employs either fish cages or substrates for molluscs and seaweeds such as stakes, ropes, and rafts.

Processing waste materials into manure

Ms. P. Sandhiyadevi, Assistant professor, Agri, NEC

Processing waste materials into manure is an eco-friendly practice known as composting. It involves collecting organic waste like food scraps, yard trimmings, and paper, and allowing them to decompose naturally over time. This process results in nutrient-rich compost that can be used to enrich soil and improve plant growth. Composting helps divert waste from landfills, reduces greenhouse gas emissions, and promotes sustainable gardening and agriculture.The process of degradation of organic wastes into manure by the action of microorganisms is called composting.Manure is obtained when the animal and plant waste are dumped by farmers in an open pit and leave it for days. The waste starts to decompose by the action of certain microorganisms, this process is called decomposition. Finally, the decomposed organic matter becomes Manure

Manure is an organic substance obtained from the decomposition of plant or animal wastes. Farmers dump plant and animal waste in pits at open places and allow it to decompose. The decomposition is caused by some microorganisms. The decomposed matter is used as organic manure.Liquid or slurry manure application equipment comes in various types including broadcast spreaders, trailing hose spreaders, shallow disk injection, and chisel (knife) injection with sweeps.

Decomposition of wooden wastes

R. Ravirajkumar, 4th Year, Agri, NEC

The decomposition of wooden wastes is a natural process carried out by microorganisms like fungi and bacteria. It involves breaking down the complex organic compounds in wood into simpler substances, releasing carbon dioxide and nutrients back into the environment. This process can take several months to years depending on factors like moisture, temperature, and the size of the wood pieces. Composting and mulching are common ways to encourage the decomposition of wooden wastes in controlled environments.Leachate, gas, and heat are the three most common byproducts of organic waste decomposition in landfills. The decomposition of organic wastes occurs in three phases:

an aerobic phase, a transient phase, and an anaerobic phase. The initial decomposition of organic wastes occurs under aerobic conditions.The major biodegradable components of wood products are cellulose and hemicellulose and under anaerobic conditions in landfills, their decomposition results in the generation of approximately equal volumes of biogenic CO2 and CH4

This combination of low water content and dense structure makes wood highly resistant to decomposition, but by no means invulnerableYou want to make sure that there is a source of nitrogen in your wood chip pile. You should see green leaves and needles also called "green yard waste." The microbes that break down the wood feed on nitrogen. Therefore, the microbes will be able to work quicker if you have nitrogen.

Food processing in grains

A. Fiza Tabassum, 3rd Year, Agri, NEC

Food processing in grains involves various techniques used to transform raw grains into edible products. This can include cleaning, milling, grinding, cooking, and packaging to make grains more palatable, digestible, and convenient for consumption. Common examples include turning wheat into flour, rice into rice flour, and oats into oatmeal. These processes can enhance shelf life, nutritional value, and overall usability of grains.

The milling process usually includes removal of the outer hull which contains tough fibrous material. The grains may then be toasted, soaked, or cooked to soften and release the starch and other carbohydrates. Flaking, crushing, or grinding the grains is done to generate the desired product.

Primary processing involves several different processes, designed to clean, sort and remove the inedible fractions from the grains. Primary processing of cereals includes cleaning, grading, hulling, milling, pounding, grinding, tempering, parboiling, soaking, drying, sieving.

The wheat flour milling process consists of 5 main steps:grain reception, preliminary cleaning, and storage; grain cleaning; tempering or conditioning; milling the grain into flour and its byproducts; and storage and/or shipment of finished product.

Steam flaking is a very effective form of grain processing since it acts to break the seed coat and endosperm and also to gelatinize the starch.

Post-harvest processing

R. Meharaj,3rd Year, Agri, NEC

Post-harvest processing refers to the various activities and techniques applied to agricultural products after they are harvested. This includes steps such as cleaning, sorting, grading, packaging, storing, and preserving the products to maintain their quality, extend shelf life, and ensure they reach consumers in good condition. These processes can vary depending on the type of crop or product and are crucial in minimizing losses and maximizing economic value.In agriculture, postharvest handling is the stage of crop production immediately following harvest, including cooling, cleaning, sorting and packing. The instant a crop is removed from the ground, or separated from its parent plant, it begins to deteriorate.Postharvest activities include, but are not limited to, crop cleaning, sun drying, shelling, fumigating, curing, sorting, grading, packing, and cooling.

The three main objectives of applying postharvest technology to harvested fruits and vegetables are: to maintain quality (appearance, texture, flavor and nutritive value) to protect food safety, and. to reduce losses between harvest and consumption.Cool the product as soon as possible after harvest. Temperature is the most important factor determining deterioration rate. Decreasing the temperature reduces the product's metabolism (respiration and ethylene production), water loss, and the growth of decay-causing fungi and bacteria.The instant a crop is removed from the ground, or separated from its parent plant, it begins to deteriorate. Postharvest treatment largely determines final quality, whether a crop is sold for fresh consumption, or used as an ingredient in a processed food product.

Method of Sowing

Dr. K. K. Suvain, Assistant professor, Agri, NEC

Sowing refers to the process of planting seeds or seedlings in the soil to initiate the growth of crops. There are different methods of sowing, including broadcasting (scattering seeds over a wide area), drilling (placing seeds in rows or furrows), dibbling (placing seeds individually in holes), and transplanting (planting seedlings that were started indoors).

There are three different methods of sowing seeds: stripe seeding, point seeding, and broadcast seeding. Choose the right method for you depending on the type of vegetable being grown and the location where the seeds are to be sown. Stripe seeding is a method of seeding that is easy to control and widely used.Broadcasting is the most common and oldest method

of seed sowing. Here the seeds are just spread on the soil. Then seeds may or may not be covered with soil. Broadcasting may be done manually with hands or through a mechanical spreader.

Weeding involves the removal of unwanted plants, commonly known as weeds, from the cultivated area. Weeds compete with crops for nutrients, water, and sunlight, which can negatively impact crop growth and yield. Manual weeding, using tools or hands to remove weeds, is a common practice. Some farmers also use herbicides to control weedsSowing plays an important role in farming. Once after the soil is loosened and ploughed, the good, disease-free and pure quality of seeds are selected and sown into the soil. After selecting seeds of good quality, they are sown on the prepared land.

Plantation in roofs

Mr. M. Rabi Ahamed, Assistant Professor, Agri, NEC

Plantation in roofs" seems to refer to the practice of growing plants on rooftops, often referred to as green roofs or rooftop gardens. These installations can provide various benefits, including insulation, stormwater management, and improved air quality. They also contribute to urban biodiversity and aesthetics. If you're considering implementing a green roof, it's important to research the appropriate plant species, drainage systems, and maintenance required for your specific location and building structure.

A roof garden is a garden on the roof of a building. Besides the decorative benefit, roof plantings may provide food, temperature control, hydrological benefits, architectural enhancement, habitats or corridors for wildlife, recreational opportunities, and in large scale it may even have ecological benefits.There are 2 ways to set a terrace garden, either you can cover the entire surface with soil to convert it to a lawn or you can put plant pots and grow plants in them. As terrace have some space constraints as compared to a normal garden, planning the space usage accordingly is necessary.The maintenance operations of green roofs include waterproofing inspections, drainage inspections, removal of litter, electricity, and lighting, plant health inspections, replacement planting, irrigation, pruning, mowing and grass cutting, fertilizing, diseases and pest control and weeding.

Seed processing before cultivation

S. Nivashini,3rd Year, Agri, NEC

Seed processing before cultivation involves various techniques to improve seed quality and ensure successful germination and plant growth. It typically includes steps like cleaning, drying, sorting, grading, treating, and packaging seeds. These processes help remove impurities, pathogens, and damaged seeds, ensuring that only high-quality seeds are used for planting. Proper seed processing contributes to higher crop yields and healthier plants

Seed Scalper It removes the larger inert matter from the seeds. If it contains a single sieve it is called as scalpers, two sieves – rough cleaners. The unit consists of a vibrating or rotating screen or sieve having perforation large enough to allow the rough seed pass through readily.Seed germination is the initial step in the life cycle of plants, which begins when the inactive dry seed imbibes water and is completed with the protrusion of the radicle from the seed coatIn processing, first phase consists of scalping, debearding, hulling, shelling to make the seed flow readily through the grader and cleaner (conditioning and pre-cleaning). The second phase includes the removal of inert material, weed seeds, other crop and broken seeds that are larger or smaller than the crop seed.

Certainly! Seed processing before cultivation involves several important steps that contribute to the quality and success of the crops. Here are some key aspects of seed processing:Cleaning: The initial step involves removing debris, stones, dust, and other foreign materials from the seeds. This helps prevent contamination and ensures a clean batch of seeds.Sorting and Grading: Seeds are sorted based on size, weight, and shape. This helps in achieving uniformity within the seed batch, which is important for consistent germination and plant growth.Seed Treatment: Treatments might involve applying fungicides, insecticides, or other chemicals to protect seeds from diseases and pests. Additionally, seed treatments can include coating with beneficial microorganisms or growth-promoting substances.

Compost mechanization

Mr. R. M. Subramanian, Assistant professor, Agri, NEC

Compost mechanization refers to the use of machinery and technology to automate or streamline the process of composting organic materials. This can include equipment for shredding, turning, mixing, and aerating compost piles, making the composting process more efficient and effective. It often involves using tractors, compost turners, shredders, and other specialized machinery to accelerate decomposition and create high-quality compost

Composting is the most preferred method for managing organic waste, as it applies to the masses, may not require significant areas, and of course, is capable of reducing the rate of the production of waste, while at the same time, producing valuable by-products, in the form of compost with potentially reducing theBy using compost, you return organic matter and nutrients to the soil in a form readily useable to plants. Organic matter improves plant growth by helping to break heavy clay soils into a better texture, by adding water and nutrient-holding capacity to sandy soils, and by adding essential nutrients to any soil.

Composting reduces the need for pesticides and synthetic fertilizers. Because compost enriches soil and promotes healthy plant growth, plants grown in compost-rich soil tend to be more resilient to diseases, pests, and fungi.Composting significantly cuts down on the amount of trash in a landfill and reduces the costs and carbon emissions it takes to haul and process those materials. Meanwhile, the valuable nutrients in your compostable materials make composting a favorable alternative to shipping your organic waste to a landfill.

Rural development in agriculture

V. Rithanya, 2nd Year, Agri, NEC

Rural development in agriculture involves improving the economic, social, and environmental aspects of rural areas through various strategies like enhancing farming techniques, providing access to markets, promoting sustainable practices, and investing in rural infrastructure. It aims to enhance the overall quality of life for people living in rural communities while also promoting agricultural productivity and sustainability.

Rural development is the process of improving the quality of life and economic well-being of people living in rural areas, often relatively isolated and sparsely populated areas. Rural development has traditionally centered on the exploitation of land-intensive natural resources such as agriculture and forestry.Improving the quality of life of the rural population. To improve the infrastructure of the rural areas. To reduce unemployment by providing opportunities for employment.Agricultural development is defined as the process that creates the conditions for the fulfillment of agricultural potential. Those conditions include the accumulation of knowledge and availability of technology as well as the allocation of inputs and output.Agriculture impacts society in many ways, including: supporting livelihoods through food, habitat, and jobs; providing raw materials for food and other products; and

building strong economies through trade.The Role of Agriculture and Rural Development in Ending Poverty and Boosting Shared Prosperity

Three-quarters of the world's poor live in rural areas and most earn their living from farming. Enhancing agricultural productivity is thus essential to achieving poverty reduction. Productivity growth in agriculture is also the driving force behind structural transformation.The purpose of this research program is twofoldProvide guidance on productivity enhancing investments in, and policies toward, the agriculture sector Understand the transformation of the sector that is already underway and how this has contributed to ending extreme poverty and boosting shared prosperity.

Modern agriculture

N. Poornima, 4th Year, Agri, NEC

Modern agriculture refers to the advanced practices, technologies, and techniques used in farming to increase productivity and efficiency. It often involves the use of genetically modified crops, precision farming, automated machinery, irrigation systems, and data-driven decision-making to optimize crop yields and minimize resource wastage. This approach aims to address the challenges of feeding a growing global population while minimizing environmental impact.

Modern Agriculture covers a broad scope of multidisciplinary and interdisciplinary fields that encompass the parts of natural, economic and social sciences that are used in the practice and understanding of agriculture.Precision farming, hydroponics, aquaponics, and vertical farming are just a few examples of modern farming methods that are gaining popularity among farmers. These methods increase efficiency, reduce waste, and provide fresh and sustainable produce for consumers.

Modern farming, also known as modern agriculture or industrial agriculture, refers to the application of advanced technologies, scientific knowledge, and mechanized methods to maximize agricultural productivity and efficiency.Modern agriculture is critical to global food security because it feeds a growing population while minimizing environmental impact. Through its financing, supplies, growing, and selling services, Jiva assists farmers worldwide in overcoming the critical challenges they face daily.

Intensive agriculture

G. Srikarthi, 4th Year, Agri, NEC

In the field of agricultural engineering, intensive agriculture involves the application of engineering principles and technologies to optimize the efficiency and productivity of farming operations. This can include designing and developing advanced machinery, precision irrigation systems, automated harvesting techniques, and improved crop management practices to enhance the output of crops and livestock while minimizing resource waste. The goal is to find innovative solutions that balance increased production with sustainable and environmentally responsible practices.Seed processing or seed conditioning is the preparation of harvested seed for marketing to farmers. The processes involved include drying, threshing, pre- cleaning, cleaning, size grading, treating, quality testing, packaging and labelling.

In processing, first phase consists of scalping, debearding, hulling, shelling to make the seed flow readily through the grader and cleaner (conditioning and pre-cleaning). The second phase includes the removal of inert material, weed seeds, other crop and broken seeds that are larger or smaller than the crop seed.Modern agriculture uses compost and mulch on annual crops, perennials, orchards, vineyards, and grasslands. Compost improves soil properties, provides nutrients in a stable organic form, increases plant growth and health, and conserves water.

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The term intensive agriculture generally refers to maximizing agricultural production on a given area of land with inputs such as labor, fertilizer and machinery. It involves a range of practices designed to rapidly and cheaply grow plentiful crops and raise large numbers of farm animals. The creation of synthetic fertilizer to stimulate plant growth, for example, led to huge increases in food production. But its use has come at great cost to the environment, degrading soils, polluting air and water, driving global deforestation and emitting greenhouse gases like methane and nitrous oxide.

Intensive agricultural methods began to develop in the lead-up to and during the Industrial Revolution. But they truly came to prominence in the second half of the 20th century, in an agricultural shift known as the Green Revolution. The U.S. and its corporate interests played a large role in this shift, ultimately exporting industrialized practices to much of the rest of theworld.

Preservation of farmland

S. Yogiya, 3rd year, Agri, NEC

Preservation of farmland is seen, in this sense, as an integral element of the nation's environmental, social, and economic sustainability, both in a consumptive sense (the use and economic values of agricultural production) and in an inherent, possibly spiritual, value sense (preservation of the existence of farmland, regardless of its production or any actual effects on the valuing individual).

With life so greatly changed and daily activities so far removed from any intimate contact with the land, many people today still seek assurance that the bond between themselves and the land that supports them remains intact. A sustainable society requires a sustainable environment We are thus challenged to think about the land in new ways and to communicate what we see to people whose connections to the land are less direct but just as essential.

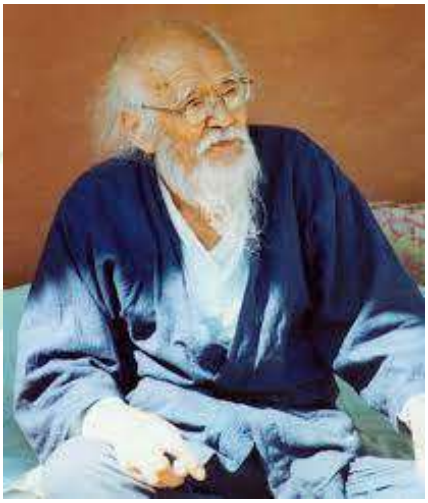
Loss of agricultural land to development results from two kinds of growth: growth on the “urban fringe,” i.e., in metropolitan counties that are not dense enough to be “urban,” and growth “beyond the urban fringe,” i.e., in rural areas often in non-metropolitan counties. While growth on the urban fringe results in low-density development (two houses per acre or less), growth beyond the fringe results in single-family houses scattered throughout the landscape. Beyond-the-fringe growth is not “urban,” but it still changes the surrounding landscape and may convert productive farmland to residential uses. This may lead to

significant conversion, especially as larger-lot residential parcels become more popular in rural area.

இயற்கையின் மதிப்பு

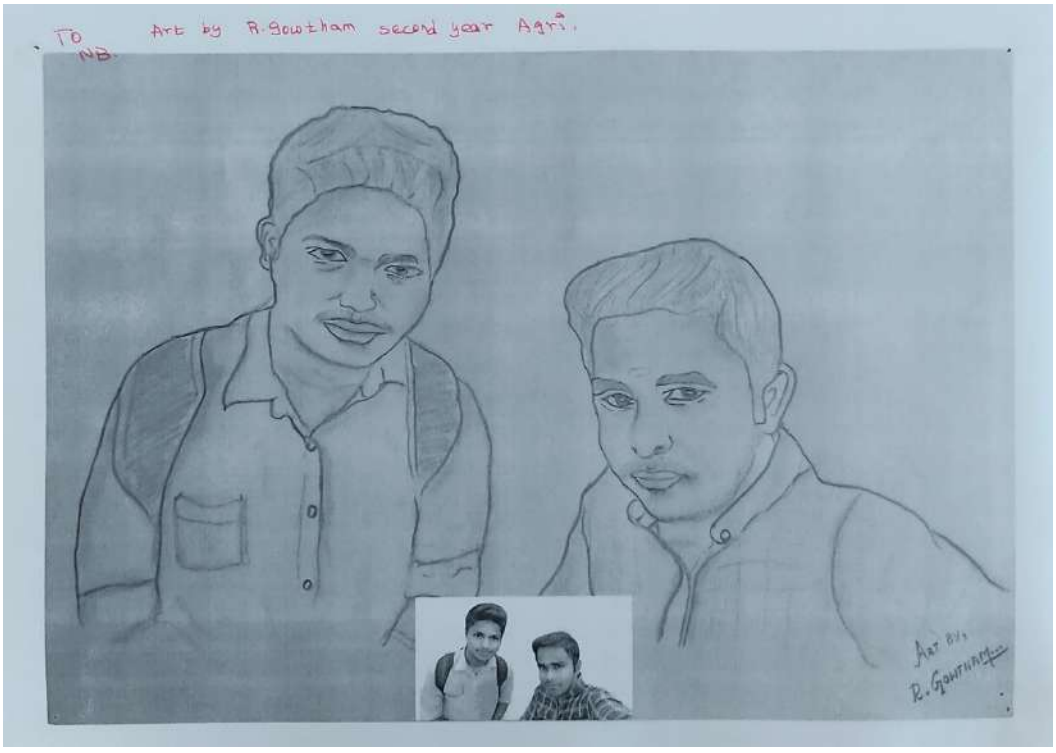
கடவுள் வாரி வழங்கிய வரம் இயற்கை!
மனிதன் ஈன்றளித்த உரம் தான் செயற்கை!
கடவுள் அளித்த வரத்தை அழித்து;
மனிதன் கொடுத்த உரத்தையே பெரிதும் வளர்கிறோம்!
கண்ணைக் கவரும் இயற்கை வனப்பு!!
எண்ணமுடியாது அவை கொண்ட வகைகளின் கணக்கு!!
இயற்கையின் முக்கியத்துவம் கருதி,
மாறுவோம்!.... மாற்றுவோம்!
எங்கும் இயற்கை கொண்ட உலகை!!!
விரைந்து எழுவோம்!
செயற்கையின் காலடியில் இருந்து;
வளமுடன் வாழ்வோம்..
" தேனிலும் மிருதுவான" நம் இயற்கையின் மடியில் ...
ஆனந்தமாய்!!!!!

ஜ.சந்தியா



THE ULTIMATE GOAL OF FARMING IS NOT THE GROWING OF CROPS, BUT THE CULTIVATION AND PERFECTION OF HUMAN BEINGS.

- Masanobu Fukuoka



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