AgroTech Nexus

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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

Crop Physiology

S. Vanisha, 3rd year, Agri, NEC

Crop physiology is the study of how crops are structured and function in relation to their productivity and quality. It's an integrative science that uses information from many disciplines, including: Soil science, Ecology, Plant physiology, Botany, Statistics, Micro meteorology, Modeling. Crop physiology helps to understand the biological processes of plants, such as: Photosynthesis, Respiration, Transpiration, Translocation, Nutrient uptake, Plant growth regulation through hormones. Crop physiologists are working to understand why some plants are more efficient and produce more per acre. By growing crops that are more efficient at using water, nutrients, and the sun's energy, we can harvest more and harvest crops that are more nutritious.

Soil science and management

Dr.Dhananivetha, M.,Professor, Agri, NEC

Soil science is the scientific study of soil, or pedology. Soil is a thin layer of the Earth's crust that is made up of organic and mineral components. Soil has many functions, including: Providing a medium for plant growth, regulating water supplies, recycling raw materials, providing a habitat for soil organisms, Serving as a landscaping and engineering medium.Soil conservation programs that are top-down and centralized have led to low adoption of sustainable practices. Soil erosion and environmental pollution are serious problems that need to be addressed.

Horticulture

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

Horticulture is the science and art of growing fruits, vegetables, flowers, and ornamental plants. It includes the development, sustainable production, marketing, and use of these plants. Horticulture also includes plant conservation, landscape restoration, soil management, and garden design. The word horticulture comes from the Latin words hortus (garden plant) and cultura (tilling the soil). Horticulture is the cultivation of plants in gardens or greenhouses, as opposed to the field-scaleproduction of crops characteristic of agriculture. Horticulture is the only plant science that incorporates both the science and aesthetics of plants. It is not difficult to learn horticulture. You can start by reading books and starting a garden in your backyard.

Biomass in agriculture energy sources

M. M. Pujara, 4th year, Agri, NEC

Biomass is a renewable energy source that comes from organic matter, such as plants and animals. Biofuels are fuels that are derived from biomass, which can be plant or algae material or animal waste. Biofuels are considered a renewable energy source because the feedstock material can be replenished.Biomass can be used for fuels, power production, and products that would otherwise be made from fossil fuels. For example, dung, grasses, and wood products were early biofuels that people used to produce energy. In some societies, they are still widely in use.The two most common types of biofuels in use today are ethanol and biodiesel. Biomass can also be directly converted to energy through gasification. During the gasification process, a biomass feedstock is heated to more than 700° C (1,300° F) with a controlled amount of oxygen.Biomass and biofuels are alternative energy sources to fossil fuels, such as coal, petroleum, and natural gas.

Recycling wastewater for agriculture

M. Eindhuja, 3rd year, Agri, NEC

Recycling wastewater for agriculture in arid regions can have many benefits, including:Conserving traditional water sources, reducing dependence on traditional water sources, improving soil health and fertility, increasing food production and security, Improving the growth rate of plants, Reducing the cost of chemical fertilizers. Recycling wastewater is one of the best ways to combat water scarcity for irrigation in arid and semi-arid areas. It has gained popularity in parts of Asia and Africa in recent years.Wastewater should be treated before being used for agricultural purposes. Water recycling systems vary depending on the type of water to be recycled and the requirements of the intended application.Reusing treated wastewater involves several types of risks, including health, environmental, economic, and strategic risks. It is difficult to measure these risks.

Hydroponic agriculture

Dr. S. Vanitha, Associate professor, Agri, NEC

Hydroponic agriculture is a method of growing plants without soil. Instead of planting crops in the ground, hydroponic produce is grown with roots dangling in water. The plant

roots grow in a liquid nutrient solution or inside moist inert materials like Rockwool and Vermiculite. The liquid nutrient solution is a mixture of essential plant nutrients in the water.Hydroponic systems can be used by small farmers, hobbyists, and commercial enterprises. They can foster rapid growth, stronger yields, and superior quality.Hydroponics is the technique of growing plants using a water-based nutrient solution rather than soil, and can include an aggregate substrate, or growing media, such as vermiculite, coconut coir, or perlite. Hydroponic production systems are used by small farmers, hobbyists, and commercial enterprises.

Wind power

S. Haripriya, 2nd year, Agri, NEC

Wind power has been used in agriculture for centuries to grind grain into flour and pump water from wells. Wind turbines can also help crops by:Improving the flow of carbon dioxide to crops, reducing temperature, which can increase crop yields, Wind farms can also help farmers save money by generating electricity to power farm equipment. This can help farmers produce more food.Wind power has been used in traditional agriculture by growing trees along the edges of fields. This technique slows the wind and stirs up the air, which benefits crops.Research suggests that wind turbines do not have a negative effect on crop yields.

Neem as an organic plant protection in agriculture

Ms. M. Indhumathi, Assistant professor, Agri, NEC

Neem is a natural pesticide that can be used to protect plants from pests. Neem oil and seed extracts have germicidal and anti-bacterial properties. Neem can repel pests like weevils, flour beetles, and bean-seed beetles. Neem can also control caterpillars, beetle larvae, grasshoppers, leaf miners, and plant-hoppers.Neem has been used for centuries by Indian farmers to protect stored grains from pests. Neem can also help plants grow. Neem does not leave any residue on plants.Neem can be used as an insecticide, fertilizer, manure, soil conditioner, urea coating agent, and fumigant.

Terrace farming

S. S.Bhavan Hari Karthi, 2ndYear, Agri, NEC

Terrace farming is a method of farming that involves building flat areas, or terraces, on the slopes of hills and mountains. The terraces are built to reduce runoff and better control soil conservation.Terrace farming is also known as step farming. It has been practiced in various places around the world, including:The Philippine Cordilleras, where the Rice Terraces are a World Heritage Site, The Andes, where the Inca people built canals, aqueducts, and puquios to direct water through dry land, Terrace farming can help crops grow in mountainous or hilly areas. When it rains, the terraces prevent rain from carrying away soil nutrients and plants down the slope. Instead, the water flows to the next terrace.However, if terraces are not constructed properly, they can hold excess water. This can lead to crop loss, erosion, and even mudslides and landslides.Terrace farming is practiced in hilly areas in India, including Himachal Pradesh, Uttarakhand, and the northeast states.

Genetically modified crops

S. Boobalan, 4th year, Agri, NEC

Genetically modified (GM) crops are plants that have been genetically engineered to alter their DNA sequences. The goal of producing GM crops is to increase yield and produce disease-resistant crops. GM crops are also called transgenic crops.GM crops are created by inserting genetic material from another organism into the plant's genes. This can give the plant new properties, such as:Increased yield, Tolerance to a herbicide, Resistance to disease or drought, Improved nutritional value, An example of a GM crop is Golden Rice. In India, field studies comparing Bt cotton with non-Bt cotton showed a 30–80% increase in yield from the GM crop.This increase was attributed to the GM plants' ability to overcome bollworm infestation.The characteristics of all living organisms are determined by their genetic makeup and its interaction with the environment. The genetic makeup of an organism is its genome, which in hujiko45ce4dv5fb6gt8juk9i0lo;'all plants and animals is made of DNA.

Technological transformation in agriculture

A. Rakesh, 2nd year, Agri, NEC

Technological transformation in agriculture is the use of modern technology to increase productivity and efficiency in farming. This includes technologies such as:
Precision agriculture, Smart irrigation, Biotechnology, Automation, Artificial intelligence (AI, 3D printing.Technological transformation can help farmers overcome challenges such as:

Financing, Supplies, Crop productivity.Technological transformation can also help farmers:Increase overall production, Reduce their impact on natural ecosystems, Ensure safer growing conditions, Technological transformation can have a positive impact on productivity, security, and supply chain. For example, 3D printing can create efficiencies and savings in the food supply chain.

Socialization of technology in agriculture

A. J. Arsha, 4th year, Agri, NEC

The socialization of technology in agriculture has had a positive impact on the sector, leading to increased production and efficiency. Technology has brought new techniques and approaches to agriculture, including:Mechanization, which facilitates effective tilling and harvesting while also reducing manual labor, Precision agriculture, which involves the use of sensors, drones, and GPS to monitor crop growth and optimize inputs such as water, fertilizer, and pesticides. The socialization of technology in agriculture has helped farmers in the acquisition of farm information in detail. The collected farm data enables farmers to make informed decisions and improve the agriculture process and efficiency of their operations.

The benefits of technology in agriculture include:Higher crop productivity, Decreased use of water, fertilizer, and pesticides, which in turn keeps food prices down, Reduced impact onnatural ecosystems, Less runoff of chemicals into rivers and groundwater, Increased worker safety

Agricultural diversification

R. Kavinesh, M. P. Sanjay, 1st year, Agri, NEC

Agricultural diversification is the process of changing cropping patterns or shifting agricultural workers to other non-agricultural activities. It can involve adding more species, plant varieties, or animal breeds to a farm or farming community. For example, a farm might grow multiple crops in the same season or intercrop.Agricultural diversification can involve:Moving resources from low-value commodities to high-value ones, Focusing on horticultural, dairy, poultry, and fisheries sectors, Shifting cropping patterns from food grains to cash crops, The main aim of agricultural diversification is to promote a shift from subsistence farming to commercial farming.Benefits of agricultural diversification include:Increased production, Additional employment in rural areas, Reduced financial risks associated with unfavorable weather or market shocksIncreased market potential,

Agricultural diversification has increased rapidly across the country since the Golden Revolution period from 1991-2003.

Population growth

S. Sandhiya, 4th year, Agri, NEC

Population growth can put pressure on food production, which can lead to food insecurity and environmental degradation. In poor countries with limited land and water, more people means fewer resources to meet basic needs.In India, population growth is faster in rural areas, especially in the central states. The growing population is also leading to the fragmentation of landholdings as land is divided between generations.Other factors that contribute to low agricultural productivity in India include:Unprofitable holdings, Uncertain monsoons and poor irrigation infrastructure, The subsistence nature of agriculture, Soil fertility decline, Not enough support services, India's agriculture sector has been growing at an average annual rate of 4.6% over the last six years. Key factors promoting the sector include increasing MSP, growing agri credit, income support schemes, and agri insurance.

Farm power

S. Kamala Kannan, 3rd year, Agri, NEC

Farm power is any source of energy used to support commercial agriculture. It plays a key role in determining the yield strength of tilled land. Farm power is used to operate machinery for tasks such as:Tillage, Planting, Plant protection, Threshing, Harvesting, Operating irrigation equipment, Threshers, Shellers, Cleaners, Graders.The different forms of energy used for agriculture include: Human power, Animal power, Mechanical power, Electrical power, Renewable energy.Human power is the most common source of power on a farm. It is easily available and requires no maintenance. Animals such as bulls, donkeys, and horses can also provide power.Electricity is the most expensive form of power. It has poor efficiency, requires complete preservation even when not in use, and is impacted by climate and seasons.

Sodic soil reclamation

S. Gokul, 4th year, Agri, NEC

Sodic soil reclamation involves replacing exchangeable sodium with calcium. This is usually done by adding gypsum, which is relatively soluble and inexpensive. Gypsum is applied to the soil and then leached. The rate of reclamation depends on the water intake rate.The Ca2+ in gypsum exchanges with the Na+, which is then leached out as a soluble salt. The CaSO4 and CaCl2 also increase permeability by increasing electrolyte concentration.The replaced Na+ is removed either below the root zone or out of the soil profile by leaching water. The rate of reclamation depends on the water intake rate.The economics of sodic soil reclamation require a low-cost method for successful implementation. Gypsum is also a source of sulfur and calcium to plants.

Sludge disposal

G. Karunya, 4th year, Agri, NEC

The most common method of sludge disposal is landfilling. After dewatering, sludge can be buried in a sanitary landfill or used as a fertilizer or soil conditioner on agricultural land. Incineration is another method of sludge disposal. Incineration involves burning the sludge to reduce its volume and eliminate pathogens. If the sludge is too toxic to be reused or buried, it can be incinerated and converted into ash.Sludge treatment and disposal generally include several unit processes:Thickening, Stabilization, Disinfection, Conditioning, Dewatering, Drying, Thermal reduction, Miscellaneous processes, Ultimate disposal, Reuse.Sludge is commonly collected by self-loading vacuum trucks, tanks, or boxes and hauled to the appropriate treatment and/or disposal facility.

Commercialization of agriculture

M. Nandhakumar, 3rd year, Agri, NEC

Commercialization of agriculture means the production of crops for sale in the market rather than for self-consumption. It began during British rule. This brought a change in home consumption to cultivation for the market.Commercialization of agriculture is the practice of growing crops for sale in the market rather than for personal use. This practice began during British rule in India. The British encouraged the production of cash crops such as tea, coffee, sugar, and indigo. These crops were meant for the market and were not grown for

consumption in villages.The commercialization of agriculture had several consequences:It reduced India's self-sufficiency in food production.It adversely affected the self-sufficiency of the village economy.It acted as a major factor in the declining state of the rural economy.It assisted the industrial revolution in Britain.The commercialization of agriculture also disturbed the socio-economic fabric of India.

Industrial revolution

M. R. Tharshiny, 2nd year, Agri, NEC

The industrial revolution had a significant impact on agriculture. It led to a decline in agricultural productivity as people left farms to work in factories. However, it also led to the development of new technologies and machines that have improved the way we produce food.

Industrial agricultural practices can have negative effects on the ecosystem. They can deplete soil quality, contribute to air and water pollution, and diminish biodiversity.

Some ways that industrial agriculture can deplete soil quality include:Wind and water erosion of exposed topsoilTilling (mixing the soil), Overgrazing of livestock, Industrial agriculture can also contribute to environmental degradation in other ways, such as:Consuming fossil fuel, water, and topsoil at unsustainable rates, Producing greenhouse gas emissions, Destroying wildlife, Industrial agriculture can also interfere with natural soil processes. For example, chemical pesticides can destroy microorganisms that ensure composting and proper organic matter incorporation.

Artificial intelligence in agriculture

S. Sindhu, 2ndYear, Agri, NEC

Artificial intelligence (AI) is used in agriculture to help farmers make better decisions and improve the quality of their crops. AI can help with a variety of tasks, including:Optimizing irrigation systems, Detecting leaks or damage to irrigation systems, Monitoring crop and soil health, Detecting disease and pests, Monitoring livestock health, Providing fertilizer recommendations. Analyzing crop sustainability, Predicting weather conditions, Detecting and targeting weeds, Providing accurate weather forecasts, Detecting pests and diseases early, AI can use data such as temperature, precipitation, wind speed, and solar radiation to make predictions. For example, AI can use infrared camera data from drones and sensors on

fields to predict and identify pest infestations before they occur.AI can help farmers make better decisions and improve the quality of their crops. It can also help with the workload and improve a wide range of agriculture-related tasks in the entire food supply chain.

Study of diseases and pathogens

A.Selin princy, B. Varsnica, 1st year, Agri, NEC

The study of diseases and pathogens transmitted by seeds, as well as the mechanisms by which they infect and spread, as well as methods for controlling them, is known as seed pathology. It is crucial to understand the mechanisms by which seed-borne viruses are spread and infected in agricultural crops.Seed pathology is the study of diseases and pathogens that are transmitted by seeds. It also includes the study of how these diseases spread and infect agricultural crops, and how to control them.Seed pathology includes the study of diseases caused by:Bacteria, Fungi, Nematodes, Viroids, Viruses, Physiological and mechanical disorders.Seed pathology also includes the study of how to manage diseases that affect seed production and utilization.The term “seed” refers to anything that is planted in the ground and grows into a plant.Paul Neergaard and Mary Noble coined the term “seed pathology” in the 1940s.

Agricultureimportance

S. Kanishka, 4th year, Agri, NEC

Agriculture is important for food security because it ensures that people have access to safe, nutritious food. Agriculture is also a major source of income for many developing countries.

The goal of agricultural development is to ensure food security. Food security means that people have access to enough safe, nutritious food to meet their dietary needs.Agriculture is also important because it provides raw materials for industries and is a major source of employment.The World Bank is working to increase food security by:Increasing digital advisory services for agriculture and food crisis prevention, Boosting the ability of agriculture system actors to adapt, Investing in regional food market integration and trade, The U.S. government has enacted laws to reduce hunger, malnutrition, and poverty around the world.

Improvements in livestock productivity lead to higher earnings for farmers and increase the availability of meat and meat products to the public. Efficient land use and healthy soils are important for food security.

Green farming technologies

B. Lakshmi Priya, 4th year, Agri, NEC

Green farming technologies are farming techniques that protect the planet and the people who live on it. These techniques produce healthy food without depleting natural resources, including land, air, and water.Some examples of green farming technologies include:Renewable energy, Zero tillage, Biotechnology, Organic farming, Vertical farming, Irrigation monitoring, Integrated pest management, Drones, Fleet management, Digital sensors.Sustainable farming also involves using alternative energy sources such as hydropower, solar power, or wind farms. Solar panels can be used to run pumping and heating systems.That term has evolved over the years, but it is most simply defined as growing food using farming techniques that protect the planet and the people who live on it. Sustainable agriculture produces healthy food without depleting natural resources, including land, air and water.

Nanobiosensors

G. Manobala, 3rd year, Agri, NEC

Nanobiosensors can be used in agriculture to detect a variety of things, including:Fertilizers, Herbicides, Pesticides, Insecticides, Pathogens, Soil pH, Moisture, Plant hormones, Plant metabolites, Metal ions.Nanobiosensors can help with crop management, environmental safety, and food safety. They can be used to detect plant viruses, soil nutrient levels, and crop infections. The high selectivity and sensitivity of nanobiosensors enable early detection and management of targeted abnormalities.Nanobiosensors work by measuring the physical change that occurs with the reaction at the bio-receptor. The transducer then transforms that energy into a measurable electrical output.Nanobiosensors can be used in conjunction with artificial intelligence to revolutionize the biosensor field.

Multilayer farming

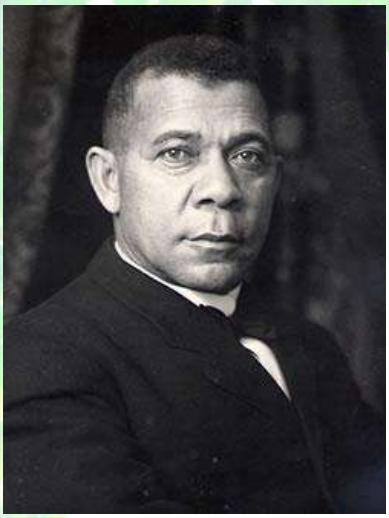
S. Thillaiarasan, 2nd year, Agri, NEC

Multilayer farming is the process of growing multiple crops in a single field. This is done by planting a crop on top of an already existing crop. The first crop is then harvested, and the land is used to plant another crop. The purpose of this is to save space on land and improve efficiency.Multilayer farming is a technique that involves growing multiple crops on the same piece of land at different heights. This method optimizes land use to increase productivity and profitability.Multilayer farming can be used with any type of crop, but it's most common for subsistence farmers who have limited resources and land available for planting. The crops are grown in layers that can be harvested at different times.The basic principles of multilayer farming are:Diversification of crops according to scientific, ecological, and economic principles.Getting more profit by maximizing the productivity of the system.Using farm resources with high efficiency.Use of intensive investment method for maximum profit.When using fertilizers and manures, it's important to remember that the crops planted in multilayer farming have different nutrient requirements. Therefore, "basal dose" is more preferred. Basal dose refers to all types of primary fertilizers applied in the soil.

Plantation farming

P. Sasikumar, 3rd year, Agri, NEC

Plantation farming is the practice of clearing a large parcel of forest land and planting the desired crops in huge numbers on the cleared land. This type of farming helps in increasing the production of the desired produce and makes it easier to control the cultivation.Plantation farming is a type of agriculture where a single crop is grown on a large farm. The crop is usually grown for export and the plantation is often owned by a company or government.Plantation farming involves clearing a large parcel of forest land and planting the desired crops in huge numbers on the cleared land. This type of farming helps in increasing the production of the desired produce and makes it easier to control the cultivation.Plantation crops are typically cash crops, which means they fetch high prices when sold on the international market. Examples of plantation crops include tea, coffee, rubber, cocoa, sugarcane, bananas, coconut, and oil palm. Plantation farming requires capital for modern machinery and personnel. Plantations can be found in many parts of the world, but are most common in tropical countries.Plantations frequently depend on foreign capital and agricultural training and tend to exploit the labor forces of native populations.



NO RACE CAN PROSPER TILL IT LEARNS THERE IS AS MUCH DIGNITY IN TELLING A FIELD AS IN WRITING A POEM.

- BOOKER T. WASHINGTON

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