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

Specialized garden

R. Aruna, 3rdYear, Agri, NEC

Gardening is not only a hobby; it's an art form. Gardens are as unique as their designers. There are gardens for specific uses such as memory or vegetable gardens; gardens designed to evoke a feeling, as in meditation gardens; and those that honor a particular national style, like Japanese gardens. Specialty gardens allow gardeners to express their dreams, reflect on concepts, and pay tribute to gardeners from the past.

Travel to almost any destination and you will see many types of gardens. Some are colossal professional landscapes with historical importance, while others are simple home gardens for food or backyard enjoyment. Whether it is a landscape already mentioned, a native garden, tropical or any other of the many unique gardening styles, ease of maintenance, appropriate plants for site and zone, hardscape details and other items are all considerations of the design.

Extensive agriculture

Dr. D. Prabha, Professor, Agri, NEC

System of crop cultivation using small amounts of labor and capital in relation to area of land being farmed. The crop yield in extensive agriculture depends primarily on the natural fertility of the soil, terrain, climate, and the availability of water.In agricultural economics, a system of crop cultivation using small amounts of labour and capital in relation to area of land being farmed.

Extensive farming is a method of farming that employs large agricultural machinery, chemical fertilizers, pesticides, and agricultural research and involves huge capital. It is practised where huge cultivable land is available for agriculture, and there is low population density. Hence, this type of farming is widely found in Argentina, Australia, parts of the U.S.A., Canada, Ukraine, and Russia, where the population is low and cultivable land is plenty. When compared to the quantity of land being farmed, extensive farming is an agricultural production approach that uses low labour, fertiliser, and capital inputs.In agricultural economics, extensive agriculture is a method of crop production that consumes little labour and resources compared to the area being farmed.

Wetland farming

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

Wetland refers to the soil that has been flooded or irrigated by a lake, pond, or canal, and the land is always submerged. Wetland agriculture is a type of farming practiced on or near water bodies as farmland. They build raised farm beds on lands near water systems. This is an intensive type of farming that necessitates constant attention and systematic treatment. This article will explain to you about Wetland Farming which will be helpful in preparing the Agriculture Syllabus for the UPSC Civil Service exam.

A variety of local and migratory bird species, as well as aquatic flora and wildlife, reside in wetland.Wetlands are a crucial resource for eco-friendly travel.They filter sediments and nutrients from surface water, as well as purify the water.They support local climate stabilization, groundwater recharge, and nutrient recycling: By regulating the rate of runoff, play a significant part in flood reduction. By protecting shorelines from erosion and pollution by acting as a riparian buffer.They serve as a genetic storehouse for numerous plant species (especially rice).They support fertile soils, reduce erosion, retain sediments and nutrients, and reduce the risk of salinity and acid sulphate soils.Encourages aquaculture or grazing.Provides a variety of raw materials such as timber, stock feed, salt, peat, and firewood. Acts as natural filters in the treatment of waste water.

Agriculture business management

T. Keerthana, 4th Year, Agri, NEC

Agriculture business management is a specialised management programme that focuses on the business aspect of agriculture production and its international trade. Agriculture Business Management assists the agricultural sector by providing professionals and business leaders. Several leading business schools of India provide this management course vehicle focusing on the management and economics of the agricultural sector. The course focuses on various aspects of business management such as making key business decisions and minimising risk. There are several degree options available such as B.Com, BBA,

B.Sc. (Hons), M.Com, MBA, M.Phil, Ph.D., Diploma for those interested in pursuing this course at various education levels.

Smart agriculture

K. Elango, 3rd Year, Agri, NEC

Smart agriculture is a newly introduced concept. Majority of farmers and agricultural experts are new to this concept. Smart agriculture involves the use of smart technologies such as automated machines, sensors, actuators, drones and security cameras to control and operate agricultural lands and animals. The motive is to increase the quality and quantity of agricultural goods at the same time keeping in mind the cost and energy usage.

Another very important domain in the internet of things is the agricultural domain. IoT is responsible for modernizing the agricultural field by using proficient methods and instruments to manage crops, soil and animals. This in turn has led to decrease in the waste generation and a phenomenal increase in productivity. This is smart agriculture using IoT. Afarm which is managed using smart technologies and modern forms of communication is termed as a smart farm.

The smart farms are completely operated by automated tools and robotics in such a manner that the farmer does not even have to step on the field. The cost of manual labour reduces due to smart farming. IoT integrates and connects the entire farm to improve quality and quantity of crops and other produce.

Precision agriculture

P. Selvakumar,3rd Year, Agri, NEC

Precision agriculture (PA) is a farming management concept based on observing, measuring and responding to inter- and intra-field variability in crops. PA is also sometimes referred to as precision farming, satellite agriculture, as-needed farming and site-specific crop management (SSCM).Precision agriculture uses information technology (IT) to ensure that crops and soil receive exactly what they need for optimum health and productivity. This also ensures profitability,sustainability and protection of the environment. It considers aspects such as soil type, terrain, weather, plant growth and yield data when managing crops.

To do its job, precision agriculture relies upon specialized equipment, software and IT services. This includes accessing real-time data about the conditions of the crops, soil and

ambient air, along with other relevant information such as hyperlocal weather predictions, labor costs and equipment availability.The real-time data is collected via sensors in fields that measure the moisture content and temperature of the soil and surrounding air. Satellites and robotic drones can also provide farmers with real-time images of individual plants.

Renewable energy in agriculture

Mr. N. Mukilan, Associate professor, Agri, NEC

Renewable technologies are now supplying or supplementing many on-farm energy requirements, from water pumping to space heating. Increasingly, farmers and ranchers are selling energy (e.g., electricity generated from wind turbines, biofuels, and products from biomass). This is contributing to greater energy security in agriculture through increased diversity of energy sources, more self-supply of energy, and reduced environmental impact.

The United States faces a choice of energy futures. Continuing the present course is one alternative. Fossil energy for mechanized agriculture has been an important driver of the "Green Revolution" of increasing farm productivity. Today, three energy inputs (diesel fuel, fertilizer, and electricity) account for more than three-quarters of farm energy use. (Miranowski, 2004). At predicted levels of oil production and consumption, America will be increasingly dependent on foreign oil imports in the Years ahead, making the Nation even more vulnerable to oil disruptions and price spikes. In agriculture, an energy supply disruption of even a short duration could mean a substantial reduction or the complete loss of an entire growing season. As price-takers for their commodities, farmers are generally unable to pass price increases for energy or fertilizer on to the consumer, and therefore receive a lower return for their products when prices rise (Costantini &Bracceva, 2004).

Renewable energy can address many concerns related to fossil energy use. It produces little or no environmental emissions and does not rely on imported fuels. Renewable resources are not finite (as fossil fuels are) and many are available throughout the country. Price competitiveness has been a concern, but costs have decreased significantly since the initial wave of interest in renewable energy in the 1970s. These technologies now provide 6.1 quadrillion British Thermal Units (Btu) for domestic energy consumption.

Bio gas production

Dr. R. Jeya Prakash, Assistant Professor, Agri, NEC

Biogas is produced through the processing of various types of organic waste. It is a renewable and environmentally friendly fuel made from 100% local feedstocks that is suitable for a diversity of uses including road vehicle fuel and industrial uses. The circular-economy impact of biogas production is further enhanced by the organic nutrients recovered in the production process.Biogas can be produced from a vast variety of raw materials (feedstocks). The biggest role in the biogas production process is played by microbes feeding on the biomass.

Digestion carried out by these microorganisms creates methane, which can be used as it is locally or upgraded to biogas equivalent to natural gas quality, enabling the transport of the biogas over longer distances. Material containing organic nutrients is also produced in the process, and this can be utilized for purposes such as agriculture.

Larva formation in plants

V. Diviya, 3rd Year, Agri, NEC

Larvastage in the development of many animals, occurring after birth or hatching and before the adult form is reached. These immature, active forms are structurally different from the adults and are adapted to a different environment.In some species the larva is free-living and the adult is an attached or nonmobile form; in others the larva is aquatic and the adult lives on land. In forms with nonmobile adults, the mobile larva increases the geographic distribution of the species. Such larvae have well-developed locomotor structures. A larva sometimes functions as a food gathererin many species the larval stage occurs at a time when food is abundantand has a well-developed alimentary system. It stores food so that the transformation to the adult stage can occur. Some larvae function in both dispersion and nutrition.

The amount of time in the life cycle spent in the larval stage varies among species. Some have long larval periods, either hatching early, metamorphosing into adults late, or both. Some organisms have a short-lived larval phase or no larvae at all.Larvae appear in a variety of forms. Many invertebrates (e.g., cnidarians) have a simple ciliated larva called a planula. Flukes have several larval stages, and annelids, mollusks, and crustaceans have various larval forms. The larval forms of the various insects are called caterpillars, grubs, maggots, and nymphs. Echinoderms (e.g., starfish) also have larval forms. The larva of the frog is called a tadpole.

Transporting of harvested horticulture crops

K. Pradeep Kumar, Assistant professor, Agri, NEC

Temperature management is critical during long distance transport, so loads must be stacked to enable proper air circulation to carry away heat from the produce itself as well as incoming heat from the atmosphere and off the road.Transport vehicles should be well insulated to maintain cool environments for pre-cooled commodities and well-ventilated to allow air movement through the produce. During transport, produce must be stacked in ways that minimize damage, then be braced and secured. An open-air vehicle can be loaded in such a way that air can pass through the load, and provide some cooling of the produce as the vehicle moves. Traveling during the night and early morning can reduce the heat load on a vehicle that is transporting produce. Drivers of vehicles used for shipping produce must be trained in how to load and handle their cargoes. There tends to be a large turnover in drivers (in the US the average time on the job is only 3.5 Years) so training is a constant concern.

Recent documents report that carrying mixed loads in North America is still a very common practice, especially with vegetable shipments (Hagen et al, 1999). Mixed loads can be a serious concern when temperature optima are not compatible (for example, when transporting chilling sensitive fruits with commodities that require very low temperatures) or when ethylene producing commodities and ethylene sensitive commodities are transported together. High ethylene producers (such as ripe bananas, apples, cantaloupe) can induce physiological disorders and/or undesirable changes in color, flavor and texture in ethylene sensitive commodities (such as lettuce, cucumbers, carrots, potatoes, sweet potatoes).

Protected cultivation

A. R. Preetha, J. Mythili,2nd Year, Agri, NEC

Protected cultivation of vegetables and ornamentals is one of the important technological advancements in crop production popularized during the twenty first century and offers maximum utilization of resources for economic benefits to the growers. With the use of protected cultivation, important vegetables and flowers become available for an extended period or during off-season. Environmental conditions especially the moderate temperature, high humidity, and adequate soil moisture maintained under protected

cultivations also happen to be ideal for nematode survival and multiplication. As a result, nematode infestation becomes very common, and presents serious disease problems in vegetables and ornamentals being grown under protected structures. Root-knot nematode, root lesion nematode, burrowing nematode, reniform nematode, etc., are commonly encountered in the root zone of the plants under protected cultivation, and inflict significant crop losses. Sanitation, especially the removal of plant residues followed by deep plowing, solarization/steaming, and application of biocontrol agents and organic materials may offer sustainable management of these nematode problems. However, adequate management strategies are needed to properly evaluate the effectiveness of the above methods and devise their sustainable combinations for implementation under integrated pest management in protected cultivation.

Horticultural crops

K. Jai Surya, 4th Year, Agri, NEC

Horticultural crops are an important source of carbohydrates, proteins, organic acids, vitamins and minerals for human nutrition. When humans use plants or plant parts, whether for food or for aesthetic purposes, there is always a postharvest component that leads to loss. Their losses in quantity and quality affect horticultural crops between harvest and consumption. Thus, to reduce the losses, producers and handlers must understand the biological and environmental factors involved in deterioration. Fresh horticultural crops are living tissues subject to continuous changes after harvest. While some changes are desirable, most are not. In addition, all fresh horticultural crops are high in water content and thus are subject to desiccation and to mechanical injury. Their commodities are perishable products with active metabolism and subject to extensive postharvest losses through microbial decay, physical injury, and senescence during the postharvest period. However, these postharvest changes in horticultural crops cannot be stopped, but they can be slowed within certain limits. Consequently, the maintenance or improvement of the postharvest life of fresh horticultural crops is becoming increasingly important. Proper postharvest handling plays an important role in increasing food availability. Most postharvest treatments involve the alteration of the natural conditions of horticultural crops in order to prolong their postharvest life. Additionally, fresh horticultural crops are diverse in morphological structure (roots, stems, leaves, flowers, fruits, and so on), in composition, and in general physiology. Commodity

requirements and recommendations for maximum postharvest life vary among the commodities

Processing of wood

R. Aswin, 4thYear, Agri, NEC

Commercial wood processing facilities normally have guidelinesfor acceptance of their input material, according to specific market segments. The criteria usually include factors such as log diameter, length and shape, which suit the primary processing equipment, and wood quality criteria such as basic density, stiffness and visible defects (cracks, compression wood and resin features). For these reasons, logs from different stands and from different parts of the trees are sent to different processing streams. Logs cut from the lower part of the stem can be processed into sawn timber or can be peeled to produce veneer sheets that can be used for products such as plywood or LVL. Logs from the upper parts of the stem, which are smaller in diameter and often have larger branches and more juvenile wood are generally pulped, chipped or flaked and used to produce products such as paper, MDF, OSB or chipboard. Residues from sawmilling and peeling operations can be used as feedstock for other products, or are used locally to produce heat and power. However, the continued drive for higher efficiency and recovery in sawmills and plywood mills means that as conversion to useful products increases, there is less available for other downstream uses.

Agriculture research and development

Dr. M. Dhananivetha, Professor, Agri, NEC

Agricultural R&D is a crucial determinant of agricultural productivity and production and therefore food prices and poverty. In this article, the authors present new evidence on investments in public agricultural R&D worldwide as an indicator of the prospects for agricultural productivity growth over the coming decades. The agricultural R&D world is changing, and in ways that will definitely affect future global patterns of poverty, hunger, and other outcomes. The overall picture is one in which the middle-income countries are growing in relative importance as producers of agricultural innovations through public investments in R&D and have consequently better prospects as producers of agricultural products, although the important role of privately performed R&D gives a substantial innovative edge to the higher income countries where most of this R&D takes place.

The economic impact of this research has been much studied, and the overwhelming conclusion drawn from this evidence is that the returns to agricultural R&D have been large. However, some have questioned the evidence, and there are reasons to be skeptical about some aspects of it. The reinvestment rate assumptions implicit in the calculations used to derive internal rates of return (IRRs) – the statistic of choice used to summarize the returns associated with a given cost of research – are part of the estimation problem, which can be addressed by using a MIRR to summarize the same research benefit–cost streams. The recalibrated MIRR estimates of the rates of return to public agricultural R&D are more modest but still substantial compared with the opportunity cost of the funds used to finance the research. This still suggests that society has persistently underinvested in public agricultural R&D, notwithstanding the distorted view of the evidence created by reliance on the IRR to represent the returns to this investment that has characterized the literature for the past 50 Years. If this underinvestment continues and the supply of important agricultural staples fails to keep pace with the growth in aggregate demand, increasing food prices will further stress the world's most vulnerable populations.

Soil conservation practices

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

If the soil becomes unsuitable or unstable, the entire process comes to a halt; nothing else can grow or break down. To avoid this, we must be aware of the beautiful ecosystem that exists beneath our feet.Soil contains nutrients that are necessary for plant growth, animal life, and millions of microorganisms. The life cycle, however, comes to a halt if the soil becomes unhealthy, unstable, or polluted.Soil conservation refers to the practices and strategies implemented to prevent soil erosion, maintain soil fertility, and ensure a healthy soil ecosystem.

It's about managing the soil to prevent its destruction or degradation, which could be caused by a variety of factors, including agricultural activities, industrialization, urbanization, deforestation, and natural events like floods or landslides.It is concerned with keeping soils healthy through a variety of methods and techniques. Individuals who are committed to conservation assist to keep it fertile and productive while also protecting it from erosion and degradation.

Tillage practices

M. Elamaran, 3rdYear, Agri, NEC

Tillage is an agricultural management approach that aims to minimize the frequency or intensity of tillage operations in an effort to promote certain economic and environmental benefits.These include a decrease in carbon dioxide and greenhouse gas emissions, less reliance on farm machinery and equipment, and an overall reduction in fuel and labor costs. In addition, conservation tillage methods have been shown to improve soil health, reduce runoff, and limit the extent of erosion. With a range of potential environmental and economic benefits, a well-developed and properly integrated conservation tillage practice can contribute toward the sustainability of an agricultural system.

Tillage systems have traditionally been used as a method to prepare for planting, control weeds, remove plant residue, and loosen compacted surface soil. While tillage can be a critical component in a successful and profitable agro-ecological enterprise, minimizing mechanical operations and soil disturbance in a field can lead to benefits such as reduced soil erosion and associated air and water pollution; decreased fuel expenditures and costs of production; and reduced subsurface soil compaction from tractor passes.

பள்ளி நட்பு

ஒரு பெண் தாய்மை அடையும் போது

பேரின்பம் கொள்வாள் - அதுபோல

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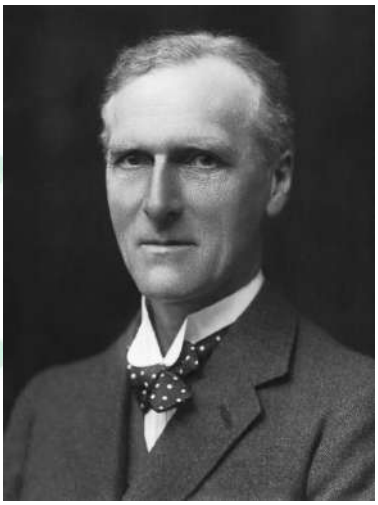
மா. சீத்தாலெட்சுமி



THE DISCOVERY OF AGRICULTURE WAS THE FIRST BIG STEP TOWARD CIVILIZED LIFE.

- Arthur Keith

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