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

Mixed farming

E. Sharma, 3rd Year, Agri, NEC

Mixed farming is a type of farming which involves both the growing of crops and the raising of livestock. Such agriculture occurs across Asia and in countries such as India, Malaysia, Indonesia, Afghanistan, South Africa, China, Central Europe, Canada, and Russia. Though at first[when?] it mainly served domestic consumption, countries such as the United States and Japan now use it for commercial purposes.

The cultivation of crops alongside the rearing of animals for meat or eggs or milk defines mixed farming. For example, a mixed farm may grow cereal crops, such as wheat or rye, and also keep cattle, sheep, pigs or poultry. Often the dung from the cattle serves to fertilize the crops. Also some of the crops might be used as fodder for the livestock. Before horses were commonly used for haulage, many young male cattle on such farms were often not butchered as surplus for meat but castrated and used as bullocks to haul the cart and the plough

Robotics in agriculture

Mr. M. Mohan Kumar, Assistant professor, Agri, NEC

Agriculture is quickly becoming an exciting high-tech industry, drawing new professionals, new companies and new investors. The technology is developing rapidly, not only advancing the production capabilities of farmers but also advancing robotics and automation technology as we know it.At the heart of this phenomenon is the need for significantly increased production yields. The UN estimates the world population will rise from 7.3 billion today to 9.7 billion in 2050. The world will need a lot more food, and farmers will face serious pressure to keep up with demand.

Agricultural robots are increasing production yields for farmers in various ways. From drones to autonomous tractors to robotic arms, the technology is being deployed in creative and innovative applications.The incorporation of robotics in agriculture improves both productivity and working conditions for farmers and workers. Intelligent systems are becoming the ideal solution to drive precision agriculture. Today, a large number of agricultural operations are already being done autonomously.

Dryland farming

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

Dryland farming is agriculture dependent upon the vagaries of weather, especially precipitation. In its broadest aspects, dryland farming is concerned with all phases of land use under semiarid conditions. Not only how to farm but how much to farm and whether to farm must be taken into consideration. Above all else, dryland farming must emphasize the capture and efficient use of precipitation.

Rainfed farming and dryland farming are often used interchangeably, but this is a serious error. They both exclude irrigation, but beyond that, they can differ significantly. Dryland farming is a special case of rainfed agriculture practiced in arid and semiarid regions in which annual precipitation is about 20–35% of potential evapotranspiration. Conditions of moderate-to-severe moisture stress occur during a substantial part of the year, greatly limiting yield potential, and in which farming emphasizes water conservation in all practices throughout the year. Rainfed systems, although they include dryland systems, can also include systems which emphasize disposal of excess water, maximum crop yields, and high inputs of fertilizer.

Nanotechnology in pesticides and fertilizers

S. Thillaiarasan, 4th Year, Agri, NEC

These days, sustainable agriculture is needed. It may be understood to present a good approach of ecosystem for long run. Practices that can cause long-term damage to soil include excessive tilling of the soil which leads to erosion and irrigation without needed drainage. This will lead to salinization. This is to satisfy human being food, animal feed and fiber needs.

Long-term experiments are required to show the effect of different practices on soil properties which are essential to sustainability and to provide important data on this objective. In the United States, a federal agency, the development of nano-chemicals has appeared as promising agents for the plant growth and pest control. The fertilizers are required in plants growth. Nanomaterials act as fertilizers might have the properties such as crop improvement and with less eco-toxicity. Plants can give an important way for their

bioaccumulation into the food chain. The recent developments in agriculture cover the applications of NPs for more effective and safe use of chemicals for plants. The effects of different NPs on plant growth and phytotoxicity were reported by several workers including magnetite (Fe3O4) nanoparticles and plant growth , alumina, zinc, and zinc oxide on seed germination and root growth of five higher plant species; radish, rape, lettuce, corn, and cucumber, silver nanoparticles and seedling growth in wheat , sulfur nanoparticles on tomato , zinc oxide in mungbean, nanoparticles of AlO, CuO, FeO, MnO, NiO, and ZnO . Silver nanoparticles can stimulate wheat growth and yield. Soil applied 25 ppm SNPs had highly favorable growth promoting effects on wheat growth and yield.

Crop management

P. Soniya Shree,3rd Year, Agri, NEC

Crop management begins with the sowing of seeds, continues with crop maintenance during growth and development, and ends with crop harvest, storage, and distribution. During seed sowing, a mechanized planter often opens a furrow in the prepared soil seed bed, places the seed in the exposed moist soil, covers the planted seed, and then often packs the soil down to assure firm seed-soil contact. In no-till systems, the crop is planted directly into the soil through residue from the previous crop.

Soil fertilization is an essential component of crop management to assure nutritional sufficiency for plant growth. The selection of type, amount, timing, and method of fertilizer application is determined by a variety of considerations including the crop type, the nature of the fertilizer, soil conditions, and weather. A generalized listing of common fertilizer applications follows broadcast [application of fertilizer (often pelletized) to the soil surface before the crop emerges]; plowing in (application of fertilizer to the surface followed by mixing into the topsoil by plowing); sideband (fertilizer application in bands adjacent to the seed); contact placement (fertilizer application in direct contact with the seed); side-dressing (fertilizer placement in narrow rows at the surface after crop emergence); andtop-dressing (general application of fertilizer to the crop after emergence).

During crop growth, a variety of crop and soil maintenance as well as weed removal practices may be undertaken. Again, the specific type of farm machinery actually used and overall management practices are site, farmer, and climate specific. But overall, weed control can be accomplished through several types of soil cultivation practices. These include dense

arrays of small spring tines, rotary hoes, and tractor-mounted arrays of spear- or sweep-pointed shanks designed to till in between crop rows. Herbicides are also used widely for weed control.

In essence, crop management practices influence the subsurface habitat by two independent mechanisms. First, the physical structure of soil is altered by farm machinery traffic passing over the soil, by cultivation implements, and by the penetration of soil by roots and shoots of the growing crop plants. Second, the solutes in soil that may be conveyed to the subsurface by infiltrating water are determined by the organic and inorganic compounds present in the soil as a result of fertilizer amendments and crop growth and decay.

Fiber cropping

T. Nilavarasan,3rd Year, Agri, NEC

Fiber cropping systems involve cultivating plants specifically for their fibrous materials, often used in industries like textiles and paper. These systems include crops like cotton, flax, hemp, and jute, where the primary goal is to produce high-quality fibers for various applications. These plants are carefully managed and harvested to ensure the best fiber quality and yield.

Method of weeding

Dr. R, Jeya Prakash, Associate professor, Agri, NEC

Managing weeds in ornamental plant production, whether in field soil, greenhouses, or outdoor containers, can be difficult but is essential to successful production. Weeds not only compete with the crop for plant nutrients and sunlight but are also unsightly and do not meet clean nursery quality standards. In addition, ornamental plants infested with certain noxious weeds cannot be sold because of quarantine regulations. Because of the high value of ornamental crops and the limited number of herbicides available, growers often resort to costly hand-weeding. However, many of the strategies used in vegetable row crops or tree crops can be adapted for use in field-grown trees and cut flower production. For example, planting in rows allows the field to be more easily cultivated by hand or mechanically. The use of drip irrigation in tree or shrub production greatly reduces excessively wet areas, thus reducing the germination and growth of weeds.Whether ornamentals are grown in containers, fields, or greenhouses, there are some control practices common to many methods

of production that can reduce the impact of weeds on the crop as listed below in no particular order.

Agricultural water management

Mr. V. Chandramohan, Assistant Professor, Agri, NEC

Agricultural water management (AWM) seeks to use water in a way that provides crops and animals the amount of water they need, enhances productivity, and conserves natural resources for the benefit of downstream users and ecosystem services.Although AWM includes irrigation, it is not simply about applying water. It includes soil, land, and ecosystem conservation practices, such as drainage and watershed management; fisheries management; and technologies for lifting, storing, and conveying water. Traditional AWM was concerned with improving the efficiency of water use in large-scale irrigation schemes in which the objective was to control, not manage, water. As larger numbers of farmers are investing in small-scale irrigation systems, and regulation is either absent or uncoordinated, there is a need for improved practices. AWM has the potential to improve incomes and food security for poor farmers in priority countries.

Plant growth regulation

M. Harsini,3rd Year, Agri, NEC

Plant growth is regulated by various factors, including hormones, environmental conditions, and genetic factors. Hormones like auxins, gibberellins, cytokinin, abscisic acid, and ethylene play crucial roles in controlling processes such as cell elongation, root growth, flowering, and fruit development. Environmental factors like light, temperature, water availability, and nutrients also influence plant growth. Genetic factors determine the plant's inherent growth potential and response to external stimuli. These elements interact to orchestrate the complex process of plant growth and development.

Chemicals that control plant growth have long been treated like a poor re- lation of the herbicides yet in one manner of thinking, herbicides them- selves are but one facet of the entire picture of plant growth regulation - a major fraction, to be sure, economically. It is now time to recognize that plant growth regulators should occupy an increasingly important role in agriculture. Sufficient numbers of uses having considerable economic re- turn have already

become established: to increase the latex flow in the rubber trees; to ripen sugarcane; to control sprouting in onions and potatoes; to shorten and strengthen wheat stems to prevent lodging; to prevent premature deterioration; and to permit control of timing for maximum utilization of crops. In addition, as energy becomes more difficult and costly to obtain, plant growth regulators will play an increasingly important role in energy conservation as a result of increased yields due to their use. There are a number of ways to present to the reader the role and effectiveness of plant growth regulators. The one chosen here is to emphasize the effects on plant functions such as the induction of roots, the control of flowering, the control of sex, and the control of aging. Little emphasis has been placed on the basic research that has served as a background for the successes and potential successes discussed herein. N or is much attention paid to the mode of action of the various regulators.

Mechanical harvesting

Mr. K. Pradeep Kumar, Assistant professor, Agri, NEC

It is well known that hand harvesting of certain of our edible crops is a back-breaking and tedious operation, due to the fact that the vegetable matter grows close to the ground and must be cut at the ground level in a manner that requires the harvester to operate in a bent over position or on his knees. It is also well known that the harvesting operation must be carried on with great speed but at the same time with a minimum of bruising and slashing to the crop.

It is an important object of this invention to provide a mechanism for harvesting crops close to the ground, which mechanism is simple to construct and deficient in operation.It is a further object of this invention to provide a harvesting mechanism which will efficiently cut and handle asparagus without injury to the same, even though the operation be affected at high speed.Another object of my invention is to provide, in a harvester of the type described, crop gripping elements which will readily engage about the stalk of material being harvested and handle the same during cutting as well as during subsequent depositing in suitable containers.

Underground irrigation in agriculture

K. Meenaa, 2nd Year, Agri, NEC

Underground irrigation provides clean water for crops and significantly reduces the use of fresh water by the agricultural sector.In underground irrigation systems, about a quarter of agricultural water supply requirements can be met by using wastewater during an average season, while the figure is 17 % during a dry season. In order to satisfy the demand for irrigation water, 7 to 13% of the annual amount of wastewater would need to be used for this purpose."

"Although less water is lost due to evaporation in underground irrigation systems, more water is nevertheless still needed in comparison with aboveground irrigation. Groundwater must rise to a certain level before it can reach crops." In the long run, underground irrigation will require less water owing to increased groundwater levels.

Pot farming

V. Sowmitha, 4th Year, Agri, NEC

The cultivation of potted vegetables is a custom that is increasing due to several factors such as the lack of exterior spaces in homes, the new found awareness on how the origin of food can influence our health, the need to harvest fresh and pesticide-free products, wanting to have a pleasant aroma in our home, as well as mere decorating. This type of urban agriculture is known as "pot farming".

At present, the most used system is vertical gardening, since it allows the cultivation of many different species of vegetables in reduced spaces.An environmentally friendly alternative are pots made from biodegradable materials that will degrade and become organic matter after a certain period of time. This simplifies the process of transplanting since it makes planting the vegetable with its pot viable, facilitating the adaptation of the plant. Utilizing an egg shell is a great example.When choosing a pot, it is important to remember that it should be large enough for the plants to develop their roots, in addition to having at least one hole at the bottom of the container in order to drain excess water.

Urban agriculture

T. Poonguzhali, 4th Year, Agri, NEC

Urban agriculture can be described as the growing of plants and the rearing of animals primarily for food and other domestic use within a city or a town and its environs. It also involves activities such as the production, processing, marketing, and delivery of farming

products. Urban agriculture consists of a number of production systems. They vary from domestic production and household level processing to large scale agriculture. This is usually done within the city peripherals.

Urban agriculture shows great potential in the fulfillment of basic human needs, it not only provides food but also ensures a sustainable distribution and production system thereby creating employment opportunities and regular income for individuals. It also helps countries in the protection of their environment and saving upon their foreign currency and transportation costs.

The growing of food on home property. Its produce is mostly shared among friends, family, and neighbors as it typically leads to a surplus in the harvest. The food can also be stored and preserved. Backyard gardens are beneficial to communities as neighbors can share each other's backyard and employ different methods of farming leading to better yields.

The limited space available to practice agriculture without having to incur hefty expenses. For instance, an urban dweller could easily make a keyhole garden to cover a space that was intended for car parking in the street. This puts to good use land that could have potentially have gone to waste and instead creates an activity that can be done for leisure or to make more food.

The landscaping of streets for different uses such as community gardens, which are tended to by the people in the neighborhood. They not only make the streets look beautiful but also purifies the air creating a clean environment. Since they are primarily located along the street, their added advantage is their capability of reducing urban stormwater runoff.

Cropping system: hilly regions

R. Swetha. 3rd year, Agri, NEC

Cropping system is a component of integrated farming system which includes growing paddy, vegetables and horticultural crops by contour farming. Contour farming means growing crops across or perpendicular to the slope of the hill. This pattern of cropping system helps in breaking up the flow water speed and reducing the soil erosion.

In contour farming, land is divided into a series of horizontal strips known as terraces. Small contour bunds are constructed at the end of each terrace to hold water allowing more time for water to penetrate the soil. Slopes with no contours lead to water runoff quickly without absorption by soil.Contour farming includes growing a single variety of crop on a

farm or mixture of several crops called strip cropping. In strip cropping farmers grow different varieties of crops in alternating strips at different levels

Mechanization is essential to make hilly farming sustainable like introducing small power source agriculture equipment like power tiller and intercultivator for land preparation. Other matching equipment for hilly regions are manual seeder, rotavator for tillage, multi crop planter, potato planter, self-propelled reaper, and digger suitable for terrace farming. Plant protection equipment such as sprayers are essential.Tractor operated or big machinery like harvester, planter etc., are difficult to move in hilly areas but our KisanKraft machinery are light in weight small in size so easy to carry in hilly regions.

Importance of tree plantation

B. Swethabala, E. Vithya, 2nd year, Agri, NEC

Tree plantation is significant because it is linked to our basic need for good food to eat and clean air to breathe. Aside from these necessities, they preserve biodiversity, conserve water, preserve soil, and control climate, among other things.Tree plantation is important because it provides fresh fruits, vegetables, nuts, and other foods for the survival of life on Earth. They are the producers and the source of food energy for all living things to survive, as they are at the bottom of the food chain. Aside from this basic need, tree plantation is important for humans to meet their medicinal needs, fodder for domestic animals, household tools, fuel, and so on.Trees provide clean air for living beings to breathe and generate energy. The importance of plantations for a healthy life free of suffocation and pollution cannot be overstated, particularly in urban areas.The importance of tree plantation in preserving biodiversity and balancing the ecosystem cannot be overstated. Trees provide a natural habitat for many different species. A diverse and healthy ecosystem revitalizes the land and life on Earth.

Trees are also known for their ability to hold soil and prevent erosion. The topsoil of the earth is washed away by water during rain and floods. The roots of the trees play an important role in preventing erosion of the topsoil.

Because trees absorb carbon dioxide from the atmosphere, tree plantation is the most effective organic method for reversing global warming and preventing climate change. In recent years, particularly since the 2015 Paris Agreement on Climate Change, the importance of tree plantation has grown significantly in many countries.

Reptile Farms

R. Meharaj, 3rd Year, Agri, NEC

Reptiles, in common parlance, are a group of tetrapods with an ectothermic metabolism and amniotic development. Living reptiles comprise four orders: Testudines, Crocodilia, Squamata, and Rhynchocephalia. As of May 2023, about 12,000 living species of reptiles are listed in the Reptile Database.Reptiles are a class of vertebrates that include snakes, turtles, lizards, and crocodilians. They are characterized by their dry, scaly skin. Reptiles are cold-blooded and most lay eggs, but some, like the boa constrictor, give birth to live young.Reptiles are air-breathing and their skin is made up of scales, bony plates, or a combination of both. They regularly shed the outer layer of their skin. Their metabolism depends on the temperature of their environment. In cold conditions, they become sluggish and don't move around much. If it will be cold for a long time, some enter a state of torpor or brumation, which is similar to hibernation.Reptiles are divided into four orders:Testudines (turtles), Crocodilia (crocodilians), Squamata (lizards and snakes), Rhynchocephalia (the tuatara). One of the largest land animals ever to have lived was a reptile—the dinosaur Argentinosaurus, which was 115ft (35m) long.

Crop diversification

N. Pranesh, 4th Year, Agri, NEC

Crop diversification is the addition of new crops or cropping systems to a farm's agricultural production. It can involve crop rotation, multiple cropping, or increasing the structural diversity of the crops.Crop diversification can help farmers:Spread the risk of fluctuating market prices, increase natural biodiversity, Strengthen the agroecosystem's ability to respond to climatic and environmental stresses

Crop diversification can be accomplished by:Adding a new crop species or variety, Changing the current cropping system. The Department of Agriculture & Farmers Welfare (DA&FW) is implementing the Crop Diversification Programme (CDP).

Mariculture

R. Harini, 4th Year, Agri, NEC

Mariculture is the farming of aquatic plants and animals in salt water for human consumption. It is a subset of aquaculture, which is the farming of both fresh-water and marine organisms.Mariculture can take place in the open ocean, in an enclosed section of the ocean, or in tanks, ponds, or raceways filled with seawater. The major categories of mariculture species are seaweeds, mollusks, crustaceans, and finfish.Examples of fish that are cultivated through mariculture include sea bream and sea bass.Mariculture can have economic and environmental benefits. For example, ranching can produce fish at a lower cost than industrial fishing. This can lead to better human diets and the gradual elimination of unsustainable fisheries.

AGRICULTURE IS THE MOST HEALTHFUL, MOST USEFUL AND MOST NOBLE EMPLOYMENT OF MAN.

- George Washington

விழிகள் தேடும் விசித்திரம்

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I.Santhiya

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