



SNS COLLEGE OF TECHNOLOGY

**An Autonomous Institution
Coimbatore - 35**

Accredited by NBA – AICTE and Accredited by NACC – UGC with ‘A++’ Grade
Approved by AICTE , New Delhi and Affiliated to Anna University , Chennai.

DEPARTMENT OF AGRICULTURAL ENGINEERING

19AGT203 – AUTOMATION TECHNIQUES IN AGRICULTURE ENGINEERING

II – YEAR IV SEMESTER

UNIT 1 – ADVANCED MACHINERY/EQUIPMENT IN AGRICULTURAL ENGINEERING- I

TOPIC 1 – INTRODUCTION TO FARM MACHINERY: PRECISION FARMING CONCEPTS

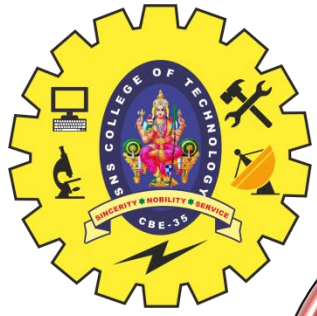


Farm machinery

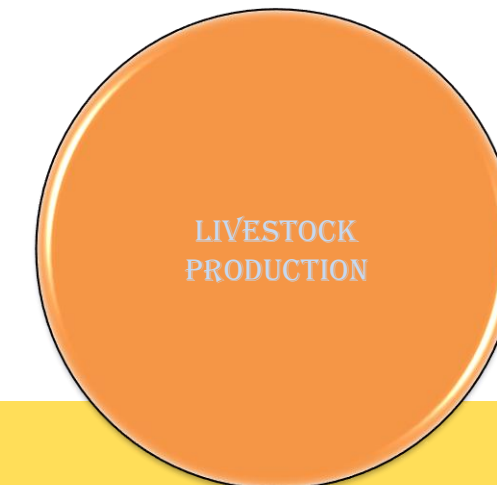
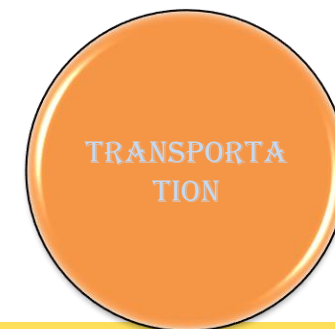
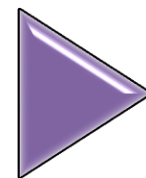
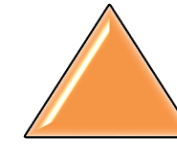
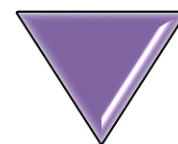
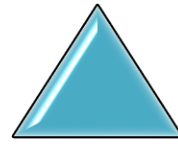
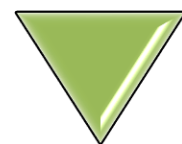
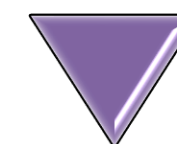
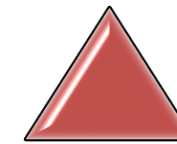
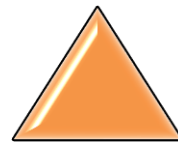
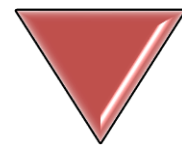
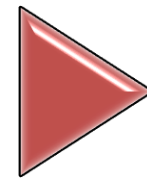


- ❖ Mechanical devices, including tractors and implements, used in farming to save labour.
- ❖ A great variety of devices with a wide range of complexity: from simple hand-held implements used since prehistoric times to the complex harvesters of modern mechanized agriculture.





OPERATIONS





History



- ❖ In the early 19th century, animals were the chief source of power in farming.
- ❖ Later in the century, steam power gained in importance.
- ❖ During World War I gasoline- (petrol-) powered tractors became common, and diesel engines later became prevalent.
- ❖ In the developed countries, the number of farm workers has steadily declined in the 20th century, while farm production has increased because of the use of machinery.



History





History





Role of Farm machinery

- ❖ Carefully chosen machinery can allow crops to be grown and harvested with minimum-to-no soil disturbance, ensure that the soil surface remains protected by organic cover, manage crop rotations to enhance soil health and conserve crop nutrients.
- ❖ The type and size of machinery made available to farmers is also crucial.





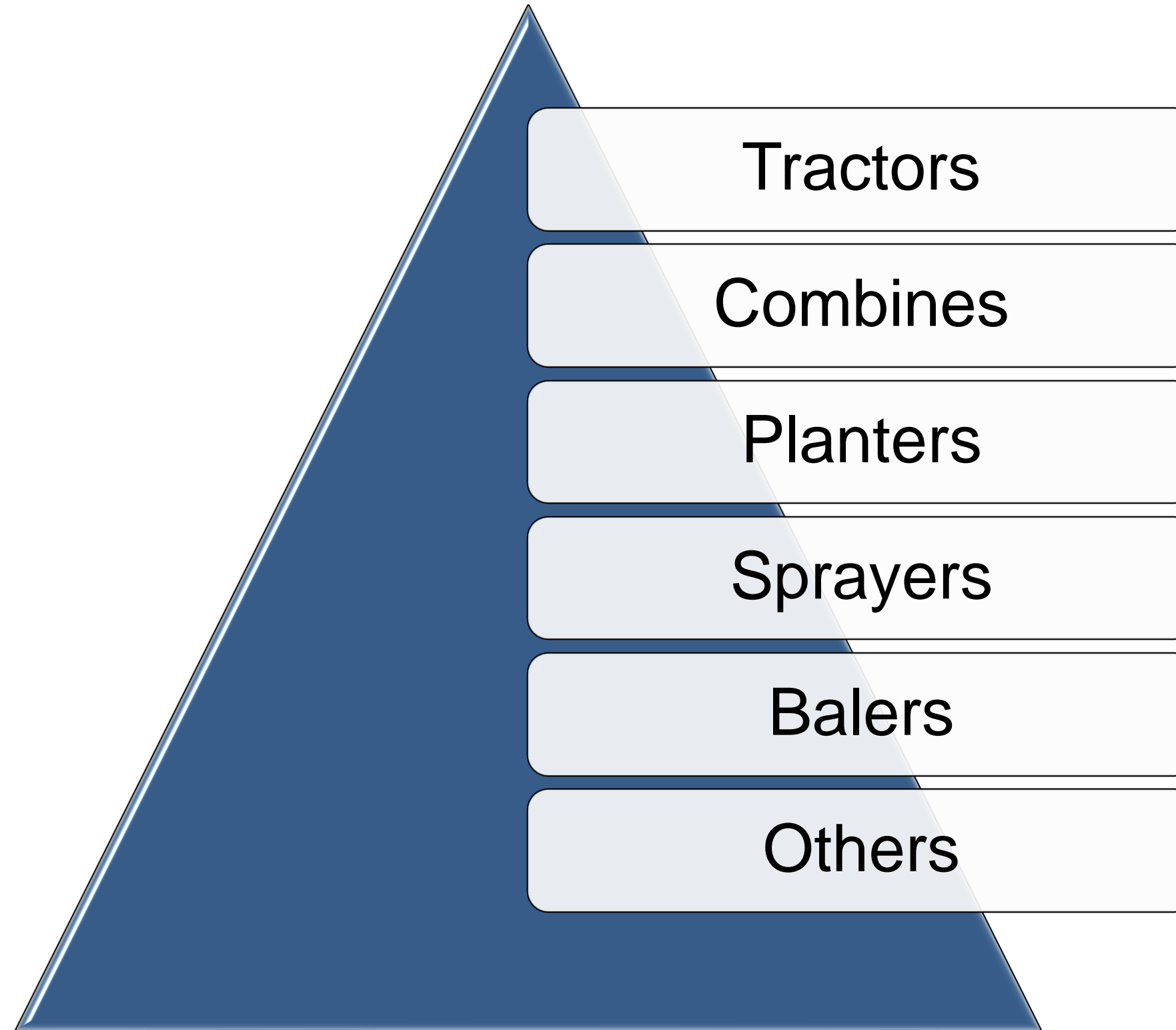
Why it is important ?????

- ❖ Sustainable agricultural mechanization can also contribute significantly to the development of value chains and food systems as it has the potential to render postharvest, processing and marketing activities and functions more efficient, effective and environmentally friendly.





Types





New technology and the future



- ❖ The basic technology of agricultural machines has changed little in the last century.
- ❖ Though modern harvesters and planters may do a better job or be slightly tweaked from their predecessors, the US\$250,000 combine of today still cuts, threshes, and separates grain in the same way it has always been done.
- ❖ However, technology is changing the way that humans operate the machines, as computer monitoring systems, GPS locators and self-steer programs allow the most advanced tractors and implements to be more precise and less wasteful in the use of fuel, seed, or fertilizer.
- ❖ In the foreseeable future, there may be mass production of driverless tractors, which use GPS maps and electronic sensors.





Agricultural Automation

- ❖ The Food and Agriculture Organization of the United Nations (FAO) defines agricultural automation as the use of machinery and equipment in agricultural operations to improve their diagnosis, decision-making or performing, reducing the drudgery of agricultural work and/or improving the timeliness, and potentially the precision, of agricultural operations
- ❖ The technological evolution in agriculture can be summarized by a progressive move from manual tools to animal traction, to motorized mechanization, to digital equipment and finally, to robotics with artificial intelligence (AI).
- ❖ Motorized mechanization using engine power automates the performing of agricultural operations such as ploughing, seeding, fertilizing, milking, feeding and irrigating.
- ❖ With digital automation technologies, it also becomes possible to automate diagnosis and decision-making. For example, autonomous crop robots can harvest and seed crops, and drones can collect information to help automate input application.
- ❖ Tractors, instead, can be transformed into automated vehicles that can sow fields independently.



Precision agriculture

- ❖ Precision agriculture (PA) is a farming management strategy based on observing, measuring and responding to temporal and spatial variability to improve agricultural production sustainability.[2] It is used in both crop and livestock production.
- ❖ First conceptual work on PA and practical applications go back in the late 1980s.
- ❖ The goal of precision agriculture research is to define a decision support system (DSS) for whole farm management with the goal of optimizing returns on inputs while preserving resources.
- ❖ The practice of precision agriculture has been enabled by the advent of GPS and GNSS. The farmer's and/or researcher's ability to locate their precise position in a field allows for the creation of maps of the spatial variability of as many variables as can be measured (e.g. crop yield, terrain features/topography, organic matter content, moisture levels, nitrogen levels, pH, EC, Mg, K, and others).
- ❖ Precision agriculture has also been enabled by unmanned aerial vehicles that are relatively inexpensive and can be operated by novice pilots.
- ❖ These agricultural drones can be equipped with multispectral or RGB cameras to capture many images of a field that can be stitched together using photogrammetric methods to create orthophotos.



Precision agriculture- History

- ❖ Precision agriculture is a key component of the third wave of modern agricultural revolutions.
- ❖ The first agricultural revolution was the increase of mechanized agriculture, from 1900 to 1930. Each farmer produced enough food to feed about 26 people during this time.
- ❖ The 1960s prompted the Green Revolution with new methods of genetic modification, which led to each farmer feeding about 156 people.
- ❖ It is expected that by 2050, the global population will reach about 9.6 billion, and food production must effectively double from current levels in order to feed every mouth.
- ❖ With new technological advancements in the agricultural revolution of precision farming, each farmer will be able to feed 265 people on the same acreage.



[Yara N-Sensor ALS](#) mounted on a tractor's canopy – a system that records light reflection of crops, calculates fertilisation recommendations and then varies the amount of fertilizer spread



See You at Next Class!!!!