

**Level: Forms 4 & 5**

**CSEC Agricultural Science Syllabus**

**SECTION B: Crop Production**

**4. Land Preparation and Farm Machinery**

***Specific objective(s):***

**4.2 Discuss the importance and functions of machinery in crop husbandry**

## **WHAT IS FARM MACHINERY**

Farm machinery is machinery that is used in the production, harvesting, care and maintenance of agricultural products.

## **THE IMPORTANCE OF MECHANIZATION**

- **Increased Production:** Mechanization increases the speed at which farming operations can be performed. E.g. A farmer clearing grass on a plot of land will perform the task in a quicker time using a mechanical brush cutter as compared to using a cutlass.
- **Makes difficult jobs easier.** E.g. A farmer using an excavator to dig a pond will be easier as compared to using a garden fork to remove the soil.
- **Time efficient** e.g. A farmer using a transplanter to transplant one thousand tomato seedlings will take less time to complete the task compared to the time taken if the task is performed manually.
- **Cost efficient in the long run.** E.g. Investing in a piece of machinery will save the farmer money in the long run by increasing efficiency on production and saving on labour costs.

## **DISADVANTAGES OF MECHANIZATION**

- **Costly for small farmers** e.g. a farmer who operates on a small scale may not have the necessary revenue to support the purchase of an expensive piece of machinery such as a tractor.
- **Requires skilled personnel to operate** e.g. special training and licenses are needed to operate certain types of farm machinery such as tractors, excavators, harvesters etc.
- **May lead to unemployment** e.g. one piece of farm machinery such as a combine harvester can replace many labourers on a farm.

## **TYPES OF MACHINERY COMMONLY USED ON A CROP FARM:**

- 1. Seeders and Transplanters**
- 2. Harvesters**
- 3. Tractors and attachments**

***Ministry of Education***  
***Curriculum Planning & Development Division***

## Seeders and Transplanters

A **Seeder** is a device used to plant **seeds**. Some seeders use drills which sow seeds directly into the soil. A seeder is usually towed behind a tractor that sows seeds in rows throughout a field.

**Transplanters** perform the same task but instead of sowing seeds, **seedlings** are planted.



Figure 1. A Seeder attached to a tractor sowing seeds

Source: <https://www.pinterest.com/pin/359725088989362266/>



Figure 2. A Transplanter attached to a tractor transplanting seedlings

Source: <http://www.edwardsfarmmachinery.com/product/trium-module-planter/>

## Harvesters

There are several types of Harvesters used in farming. The design and function of harvesters varies widely, as each harvester is designed to harvest a specific crop. For example, a sweet potato harvester digs up the sweet potato out of the soil and places the tubers on a conveyor belt.



Figure 3. A Harvester attached to a tractor, harvesting sweet potato

Source: <https://www.wheeltractor.com/products/offer/sweet-potato-harvester.html>

## **Tractors**

A tractor is one of the most widely used pieces of equipment on a farm. It is used mainly with attachments such as trailers, ploughs, planters and harvesters. The two main types of tractors are the **wheel tractor** and the **crawler tractor**. While wheel tractors have wheels, crawl tractors use more powerful metal chain belts for locomotion.



**Figure 4. A Wheel tractor**

Source: <https://www.truck1.eu/agricultural-machinery/wheel-tractors/case-ih-magnum-7240-pro-bj-2000-a4070966.html>



**Figure 5. A Crawler Tractor**

Source: [https://www.alibaba.com/product-detail/YTO-C1802E-China-180HP-Big-agricultural\\_60768209378.html](https://www.alibaba.com/product-detail/YTO-C1802E-China-180HP-Big-agricultural_60768209378.html)

## **SOME FACTORS TO BE CONSIDERED BEFORE INTRODUCING MACHINERY ON THE FARM:**

- Initial cost of purchasing and maintaining the machinery
- Cost of operation and maintenance of the machinery
- Life span of the machinery
- Size of land to be cultivated
- Availability of spare parts for the machinery
- Availability of qualified labour force to operate and maintain the machinery

STUDENT SELF ASSESSMENT

Machinery on Large Farms Worksheet

LIST OF SOME MACHINERY USED ON A LARGE FARM	
Crop dusting light aircraft	Excavator
Combine Harvester	Water pump and piping
Mechanical Brushcutter	Wheel tractor with disc plough
Mechanical pole pruner	Mist blower

1. Conduct some further research (textbook, internet, interview a farmer) on the types of machinery listed above and complete the following table:

MACHINERY TO BE USED	TASK TO BE COMPLETED
	Ploughing a 15,000 m <sup>2</sup> parcel of land.
	Harvesting a 6,000m <sup>2</sup> field of dried corn.
	Irrigating 10,000 cabbage plants
	Applying insecticide to a 600,000m <sup>2</sup> field of sugarcane
	Digging a 100m x 500m pond for water storage
	Applying insecticide to a 5,000m <sup>2</sup> field of sugarcane
	Pruning 500 cocoa trees
	Clearing grass and shrubs on a 5,000 m <sup>2</sup> piece of land

2. Farmer Sheldon is a tomato farmer. He recently purchased a large parcel of land adjoining a river and has expanded his production from five hundred plants to ten thousand plants. Farmer Sheldon usually irrigates his field manually using watering cans but now, with his expanded production, he would like to invest in a piece of machinery to make this process easier.
- a. Identify the piece of machinery farmer Sheldon can purchase to irrigate his expanded field of tomatoes.
  - b. State TWO advantages of using machinery for irrigating a large field of tomatoes
  - c. State TWO disadvantages of using machinery for irrigating a large field of tomatoes.

**ANSWER SHEET**

1. Conduct some further research (textbook, internet, interview a farmer) on the types of machinery listed above and complete the following table:

<b>MACHINERY TO BE USED</b>	<b>TASK TO BE COMPLETED</b>
Wheel tractor with disc plough	Ploughing a 15,000 m <sup>2</sup> parcel of land.
Combine Harvester	Harvesting a 6,000m <sup>2</sup> field of dried corn.
Water pump and piping	Irrigating 10,000 cabbage plants
Crop dusting light aircraft	Applying insecticide to a 600,000m <sup>2</sup> field of sugarcane
Excavator	Digging a 100m x 500m pond for water storage
Mist blower	Applying insecticide to a 1,000m <sup>2</sup> field of hot peppers
Mechanical pole pruner	Pruning 500 cocoa trees
Mechanical Brushcutter	Clearing grass and shrubs on a 5,000 m <sup>2</sup> piece of land

2. Farmer Sheldon is a tomato farmer. He recently purchased a large parcel of land adjoining a river and has expanded his production from five hundred plants to ten thousand plants. Farmer Sheldon usually irrigates his field manually using watering cans but now, with his expanded production, he would like to invest in a piece of machinery to make this process easier.
- a. The piece of machinery farmer Sheldon can purchase to irrigate his expanded field of tomatoes:  
ANY OF THE FOLLOWING: Water pump and piping.
- b. TWO advantages of using machinery for irrigating a large field of tomatoes:  
ANY OF THE FOLLOWING: Saves time, reduced manual work, greater yield.
- c. TWO disadvantages of using machinery for irrigating a large field of tomatoes:  
ANY OF THE FOLLOWING: high initial capital investment, risk of theft, unemployment, high cost of maintenance.

**End of Lesson**