

# SCIENCE

## STANDARD EIGHT

### TERM I

### Volume 2

#### Textbook Team

#### Chairperson

**Prof. K. SIVAKUMAR**

Head, Department of Physics  
Anna university, Chennai

#### Reviewers

**Dr. T. SEKAR**

Associate Professor of Botany  
PG& Research Dept. of Botany  
Pachaiyappa's college  
Chennai

**Dr. M. DHANDAPANI**

Associate professor of Chemistry  
Sri Ramakrishna Mission Vidyalaya  
College of Arts & Science  
Coimbatore

#### Authors

##### Botany

**S. Peter Joseph Irudayaraj**

P.G. Teacher  
Don Bosco Mat. Hr. Sec. School  
Egmore, Chennai

**G.S. Auxilia Felix**

P.G. Teacher  
St. Francis Xavier Anglo Indian Hr. Sec. School  
Broadway, Chennai

##### Zoology

**M. Rajasekar**

P.G. Teacher  
St. Mary's Mat. Girls Hr. Sec. School  
Perambur, Chennai

**T. Elango,**

Graduate Teacher  
Sri Ramalingar High School  
Subramaniapuram, Cuddalore

##### Chemistry

**S. Balasubramanian**

P.G. Teacher  
Govt. Hr. Sec. School  
Murungapatti, Salem

**G. Vijayalakshmi**

Graduate Teacher  
Kshatriya Girls Hr. Sec. School  
Virudhunagar

##### Physics

**V. Rajasekaran**

P.G. Teacher  
Govt. Girls Hr. Sec. School  
Alanganallur, Madurai

**S. Vijayakumar**

Graduate Teacher  
Arulneri High School  
Ammanpettai, Thanjavur

#### Illustration

**A. Kasiviswanathan, N. Gopala Krishnan**  
**M. Chinnaswamy, Jayakumar**

#### Layout

**A.S.J. Aloysius Devadass**  
**M. Vasanth**

**Type setting - B. Suganthi, B. Yuvaraj**

## 1. CROP PRODUCTION AND MANAGEMENT



India is an agricultural country. We all totally depend on agriculture for our basic needs, Food, clothing and shelter. Food is essential for our survival, it provides energy and materials required for the growth and maintenance of our body. Indian population had grown by 21.34% between 1991 and 2001. It is expected to exceed by 20% more in 2050. How do you think food can be provided to such a large number of people? In order to provide sufficient food for a larger population, a regular production, proper management, storage and application of recent technology are to be implemented in agriculture.

### MORE TO KNOW

- Current Population of India in 2010 is around 1,192,196,919 (1.19 billion) people.
- It is growing faster than its ability to produce rice and wheat.

### 1.1. AGRICULTURAL PRACTICES

With the increase in population, the demand for food has also gone up. The available land for agriculture has been decreasing. Therefore improved, agricultural practices have to be introduced.

All the activities which are involved in the cultivation of crops from sowing to harvesting are known as **agricultural practices**.

**Agriculture** : Science that deals with the growth of plants and animals for human use is called agriculture.

## 1.2. BASIC PRACTICES OF CROP PRODUCTION

Production of crops involves several activities carried out by the farmers over a period of time. These activities are given below.

- Preparation of soil and sowing
- Adding manure and fertilizer
- Types of irrigation
- Protection from weeds
- Harvesting
- Storage and Marketing

## 1.3. PREPARATION OF SOIL AND SOWING

Before sowing the seeds, we have to prepare the soil. Preparation of soil is the first essential stage for cultivation of crops, in order to turn the soil and loosen it. It involves,

- Ploughing or tilling
- Levelling and
- Manuring

**i) Ploughing:** It is the process of loosening soil. Ploughing is important because it,

- Provides good aeration to roots in order to breathe

- Retain moisture for a long period
- Promote growth of useful micro-organisms to bring nutrient rich soil to the top
- Helps in the removal of undesirable plants (weeds)

### Ploughing is done in two ways

- **Manual ploughing** is one of the old and traditional methods of agriculture. A farmer ploughs the field with a plough drawn by a pair of bulls.



*Ploughing*

- Now a days ploughing is done by **tractor** driven by the **cultivator**. The use of cultivator saves labour and time.



*Tractor and cultivator*

The other ploughing tools are spade, shovel, hoe and pick-axe.

**ii) Levelling:** The ploughed field may have big pieces of soil crumbs, so, it is necessary to break these crumbs with the leveller. It also ensures uniform irrigation.

**iii) Manuring:** Sometimes manure is added before tilling. It helps in proper mixing of manure with soil.

**Sowing:** It is the most important step of crop production. The process of putting seeds into the soil is called **sowing**. Before sowing, the land must be watered. Seeds used for sowing should be of **good quality, healthy** and **free from infection**. Sowing is done by two methods.

**Broadcasting:** It is the traditional method of sowing where the seeds are sown manually by scattering them in the moist soil.



*Manual sowing.*

**Seed Drill:** It is a method of sowing the seeds through the funnel or using two or three pipes having sharp ends.

Seed drill helps in uniform distribution of seeds, covering the seed after sowing and preventing the seeds from being damaged by birds.



*Sowing by seed drill.*

### Adding manure and fertilizers

All the plants get their nutrients from the soil. Repeated cultivation of crops make the soil deficient in minerals. So farmers add manure and fertilizers to the soil to ensure that the crops get proper nutrients.

The substances which are added to the soil in the form of nutrients for the healthy growth of plants are called **manure or fertilizers**.

## 1.4. IRRIGATION

Plants need water for germination, drawing nutrients and preparing their food by photosynthesis.

The process of supplying water to crops in the field at different intervals is called **irrigation**. It varies from crop to crop, season to season and soil to soil.

Some of the sources of irrigation are well, tube wells, ponds, lakes, rivers, dams and canals.

## Methods of irrigation

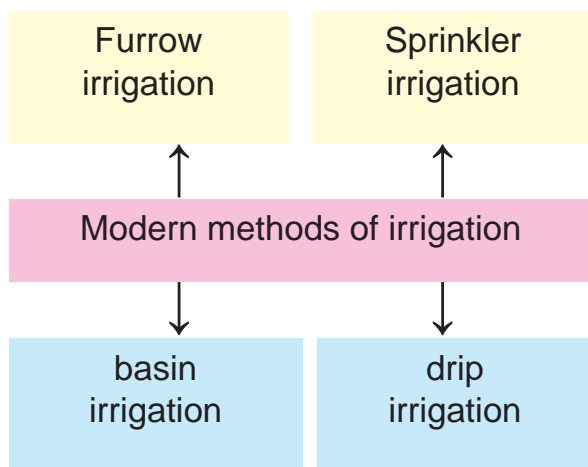
### i) Traditional Method

In our country traditional systems of irrigation like,

- pulley system (moat)
- chain pump and
- lever system (rahat)

have been used for centuries to lift water from water reservoirs and supply it to the field for irrigation. These methods are cheaper but not much efficient.

### ii) Modern Methods



**Furrow irrigation:** In this method water is allowed to enter the field through channels of furrows made between two rows of crop. e.g., sugar cane, banana, paddy, etc.,



*Furrow irrigation*

**Basin irrigation:** In this method the field is just filled with water. e.g., Paddy Field.



*Basin irrigation*

**Sprinkler irrigation:** This irrigation is used where the soil cannot retain water for a long time. Here the water is sprinkled by sprinklers. e.g., Lawn



*Sprinkler irrigation*

**Drip irrigation:** In this irrigation the water falls drop by drop direct at the position of the roots, so it is called drip irrigation. It is the best method to save water. It helps to irrigate grapes, banana, brinjal, etc.,



*Drip irrigation*

Care must be taken not to water the field excessively. Excess water on the field may cause a condition called **water logging** which may harm the crops.

### ACTIVITY 1.1

Select a small place in your garden. Use a spade or a shovel, plough the soil and sow seeds with the help of a funnel and sprinkle water.

### MORE TO KNOW

- The **Karakum canal** in Turkmanistan is the longest irrigation canal in the world. It is over 1300 km long.
- PAP – Parambikulam Aliyar Project ranks first in India in the top 10 list of the World for its massive storage capacity.
- Indira Gandhi Canal - It is one of the biggest canal project in India. Starts from Harike Barrage at Sultanpore.

## 1.5. PROTECTION FROM WEEDS (UNWANTED PLANTS)

Weeds are undesirable plants growing naturally along with the crop. Removal of these weeds is called **weeding**. Weeding should be done then and there.

The weeds must be removed because,

They compete with crops for water, nutrients, space and light therefore affect their growth.

Some weeds become poisonous.

### The common types of weeds are

- Grass
- Amaranthus
- Chenopodium

### Methods of weeding

i) **Manual weeding:** Weeds may be manually removed by hand by uprooting them or by using some tools like hand fork, khurpa and harrow.



*Tools used for weeding*

ii) **Chemical Control:** The chemical substances which destroy the weeds but do not harm the crop are called weedicides. eg. Dalapon, metachlor, 2-4- Dichlorophenoxy-acetic acid.

Excess use of chemical weedicides cause water and land pollution. Traces of these poisonous chemicals may remain in crops themselves. Therefore it is very important to use them with extreme caution.



Weedicide sprayer



Does it affect the person who sprays it?  
**Yes certainly. But we can prevent by using the mask.**

### MORE TO KNOW

Bio-weedicides are the mechanism of using micro organism such as fungi and bacteria to destroy weeds.

## 1.6. HARVESTING

Once the crop gets matured, it has to be gathered. The process of cutting and gathering a matured crop is known as harvesting.

All over the world harvest season is celebrated with excitement. Pongal (Tamilnadu), Bihu (Assam), Holi (Punjab), Onam (Kerala), etc., are the harvest festivals celebrated in India.

What is your experience in harvesting? Harvesting of paddy in our country is either done manually by sickle or a machine called harvester.

In small farms crops are usually cut down using a hand held tool called



Manual Harvesting

a sickle. In big farms a large vehicle called **harvester combine** is used.



Harvester combine

Grains are separated from the stalks by the process of **threshing**. This is carried out by beating the cut stalks against hard floor or a machine called **mechanical thresher**.



Manual threshing

The chaff (pieces of straw and husk after threshing) is separated from the whole grain by **winning**.



Manual winnowing

### MORE TO KNOW

Green Revolution: The massive step taken to augment food production by adopting modern agricultural practices in India.

## 1.7. STORAGE

Grains are kept safe from moisture, insects and micro-organisms. If they are not kept in a proper manner they will get spoiled and cannot be consumed.

Farmers store grains in jute bags and metallic-bins. In a large scale the grains are stored in godowns silos, (very tall cement tanks) and granaries.

Fresh fruits and vegetables have much moisture content. And thus they get spoilt soon. Therefore they are stored in cold storage.



Silo

### MORE TO KNOW

Neem leaves, salt, turmeric and castor oil also prevent pests and micro organism.

## 1.8. MARKETING

Increase in agricultural production alone will not bring about prosperity for farmers. It is important that agricultural product fetches a remunerative price. Warehousing and marketing facilities are essential to ensure this strategy.



“Uzhavar Sandhai”



Government has taken more steps to assist marketing of agricultural product and to promote the status of small farmers. Tamilnadu Government has established “Uzhavar Sandhai” to satisfy the need of consumer and the small scale village farmers.

Regulated markets eliminate unhealthy marketing practices and exploitation of the products by middleman.

The government provides loan at very low rate of interest to the farmers for cultivation.

### MORE TO KNOW

State warehousing corporations provide storage facilities for agricultural product, fertilizers etc., Thanjavur is said to be the Rice Bowl of Tamilnadu.

Agmark: Agmark grading and standardization is a central sector scheme to check the quality and standard for agricultural products. The grades given are Grade 1, 2, 3, 4 or Special, Good, Fair and Ordinary.

## 1.9. CROP ROTATION

What will happen if the same crop is grown again and again on the same land? By repeated planting of the same plant a part of minerals gets depleted in the soil. It then leads to very poor yield. One way of improving the crop yield is by crop rotation. In this method different crops are grown alternately.

The practice of growing a cereal crop and the pulse crop alternately in the same field in successive season is called as **crop rotation**.

### ACTIVITY 1.2

Take a trowel and carefully dig up a pea plant or any leguminous plant from the garden. Wash off the mud and observe the bead like structures on the roots called nodules.

Leguminous plants have root nodules associated with symbiotic bacteria which fix atmospheric nitrogen.

For example wheat and paddy (plants need nitrogen to make protein, they can't use nitrogen directly from the air) absorb more nitrogen from soil. This lost nitrogen can be replaced naturally by leguminous plants which has symbiotic bacteria in their root nodules.eg. pea, soya, bean are cultivated after wheat or paddy.

## 1.10. BIOTECHNOLOGY IN AGRICULTURE

Biotechnology is the field of applied biology that involves the use of living organisms and bio-processes in engineering, technology, medicine and other field requiring bioproducts.

Biotechnology has also revolutionised research activities in the area of agriculture.

There are seven different techniques that are used in plant improvement.

1. Selection
2. Hybridisation
3. Polyploid breeding
4. Mutation breeding
5. Protoplast fusion
6. Tissue culture and,
7. Genetic engineering

### Genetic engineering

Genetic engineering is a part of biotechnology. It offers new hope to the farmers who are struggling hard with plant pests and diseases.

The aim of agricultural biotechnology is to give transgenic plants carrying desirable traits like

- Disease / Insect / Herbicide resistant.
- Increased photosynthetic efficiency.
- Nitrogen fixing ability.
- Increased size of storage roots, seeds, fruits and vegetables.
- Oil seeds (soya) rich in PUFA (poly unsaturated fatty acid) recommended for heart patients.
- Potatoes with vaccines, improves starch and vitamin A is produced.
- Genetically modified (GM) seeds, biofertilizers, biofuels are also produced.

### 1.11. BIOTECHNOLOGY IN FOOD PROCESSING

Food processing industry is the oldest and largest industry

using biotechnological processes. Biotechnology in food processing is used to improve existing processes such as

- Production of additives and
- Processing aids.

Improving of micro organisms in order to improve process, control, yield, safety and quality of the processed products.

### Application of biotechnology in processing of food

- Gene modification and transfer.
- Development of recombinant vaccines vitamins and proteins.
- Improving the quality, safety and consistency of fermented foods.
- Improving of microorganisms in order to improve process, control and yield of the processed products.
- Improving the processing properties eg., Development of the “flavr Savr, tomato” variety. Genetically modified to reduce its ripening rate.

### Bioethics of genetic engineering

Besides many benefits, the ethical, social and legal implications of these potent gene technologies have led to considerable concern about the possibility of accidentally producing new pathogens responsible, for fatal diseases or developing ‘genetic monsters’.

### MORE TO KNOW

Biotechnology helps in promoting greater fruit and vegetable consumption for healthy nutrition.



### ACTIVITY 1.3

Can we list the processed foods used in your daily life?

1. Soft drinks.
2. Chips
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_

## EVALUATION

### 1. Choose the correct answer:

- a) Sowing is done in large scale by \_\_\_\_\_ (broad casting / seed drill)
- b) We can prevent pest at home in natural way by using (Thulsi leaves / Neem leaves)
- c) Pick the odd one out. (hand fork, harrow, sickle, hoe)
- d) Government has established \_\_\_\_\_ to satisfy consumers and farmers in marketing. (Uzhavar Sandhai / Co-operative bank / Private shops)
- c) Choose the fermented food. (wine / fresh juice / milk)

### 2. Arrange the following steps of preparation of soil in correct order.

- a) Sowing
- b) Levelling
- c) Ploughing

### 3. Match the following

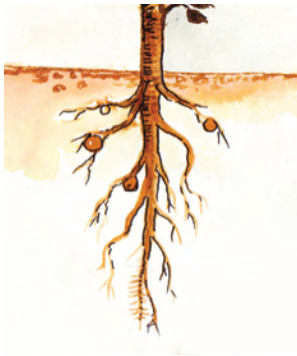
- |                         |   |                                     |
|-------------------------|---|-------------------------------------|
| a) Furrow irrigation    | — | to irrigate grapes, banana etc.,    |
| b) Basin irrigation     | — | used where soil can't retain water. |
| c) Sprinkler irrigation | — | between two rows of crop.           |
| d) Drip irrigation      | — | paddy field.                        |

4. Name the types of irrigation related to the following figures.



A) \_\_\_\_\_ B) \_\_\_\_\_ C) \_\_\_\_\_ D) \_\_\_\_\_

5. Label the diagram of the taproot system and write its significance.



6. Classify the following chemicals based on the uses given below.

( Phosphorus, 2, 4 – D, Pottassium, Dalapon, Nitrate, metachlor )

Fertilizers	Weedicides
1.	1.
2.	2.
3.	3.

7. a)

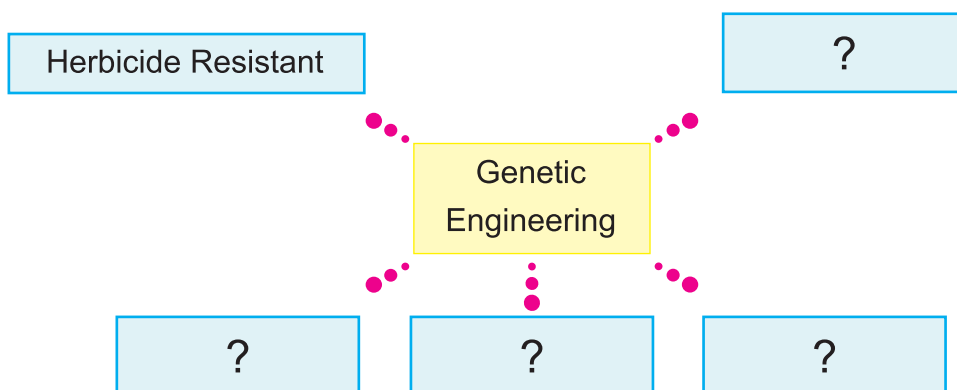
- Mani is repeatedly cultivating same paddy crop in his field and getting poor yield.
- Nathan likes to go for changing the crops every season and getting good yield.
- From the above statements find out and justify the best method of agricultural practice.

**7. b) Classify the following items based on the storage methods.**

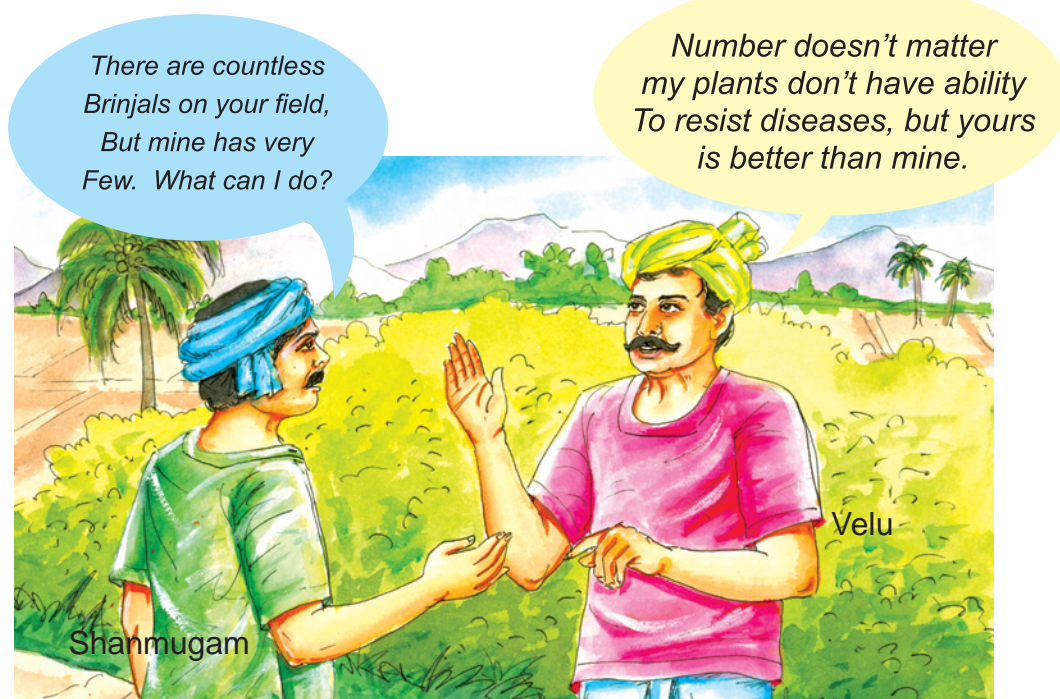
( Apple, Wheat, Potato, Rice, Grape, Sorghum )

Dry storage	Cold storage

**8. a) Complete the circles based on applications of Genetic Engineering.**









**8. b)**



From the above statements, suggest techniques to overcome the problems of Shanmugam and Velu.

## 9. List some more common crop plants

Common crop plants.			
S.No	Crop group	Crops	
1.	Cereals	Wheat,-----	
2.	Pulses	peas,-----	
3.	Vegetables	potato, -----	
4.	Fruits	apple,-----	
5.	Oil seeds	coconut,-----	
6.	Sugar yielding crops	sugarcane-----	

### FURTHER REFERENCE

#### Books

Bio technology - A.K.Panday - CBS publication

Biology - Understanding life IV the edition, Wallace, Sanders - Ferlcollins  
College publishers Science encyclopedia - Mathew Coles

#### Websites

[www.msswaminathan.com](http://www.msswaminathan.com)

[www.biotechnology.com](http://www.biotechnology.com)