8. PRODUCTION AND MANAGEMENT OF FOOD FROM PLANTS

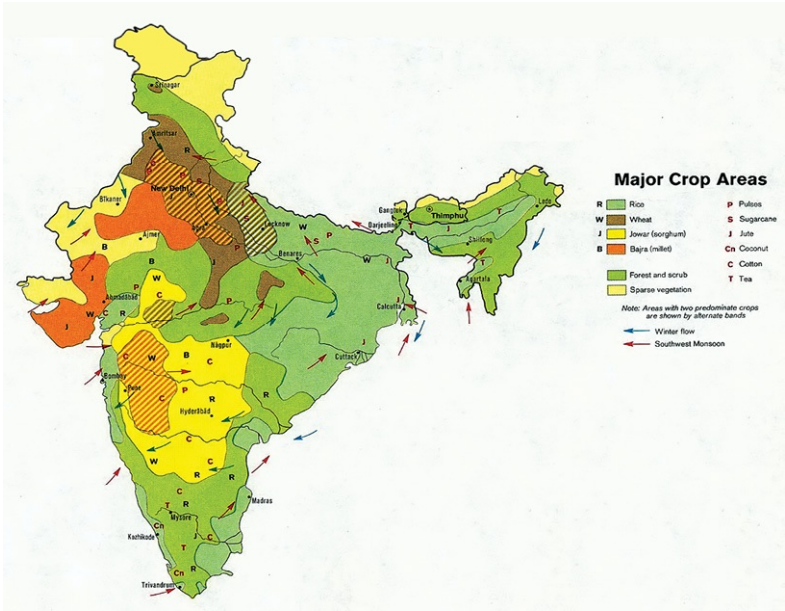
Naveen has come to his uncle's village for enjoying his holidays. On his way home, his uncle showed him his fields. Curiously, Naveen enquired his uncle, what crops are grown in the village? Uncle said Maize, paddy, wheat, Raagi etc., are being grown in the fields.

Activity-1

Crops in India

Observe the following map (India). List out the crops that are grown in our country.

- Are there many crops that are grown in most of the parts of our country? What are they?
- Why such crops are grown all over the country?
- From the above list, which of them are grown in your village?



India map

Go through your social studies text book or in library, make comparative statements showing crops largerly grown in the country.

a. Country _____

b. State _____

c. District _____

d. Your village _____

But don't forget to add your observations at the end of the table.

We are mainly dependent on Agriculture for our food. Most of our food products are obtained from plants. The plants which are grown in large number to get useful food products are known as 'crops'. The process of growing crops is called 'Agriculture'.

How many days are required for getting the crops?

Is time period for all crops the same?

Which crop needs more duration?

Activity-2

Duration of crop

Collect information from the farmers of your village about the period taken to grow different crops. Write the information in the table.

Name of the Crop	Duration of the crop
.....	.....
.....	.....
.....	.....
.....	.....
.....	.....
.....	.....

Some crops like jowar, red gram takes a minimum of 180 days or more for harvesting. Such crops are called **"Long term crops".**

Based on the above list or the discussion with farmer give some more examples for long term crops. .....

.....

.....

Some crops like green gram, black gram takes 100 days for harvesting and such crops are called "**short term crops".**

Based on the above list or the discussion with farmer give some more examples for short term crops. .....

.....

.....

Activity-3

When do crops are grown

We eat different fruits and vegetables. Are all the vegetables and fruits available throughout the year? In a particular season some are mostly available and some are less in number. Some are not at all available. Discuss in groups and make a list of these things for the following table.

Season	Vegetables	Fruits	cereals	Pulses
Rainy				
Winter				
Summer				

- In which season do you find more varieties of vegetables in the market? Why?
- Generally, farmers grow varieties of vegetables during rainy season. Can you guess the reason?

You know water is essential for growing of crops. In rainy season ponds, wells, rivers, ditches are pooled with water. Hence, farmers grow varieties of crops in this season. Did you know any name for the crops that grown in rainy season?(June to October). The crops grown in the rainy season are termed as "**Kharif**". In Arabic Language Kharif means 'Rain'. Paddy, Chilli, Sugar cane, Jower, Cotton, Moong, Turmeric etc are Kharif crops.

Now revisit activity-3. What are the vegetables, fruits, cereals and pulses you have written in the table. These crops are widely grown in winter season. Are these crops require water like Kharif crops? The crops that are grown only in winter season (October to march/ April) are generally called Rabi. In Arabic language Rabi means 'Winter'. Wheat, maize, Coriandar, Fenugram, Barli etc are rabi crops. We will learn more about these crops.

Why farmers cultivate different crops in Rabi and Kharif season?

Crop production is based on flowering of plant. After conducting so many experiments. Scientists invented those main reasons for flowering of plant.

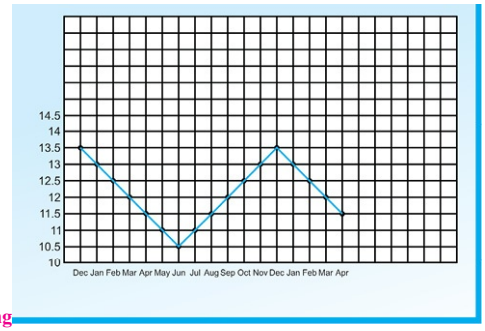
1) The flower will come out from the plant after certain growth. In some plants flowering takes place after growing certain height, branches, nodes and after producing 7-9 leaves.

2) Flowering of plants also depends upon the duration of night. The effect of night duration in flowering plants differs from plant to plant. In some plants when the night duration is shorter than 12 ½ hours the flowering will be more. For example Wheat plants flowering takes place only in short night durations. Aslong as the nights are longer than 12 ½ hours the wheet plant does not flower. In addition to that, temparature is also not sufficient to seed formation. So these are called short night plants

Plants like maize, cotton flowering will be more when the night duration is more than 12 ½ hours. These are called long night plants

3) In some plants night duration is not at all the reason for flowering. They can give flowers any time during the year ex: soyabean. These are called night neutaral plants.

Now observe the graph and answer the following questions.



- Why farmers cultivate Wheat crop in Rabi season?
- What happens if it is cultivated in the month of September?
- Why do farmers or why don't farmers not cultivate it in Kharif season?

If we cultivate wheat crop in the month of July it takes 8-10 weeks for growing. After that flowering will take place. By that time it would be October . Then the night duration extends more than 12 ½ hours. The flowering does not take properly at that time.

- If we cultivate wheat in the month of November what will happen?
- Heat is essential for ripening and development of grains in the plants. Then when do we get more heat?

We get hot climate from February onwards. It is suitable for maturing the grains. That is the reason wheat is cultivated in the Rabi season only.

By keeping this in mind farmers cultivate some crops in Rabi and some crops in Kharif season. You know paddy is cultivated in both Rabi and Kharif seasons. Is there any difference in production and quality of seeds grown in both seasons?

Activity-4

Production of Paddy

Go to your nearest farmer and collect the information for the following table.

Paddy growing season	Paddy Production Per hectare	Quality of seeds	
		Size	Weight
Rabi			
Kharif			

(One hectare is equals to 2.4 acres.)

- In which season farmers get more benefits?
- Are there any other crops which are grown in both Kharif and Rabi Seasons?
- In which seasons farmers generally get good quality of seeds?
- The quantity of grains is higher in Kharif, lower in Rabi. Do you agree this? Give your reasons.
- Do you know about third crops? Some of the places in our state growing 3rd crop also.

Ask your teacher about which crops are generally grown as 3rd crop. Think why it is not practised in all areas of our state.

Growing paddy and Agricultural practices

Rice is the prime, most essential and important staple food crop. 'It is also called global grain'. Rice was cultivated in the late Mesolithic period (9000-8000 B.C) and in the Harappan civilization (2300 B.C). It is grown as a Kharif or a Rabi crop from Rajasthan to Arunachal Pradesh and from Kerala to Jammu and Kashmir. Although it is a crop of the warm tropical wet lands, it also grows in the cooler temperature regions of China, Japan and Australia. India has the largest area of land under rice cultivation in the world. Though the production per hectare is low when compared with China and Japan.

Country	Land under rice cultivation million hectare	Total production Million metric tones	Production per area Kg/ hectare
India	40	79	1975
China	37	130	3534

Japan	2.5	16	6250

Let us disscuss the following questions :

- What are the reasons for high production in Japan?
- What are the reasons for low production in India?

For understanding these issues we have to know the details of cultivation of paddy.

- How paddy grown in fields?

Let us know about the agricultural practices for paddy.

The paddy growing field is divided into so many plots (Kayyalu or Madulu). Why they do like this? Leveling the land and providing water for the crop is easy within these plots (Kayyalu).

To obtain better yield farmers prepare a plan before hand. While planning they take into account the nature of the soil, humidity, rainfall and temperature, because they vary from time to time and place to place. They cultivate the crops accordingly. In general farmers starts agricultural works before monsoon reaches (May, June months). At that time farmers celebrate festivals like Eruvaka. Ask your parents about this.

Rice growing is a seasonal task and associated with many festivals. The sowing and transplanting is associated with Akshaya Trithiya and harvesting associated with Pongal and Onam. Indian cultures are often described in stories and songs. Agricultural tasks are carried out to the tune and rhythm of certain songs. Do you sing such songs? Collect those songs from your village and sing them in your School Theatre day.

Sowing to storing

The cultivation of paddy involves a series of activities. Did you know these practices? Write in your note book. Let us study the practices that are followed as follows.

1. Preparing the Soil
2. Sowing of seeds
3. Applying manure
4. Facilitate water(Irrigation)
5. Weeding
6. Crop harvesting
7. Storage

Agriculture practices are carried out either using manpower or through special tools. The above practices are common for Kharif, Rabi and third crop also. These practices are not only for paddy growing but also for other crops.

1. Preparing the soil

You know that supply of air and water to the plants through the roots is important. To germinate the seeds properly, and for uniform supply of water, soil should be prepared well. For this ploughing and leveling are done.

a) Ploughing and applying manure

Farmers make nursery in so many plots by bounds. Then the nursery is first harrowed and ploughed. Plough and soil plank being pulled by a pair of bullocks. The nursery might be first covered with manure and then flooded. Flooding submerges the old weeds and stubble which decompose releasing nutrients and also making a soft seed bed.

- Do you find any relation between nail length and sowing?
- Do all crops cultivated like this way? Is there any difference in the way the soil is prepared ?
- Can you say what the advantages of ploughing are?

Fig-1 Wooden plough

Before growing crops proper ploughing of the soil is necessary. Ploughing loosen the soil and it helps in easy transportation of air and water.

- Water is stored deeply for a long time as the soil is soft.
- Roots penetrate in the deep and can respire well as the air enters easily into the soil.
- Soil friendly micro organisms and earth worms can grow well when the soil is soft.
- Some Foe Micro organisms die due to the sunrays.

Plough

This tool is used for ploughing. This is made up of Iron and wood. The shape of plough is like T. It is also used for weeding. At the end of the plough a sharp chisel like iron nail is attached, which helps in penetrating the soil.

Fig-2 Iron plough

How many nails does a wooden plough have? How much depth farmer plough his field? Go to a nearby farmer and measure the length of nail of the plough. If he used tractor measure its plough nail's length.

The 'V'shaped ridges are formed while ploughing. Think, why these ridges are 'V' shaped only? This helps for better watering the crops.

b) Leveling the soil

The fields have a lot of ups and downs even after ploughing. So, a leveler is used for leveling the soil. By leveling the soil water and nutrients can be reached to every part of the land. It also helps in sowing seeds and planting.

Fig. 3 Iron leveller & Preparing field for sowing

The leveler is made of a log and iron blade. This is tied to bullocks with a rope.

2. Sowing the seeds

Sowing of seeds in the field is an important task. Farmers are aware of seeds. Production of crop is mostly dependent on quality of seeds.

Selection of seeds is an important step in agriculture. Ask your elders where they buy seeds for crops?

Before sowing, farmers select the seeds. The healthy seeds give healthy crop. After harvesting the farmers select wrinkle free, round shaped and more weighing seeds and store them for future use. This is called selection. The rest of crop either they will sell or use as food.

- In olden days farmers preserved their own seeds. How did they preserve? Discuss with your teacher in your classroom. After that collect information about their own seeds from your elders.

Do you know how to select or separate good seeds?

Drop seeds into a bucket of water. Some seeds float on water. Remove all the floated seeds and soak the remaining seeds in water for a day and dry and keep to sprout in warm, moist and dark place.

Did you ever eat sprouts salad? Ask your friends how to make sprouts to eat in their home?

Why do some seeds float on water? Why do we remove the floated seeds from the water? Why do we soak seeds in water for a day?

Do you know?

The name Oryza for paddy- which was named by Linnaeus. Thousands of varieties of paddy are available throughout the world. Oryza sativa is cultivated in Asia. Oryza glaberrima is cultivated in Africa. Oryza glumaepatula is cultivated in America. In our state we have hundreds of varieties of paddy. Molagolukulu is the traditional good variety which is grown in coastal areas of Nellore. Amrita Sari, Bangaru Teega, Kolleti Kusuma, Potti Basangi, Sona masuri are some of our traditional varieties.

Activity-5

Selection of Seeds

Take some water in a glass. Drop a fist of seeds in it. You can observe some seeds floating on water. Collect those seeds and observe with a hand lense and compare with those seeds that sank in the water. Write your observations in the table.

Seed character	Sunken seed	Floated seed
Good colour		
Wrinkled and rough shaped		
Smooth and round shaped		
More weight		
Less weight		

- What are the differences you observed in both seeds?
- Do you know why the floated seeds are light in weight?

Activity-6

Germination and selection

Sow both the seeds in different pots and provide water uniformly, observe the growth of the plants in two pots and make a report.

- Which seeds germinate well? Why?
- Which seeds do not germinate properly? Why?
- Were all seeds tested like this?
- Do you know how the paddy seeds germinate?

There are different stages in sprouting of the soaked rice seeds before it is planted.

Observe a sprout of paddy. Can you say which part becomes root? Which part become shoot in the picture?

Seed crisis

Farmers in our state generally purchase seeds in the nearby market. The grains that are available in the packets play a vital role in agriculture. Sometimes the rate of germination of the seeds is not up to the mark, which was labeled on the packet. Sometimes never germinate too. They grow into plants, but may be sterile. Some multinational companies sell genetically modified seeds. Every year, farmers are imposed to purchase seeds from the companies only, because the seeds produced by the plants may again be sterile. National Seed Development Corporation of India preserves and promotes different varieties of seeds. Now a days our traditional varieties are almost disappearing. Think why does this kind of situation take place? How to get sustainability in seed availability at the level of farmer while dependency of farmers on seeds from market?

Fig. 4 Sprouting paddy seeds

Selection of seeds free from pests is also important issue in agriculture. Sometimes farmers wash seeds with chemicals to protect from pests.

Can you guess the answer? Discuss with your friends and teachers and write the reasons in your note book.

Medication is done to keep seeds away from the harmful micro organisms like bacteria, fungus etc. So, generally farmers medicate seeds before making them to germinate.

- What are the major practices in your village before sowing paddy seeds? Write in your notebook.

Fig. 5 Fungicides

Types of Seeding

The medicated, germinating seeds of paddy are sprinkled on the paddy fields. This is one of the practice in some places of our state. Are all the seeds dispersed like this? Most of the time farmers develop seeds beds to grow paddy plantlets (naru). These grown plantlets are uprooted and planted throughout the field (naatlu).

- Discuss with your friends and make a list of crops that we cultivate by sowing plantlets.

Different types of sowing the seeds

Some seeds are directly sowed by seed drill. And some seeds sowed with hands.

Activity-7

Sowing Methods

Collect information from the nearby farmers and fill the table.

Fig. 6 Broadcasting

The method of dispersing seeds by sprinkling is called broadcasting.

Seed drill

Seed drill is an instrument used to sow seeds in the soil. There is a funnel like device on the top of the seed harrow. Farmers pour the seeds in the funnel. They travel through pipes helping the seeds to be sowed uniformly in the land. Generally there are three pipes in the seed drill. Based on the roots and distance between plants, farmers select 3 to 6 piped seed drills. After that farmers cover the seeds with soil.

Did you find any disadvantages with this? Think, how to solve this and discuss with your nearby farmers about your findings. How will your ideas help them?

Do you know how many kilograms of paddy grains are required for an acre to plant? Is it equal for all varieties of paddy? Ask your elders, collect information and discuss in your class.

- Can you say why seeds were covered with soil? Discuss with your teacher.

Modern seed drill

Fig-6 Modern tractor seed drill

Now a days farmers use the sophisticated seed drill used with the help of tractor.

This seed drill is attached to a tractor and helps to sow seeds in 5 or 6 rows. It also covers the sown seeds with soil immediately with the help of a blade attached to it. It is time saving and easiest way of sowing the seeds.

Seeds that are broadcasted in a plot will grow. The growing seedlings need to have their roots constantly submerged in water. When the seedlings have grown 4 – 5 leaves they can readily be transplanted.

This stage might have taken from 14 to 40 days depending on the type of rice, temperature and availability of water. In the meanwhile the remaining plots are leveled, ploughed and manured.

Removing seedlings from the nursery plot

When the plants grow to certain height, farmers pick out the seedlings from the plots and make bundles. Some farmers purchase these bundles to replant in their fields also. Do you know how many bundles of plantlets are required for one acre? Paddy plants are sown in proper distances. This is called transplanting. (Naru etlu)

The paddy variety 'Sri Vari' requires much gap between the plants. Ask your elders, how many plantlets are planted at one place? Is it one or 5 to 6 plants as a group?

- Why the seedlings are replanted at proper distances?
- Do all the crops grow when replanted? Why not?

See annexure for more details about sri vari in the chapter challenges in agriculture in class IX.

Fig. 7 Transplantation

Do you know, what a Paddy planter is? Observe this picture.

Fig. 8 Paddy Planter

This is a paddy planter. It is useful for farmers those who cultivate paddy in large areas. It is easy to maintain proper distance sowing the seedlings.It is time saving and money saving process.

3. Applying manure and pesticides:

The growing rice crop is attractive food for moth caterpillars, paddy beetles and their larva, paddy grasshoppers and aphids. Some eat the leaves others bore through the root and stem or suck the juice from the tender rice grain. To control these pests, pesticides might be dusted or sprayed on the crop.

Fig. 9 Diseases in Paddy

Activity-8

Crops and diseases

Form a group with 4 to 5 of your classmates, visit nearby field, discuss with farmers about diseases effected by, and how to control them. If you do not know the name of the disease, write its local name or its characters.

S. No.	Name of the farmer	Crop grown	Observed diseases	Name of the pesticides used	Results	Remarks

- Do all the farmers use the same pesticides for the same crop?
- Is there any disease that you find in all fields?
- Where do they buy pesticides?
- What are the appliances used to spray pesticides?
- Did you find any other living organisms dying along with pests due to pesticides? What are they?

Crop protection management.

Pests damage the crops

Do you agree that plants also fall ill like us? In agriculture along with weeds, pests also damage the crops. Almost all crops are generally affected by pests. Sometimes caterpillars suddenly appear on the leaves of the plants and eat them.

Activity-9

Identification of pests

Observe the plants in a nearby field or in your school garden. Closely observe the leaves and stems to collect the following information.

Name of the plant/crop : .....

Place : .....

Leaves	Stem
Twilted	Scars
Rolled	Beetles
Spots appear	Spots appear
Colour	Colour
Fleshy spots	Fleshy spots
Powdery spots	Powdery spots
Caterpillars	Caterpillars
Scars	Wilting
Others	Others

Do all the leaves of plant have spots?

Draw the leaf with those spots.

- What is your reason for the leaves which have cutting edges?
- Do you find any twilted leaves with insects? How are they?
- Are the scars on the stems same as spots on leaves?
- Collect powdery substance of the spots on leaves and observe under microscope. Write down your observations.

……

……

Do you think there is some relation between these spots and caterpillars? These infections are caused by different viruses, bacteria and fungi.

Wheat, paddy and sugarcane are generally affected by fungal diseases. The leaves and stems of these plants have spots and scars on them.

Particularly in groundnut all leaves of the affected plant have powdery spots. The whole plant becomes wilted. This fungal disease is called Tikka disease. If you uproot the plant you will notice that the roots have rotten and emit a foul smell. Do you think there is a connection in spreading disease from root to leaf?

Collect and observe leaves and fruits of lemon tree which contains spots on them. How are they? Is there any powdery like substance? This is because of virus. We may see white brown colour spots on fruits and leaves. This is because of bacteria. Along with these diseases leaf minor, citrus butterfly, aphids, mites can be seen on lemon plants. They are the carriers of disease causing virus, bacteria and fungi. How can these pests can be controlled.

Controlling pests:

Observe the following pest controlling practices.

- A farmer removes the affected leaves from the plant and puts them under that plant only.
- A farmer removes the affected leaves from the plant and puts them aside in the field.
- A farmer removes the affected leaves from the plant and puts them in a dump and covers with soil.
- A farmer remove the affected leaves from the plant and burns them.

Which of the above practice is good? Why do you think so? Discuss with your classmates.

A farmer used pesticides Dithane M-45 and Eldrine. He sprayed both of them by a sprayer on the plant. Why did he use two pesticides at a time? That year pests were controlled. Next year also he used the same. But the pests were not controlled. Why did this happen?

If we use pesticides unwisely, pests become resistant to the pesticides. What will we do to solve this problem?

Activity-10

Pest controling practices

In your village farmers control pests by using different pesticides and insecticides for different crops. For this they use different practices. Ask your elders the names of pesticides that they use in the following pest controlling practices.

1. Spraying .....

.....

2. Dusting.....

.....

3. Put in the soil.....

.....

4. Burning, picking are also the practices where they use these.....

5. Bio pesticides .....

Small holes and cuts in leaves are evidence of damage caused by insects, often by caterpillars. A wart or swelling may hold insects inside it. A crumpled or twisted leaf might show that aphids have been sucking its juice. A fungal infection is usually seen as white, black, yellow, brown spots or a fluffy or powdery coating on leaves. Some discolouration also could be caused by bacteria or viral infectives. Root infections like boring worms, insects or fungus are not seen above the ground. But they lead to wilting of plants.

Every plant has characteristic insects and other living things depending on it. Some of these associations might be useful or harmful for the plants. For example these helps in pollination, wasps and lady bugs eat more harmful insects. In small number even the pests may not cause much harm. In the wild they might actually serve to keep in check the plant population. But the large numbers of these pests cause immense harm. In farms and plantations the large numbers of the same kind of plants are grown in one place, making it easy for pests to spread from one plant to the another, multiply further into large number and thus destroy the crop.

Insects are the most common agricultural pests. They multiply rapidly when food is plenty. At other times they stay dormant or their numbers is less. For example the desert locust occurs in India in regular cycles. The Deccan wingless grasshopper is seen only in the Kharif season. Many pests are abundant in the monsoons. At the end of the season they lay their eggs in the soil to hatch only in the next monsoon. Do you know, why farmers plough the field and leave it for sometime under the sun.

Some insects like aphids and the white fly besides sucking plant sap also carry viral infections. Other crop pests might be carried by mammals like rats, bats, monkeys, rabbits and squirrels etc. and even round worms mites, crabs, millipedes, snails and slugs.

Aphids

Virus

Tikka disease

A wide variety of agricultural and garden pesticides are available. A few derived from plants like neem, tobacco and chrysanthemum are less dangerous to other living things. Others are inorganic pesticides like compounds of arsenic, zinc, sulphur, phosphorous and fluorine. A wide variety of organic synthetic pesticides are commonly used. DDT (Dichloro diphenyl trichloro ethane), BHC (Benzene hexa chloride), Chlordane, Endrin, Aldrin, Endosulfan and Diazinon pesticides are usually dusted or sprayed on crops while some types are put in the soil.

Some pesticides act on particular species of pests , but many pesticides harmful to other harmless and useful animals.

Do you know?

In 1960 Rachael Carson wrote a book called ‘silent spring’ in which she pointed out the dangers of pesticides. Pesticides get into the bodies of microscopic plants and animals in the soil and water. When these plants and animals are eaten by fish the pesticides get into their bodies. Even if the fish are not seriously poisoned with each successive meal pesticides buildup inside their bodies.

A bird that eat these fish might get a concentrated lethal dose. DDT also accumulates in the egg shells weakening them and making the shells break before hatching. There are just two out of the numerous ways that pesticides are eaten, passed down the food chain, and accumulate in the bodies of higher animals including human beings causing sickness and sometimes death. Think, how dangerous the pesticides are...!

How do farmers get high yield?

In addition to control pests and diseases proper manuring is also an important activity in agriculture.

Why do we supply manure?

We know that plants require nutrients to grow which are obtained from soil. Our present agricultural lands have been used since long time. Guess, what would happen if a farmer grows same type of crop, in the same field every year?

If you do so, the nutrients in the soil decrease and soil becomes infertile. In order to overcome this problem, farmers add manure to the soil. Manure is needed for healthy growth of the plants. Manure contains Nitrogen, Phosphorous, Potash etc.

- Farmers add manure to the soil.

What they used to add?

- Do you have a compost pit in your school / house?

Manure is of two types

1. Natural Manure (Bio fertilizers)
2. Artificial Manure (Chemical fertilizers)

Natural Manure

This is also called Bio Fertilizers.

These fertilizers are formed by decomposing plant and animal wastes. In rural areas farmers keep these plant and animal wastes outside the village in an open space. Some bacteria like Azatobacter and Nitrobacter decompose it into manure which contain nutrients. Wherever the manure is added to the soil, there it provides nutrients to the plants.

Artificial Manure/Chemical fertilizers:

These are prepared in factories. These are also called chemical fertilizers. These are sold in the market by the names Urea, D.A.P, Superphosphate, Potash, which are enriched with Nitrogen, Phosphorus and Potash.

Discuss – Have you ever heard or read in the newspapers of fighting for fertilizers. Why this happens? Why farmers want to get more bags of fertilizers? Do you have any solution for this? Make a note on your ideas about this and display in the Wall Magazine.

Look at the picture given below and write the constituents in it?

Nitrogen (..... %)
Phosphorus (..... %)
Potash (..... %)

Which manure is better?

Let us compare chemical, natural fertilizers, which manure is beneficial?

Chemical fertilizers	Natural fertilizers
1. These are made up of inorganic salts	1.These are made by the decomposition of plants and animal (organic) wastes.
2.These are prepared in factories	2. These are prepared in open places.
3. No humus can be found.	3. Deposits of humus layer is found in the soil.
4. More amount of Nitrogen, Phosphorus and Potash deposits in the soil.	4. Less amount of Nitrogen, phosphorus and Potash deposits in the soil.

Observe the table carefully, discuss with your teacher and conclude which fertilizer is best to the farmers and why?

What would happen if over dosage of manure is added to soil?

Generally, farmers should use fertilizers keeping in view the nature of the soil and the crops he wants to grow. Some times in order to get more quantity of crops he uses more amounts of fertilizers. In turn, this leads to soil pollution and water pollution. After some time soil becomes either acidic or alkaline. Thus it brings only grief to the farmers.

Irrigation

The process of watering crop plants in the field is known as irrigation. The source of water should be at a higher level. So that each and every part of the field gets water. Wells and canals are common sources of water. Farmers irrigate their fields either manually using bullocks or by using pumps. There are three methods of irrigation which are commonly practised in our country.

Furrow Irrigation

In this method of irrigation, the water is allowed to enter the field through channels or furrows made between two rows of crop.

Fig. 10

Which crops were irrigated in this method? Discuss with your friends and write in your note book.

Basin Irrigation

In this method of irrigation the field is just filled with water as in the case of paddy. Canals, tanks and wells are the water resources in most of the areas of our state. Farmers dig small canals from tank to fields to supply water.

Preparing of canal bunds and removing of water flow barriers like Pistia plants is a major job in irrigation. Do you know about ‘Saagu Neeti Sahakara Sangham’ in your village?

- Ask your village elders about the activities taken up by the Water users association in your village and make a report on it.

Fig. 11

Sometimes field gets excess water which the soil is unable to absorbs. This condition is called water logging. Water logging is harmful to most crops as it does not allow the roots to

breathe. Therefore provision should be made for draining the excess amount of water from the fields. Farmers learn from experience as to when and how many times to irrigate a field.

- When do farmers irrigate the land?
- List out the water resources of your village.
- Are they useful to farmers?
- In what way the farmers of your village get water to the fields?

Why water is essential for plants?

Have you ever observed the plants blossom if you water them properly? Why?

The nutrients in the soil should be transported to the plants properly. For this it should be dissolved in water. When nutrients dissolved, they can easily be transported of about the plants with the help of its roots. That's why farmers water their field after adding manure to it.

Activity-11

When should farmers irrigate the field?

Consult the farmers and fill the table with the information on how and when they provide water to various crops.

Name of the crop	Stages of providing water

- Are all the crops provided with equal amount of water ?

Providing water to fields in different stages is called irrigation. Irrigation should be done according to nature of the soil, and the type of crop to be grown.

Do you know?

Paddy requires high quantity of water. That is why paddy grown in areas where plenty of water is available. Because of marketing and supporting price, paddy is grown all over the country irrespective of water availability. For this farmers dig bore wells and use ground water wherever water is not sufficient.. There is a need to shift to those crops which require less water. In some areas, recently farmers grow fishes in paddy growing fields.

Why do farmers provide more water to the summer crops?

Observe the following pictures

Fig. 12 Ancient irrigation techniques

In the Ancient practices of agriculture, farmers used to cultivate lands by using mota, yatam, chain pump etc.

The Water available in wells, lakes and canals is lifted up by different methods in different regions, for taking it to the fields. Cattle or human labour is used in these methods. So, these methods are cheaper, but less efficient.

Nowadays pumps are commonly used for lifting water. Diesel, Bio gas, electricity are used to run these pumps.

What are the ways that the farmers of your place supply water to the fields?

3. Modern methods of Irrigation:

During irrigation large amounts of water absorbed by the canal soil before reaching to the plant. Do you have any idea to protect this water loss? A modern device of watering plants is called "Sprinkler".

Fig. 13 Spinkler

It is used for conserving water in Agriculture in the areas where water is scarcely available, these sprinklers are handy to use. It provides uniform watering all over the field. It works on the principle of force of water. Observe a sprinkler if possible or ask your teacher, How does it works? It is beneficial in the way that every drop of water reaches to every plant in a field. It is mainly beneficial in sandy soil.Government encourage sprinklers, drip irrigation systems by giving huge subsidy.

Drip irrigation:

This method is employed when the availability of water is poor. As the water reaches the plants drop by drop this is called Drip irrigation. It consists of a long tube followed by small tubes attached to a motor. Holes are made in the tubes. So that water comes out from the holes. The holes are arranged in such a way that it provide water exactly at the place where plant roots could receive water.

Fig. 14 Drip irrigation system

Activity-12

Visit a nearby nursery and observe sprinklers and drip system. Prepare your own report. This should contains apparatus, instruments used, water supplying process, water resource,

investment and maintenance, merits and demerits. For this project you need to talk with the farmer.

5. Weeding:

If you observe a field with a standing crop of groundnut you will find some other plants growing here and there. These are undesirable plants, called Weeds. They should be removed immediately.

- Why they should be removed?

The weeds compete with the primary crops for nutrients, water and light. Because of these plants the prime plants may not grow properly. Hence, they should be removed.

Besides competition for food, light and water they also work as carriers for different diseases. They also serve as a host for different pests. Some weeds disperse pollen grains to air which in turn cause respiratory diseases.

Parthenium harmful to environment

See the picture. Have you seen such plants in your surroundings? Do you know that some of your friends may have got allergy because of the pollen grains of this plant. Incidentally, this weed has been imported along with wheat from Australia long before.

Fig. 15 Parthenium

Can you name any weed that you see in paddy field? Generally some weeds commonly grow with some crops.

Garika, Wanza, Varipilla Gaddi, Sukha Bhogi, Dharaka, Buradha Thung grow along with paddy.

We can see plants like Gunugu, Gaddi Chamanthi, Jeeluga are in vegetable crop weeds.

Pogaku Malle in tobacco, Puli Chinta in Mirchi and Cotton fields are the common weeds.

Activity-13

Ask your nearby farmers and know the weeds that grow in different crops. Make a table in your notebook.

How is weeding done?

Weeding is done by different methods by the farmers. Most of the weeds are up rooted at the time of tilling or ploughing. Those which still remain after tilling are manually uprooted. It is better to root out the weeds before flowering. Why?

Fig. 16 Weed harrow

Sometimes weeds are removed with the help of weed harrow. Dante or Guntaka is generally used by the farmers to remove weeds from the fields. Do you know, why farmers keep weight (stone) on it? Draw the diagrams of the material used by the farmers to remove the weeds in your village? Do not forget to write their names.

When the crop is fully grown the above methods may not be suitable for uprooting weeds. So, farmers use weedicides like 2-4D (2-4 Di Chloro Phenoxy acetic acid) to control the weeds. But these weeds do not work on monocotyledons.

By spraying weedicides, weeds are killed, but not the crop plants why?

6. Harvesting:

How do farmers harvest the crop?

This is the most important task in agriculture. Collecting grains from the crop by cutting the matured plant is called Harvesting. During harvesting crops are either pulled out or cut close to the ground. After cutting they are dried in the sunlight. After the moisture has evaporated farmers collect the seeds. Harvesting is done either manually or by using machines.

Harvesting of paddy

For a paddy crop harvesting can be done by hand, using a sickle. After cutting , the grain is spread out to dry in the field for 2 to 3 days.

- If the paddy is not dried well enough. What will happen?
- Why farmers go for machinary for harvesting crops?

First crop for best friends.

Before harvesting, paddy farmers particularly young children in the family, collect riped grain (Pachi Kankulu). They make a bundle and hang it at the roof of the varanda. Do you know, for whom is this? Yes- this is for farmer's family friend 'sparrow'. The little bird sparrow makes a nest in the roof and eats those grains. And say thanks to the family by its chirping. That is the way the farmers love the nature. Think, how nice all the actions of those people?

Do you know?

To meet the food requirement of growing population there should be an increase in the cultivated land. But now a days parts of the agricultural land in rural areas remain uncultivated because of non availability of seeds, power, water supply, market problems. Farmers thinking that agriculture is a non profitable task.

Actually agriculture is the flesh and blood of our country. So young generation should develop more passion towards agriculture which would be the only benificial profession in near future.

Fig. 17

Threshing

The dry plants stocks are beaten on a hard surface to remove the grain. Threshing is also done with the help of bullocks, which trample the grain.

Fig. 18 Thrashing

Winnowing

In winnowing the grains are poured out of a basket or tray held high up the wind blows the chaff, dust and lighter seeds aside while the heavy grains collect below.

Fig-19 Winnowing

Modern harvesting Machine (Harvester)

Now a days it is a common practice to harvest the crop with the help of a harvester. After the collection of seeds farmers separate the grain and chaff by the method called winnowing. For this they use a manual winnower by using chaata and fan or winnowing machine.

Fig-20 Modern Harvester

- Have you ever seen farmers harvesting the crops on the roads?

In some villages farmers used to harvest their crops on the roads insted of using bullocks. It is a dangerous practice. Some times accidents may occur.

Fig-21 Harvesting on roads

- Where do farmers harvest the crops in your village ?
- Is harvesting same for all crops?

Harvesting is also an important task in agriculture. Farmers generally used traditional methods to harvest.

Find out the methods of harvesting in and around your village and fill in the table.

Name of the crop	Type of harvesting	Tools used
.....	.....	.....
.....	.....	.....
.....	.....	.....
.....	.....	.....

7. Storage of grains:

Where does your mother store rice, Bengal gram, jowar wheat etc.? How does she store them?

Usually in our houses the grains are stored in a tin after drying them in hot sunlight. Storage of grain is an important task, because we do not consume the entire crop at a time. Farmers store the food and wait for the reasonable market price.

How do farmers store the grain?

There are different storage practices in our state. Naturally food produce can be damaged by fungi, pests, rats and bacteria. If moisture is also there in the grains it helps to develop moulds (fungi). Such grains neither germinates nor suitable to eat.

Fig. 22 Cold storage unit

To overcome this problem farmers dry the grains for 2 to 3 days in sun. After drying they keep the grains in a jute bags and preserve them in a godown.

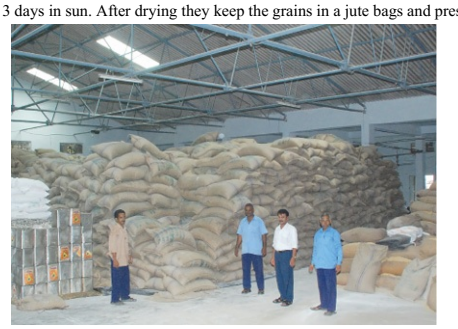


Fig. 23

Few decades back, farmers used to store the grains in metallic and bamboo bins. Now a days, specific chemical treatments are employed for storage of grains in order to protect them from pests and micro organisms.

It is a Cold Storage Unit . Here the vegetables, fruits, tamarind, chillies and other products that are usually damaged and decoloured within a short time are stored. As the temperature is very low here, the vegetables and fruits can be kept for a longer time in the cold storage units.

Keywords

Crop, Agriculture, crop production, long term crops, short term crops, Kharif season.Rabi season, Night duration, Global grain, Ploughing, plots, leveling, Sowing, selection, seed crisis, sprouting, seed dispersal, broadcasting , seed drill, nursery plot, Mannure, pesticides, paddy planter, Bio fertilizers, chemical fertilizers, Irrigation, Furrow irrigation, Basin Irrigation, sprinklers, Drip irrigation, weeding, weedicides, Harvesting, threshing, winnowing, cold storage units, godowns.

What we have learnt

- Crops that take 180 days and above for harvesting are called long term crops.
- Crops that take 100 days and below for harvesting are called short term crops.
- The crops grown in the rainy season are termed as Kharif. It starts from June to October.
- The crops grown in winter season are called Rabi.It starts from November to April.
- In some plants flowering depends on the duration of night.When the night duration is more than 12½ hours, flowering will be better.
- In some plants night duration is not at all a reason for flowering. They can flower any time during the year.
- Preparation of soil is fundamental practice in Agriculture.
- Ploughing makes soil loosen and soft, so that air and water can be transported easily.
- Levelling the soil is useful for irrigation of fields.
- Farmers sow the seeds after testing and treating with fungicides.
- Manure is of 2 types. 1. Natural manure (Bio fertilizers) 2. Artificial Manure (Chemical fertilizers).
- Sprinklers and Drip irrigation techniques are used in drought prone areas.
- Weeding increases crop yield. 2-4 Di Chloro phenoxy acetic acid is used for removing Dicot weeds.
- Proper storage of grains reduces the damage of grain by bacteria, fungi, pests, rats, etc,

Improve your learning

1. State reasons why wheat is cultivated in Kharif? (AS 1)
2. Ramaiahs field is flattened. Somaiah's field has many up and downs. Who will get more crop? (AS 1)

3. What are the advantages of ploughing? (AS 1)
4. Treating with fungicides before sowing the seed is necessary. Why? (AS 1)
5. Why do farmers dry the paddy crop after cutting them from fields? (AS 1)
6. Give some examples of plants that grow after replanting? (AS 1)
7. Rahim removed weeds in his crop field, but David did not.Guess who get more yield. Why? (AS 1)
8. What is natural manure? How to prepare it? Give two examples? (AS 1)
9. Why do farmers plough their field during summer? (AS 1)
10. Rajendar cultivated cotton crop in his field. He did not get sufficient yield. Can you guess the reasons? (AS 2)
11. What do you observe in the experiment of dropping a fist of Bengal gram seeds in water? (AS 3)
- What are the differences you observed in both the seeds?
- Do you know why the floated seeds are lighter in weight?
- Which seeds germinate well? Why?
- Which seeds would not germinate properly? why?
12. I am a plant. I grow in crop fields. Farmers pluck me. I do not know the reason. Can you tell who am I? (AS 2)
13. Go to your nearest fertilizer shop and collect the information about chemical fertilizers and fill the table. Copy the following table in your note book. (AS 4)

Name of the fertiliser	**% of Nutrients**			**Name of the crops used**
	N	**P**	**K**	

14. Prepare a flow chart from floughing to yielding in paddy (AS 5)
15. How do you appreciate the irrigation systems used in the drought prone areas? (AS 6)
16. Narendra sprayed over dose of pesticides on his cotton crop. Ramesh says it is a hazard to bio diversity and crop yield.Can you support Ramesh? How? (AS 7)
17. Venkatesh observed the irrigation method for paddy field. He wanted to follow the same practice for his Maize crop.What suggestions do you give him. (AS 7)