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# SCIENCE



EDITION INTERNATIONAL

CHAPTER 1

# Crop Production and Management

## Introduction

- Agricultural practices
- Preparation of soil
- Sowing
- Adding fertilisers / manures
- Irrigation
- Protection from weeds
- Harvest
- Storage
- Animal husbandry

We all know that food is essential for our survival. The energy we obtain from food is utilised for carrying out various functions of our body like digestion, respiration excretion, reproduction, etc. Some animals are herbivores, some carnivores and some like human beings are omnivores.

In order to provide food to a large population, food has to be produced on a large scale to meet the demands of the people. Hence proper management and distribution of food produced on a large scale is necesary.

The primitive man was a hunter and a food gatherer. He led a nomadic life and wandered from place to place in search of food, He ate whatever he found. He accidentally discovered that plants could be grown. He thus started cultivating crops. He improved irrigation facilities, and used scientific methods to grow crops. This led to the development of agriculture.

The word 'agriculture' is derived from the latin word 'ager' meaning 'field' and 'culture' meaning to 'cultivate'. Thus agriculture means producing crops and looking after them.

## AGRICULTURAL PRACTICES

A number of activities have to be performed by the farmer to grow crops. Plants of the same kind grown at one place on a large scale is called a **crop.** For example, several plants of rice grown in a field form a crop of rice.

A large number of crops are grown in India depending on the climate, rainfall and humidity. Different crops are grown in different regions of our country. Crops are basically classified into two kinds based on season.

1. **Rabi Crops :** These are grown in the winter season. These are sown in October-November and harvested in March-April. They are also called winter crops. Examples are wheat, barley, gram, pea, mustard and linseed.
2. **Kharif Crops :** They are also called summer crops. They are sown during June - July and harvested in September - October. These crops need a large amount of water and are hence sown in rainy season. Examples are rice, maize, cotton, groundnut and soyabean.

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Besides these, pulses and vegetables are also grown in many places.

**Examples of some common crops**

| Type | Example |
|---|---|
| 1. Cereal | wheat, rice, maize |
| 2. Pulses | gram, lentil, urad |
| 3. Oil seeds | mustard, groundnut |
| 4. Tuber crops | potato, onion |
| 5. Fibre crops | cotton, jute |
| 6. Fruits | apple, mango, banana |

Wheat crop

Paddy crop

Let us now learn about basic practices of crop production.

For growing crops a farmer has to perform a number of activities over a period of time in a proper sequential manner. These activities or tasks are known as agricultural practices. These activities include :

• Preparation of the soil • Selection and sowing of seeds • Adding manure and fertilisers • Irrigation • Protection from weeds • Harvesting • Threshing and storage.

## PREPARATION OF THE SOIL

The first step in growing a crop is to prepare the soil i.e. to make the soil ready. It includes **tilling** or **ploughing**. This refers to loosening and turning of the soil. This is an important process. It has many advantages. They are :

- Loosened soil allows the roots to penetrate easily deep into the soil. This helps to fix the plant firmly to the soil.
- Helps in trapping air in the soil. This is used by the roots for breathing.
- Loosening of soil helps in the growth of earthworms and microbes present in the soil. These organisms further turn and loosen the soil. Their dead, decayed bodies add humus to the soil. These organisms are friends of the farmers. These microorganisms also make the soil fertile by decomposing the remains of plants and animals, thereby the nutrients held in the dead bodies of animals are released back into the soil.
- The spaces between the soil particles help to trap water, thereby increasing the water holding capacity of the soil.
- It helps to bring nutrient rich soil to the top, which can be used by the plant.
- Fertilisers mix easily and uniformly with loose soil.

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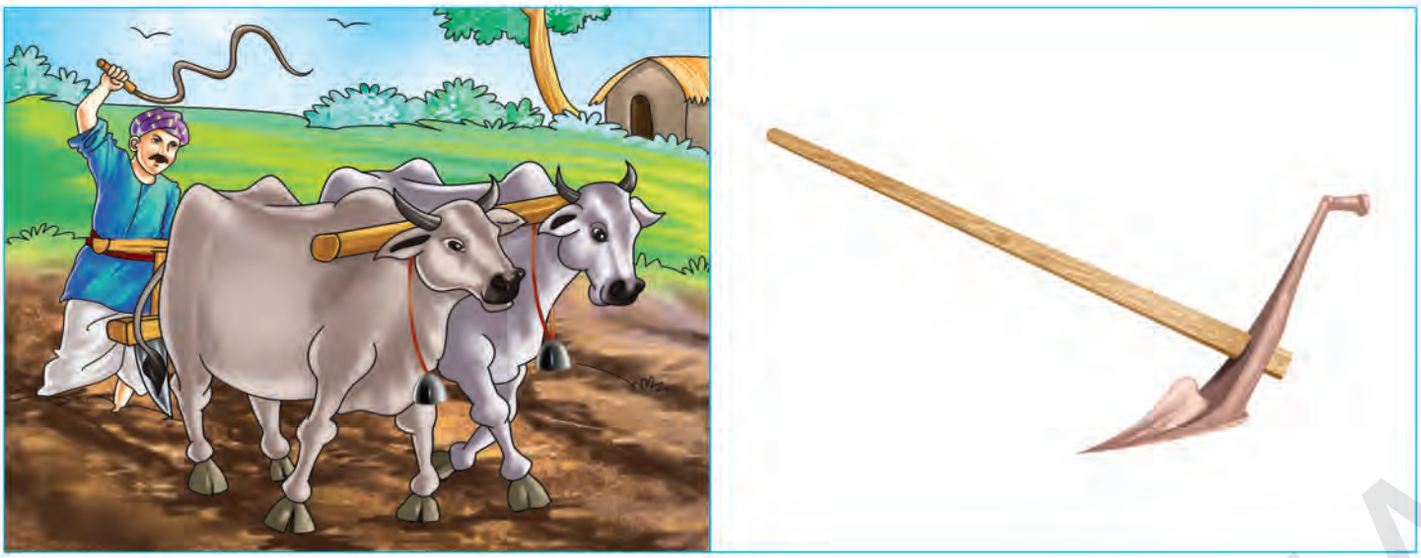
Ploughing is done by a tool called a plough.



The Plough

Ploughs are made of iron or wood. The wooden plough has an iron tip, which penetrates into the soil. These days iron ploughs are used. Ploughs are drawn either by bullocks or other animals like horses and camels or through a tractor.

At times the ploughed field may have big pieces of soil called crumbs. They need to be broken down with a plank called leveller. The process of making the soil surface even and smooth is called levelling. Levelling prevents soil erosion and helps in uniform irrigation of the field.

## Agricultural Implements

The main tools used to break soil to the size of grains to get better yield are plough, hoe and cultivator. This is done before sowing the seed.

**Plough** — It consist of a strong rectangular iron strip called plough share and a long log of wood called plough shaft. At one end of the shaft there is a handle and the other hand is attached to a beam which is placed on the bull's neck.

Cultivator driven by a tractor

**Hoe :** It is used for removing weeds and loosening the soil.

A hoe

## Cultivator

Now-a-days ploughing is done by tractor-driven cultivator.

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## SOWING

After preparing the soil, seeds are sown. This is the most important step in crop production. Seeds selected should be of good quality i.e. high yielding, disease resistant, clean and healthy.

### Activity - 1

To separate healthy seeds from unhealthy ones.

Take a beaker filled with water. Add a handful of wheat grains or whole gram seeds to it. Stir well. Leave it for sometime.

What do you observe?

Some seeds settle down at the bottom, whereas some seeds float on the surface of water.

Seeds which are damaged or eaten by insects become hollow and light. They thus tend to float on water.

This is a good method for separating good, healthy seeds from the damaged ones.

- Seeds should be sown at a right depth, neither too deep nor too shallow. If planted very deep they will not germinate. If planted too near the surface they will be eaten away by birds.
- Seeds must be sown at a proper distance from each other to avoid over crowding. If space is too little, plants will not get sufficient sunlight, nutrients and water from the soil. If the spacing is too large, precious space is wasted.

Sowing can be done either manually or mechanically using a seed drill.

### Manual Sowing

The process of sowing seeds by hand is called broadcasting. In this method seeds are sprinkled directly into the soil. In this method seeds are not uniformly distributed. This method also does not ensure that all seeds are sown at an appropriate depth. Seeds of bazra, maize and wheat are sown by this method.

### Using a Seed Drill

It is a better method than manual sowing. This method ensures uniform distribution of seeds and also seeds are sown at a proper depth. It also ensures that seeds are covered with the soil after sowing. This method is also faster and more economical.

A seed drill

### Sowing of Seeds by Transplantation Method

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Seeds of certain plants like paddy, chilly, tomato, brinjal are not sown directly into the field. They are first sown in nurseries and then transferred into the fields manually, when the seeds are four to six weeks old. This is know as transplantation. This method has several advantages. It helps the farmers:

- To select healthy seedlings and space them properly.
- To ensure that wastage of space is avoided.

**Fill in the blanks.**

1. The same kind of plant grown in a large area is called _____.
2. The process of sowing seeds manually is called _____.
3. Process of loosening and turning the soil is called _____.
4. Application of artificial water to soil at desirable intervals is called _____.
5. Damaged seeds would _____ on top of water.
6. The plants which are grown by _____ method include paddy, tomato, brinjal.

## Adding Manure and Fertilisers

We need to add manure to get better crops. Substances which are added to the soil in the form of nutrients for healthy growth of plants are called manure and fertilisers. When crops are grown in a field, they use the nutrients present in the soil. Farmers grow one crop after another. The fields are not left uncultivated. The soil becomes devoid of certain nutrients. Farmers, therefore, have to add manure to the soil to replace the nutrients. This process is called manuring.

Manure is a natural substance obtained from decomposition of plant and animal waste. It is organic in nature and increases the humus content of the soil. Manure also helps to increase the water retention ability of the soil. It improves the texture of the soil and makes the soil porous.

Fertilisers are chemicals made in factories. They are rich in a particular nutrient. They provide nutrients to the soil in a concentrated form. Some examples of fertilisers are urea, ammonium sulphate, potash, NPK (Nitrogen, Phosphors, Potassium). Fertilisers are a source of water pollution. Excessive use of fertilisers is harmful as they destroy useful micro-organisms in the soil.

### Activity - 2

Take three pots. Mark them as 'A' , 'B' and 'C'. Sow some gram seeds in all the three pots. To pot A add a little dung, to pot B, add a little urea. Do not add anything to pot C. Add equal amount of water in all the pots. Keep them in sunlight. Water them daily. After a week, observe them. What do you observe? Record your findings. The growth of plant was best in which pot?


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Therefore, we must substitute fertilisers by organic manure or leave the field uncultivated in between the crops.

**Crop Rotation** is another method of replenishing soil with nutrients. This is done by growing different crops alternately. Farmers thus grow legumes and wheat alternatively in northern India. You have already studies about Rhizobium bacteria and how they fix nitrogen in the soil in the previous classes.

**Manure and Fertilisers**

| S. No. | Manure | Fertilisers |
|---|---|---|
| 1. | It is an organic substance. It is a natural substance obtained from plant and animal waste. | It is an inorganic salt. |
| 2. | It can be prepared in fields. | It is prepared in factories. |
| 3. | It increases the humus content of the soil. | Does not increase the humus content of the soil. |
| 4. | It is not very rich in plant nutrients. | It is very rich in plant nutrients. |

The organic manure is considered better than fertilisers.

## IRRIGATION

Like human beings plants also needs water to live. Water is necessary for proper growth and development of flowers, fruits and seeds of plant. Plants contain 90% water. In the absence of water, germination will not take place. Nutrients dissolved in water are transported to the different parts of the soil. The crops are protected from both frost and hot air currents by water. Water has to be supplied to fields regularly so as to maintain the moisture content of the soil for healthy crop.

The supply of water to crops at regular intervals is called irrigation. Water requirement varies from crop to crop, soil to soil and season to season. Paddy needs a constant supply of water whereas wheat requires water at regular intervals. The farmers in India depend primarily on rains. Since the rainfall varies from time to time and also from place to place, other modes of irrigation have to be used.

**Sources of Irrigation :** The sources of irrigation are tube wells, canals, wells, ponds, lakes, rivers and dams.

**Methods of Irrigation :** Methods of irrigation are of two types- traditional and modern.

**Traditional Methods :**

Some of the traditional methods Include :

1. moat (pulley system)
2. chain pump
3. furrow irrigation



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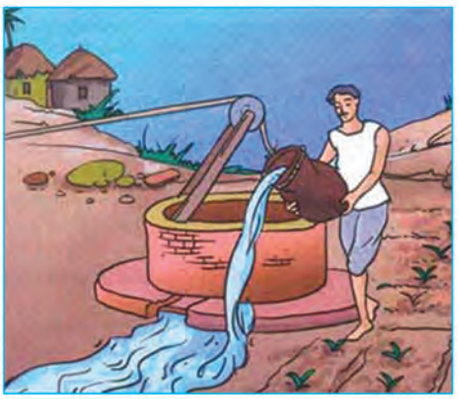
4. dhekli and

5. rahat (lever system)



Moat

Furrow irrigation

Chain pump

Dhekli

Rahat

The water available in lakes, canals etc. is lifted up in different ways. These methods are cheap, but often lead to wastage of water.

## Modern Methods

Modern methods help to save water. Sprinkler irrigation and drip irrigation are examples of modern methods.

### 1. Sprinkler System

This means supplying water on crops as artificial rain. This is useful in uneven land where sufficient water is not available. It is useful in areas having sandy soil. These are perpendicular pipes, having rotating nozzles on top, which are joined to the main pipe line at regular intervals. This method involves pumping of water at high pressure through the main line by means of a pump. As water escapes from the nozzles, it sprinkles on the crop as if it is raining.

Sprinkler System

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### 2. Drip System

In this method pipes or tubes are used having very small holes to deliver water drop by drop directly at the base of each plant. Hence it is called drip system. This method is very useful in areas having shortage of water. It is an ideal technique for watering fruit plants, gardens and trees.

Drip System

## PROTECTION FROM WEEDS

Sometimes undesirable plants called weeds naturally grow along with the main crop. These weeds need to be removed as they start competing with the crops for air, sunlight, water, space and nutrients.

The process of removing weeds from the field is known as weeding. Examples of some weeds are grass, amaranth, bathua (chenopodium) and wild oat. Farmers use different methods to remove weeds. Tilling before sowing seeds helps in uprooting and killing weeds. They dry up and mix with the soil. Manual methods of weeding involves uprooting the weeds manually. This is done using tools like khurpi. Weeds can also be uprooted with the help of a seed drill.

Spraying Weedicides

Weeds are also controlled with the help of chemicals called weedicides. Weedicides destroy the weeds without affecting the crops. Metolachlor 2, 4 –D, Dalapon, Butachlor are some of the commonly used weedicides. Weedicides are diluted with water and sprayed on the plants by water sprays. Weeding is carried out before plants produce flowers and fruits. Spraying of weedicides may adversely affect the health of the farmers if he accidentally comes in contact with these chemicals. They must be handled very carefully. Now-a-days, herbicides have replaced weedicides. They do not affect the health of the farmers and are obtained from plants.

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## HARVESTING

The process of cutting of crop after it is matures is called harvesting. It is an important step. Harvesting season is different for different crops. It is a time to rejoice for farmers. It comes after three to four months of hard work. Harvesting is done either manually by sickle or with the help of a machine called harvester.

Sickle

The crops are cut close to the ground. The harvested grains are called produce. They are tied in bundles. The grains need to be separated from the chaff. This process is called threshing. Threshing is done either manually or with the help of a machine called 'combine' which is a combined harvester and a thresher.

**Facts to know**

In India harvesting of crops is associated with many festivals like Holy, Baisakhi, Pongal, Onam, Bihu.

Combine

After the grains are threshed, chaff is removed by winnowing. This can be done manually or with the help of a winnowing machine. You have already studied about winnowing in class VI.

## STORAGE

The harvested grains have to be stored till they are made available for human consumption. They have to be stored carefully to retain crop quality. They have to be kept safe from moisture, rodents, insects and micro-organisms. Freshly harvested grains contain a lot of moisture. The grains have to properly dried in the sun to reduce the moisture before storing them. Most grains spoil quickly and are also attacked by organisms thus losing their germination capacity. Dried grains are less susceptible to attack by micro-organisms and insect pests. Farmers store grains in gunny bags or metallic bins. Bulk storage of grains is done in silos or granaries. This protects them from attack of pests. At home dried neem leaves are used to store food grains. Large quantities of grains have to be stored safely so as to last till the next harvest. The humidity level is also controlled in silos and granaries to prevent the growth of microbes.

Silos for storage of grains

Storage of grains in granaries

**Food from Animals :** We obtain many food items from animals.

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Animals give us milk, eggs, meat, etc. Milk in turn is used to prepare a number of products like butter, ghee, curd and cheese. Fishes are also consumed by human beings.

Rearing of animals on a large scale for food or other needs is called animal husbandry. Animals reared both at homes or in farms have to be provided with proper food, shelter and care.

## Activity - 3

**Complete the table**

| S. No. | Food | Sources |
|---|---|---|
| 1. | Meat | |
| 2. | Eggs | |
| 3. | Honey | |
| 4. | Milk | |

## Let's Remember

Give one word for each one of the following.

1. What is transplantation?
2. Name two fertilisers.
3. Name few sources of irrigation.
4. How are crops harvested?
5. What is a crop?

## Glossary

Agriculture : The branch of science which deals with methods of food production is Known as agriculture

Animal Husbandry : The following of animals on a large-scale is known as animal husbandry

Apiculture : The rearing the honeybees on a large scale is called apiculture

harvesting : The cutting and gathering of mature crops is called harvesting

Pisiculture : The rearing of fish on a large-scale is called pisiculture

threshing : The separation of grain from the harvested crop is called threshing

Tilling : The process of loosening and training the soil is called tilling

## SUMMARY

- Farmers have to adopt certain agricultural practices in a sequential manner, over a period of time for growing crops.
- The same kind of crop grown in a large area is called a crop.
- In India two types of crops are grown based on season - rabi and kharif.
- The first step in soil preparation involves tilling and ploughing. Ploughs and levellers are used for this purpose.

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- Selecting good quality seeds and sowing them at appropriate distances and depth is another important step in crop production. The seeds are sown either by hand (broad casting) or using a seed drill.
- Soil needs replenishment of nutrients to improve its fertility. Organic manure and fertilisers are thus added.
- Crop rotation also helps to improve crop yield.
- Supply of water to crops at appropriate intervals is called irrigation.
- Modern methods like sprinkler and drip irrigation help in saving water.
- Removal of unwanted plants that grow along with the cultivated crops is called weeding.
- The crops are cut on maturity by machines or manually. This is called harvesting.
- After harvesting, grains are separated from the chaff by threshing and winnowing.
- The grains are stored in silos or granaries. Proper storage of grains is necessary to protect them from pests and micro-organisms.
- The animals also provide us food items like milk, meat, eggs, fish and honey.
- The process of rearing animals for food is called animal husbandry.


## A. Multiple choice Questions (MCQS)

**Tick (✓) the Right option.**

1. The process of loosening soil is called _____.

   (a) sowing ☐ (b) manuring ☐ (c) ploughing ☐ (d) Irrigation ☐

2. Which one of the following is a rabi crop_____.

   (a) rice ☐ (b) wheat ☐ (c) maize ☐ (d) cotton ☐

3. Which is a modern method of irrigation _____.

   (a) drip method ☐ (b) chain pump ☐ (c) moat ☐ (d) dhekli ☐

4. Which one the following is a fertiliser _____.

   (a) NPK ☐ (b) compost ☐ (c) humus ☐ (d) cow dung ☐

5. Which tool is used for weeding _____.

   (a) axe ☐ (b) cultivator ☐ (c) trowel ☐ (d) seed drill ☐

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## B. State whether True (T) or False (F) :

1. The seeds should be sown deep in the soil.
2. Fertilisers are organic in nature.
3. Rabi crops are grown in rainy season.
4. Hoe is a simple tool used for removing weeds.
5. Sprinkler system is a good technique for watering fruit plants.

## C. Matching the following

| Coloumn A | Coloumn B |
|---|---|
| 1. Sprinklers | (a) Storage of grains |
| 2. Silos and gramaries | (b) Irrigation |
| 3. Kharif crops | (c) Urea and super phosphate |
| 4. Rabi crops | (d) Wheat, gram, Pea |
| 5. Chemical fertilizers | (e) paddy and maize |

## D. Anwser the following Questions in short.

1. Give Two examples each of kharif crops and rabi crops.
2. What is irrigation? Name two methods of irrigation which save water.
3. What precautions should we take while sowing seeds?
4. What is transplantation? What are its advantages?
5. What are weeds? How do we control them?

## E. Answer the following Questions .

1. Why is ploughing and levelling done?
2. Differentiate between manure and fertilisers .
3. What are the different ways in which seeds are sown?
4. How is soil prepared for sowing seeds?
5. How do farmers protect their crops from weeds?

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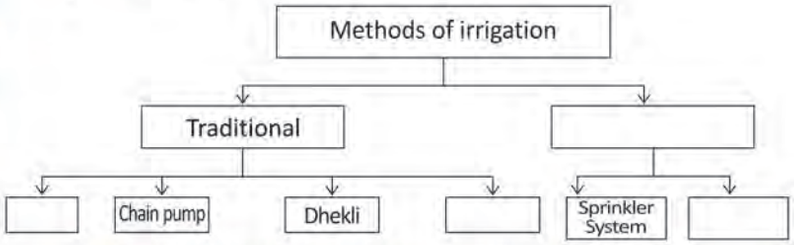
## Hots ( )

1. What do you think will happen if paddy is sown in rabi season?
2. Why do you think silos used for storing cereals should be clean and dry?

## Let's Recall

Complete the following Diagram.




### Group Discussion

**form a group of 4-5 students is your child. Discuss on the following topics :**

1. Traditional and modern irrigation Systems.
2. Merits and demerits of use of pesticides and weedicides.

## Activity To Do

### 1. Prepare a Herbarium

Collect leaves and flowers from different plants. Dry them by placing between layers of newspaper and placing them under a weight for about 10-15 days. Paste the samples on your project file. Write down the name of the plants and places of collection.

Also collect different seeds in small plastic bags. Attach them in your project file. Label them and write down their uses.

### 2. Experiment

a) Take some moong seeds and sow them in soil, one which has been loosened and one which hasn't.

b) Sow the seeds at 3 different levels in the same kind of soil. On the surface of the soil, one inch below soil and 7-8 inches below soil. Irrigate the plants daily. Observe after 2-3 days.

Note down your observations?

What do you conclude?

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## Worksheet - 1

Find out maximum words in word grid given below. All the words are related to the chapter.

| R | M | K | B | X | L | E | X | Y | B | Y | B | L | V | C | R | O | P | S | T |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| V | K | I | I | N | F | H | U | K | I | I | Q | D | D | L | P | Y | V | N | H |
| L | O | V | F | G | Z | R | G | N | D | U | F | I | N | V | X | P | V | T | A |
| O | W | O | N | E | L | B | U | B | X | H | R | A | R | N | U | S | J | Z | Y |
| Y | X | P | B | B | E | E | F | I | H | I | U | Z | R | E | X | A | K | C | P |
| D | X | C | I | B | V | M | T | O | T | L | N | I | L | M | L | F | V | O | O |
| O | U | U | A | G | H | G | I | L | J | C | A | H | T | N | E | A | S | R | T |
| M | H | R | A | T | S | S | H | I | F | O | A | A | E | O | B | R | N | S | A |
| E | S | H | L | S | T | J | P | V | M | E | N | P | U | R | I | E | B | D | T |
| S | U | Q | Q | W | A | L | N | E | H | C | I | Y | O | R | I | M | E | Y | O |
| T | L | G | R | A | I | N | E | S | O | I | M | Z | D | U | X | T | Q | T | E |
| I | Q | S | R | F | V | N | Z | T | R | S | A | U | A | Z | L | V | U | K | S |
| C | I | U | P | T | D | A | N | O | S | W | L | E | I | J | P | T | U | E | Z |
| J | F | Q | V | C | I | M | O | C | E | M | S | X | R | P | R | L | R | R | I |
| R | Z | A | S | H | E | E | P | K | S | X | A | I | Y | E | A | M | I | Y | U |
| J | B | Q | R | F | A | R | N | N | X | X | S | R | W | D | B | L | I | T | U |
| J | U | I | O | M | K | X | W | S | Y | K | B | D | K | Q | L | J | M | Q | P |
| V | J | U | S | A | K | Z | H | P | U | P | P | F | E | E | Q | G | F | M | K |
| S | H | C | B | M | F | E | X | P | O | R | T | J | Z | Q | T | B | H | A | M |
| C | L | J | L | A | X | F | S | C | L | Y | V | S | E | G | D | G | K | N | Q |

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