

# Floodplain Forest



<b><u>Item</u></b>	<b><u>Number of</u></b>
Funnels	4 sets
Filter paper	2 pkgs
Poster- "Growth of a Tree"	1
100 foot tape measurer	1
Tree ring identification kits	5

# Growth of a Tree

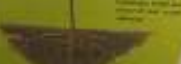
## The Tree Ring Count



### SEED SEEDLING



### SAPLING



### ROOT HAIRS



### LEAVES

### HEARTWOOD

### SAPWOOD

### CAMBIUM

### INNER BARK

### OUTER BARK

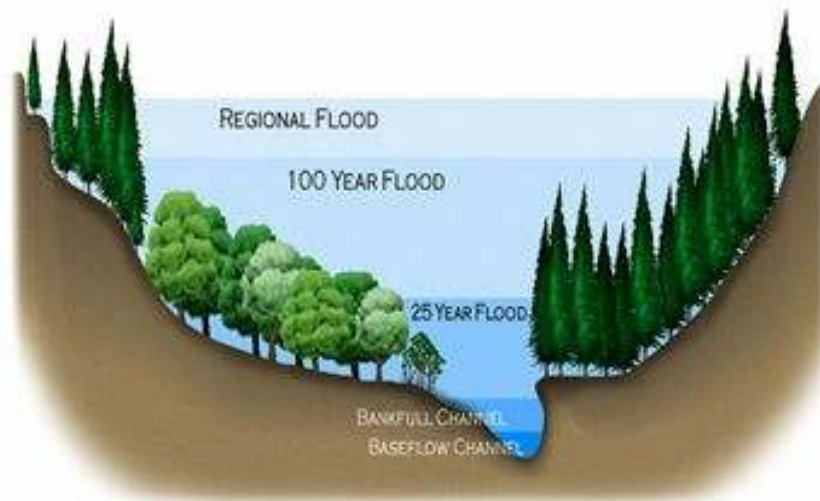
### ANNUAL RINGS



08.19.2009

# Station 11- Levels of a Floodplain Forest

## Introduction- Function of Floodplains



Floodplains are a natural feature of rivers. They are the mostly flat land adjacent to the river and form due to the actions of the river. Rivers erode their own banks and redeposit the eroded material downstream. Material is added to the floodplain during floods, a process called overbank deposition. The material that underlies floodplains is a mixture of thick layers of sand and thin layers of mud.

Floodplains in their natural form are beneficial for a number of reasons:

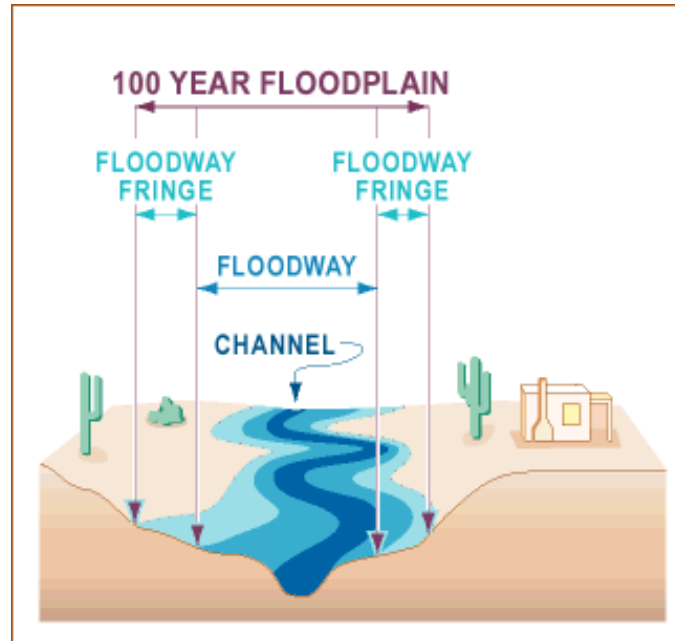
- a) reducing the number and severity of floods,
- b) minimizing non-point source water pollution,
- c) filtering storm water,
- d) providing habitat for plants and animals,
- e) aesthetic beauty and outdoor recreation benefits.

During high water events, some of the water is absorbed by the floodplain, helping to keep the river from overflowing. The absorbed water can then be returned to the stream during times of low water. If a high water event is large enough, water will overflow the channel of the river and flow onto and spread over the floodplain, which slows the flow of the water. Reduced water flow can help prevent severe erosion and flooding downstream.

Floodplains are also home to many types of plants and animals and may also have forests and wetlands on or adjacent to them. These river edges provide habitat for insects, birds, reptiles, amphibians, and mammals. The vegetation also helps filter contaminants out of the water flowing into the river. Additionally, vegetated floodplains provide shade for the adjacent rivers and streams, increasing dissolved oxygen levels and consequently improving habitat for aquatic plants and animals.

[http://www.cees.iupui.edu/education/Information\\_Resources/floodplains.htm](http://www.cees.iupui.edu/education/Information_Resources/floodplains.htm)

Sugar Creek Nature Park is in a 100-year flood plain. Below is a diagram of the basic structure of that type of floodplain.



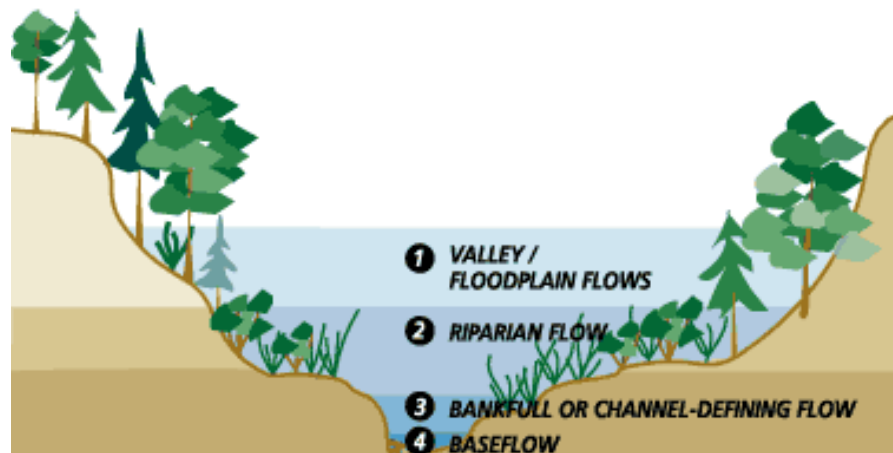
<http://rfcd.pima.gov/fpm/hazard.htm>

Floodplain forests occur along streams and rivers. These forests range from relatively well drained (mesic), to poorly drained (wet), and are flooded for varying periods of time each year. The most common floodplain forest type is the wet-mesic floodplain forest. Characteristic trees are silver maple, elm, and ash, with no clearly dominant tree type. It is wet for a significant portion of the year, but the surface is, in fact, dry for much of the year. Flooding usually occurs in the spring, but can occur into the early summer months.

### **What conditions make it hard for trees to grow in floodplain forests?**

Floodplains are extremely challenging environments for plants. Trees and shrubs must be able to withstand being partially covered by water and water-deposited sand and other sediments. There is a high degree of seasonal disturbance within these ecosystems. The floodplain is shaped and reshaped by the meandering (shifting of stream course from side to side) of streams and rivers. During flooding events, soils are disturbed and/or washed away and new sediments are deposited. The kinds and amounts of sediments deposited depend on the size and duration of the flood.

Intense floods are capable of carrying large flotsam (debris) and ice, which can damage trees. Floods deposit larger-sized particles like sand and pebbles. Silts and clays are deposited in slower moving or still water. Usually there are alternating layers of sand, silt, and fine mud deposited during a flooding season, depending on the duration and course of flooding. Sand bar willow (*Salix interior*) is an example of a tree/shrub that is able to withstand being partially buried by sand and continue to grow.



<http://www.thecottagekey.com/Water%20Flow%20and%20Level.htm>

## **Soil moisture in floodplain forest**

Soil moisture fluctuates dramatically throughout the year. Soils that are waterlogged in the spring can be dry in the late summer. Portions of a floodplain closest to the stream or river can remain submerged during periods from one week to as long as two months.

Under these conditions, oxygen deficiency in the soil is the first and most significant problem faced by floodplain vegetation. Roots cannot work well in soil with low oxygen levels. Without any oxygen whatsoever, the tips of the roots, where mineral nutrients and water are absorbed, die within hours.

The symptoms of root damage resulting from lack of oxygen in the soil appear in the shoots and leaves. Shoots wilt, leaves curl and become yellow (chlorotic), and growth stops because normal physiological processes have been slowed down or halted. Damaging byproducts accumulate in the plants. Ethylene, for example, a chemical that is associated with aging in plants, accumulates in the shoots under such circumstances, and results in damages plant tissues.

Under waterlogged conditions iron and manganese occur in reduced forms (without oxygen) that can be absorbed by the roots. Iron and manganese are essential plant nutrients, but become toxic if they accumulate to high levels in plant tissues.

## **How do plants adapt to floodplain conditions?**

Floodplain plants have a variety of adaptive strategies to cope with the seasonal flooding.

- Some of the trees restrict roots to the upper layers of soil, which will be better aerated (contain more oxygen). Willow (*Salix* species), for example responds to rising water tables with a rapid growth of roots that spread out horizontally. They let the plant take up more oxygen. They also stabilize the plant in shifting or changing sediments and soils.
- Many of the woody plants in the floodplain have well-developed lenticels (small holes in the bark), in addition to stomata in leaves. Oxygen from the atmosphere can be transported to the roots through these lenticels. Both willow and green ash have some ability to transport oxygen through the lenticels and down to the roots.
- Some plants, such as alder (*Alnus* species), possess special metabolic pathways that prevent the combination of damaging effects that result from the lack of oxygen.
- Others, such as black gum (*Nyssa sylvatica*) and ash (*Fraxinus pennsylvanica*) develop oxidized root zones. Development of an oxygen-filled zone around the roots helps prevent the excess absorption of iron and manganese.

[http://www.museum.state.il.us/muslink/forest/htmls/pr\\_flood.html](http://www.museum.state.il.us/muslink/forest/htmls/pr_flood.html)

## **Activity suggestions before visiting the Nature Park**

- Study the unique characteristics of floodplain structure, plants and animals.
- Complete the activity at <http://weathereye.kgan.com/cadet/flood/index.html> to learn more about flood in general.
- Practice determining the age of a tree by counting rings
- Study monocots and dicots (see activity section)

## **Activity suggestions during your visit to the Nature Park**

- Find what you think to be the oldest tree in your forest. Estimate its age, and write down how you figured the tree to be this old.
- Make a list of wetland characteristics that are in the Sugar Creek Nature Park that you have studied.
- Discuss how changes in this type of forest are made by natural forces and/or by people. (fire, storms, insect attack, disease, logging practices or agricultural use, etc).

## **Activity suggestions after visiting the Nature Park**

- Predict what the floodplain might look like in one year, five years, and 20 years.
- Hold a debate using the following scenario found at <http://school.discoveryeducation.com/lessonplans/programs/flood/>

- Complete the floodplain activity found at <http://www.lpb.org/education/classroom/itv/envirotacklebox/teacherguide/module4/4fldlsn1.htm>. You will need to borrow the stream table from Station 12 if you do not have one already.

### **Resources in the travelling trunk**

- 4 sets of funnels
- 2 boxes of filter paper
- 100 foot tape measuring tape
- 5 sets of tree ring identification kits

### **On-line References**

Land Use Planning Information, Floodplain Forests, <http://www.hillsdalecounty.info/planningeduc0086.asp>

Interactive panorama of floodplain, [http://www.museum.state.il.us/muslink/forest/htmls/pr\\_flood\\_pano.html](http://www.museum.state.il.us/muslink/forest/htmls/pr_flood_pano.html)

Floodplain forest treelist, [http://www.museum.state.il.us/muslink/forest/htmls/pr\\_flood\\_tr.html](http://www.museum.state.il.us/muslink/forest/htmls/pr_flood_tr.html)

Key to Wetland Communities of Indiana, <http://www.taylor.edu/dotAsset/85630.pdf>

# Monocots and Dicots

## **MATERIALS:**

- corn and bean seeds (soaked in water 1 day before)
- iodine
- peanuts
- knife (not sharp) to cut seeds
- worksheet

## **BACKGROUND:**

Angiosperms or flowering plants are the best known group of plants. The term means that the seeds are covered up by a covering. Angiosperms are the most complex type of plant. Flowering plants can be found in a wide range of habitats including both salt and fresh water. The basic food supply of the world comes from the seeds and fruits of angiosperms (rice, wheat, corn) and fibers, wood, and medicinal drugs. value.

There are two types of angiosperms; monocotyledon (monocots) and dicotyledon (dicots) plants. There are thought to be about 165,000 different types of dicots and 55,000 types of monocots.

- Monocots have only one cotyledon, dicots have two cotyledons. A cotyledon contains stored food and serves as a food reservoir.
- Monocots have long, narrow leaves with parallel veins (such as grasses.)
- The parts of monocot flowers are arranged in threes or in multiples of three.
- Dicots have broad leaves with branched veins.
- The parts of dicot flowers are arranged in fours and fives or multiples of fours and fives.
- Although the distinction between monocots and dicots is not always as sharp and clear as once thought, it is a useful taxonomic grouping.

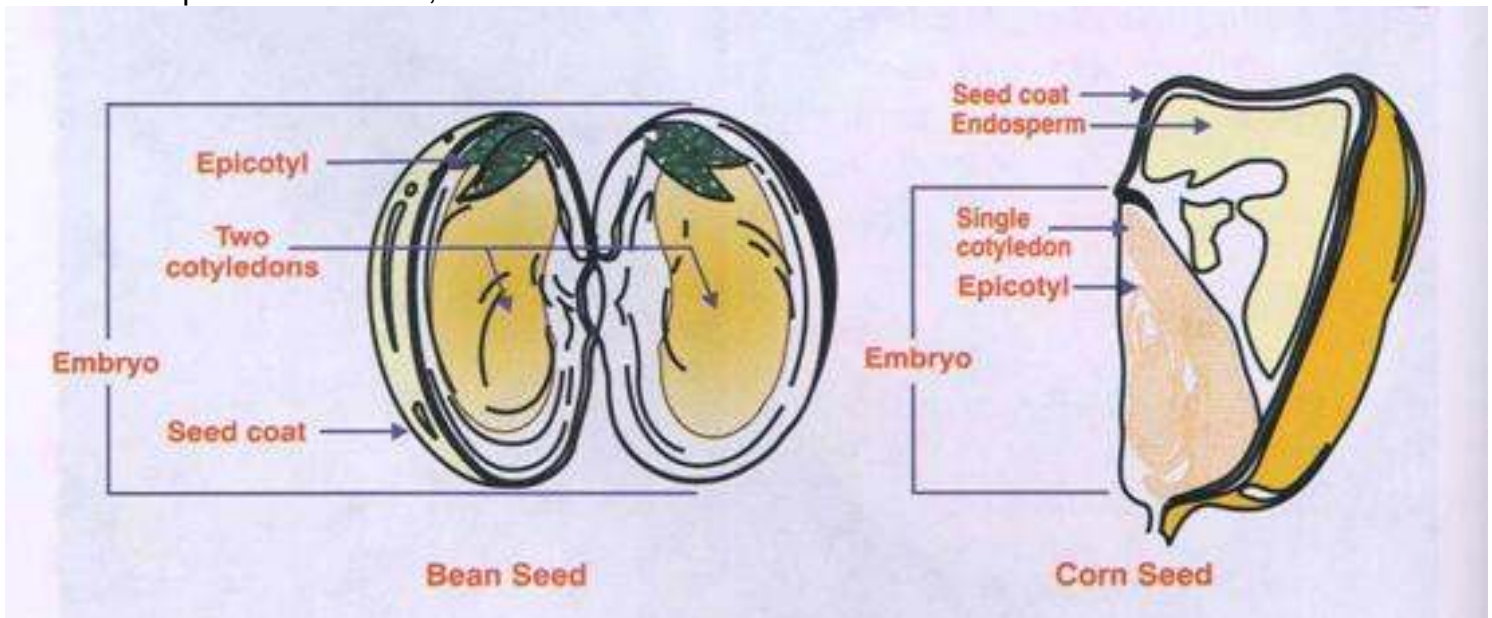
## **PROCEDURE:**

### Terms to know

An endosperm is the nutritive tissue in the developing seeds of angiosperms.

A cotyledon is the seed or first leaf of angiosperms and gymnosperms.

A bean and a peanut are dicots; corn is a monocot.



**MATERIALS:**

- 24 hour soaked corn and bean seeds
- Iodine solution
- 1 corn kernel
- hand lens or microscope

**PROCEDURE:**

**CORN SEED**

1. Examine the soaked corn seed that is cut in half.
2. Add iodine solution to one half of the seed.
3. Make a careful drawing of exactly what you see using a hand lens or a microscope. The part which turns blue-black is the endosperm, the light purple area is the cotyledon. Be sure to label your drawing.
4. Can you find the young leaves inside the seed?
5. How many are there?
6. Which part of the seed do you think is the seed coat?

**BEAN SEED**

1. Carefully remove the seed coat from the bean seed and examine what you find.
2. Separate the two halves of the bean seed with your fingers. Be careful you don't damage the sample.
3. Again, apply iodine solution to one half and make an accurate drawing.
4. Can you find the endosperm, young leaves (how many?) cotyledon? \_\_\_\_\_, and seed coat? \_\_\_\_\_.
5. Try to open another corn seed like you did the bean seed. Can you do it?

Put your drawings here

**Corn**

**Bean**

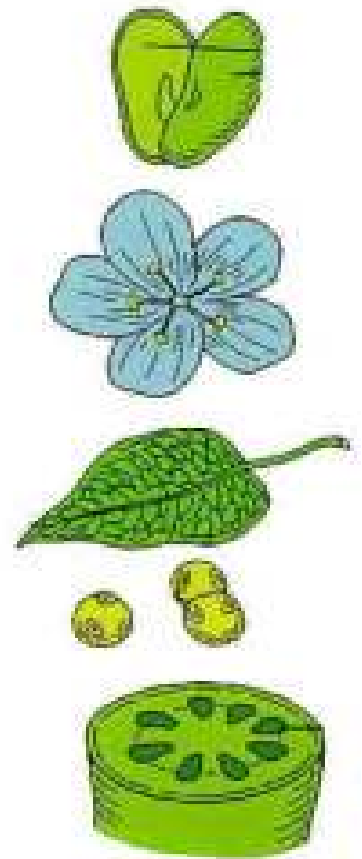
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## GUIDE KEY CHARACTERISTICS



Monocots

<b>MONO-COTYLEDONS</b>	<b>DI-COTYLEDONS</b>
1. One cotyledon or seed leaf.	1. Two cotyledons or seed leaves.
2. Generally marked parallel leaf venation.	2. Generally marked netted venation of leaves.
3. Flower parts typically in groups of 3 or multiples.	3. Flower parts typically in groups of four or five.



Dicots

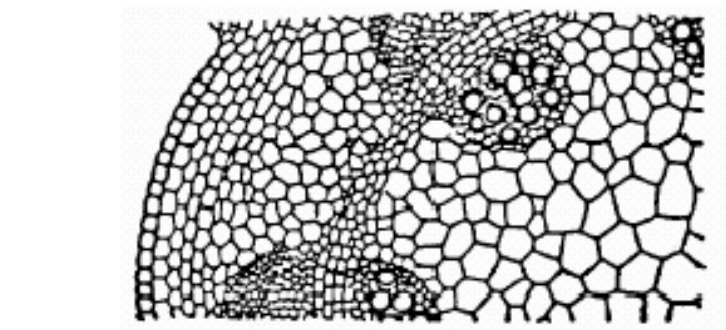
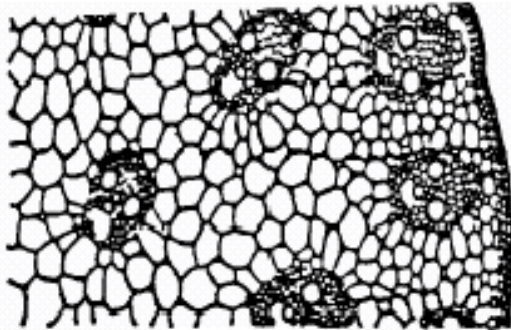


leaf of a monocot

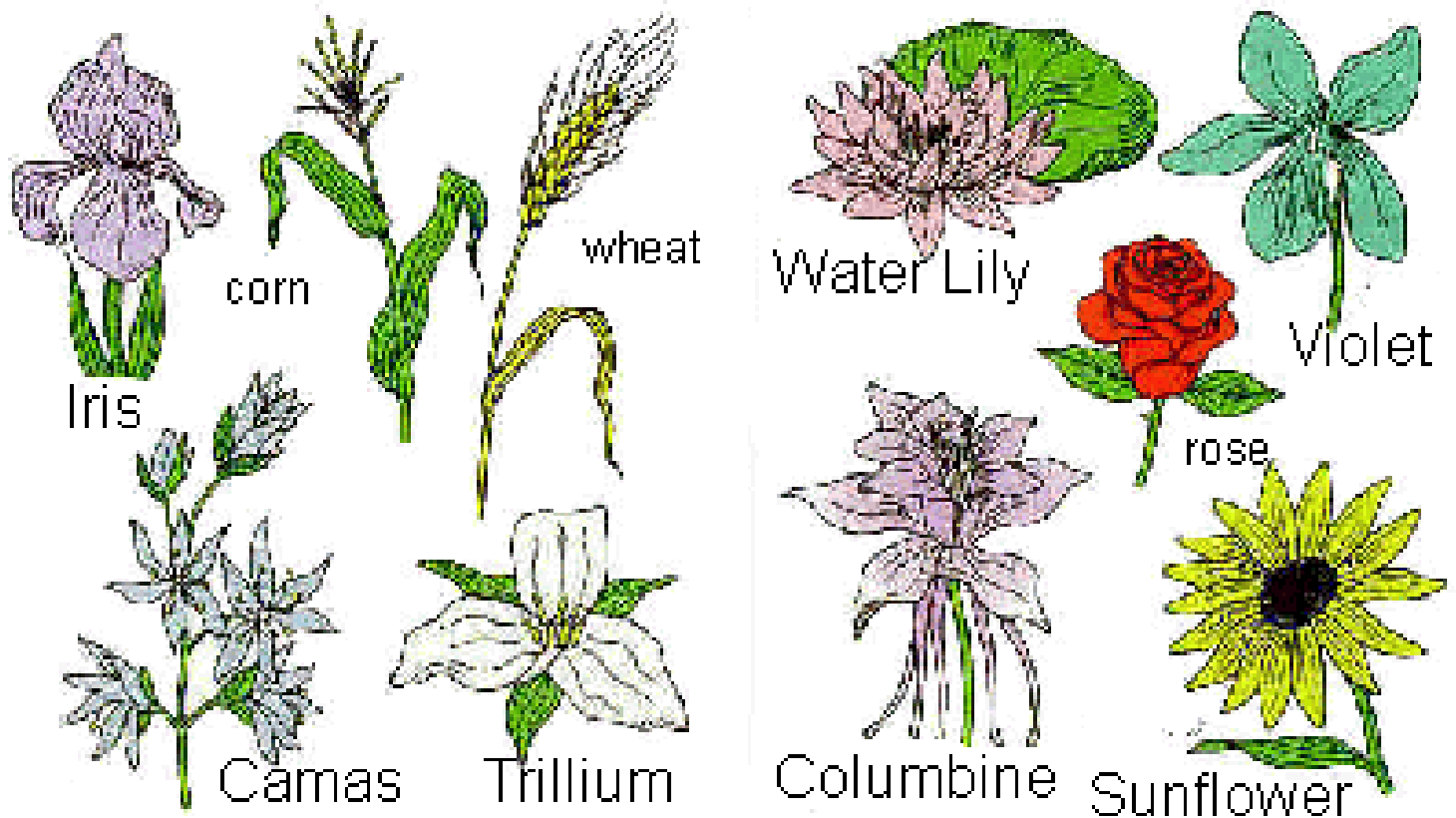


leaf of a dicot

cross section of monocot stem



cross section of dicot stem



Monocots on the left; dicots on the right

- The dicots have flower parts in multiples of four or five while monocots have flower parts in multiples of three.
- The dicots have leaves with a network of veins while monocots have leaves with parallel veins.
- The xylem and phloem in a dicot are arranged in a ring while they are randomly arranged in a monocot.
- The monocot seed has one seed leaf while the dicot has two seed leaves.
- For example a peanut is a dicot while rice and corn are monocots.
- The roots of dicots show secondary growth which the roots of the monocots do not.