2008 Envirothon to be held in Medina County

Envirothon is an annual competition held across North America. It tests high school teams' abilities and knowledge of natural resources. Each high school is eligible to field two teams for the Northeast Ohio Envirothon. The top five teams from northeast Ohio go on to compete in the State Envirothon in June. This year's Northeast Ohio Envirothon will be held in Medina County on April 30th. If you already have a Science Olympiad team, AP Biology or Environmental Science class, or a Science Club, consider signing up for Envirothon. Contact Beth Landers at 440-350-2730 or via e-mail at blanders@lakecountyohio.gov for more information, resource materials and a registration packet.

Forestry Camp

Each year, Lake SWCD sponsors one or more deserving high school students to the Ohio Forestry Association's Forestry Camp June 15-20, 2008. This week-long camp teaches the finer points of forestry including dendrology, silviculture, and tree-climbing. Any student who has completed 8th grade and is at least 15 years old can apply. Please contact Lake SWCD if you would like a scholarship application for one (or more!) of your students.

Tree Seedlings for Sale

Lake SWCD is currently taking orders for bare-root tree seedlings. There are numerous species and combination packets available. Orders will be taken through February 25th or until supplies run out, and trees can be picked up April 18th or 19th. If you are looking to create or add to a land lab, or create a wildlife planting, check out the order form at www.lakecountyohio.org/soil/treesale.htm. Proceeds from the Annual Tree Seedling Sale supports our Education and Land Conservation programs at Lake SWCD.

Your Lake SWCD Contact:

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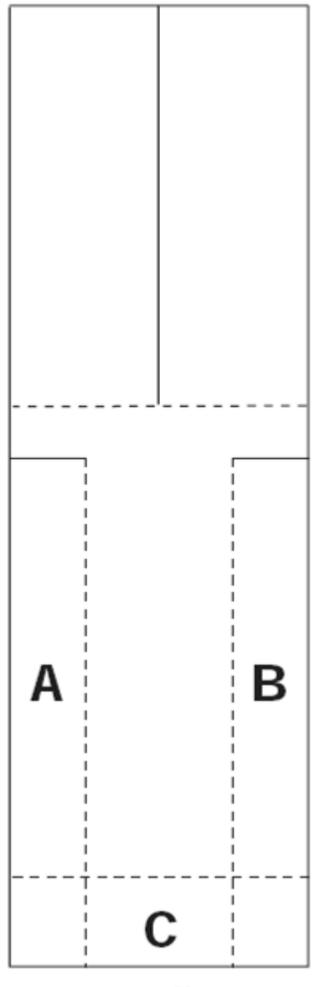
Pattern for activity on Page 2

Instructions:

1. Cut on solid lines.
2. Fold tabs A and B back.
3. Fold up tab C and hold it in place with a paper clip.
4. Fold one upper flap towards the front and the other towards the back.
5. Drop the helicopter from a ladder, stairwell, or playground climber.

Students can experiment with the design by adding more weight, changing the size of the upper flaps, or the length of the body.



Muddy Hands

Soil and Water Information for Educators Brought to You by the Lake County Soil and Water Conservation District

Winter 2008

Plant Migration - Ecology of Hitchhiking

As most of the classes that participate in Watershed Watch can attest to, this fall brought a bumper crop of cocklebur to our stream banks. What evidence did they see? Cockleburs stuck to their shirts, their pants, and the nets. But how does a rooted plant suddenly spread throughout a river system? For that matter, why aren't there 800 little oak trees under each giant oak in a forest? The answer is seed dispersal. Plants have developed ways of spreading their seeds into new ecosystems. The successful seeds start a new colony and the cycle repeats itself.

There are five main ways that plant seeds get a ride: bribery of animals, clinging to animals, wind currents, water currents, and self-propulsion. Bribery works by making the seed valuable to animals. A walk through the produce section tells you which plants have convinced humans they have value. Other wilder examples include acorns being cached by squirrels, and mistletoe seeds traveling in the digestive systems of birds. Besides cocklebur, many other plants grab onto animal fur, skin, or human clothing. Bedstraw, beggars tick, burdock and bur sedge aren't uncommon on socks, pant legs, and pets in Ohio.

Plants that haven't convinced animals to do their work for them rely on wind pressure, water currents, and sometimes vascular pressure within the plant. Wind-borne seeds are very obvious – and fun to experiment with. Maple helicopters, ash helicopters, cattails, dandelion fluff, and milkweed fluff are all examples of seeds that are designed to be carried by wind. An economically important example is cotton fiber. Water-borne seeds are less obvious, but picturing a tropical island will give you a clue as to one group of plants that takes advantage of ocean currents – the coconut palm. Many of our local grasses and aster-family wildflowers have seeds that will tolerate a trip downriver. A few notable plants have methods of flinging their seeds quite a distance from the parent plant. Jewelweed, or Touch-me-not is an easy-to-find cousin of our garden impatients. By mid-summer, the orange flowers are giving way to seed capsules. One gentle touch of a ripe seed capsule and it will explode, shooting out tiny, black seeds in all directions.

Some plants spread by means of 'vegetative propagation' or simply pieces of plant that can establish elsewhere. Bedstraw is a common outdoor example, but many of our houseplants exhibit this quality, including spider plants and philodendrons.

In the case of the cocklebur we kept encountering, there are two main methods of seed dispersal. This member of the aster family (sunflowers, coneflowers, and dandelions) has evolved a method of spreading its seeds far away from the parent plant by hooking them on to people or animals walking past. Ideally for the plant, the animal doesn't notice the cocklebur for a while and carries it to a fresh patch of soil in a new habitat. The other seed adaptation that cockleburs demonstrate is the ability to float for up to 30 days and still germinate. This, combined with the cocklebur's preference for recently disturbed soil, is probably the reason we saw so many along riverbanks in the year after a large flood.

Inside this Issue:

Spreading seeds: How plants hitch rides

A tree may grow a thousand feet tall, but its leaves will return to its roots.

-Chinese Proverb

Experimenting with Seed Dispersal

Everyone has heard the story of the Swiss engineer who examined the burdock that stuck to him and his dog and was inspired to invent Velcro (if not, http://en.wikipedia.org/wiki/George_de_Mestral contains a brief synopsis). Try a few of these ideas to demonstrate different methods plants have of spreading their seed into new habitats.

- Use Velcro-covered balls to mimic bedstraw or cockleburs. See how well they stick to different materials
- Make paper helicopters (see diagram on Page 4) to demonstrate how a fall can allow a seed to move farther. Have competitions for longest fall or farthest fall. The design is easily altered. (maple trees)
- Attach a seed to candy to demonstrated how fruits are attractive to animals and bribe the animal into moving the seed (apples, raspberries, blueberries)
- Use parachute soldier toys to demonstrate how dandelion, milkweed, and thistle 'fluff' help to spread seeds. This 'fluff' is also where we get cotton fiber for our clothing.

Experimenting with Vegetative Propagation

Quite a few plants are capable of reproducing without the use of seeds or fruit. In the Rocky Mountain region, aspen trees are commonly found in dense stands. These trees are genetically identical and share a root system, though to all appearances above ground they are separate trees. Gardeners are also familiar with this idea from chasing crab grass runners as they are weeding. It is probably not a coincidence that many houseplants are easy to start from leaves, stems, or other parts of the plant. Scour you school, home, or the garden section of your local store for some plants to clone. This is a great way to demonstrate asexual reproduction, and to involve your students in the care of a living organism. You will need potting mix (garden soil will not work as well), sharp scissors or a knife, small containers to root the plants in, and possibly rooting hormone.

Plantlets - Spider plants, Mother-of-millions (kalanchoe) - Both of these plants grow from plantlets. Spider plants have dangling stems, and a mature (or pot-bound) mother-of-millions will develop plantlets along the leaf edges. In both cases, the plantlets have aerial roots, and it is just a matter of putting them in contact with potting mix for a few weeks, then separating them from the parent plant. Spider plants can also be rooted in water, though sometimes they don't make the transition to soil afterwards.

Rooting sites on stems - Philodendron, Goldfish Plant, Dumb-cane, English Ivy - These plants have the ability to sprout roots along a stem, usually at a leaf node. Decide where you would like to establish the new plant, and remove the leaf from the node. Bury the stem in potting mix and separate from the main plant when roots are established. It sometimes helps to pin the stem down with hair pins, or even pebbles.

Stem Cuttings - Dumb-cane, Mother-in-law-tongue (Sansevieria), Wandering Jew - These plants do better with the use of rooting hormone. Take a cutting of the parent plant, dip it in water, then in the powdered rooting hormone and plant in potting mix. This method of propagation takes a little more patience, since the plant has to create a new root system and a new growing end. Once a sturdy shoot comes up from the soil, the original cutting can be trimmed away. Dumb Cane cuttings can also be rooted in water, but may not transfer to soil well.

Underground runners - Parlor Palm, Peace Lily, Peacock Tail - Simplest to propogate, as they do the work for you. Take a bound pot of any of these, knock the soil loose, and pull or cut the roots apart. Each crown of leaves can be planted separately.

With older students, they can set up experimental designs, and also research some of the more technical methods of propogation, such as air-layering and leaf-rooting. There are many useful web sites with instructions.

Invasive plants and seed dispersal

It is no accident that many invasive plant species produce huge numbers of durable seeds. This was necessary in their native environment to overcome predation and competition. But as our world becomes more connected, it becomes easier for these seeds to escape their ecosystem. Without completing plants and without animals taking a percentage of the seed, the new arrival can spread quickly, changing the native ecology.

Deer commonly eat seeds as they are foraging. These seeds get deposited in a pile of fertilizer up to 10 kilometers from their parent plant several days later. A common method of establishing a non-native species in Lake County's woodlands is an unintentional partnership of gardeners and deer. As anyone with hostas can tell you, deer love our gardens and flowerbeds. In the suburban ecology deer use both forested spaces and lawns for foraging. They typically sleep in the safety of a forest and move into neighborhoods at dusk to eat. This creates a pathway for seeds to be carried into the woods in a deer's digestive tract. Once the plant is established in a forest, other deer and herbivores carry it even further. The plants that are most adapted to this method of seed dispersal are the ones with seeds close to the foliage that deer like.

While there are very few places where a deer can cross from one ecosystem into another in that distance, a human backpacker can pick up seeds on their clothes in Arizona, pack up their gear, catch a plane and be back in Ohio a few hours later. If they shake the gear out in the yard, they may have just planted a new species. These new species may or may not become established.

Humans also deliberately disperse seed. Early settlers to Ohio brought their favorite plants with them. Whether it was something useful like teasel, edible or medicinal as are dandelions, or merely a pretty remembrance of their home such as purple loosestrife, the seeds were carefully tucked away to be sown in North America. All of these examples are now common weeds - their seeds have been carried by animals and wind into many corners of our landscape.

Long-distance seed dispersal is usually a result of human activity. Short-range establishment can often be attributed to animals or the ecology of the plant itself.

A Concept For Older Students: Reid's Paradox

There are oak trees in Great Britain. This fact, on the surface, seems mundane, but it is the basis for Reid's Paradox of Plant Migration. The paradox is that the observed distance of seed dispersal does not match the theoretical rate of seed dispersal. In other words, the rate at which oak trees were predicted to spread after the retreat of the glaciers would have prevented them from colonizing Great Britain because of the formation of the English Channel. This was first described by Clement Reid in 1899, and ecologists have been puzzling over it since. If we can understand how plant communities responded to the ice age, we can better understand how they work now.

Reid's Paradox has taken on a new meaning recently, as a way to understand and predict the effects of habitat fragmentation and increased global temperature. How will pitcher plants spread between two wetland areas if a highway cuts between them? What tree species will spread across the Great Lakes if predicted temperature increases drive their ranges north? What will colonize mountain slopes and islands in northern Canada if they are no longer bound in ice?

Paleobotanists have a good idea of what plant species were dominant where and when. They analyze pollen deposition to map the northern spread of species after the ice age. Botanists also can calculate the average seed dispersal distance of a species with field tests. It is the difference between these two sets of data that we cannot explain with current seed dispersal models. One possible solution to Reid's Paradox may lie in unusual long-range dispersal events. While over 95% of acorns end up right under the parent tree, one or two might end up in the crop of a bird or the intestine of a migratory herbivore. This would have to happen every generation for oaks to get to Great Britain before the Romans did.

For more information on Reid's Paradox, check out http://cwt33.ecology.uga.edu/publications/2119.pdf