16. Who Grows Where?

Bosque Plants

Description: Students explore plants and the role plants play in the bosque ecosystem using the Changing River model and see how human-caused changes to the bosque impact the ability of plants to survive and thrive over time.

Objectives: Students will:

- explain structure and function/adaptations of plants surviving in the bosque;
- compare conditions for survival of plants in the past, present and optimal future of the bosque;
- analyze the impacts of human-caused changes to the bosque on native plants; and
- describe the effects of introduced/exotic plants on native plants.

Materials:

- Scissors to cut the pieces
- Envelopes or plastic sandwich bags to hold the pieces and information cards
- Who Grows Where? plant pictures and description cards
- "Changing River" activity materials for Rio Bravo, Rio Manso and Rio Nuevo

Phenomena: Many kinds of plants live in the bosque including huge cottonwoods, cattails, grasses and wildflowers. Non-native species of plants are also found in the bosque.

Lesson Questions:

- *What features of plants help them survive in the bosque?*
- *How have exotic plants affected native species?*

16. Who Grows Where?

Grades: 7–12 [appropriate for some 3-5]

Time: Material preparation: 15–20 minutes. Activity: one 40-minute class period

Subjects: science

Terms: *alkaline, alkaloids, awn, basal, catkins, floret, genus, germinate, panicle, petals, phreatophyte, pollinate, rhizome, riparian, sepals, species, spikelet, spores, stamens, stomates/stomata*

Some common words with special plant meanings: *alternate, annual, compound, diameter, opposite, perennial, simple, teeth* (on leaf edges), *trunk*

New Mexico STEM Ready! / Next Generation Science Standards

NGSS DCIs and New Mexico State Performance Expectations

3.LS2.C Ecosystem Dynamics, Functioning & Resilience
3.LS4.C Adaptation
3.LS4.D Biodiversity & Humans
4.LS1.A Structure & Function
5.LS2.A Interdependent Relationships in Ecosystems*
5.ESS3.C Human Impacts on Earth Systems
MS.LS1.B Growth, and Development of Organisms
MS.LS2.A Interdependent Relationships in Ecosystems
MS.LS2.C Ecosystem Dynamics, Functioning & Resilience
MS.LS4.D Biodiversity & Humans
MS.ESS3.C (MS-ESS3-3 NM) Human Impacts on Earth Systems

NGSS CCCs

Patterns; Cause and Effect: Mechanism & Explanation; Systems & System Models*; Energy & Matter: Flows, Cycles & Conservation; Structure & Function; Stability & Change

NGSS SEPs

Asking Questions & Defining Problems; Developing & Using Models; Constructing Explanations & Designing Solutions; Engaging in Argument from Evidence; Obtaining, Evaluating & Communicating Information*

(* indicates extension activity)

Procedure:

- Prior to the activity, cut out the plant pictures and information cards for each plant. (There is only one description card for each plant, targeted for upper elementary and middle school students.) We recommend copying the Rio Bravo plants and descriptions on a different color paper than the Rio Manso plants. Keep the original as your key to match the sets; you may want to code the pictures and descriptions. (A list is included below.) It is best if the name of the plant appears only on the picture and not the description.
- Revisit the KWL charts, to consider what students already **Know** about the plants that live along the river and floodplain (see Appendix K).

  Ask students:

  What plants live along the river or in the bosque?
  How are these plants especially suited to live in this environment?
  What about the structure of a plant or its particular features allows it to survive there?

  (Asking Questions & Defining Problems)

- Vocabulary: A list of common terms is provided (see "Common Botanical Terms" in the activity "A Rose by Any Other Name" in Chapter 3). You might want to familiarize the students with the vocabulary, go over the parts of a plant and introduce some botanical terms. Or, you may prefer to wait and give opportunities to learn vocabulary as needed during the activity.

Section A: Rio Bravo

- Prior to the activity, set up the river as Rio Bravo (see activity 13, "Changing River").

Then follow Option A or Option B, below:

Option A

Plant Match: Pull one pair of cards for every pair of students in the class. (20 students = 10 plants with both illustration and description cards for each plant) Each student gets either a picture or a description of one Rio Bravo plant. Give students with descriptions a few moments to read about their plants. Taking turns, have each student summarize the description of their plant. Challenge the students to find their "partner." Class members should guess which plant is being described. The student who has the corresponding drawing should place the plant on the model in the habitat that was described. Continue around the room until all of the plants are described and plant drawings are placed on the model.

Option B

If you have less class time, hand out the plants with their matching descriptions cards to the students. Each student should have at least one plant of his or her own. Have the student carefully read the description and decide where that plant grows. *What is its habitat?* Students should then place the plant on the bosque model in a location where it would grow best. (Place them on the Rio Bravo bosque before placing the ditches, levees and homes). *Have each student describe his or her plant and where it grows to the entire group.* Do another round with other plant cards, if appropriate.

Rio Bravo Discussion Questions

Think about how plants grow, get nutrients and water, survive herbivores or competitors, reproduce and endure seasonal changes.

What helps each plant survive? What features/structures does each plant have that allow it to live along the river or in the bosque?

(3.LS4.C; 4.LS1.A; MS.LS1.B; MS.LS2.A; Cause & Effect; Structure & Function)

Look for patterns of where plants are found along the river and floodplain.

Look for features that plants have that allow them to survive in their habitat and that might be shared by different species (i.e., something that helps them survive spring flood waters, etc.?) **(Patterns)**

Plants provide perfect examples of how shape and function help an organism to survive.

How are different species similar or different in the way they are shaped and how they function?

Are any particular plant structures more suited to life along the river or in the bosque compared with drier habitats? **(Structure & Function)**

Think about annual and seasonal changes to the river through the spring runoff and the associated flood pulse.

Which plants need high spring water flow?

Which plants will "move" into newly changed/disturbed areas? Make an argument for how plants might move! Discuss in small groups.

Which plants will no longer grow in the flooded areas, or in areas that have been flooded? **(3.LS2.C; MS.LS2.A; MS.LS2.C; Stability & Change; Constructing Explanations & Designing Solutions; Engaging in Argument from Evidence)**

- Do activity 18, "Bosque Chaos," on the model.

  How do the "Bosque Chaos" changes affect the plant species that live there?

  List ways species continue to thrive in these changing conditions throughout the year. **(3.LS2.C)**

Section B: Rio Manso

- Add the human alterations to the bosque model: irrigation ditches, levees, jetty jacks, etc. (Rio Manso).
- Place the introduced species on the model, using the method from Option A or Option B above.
- Have students describe any changes to the habitat and how they think these changes will affect the plant they originally placed on Rio Bravo.

  Which plants are thriving because of the changes and which have lost habitat? **(3.LS2.C)**

- Have the class review the "Introduced and Non-native Species, Introduced Plants" section in the "Who Lives Where?" activity.

Rio Manso Discussion Questions

Think about how human-caused changes affect the availability of resources. For example, alterations to the river channel and amount of water (overbank flooding, groundwater) have affected bosque habitats.

Make a chart showing which plants are surviving well, which no longer grow in this area, which "move" in, and which may be endangered following these human-caused changes. **(3.LS2.C; MS.LS2.C; Patterns; Cause & Effect; Structure & Function; Stability & Change)**

Think about introduced/exotic species. For example, cottonwoods produce seeds during a short period of time coinciding with the spring flood pulse, while saltcedars produce seeds throughout the summer.

Do some of the non-native plants affect how well species of native plants survive in the bosque? If so, how?

What adaptations do these introduced plants have to allow them to thrive and out-compete some native plant species? For example, compare saltcedar and cottonwood.

What happens if some of these native species are no longer here in the future? **(3.LS4.C; 5.LS2.A; MS.LS2.A)**

Do human activities affect native plants? If so, how?

What can our local community do to help protect native species? **(3.LS4.D; MS.LS4.D)**

Look at the KWL charts the students created at the beginning.

*What have they **Learned?** What additional questions do they have now?*

Section C: Rio Nuevo

- Post this question for your class KWL charts.

  Given that we have introduced species (saltcedar, cheatgrass, etc.), what choices can we make to minimize their effect and to maximize the success of native species?

  First individually think of ideas, then discuss in pairs or small groups, then share with the full class.

- *What ideas do students have that will make habitats more suitable for native plants?*

  (Rio Nuevo Habitat Restoration Project Cards from "Changing River" can be used to stimulate discussion.) Adjust the model pieces to reflect suggested changes (e.g., add in sandbars, add wetlands, remove exotic species, etc.).

  Develop a justification for the move.
  How do these restoration projects change the available habitat? Are there any potential negative consequences to these suggested changes?
  Are native plants helped by these changes? How so or why not?
  Which plants are helped, and in what way are they helped?
  (5.ESS3.C; MS.ESS3.C; Cause & Effect: Mechanism & Explanation; Constructing Explanations & Designing Solutions; Engaging in Argument from Evidence)

Assessments:

- Revisit the KWL charts. *What have they **Learned**? What else do students **Want** to know?* **(Asking Questions & Defining Problems)**
- Work in small groups. Model this bosque ecosystem as you understand it. Now take your model, and choose a plant to reduce (endangered) or add (non-native) to your bosque ecosystem. Based on changing that one component, model what happens to other parts of the ecosystem. Make a list of restoration projects that would help native biodiversity in your ecosystem. Make a poster showing your resulting ideas. Have the class do a gallery walk of posters; each team should explain their main ideas to the class. **(Cause & Effect: Mechanism & Explanation; Systems & System Models; Asking Questions & Defining Problems; Developing & Using Models; Constructing Explanations & Designing Solutions)**

Extensions:

- Plants provide an excellent path to understanding both matter and energy in ecosystems. *How do plants get the energy and matter they need? How might energy or matter be transported into, out of or within an ecosystem (consider the activity of animals, decomposers, flooding, etc.)?* Use the animal cards from "Who Lives Where?" with these plant cards to do "The Web" activity in Chapter 5 of this *Guide*; or to further understand the cycle of matter and flow of energy use the "Who Grows Where?" and "Who Lives Where?" cards in the "Energy in Bosque Ecosystems" activity in this *Guide*. **(5.LS2.A; Energy & Matter; Systems & Systems Models; Developing & Using Models)**
- Oral history extension: send plant drawings home with students to ask elders about local names, uses of the plants, and stories about them. Have students report their findings back to class. **(Obtaining, Evaluating & Communicating Information)**

Who Grows Where? Rio Bravo

Common Name	Scientific Name
Rio Grande cottonwood	*Populus deltoides* subsp. *wislizeni*
New Mexico olive	*Forestiera pubescens*
Coyote willow	*Salix exigua*
One-seeded juniper	*Juniperus monosperma*
False indigo	*Amorpha fruticosa*
Western white clematis	*Clematis ligusticifolia*
Screwbean mesquite	*Prosopis pubescens*
Wolfberry	*Lycium pallidum*
Prickly pear	*Opuntia* spp.
Giant sacaton	*Sporobolus wrightii*
Sedge	*Carex* spp.
Saltgrass	*Distichlis spicata*
Smooth scouring rush or horsetails	*Equisetum laevigatum*
Yerba mansa	*Anemopsis californica*
Hooker's evening primrose	*Oenothera hookeri*
Broad-leaved cattail	*Typha latifolia*
Sacred datura	*Datura wrightii*
Sunflower	*Helianthus annuus*
Spectacle pod	*Dimorphocarpa wislizeni*
Who Grows Where? Rio Manso	
Saltcedar	*Tamarix chinensis*
Tree of heaven	*Ailanthus altissima*
White sweet clover	*Melilotus alba*
Russian olive	*Elaeagnus angustifolia*
Cheatgrass	*Bromus tectorum*
Kochia	*Kochia scoparia*

NGSS CONNECTIONS TO WHO GROWS WHERE? - DISCIPLINARY CORE IDEAS

3.LS2.C Ecosystem Dynamics, Functioning & Resilience *When the environment changes in ways that affect a place's physical characteristics, temperature, or availability of resources, some organisms survive and reproduce, others move to new locations, yet others move into the transformed environment, and some die.*

Rio Bravo: The river and bosque experienced annual and seasonal changes through the spring runoff and associated flood pulse.
Which plants need high spring water flow? Which plants will move into newly changed areas?
Which plants cannot survive where they were before the spring flood?

Do the "Bosque Chaos" activity on the model.
How do the changes affect the plant species that live there?
List ways species continue to thrive in these changing conditions throughout the year.

Rio Manso: Human-caused changes to the physical characteristics of the river and bosque, such as changes to the water table and channel shape, influence the availability of resources for plants, which in turn affects plant survival.
Which plants are thriving because of the changes and which have lost habitat?
Make a chart showing which plants are surviving well, which move in, and which can no longer live here following these human-caused changes.

3.LS4.C Adaptation *For any particular environment, some kinds of organisms survive well, some survive less well, and some cannot survive at all.*

The riparian ecosystem supports many more plants than the adjacent arid uplands, yet certain species are present only in one habitat or the other. Different plants are adapted to different environments.
What helps each plant survive in the bosque?

Think about introduced/exotic species. *Do any introduced plants affect how well other species of plants survive in the bosque? If so, which species. What effect do they have?*
What adaptations do these introduced plants have to allow them to thrive and outcompete some native plant species?

3.LS4.D Biodiversity and Humans *Populations live in a variety of habitats, and change in those habitats affects the organisms living there.*

Although floodplain ecosystems are very dynamic, with frequent changes to habitats occurring at a local scale, native organisms are less able to deal with the types of changes caused by humans. Prior to human changes, the diversity of species in New Mexican riparian habitats was very high. Changes in floodplain habitats have affected the types of plants living there.
What types of changes in floodplain habitats have affected the plants that live there?
How do these changes in floodplain habitats affect which plants are present in the floodplain?

4. LS1.A Structure and Function *Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction.*

Plants have a variety of structures that allow them to survive in given habitats. Think about plants in the bosque and along the river, and what structures help them to survive. Consider growing, getting nutrients and water, surviving herbivores or competitors, reproducing and enduring seasonal changes. During photosynthesis, plants open small structures called stomates to allow for gas exchange. Every time stomates open, they allow oxygen out and carbon dioxide in and at the same time, water vapor escapes the plant. There is a delicate balance for the plant to maximize photosynthesis while trying not to wilt from water loss. Plants have a variety of structures to reduce water loss.
What structures help each plant grow, survive and reproduce in the bosque or along the river?

5.LS2.A Interdependent Relationships in Ecosystems

The food of almost any kind of animal can be traced back to plants. Organisms are related in food webs in which some animals eat plants for food and other animals eat the animals that eat plants. Some organisms, such as fungi and bacteria, break down dead organisms (both plants or plant parts and animals) and therefore operate as "decomposers." Decomposition eventually restores (recycles) some materials back to the soil. Organisms can survive only in environments in which their particular needs are met. A healthy ecosystem is one in which multiple species of different types are each able to meet their needs in a relatively stable web of life. Newly introduced species can damage the balance of an ecosystem.

Think about this standard from the species perspective, and how the different species interact.
What does each plant need to survive? What consumes each plant?
How are the needs of each plant species met in a bosque ecosystem?
How are species affected by other species that are present?

Note that a decomposer card is in the "Energy in a Bosque Ecosystem" activity.
What is the role of decomposers in the food web?

Do the Rio Manso model and place the introduced/exotic species.
What effects do these new species have on native species?
What happens if some of these native species are no longer here in the future?

5.ESS3.C Human Impacts on Earth Systems *Human activities in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, ocean, air and even outer space. But individuals and communities are doing things to help protect Earth's resources and environments.*

Human activities have altered many habitats along the Rio Grande and its floodplain. Consider how the hydrological changes have affected habitats and how those changes affect the plants that live there.
What effects do human activities have on native plants?
What can our local community do to help protect native plant species?

Look at the Rio Nuevo model changes.
Which changes may help native plant species?
Which plants are helped, and in what way are they helped with Rio Nuevo changes?

MS.LS1.B Growth, and Development of Organisms

-Animals engage in characteristic behaviors that increase the odds of reproduction.

-Plants reproduce in a variety of ways, sometimes depending on animal behavior and specialized features for reproduction

Use *Who Grows Where?* cards along with additional outside research to address how specialized plant structures affect the probability of successful reproduction.

MS.LS2.A Interdependent Relationships in Ecosystems

-Organisms and populations of organisms, are dependent on their environmental interactions both with other living things and with nonliving factors.

-In any ecosystem, organisms and populations with similar requirements for food, water, oxygen or other resources may compete with each other for limited resources, access to which consequently constrains their growth and reproduction.

-Growth of organisms and population increases are limited by access to resources.

Pick one species of plant. *How are those plants dependent on interactions with other living plants/creatures? What do they need?* (Cottonwoods need shade to germinate.) *What eats them? What nonliving factors does that species depend on? (What water does it need? Is it possible for too much or too little? Temperature? Soil type?* Brainstorm ideas.*)* Consider cottonwoods. *How does flooding, a resource for them, affect the population of cottonwoods?* Look at a native and non-native riparian species like cottonwood and saltcedar. *In what way do they directly compete for resources? How do introduced species affect native species when they are competing for the same resources?*

MS.LS2.C Ecosystem Dynamics, Functioning & Resilience

--Ecosystems are dynamic in nature; their characteristics can vary over time. Disruptions to any physical or biological component of an ecosystem can lead to shifts in all its populations.

--Biodiversity describes the variety of species found in Earth's terrestrial and oceanic ecosystems. The completeness or integrity of an ecosystem's biodiversity is often used as a measure of its health.

Each year the flood pulse may make changes to the river channel and banks. *What plants are affected by changes in the river, sandbars, banks and floodplain? In what ways are those plants affected?* Make the Rio Manso changes to the model. *What native species are affected by these human-caused changes? How do introduced non-native species affect native plants in the bosque?*

MS.LS4.D Biodiversity & Humans *Changes in biodiversity can influence human's resources, such as food, energy, and medicines, as well as ecosystem services that humans rely on—for example, water purification and recycling.*

Although floodplain ecosystems are very dynamic, with frequent changes to habitats occurring at a local scale, native organisms are less able to deal with the types of changes caused by humans. Prior to human changes, the diversity of species in New Mexican riparian habitats was very high. Changes in floodplain habitats have affected the types of plants living there.

What types of changes in floodplain habitats have affected the plants that live there?

How do these changes in floodplain habitats affect which plants are present in the floodplain?

MS.ESS3.C Human Impacts on Earth Systems

-Human activities have significantly altered the biosphere, sometimes damaging or destroying natural habitats and causing the extinction of other species. But changes to Earth's environments can have different impacts (negative and positive) for different living things.

-Typically, as human populations and per-capita consumption of natural resources increase, so do the negative impacts on Earth unless the activities and technologies involved are engineered otherwise.

-The sustainability of human societies and the biodiversity that supports them requires responsible management of natural resources.

Humans have made many changes to the river valley and the river channel, and these human alterations have changed the dynamic nature of the Rio Grande floodplain and altered many aspects of natural habitats (changing from Rio Bravo to Rio Manso). In Rio Nuevo, students learn how humans are able to make new changes that help restore some of the natural floodplain ecosystems.

What changes did humans make along the Rio Grande to promote agriculture and allow settlement along the floodplain?

How did those human alterations affect the bosque, and how could they be modified to allow a more natural, dynamic system?

What are the effects on native species from these human activities?

How can we decrease the number of individuals of species that are threatened or endangered?

Land managers along the Rio Grande have made a definite shift in their priorities for how the river and floodplain are used, with a greater emphasis now on protecting natural biodiversity. Follow up any of the above activities by considering the following:

How do you think the biodiversity of the bosque affects you, your family, your community?

Is it important to protect the bosque? If so, why?

Design a conservation plan for the bosque that will protect native plants and animals while also contributing to the well-being of human communities living nearby.

Who Grows Where?

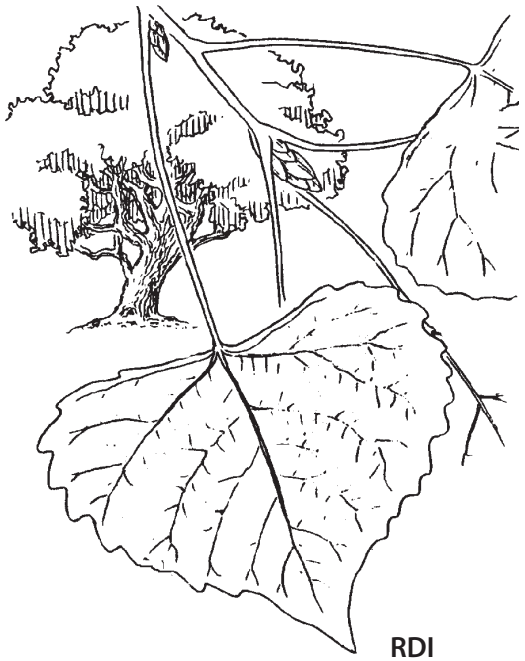
Drawings by Robert DeWitt Ivey (RDI) and George Mauro (GM)

Part 1: Rio Bravo

A majestic landmark species of the bosque, my trunk can reach 5 feet (1.5 meters) in diameter. My heart-shaped leaves have toothed edges. In autumn they turn yellow making the bosque appear as a river of gold. You can tell my sex in the spring. Male trees have red flowers that form conspicuous long clusters, or catkins, that produce pollen. The female flowers are hard to spot until they develop grape-like clusters of seed pods, or tetones (te-TOE-nes). Having evolved along the Rio Grande, I take advantage of high spring water runoff. In the late spring my seed capsules pop open and billions of minute cottony down-covered seeds are carried into the sky by wind. To grow they must land on moist, bare soil where they can receive a full day's sunlight. Once my seeds sprout, their roots must keep in contact with the moist soil as the water recedes and the water table drops.

Rio Grande Cottonwood

Populus deltoides subsp. *wislizeni*



I grow as an erect spreading shrub that can reach 10 feet or 3 meters tall. I have a smooth, whitish-green bark that makes me distinctive even in the winter when I have no leaves. My bright green oval-shaped leaves are arranged oppositely on my twigs. My species has separate male and female plants. My flowers bloom in the spring before my leaves emerge. Although my small flowers have no petals, the stamens give the flowers a yellowish cast. Females of my species make small blue-black olive-shaped fruits that are attractive to birds. I am native to the bosque and like both dry and moist soils. My roots can grow over 10 feet or 3 meters deep. My hard wood has been used by Native Americans for making digging and prayer sticks.

New Mexico Olive

Forestiera pubescens

RDI

Flood waters don't bother me because my limber branches can ride in the water without my roots being torn from the soil. I like to grow in thickets along the edge of the river or streams. I am one of the most common riparian shrubs in New Mexico. I can grow into a 15-foot (5-meter) tall tree, but mostly I appear as a small shrub. My male flowers grow in tight, dense clusters called catkins. My female catkins have loosely arranged flowers that produce seeds with hairy filaments that are easily distributed by the wind. My long, lance-shaped, minutely toothed leaves are silvery early in the summer because of fine hairs. As the hair wears off I look more dull grayish green. Wildlife such as elk and beaver like to eat my branches. Like other members of the Salicaceae family, I have bark from which tea can be brewed and used to relieve pain.

Coyote Willow

Salix exigua

RDI

I am one of the most common small trees in New Mexico. I like to live in dry rocky plains, hills and mountains where I often grow with pinyon pine. I look brushy since my many branches grow from an underground trunk. Tiny scale-like leaves cover my twigs. My sometimes frosty-looking fruit appears to be dark blue to copper berries, but they are really cones. Birds and mammals, especially bear, like to eat my cones. My leaves, twigs, "berries" and bark smell wonderfully pungent. Navajos have used my bark for clothes, blankets and shoes. I do not grow in areas that flood or have high water tables, so the foothills, not the bosque, are my more common home.

One-seed Juniper

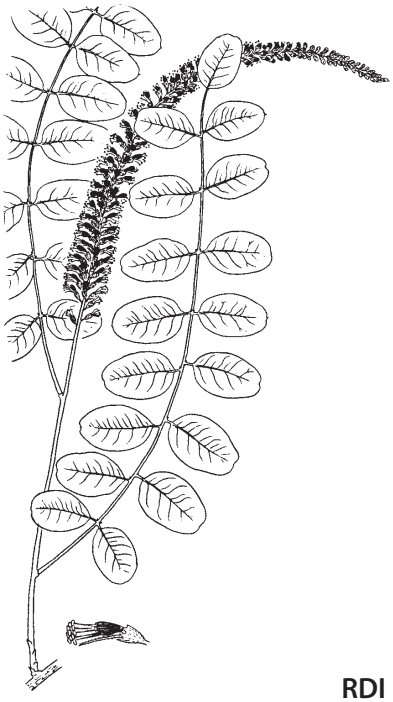
Juniperus monosperma

RDI

Look closely: my deep blue-violet flowers, from which I get my name, have only one petal. Stamens covered with bright yellow pollen extend beyond the petal. My flowers are grouped together in long, dense clusters at the end of my branches. I am a woody plant that usually grows about 6 feet (2 meters) tall. A member of the pea family, I have compound leaves with many opposite oval leaflets that are sometimes mistaken for locust leaves (I am not a locust!). I have a close relationship with bacteria that live in my roots. Together we add nitrogen, a vital nutrient, to the soil. I grow in moist, sandy soil near places where water is close to the surface. My many branches make nice places for bird nests.

False Indigo

Amorpha fruticosa



RDI

I am a vine that likes dry conditions. Also called old-man's beard, I have stems that grow along the ground or up into trees. My seeds form cotton-like masses of hairy fruits. I have no petals, but the sepals of my flower are creamy or purplish-brown in color and therefore look like petals. My leaves are opposite each other on a long slender vine and have three lobes, each with teeth or lobes of their own. As a perennial, I can be found in the same place year after year. I am a member of the buttercup family.

Western White Clematis

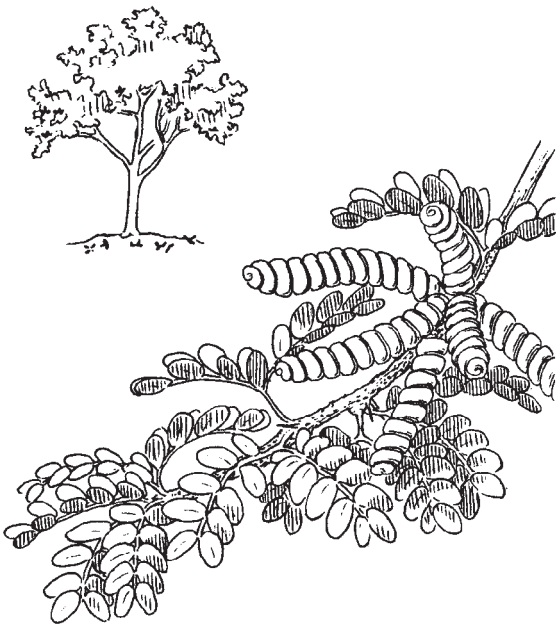
Clematis ligusticifolia

RDI

I am a spiny shrub or small tree with slender branches. My fruit look like screws. Each bean is coiled in a spiral with the same diameter. My compound leaves have four to eight pairs of small oval leaflets. My flowers are yellow to yellow-green or pale green in color with anthers ending in red glands. My fruit is sweet to taste and is eaten by humans, coyotes, and roadrunners. I have spines or thorns along my stems. My thorns are sometimes used by a bird called a loggerhead shrike as a place to store grasshoppers or lizards it plans to eat later. I grow well in the desert washes and dry streams that sometimes flow into the Rio Grande.

Screwbean mesquite

Prosopis pubescens



RDI

Red berries hang from my thorny stems during the summer and attract birds. I look like a mound of woody stems, with small narrow leaves in clusters on short spiky branches. In the winter I provide a little greenery. My early flowers are green lavender and shaped like tiny funnels and attract insects. Besides the berries, birds use me for cover and protected roosts at night. Native Americans used me for food: my slightly bitter, juicy berries were eaten raw or prepared as a sauce.

Wolfberry

Lycium pallidum

RDI

A common member of the cactus family, I like the sandy soils of the bosque. When undisturbed, I can grow into huge clumps. My stems are flattened pods, and what would be leaves on other plants are sharp prickly spines that grow in a pattern. My fruits are large and red to purple, juicy, and pear-shaped, containing many seeds. Wildlife and many people eat them. Animals like rodents and rabbits may eat my pads for their water needs. It is evident when coyotes eat me: their poop is the same red color and full of my seeds. That is how I spread from place to place. In the bosque I may have bright yellow flowers that all kinds of pollinators visit.

Prickly pear

Opuntia spp.

RDI

A native grass, I am adapted to living in dry soil but I also can be found near stream banks. I am a perennial and grow well in hard-packed alkaline soils. My panicle or seedheads are 8 - 24 inches (20 - 60 centimeters) long and the branchlets are densely flowered, producing many seeds for birds and small mammals. I grow in thick clumps and can reach heights of 6 feet (2 meters). My leaves are long, sword-shaped and tender to eat when young. As I grow older leaves are tough and less tasty. I provide cover for ground nesting birds and lizards.

Giant Sacaton

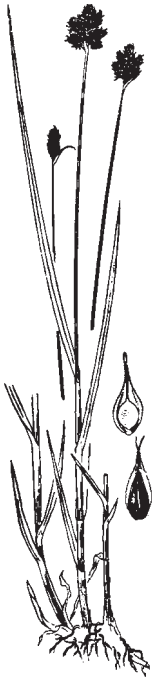
Sporobolus wrightii

RDI

I am a grass-like aquatic plant that grows along the banks of rivers and in marshes or shallow ponds. My stiffly edged stem is triangle shaped and has three long grass-like leaves. They sheath or wrap around the stem. I have seed clusters or nutlets that grow close to the stem. Ducks, Canada geese and muskrats will uproot me to eat. Dragonfly and mayfly nymphs crawl from the water up my stem and emerge in their adult form. Native leopard frogs hide from bullfrogs where I grow thickly. Many people use my name in the rhyme "____ have edges" to remember my triangular stem.

Sedge

Carex spp.

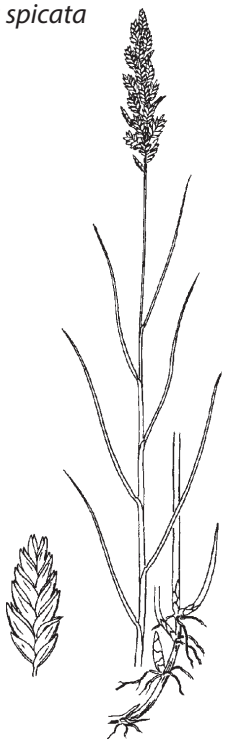


RDI

A native grass, I grow well in sandy alkaline (salty) soil of floodplains, swales or salt flats. I am a perennial and spread by vigorously growing underground stems called rhizomes (RYE-zomes). My long and slender leaves are opposite and sheath or wrap around the stem. The seed head appears condensed with many branches (spikelets) of tightly arranged flowers (florets) that each produce a seed or grain. Small mammals eat these seeds. I grow in clumps and prevent soil from eroding. I produce much plant material that decays and becomes part of the soil.

Saltgrass

Distichlis spicata

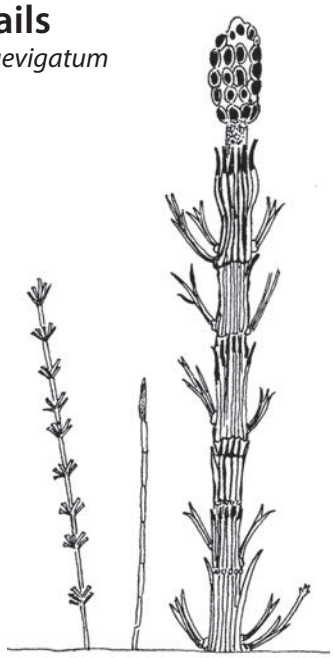


RDI

I am an unusual looking plant. I grow along banks, streams or rivers where my roots can reach the water. My stem is thick and contains tube-like conducting tissues around a hollow center. Solid joints connect my stem segments. Instead of seeds I produce spores from a cone. I have been around for 250 million years and once grew as large as a tree. One of my common names comes from the long striations of my stem and the cone-like tip. Another name comes from the high concentration of silica in my stem, which can be gathered and used to scrub pots.

Smooth Scouring Rush or Horsetails

Equisetum laevigatum



GM

I am known as one of the most used herbs of Spanish and Puebloan cultures. I grow in thick stands where the ground stays moist such as stream beds, low banks of a river or marshes. My broad basal leaves are 3 - 6 inches (7–15 centimeters) long, stand erect and are rounded at the tip. The thick leaves contain lots of moisture and often have a reddish-silvery edge. My flowers form a cone-shaped white spike with six white bracts about the base that look like petals. In the fall my stems, leaves and flowers turn brick red. My leaf stems will sprout roots to form colonies. I smell really strong and earthy. People use me for medicine for inflammation resulting from irritation, injury or infection.

Yerba Mansa

Anemopsis californica

RDI

I grow up to 4 feet (1.2 meters) tall with a stiff, erect, hairy stem. My large delicate yellow flowers open in the evening with four petals and eight large stamens. My leaves are long and lance-shaped with occasional teeth. Hawk moths, bats and bees pollinate me early in the morning. By the middle of the day my bloom has closed, wilted and turned an orange-red color. When my seed capsules mature, they pop open at the slightest touch to propel the seeds away from me. I grow best in moderately dry to moist soil in disturbed areas and open fields.

Hooker's Evening Primrose

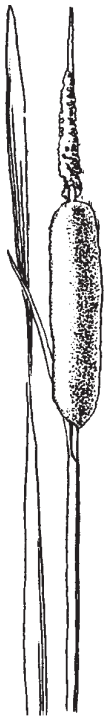
Oenothera hookeri

GM

My female flowers form a dense, dark brown sausage-like cluster on a tall stiff stem. The male flowers that grow above this cluster leave a bare stem when they fly away after producing pollen. My seed head fluffs out when my seeds are dispersing. My sword-like leaves are flat, strap-like and spongy and wrap around the stem as they grow. I grow in wet places like marshes and ponds all over the world except where it is really cold. My new shoots taste like cucumbers, my green flower heads can be roasted like corn on the cob. My rootstalks can be eaten raw, roasted over hot coals or dried and ground into meal. Muskrats, geese and elk also eat my roots. American Coots, Red-winged Blackbirds, waterfowl and shorebirds use my leaves as nesting cover.

Broad-leaved Cattail

Typha latifolia



RDI

All of my parts are poisonous, even to the touch. A chemical called atropine and alkaloids, which depress the nervous system, are contained in my system. My large beautiful white, trumpet-shaped flowers open at night to attract sphinx or hawk moths, bats, beetles and bees. During the day I am visited by hummingbirds attracted to my heavily scented flowers. By midday my flower fades to a cream color tinged with lavender, closes and becomes limp. I grow into a large spreading dark green plant up to 6 feet (2 meters) across. My leaves are a dusky green-gray, triangular in shape and strongly veined. When developed my seeds are in a spine-covered 1 - 2 inch (2.5 - 5 centimeters) ball called a capsule that smells musty. My roots are large top-shaped tubers. I grow in deep, well-drained loose soil in eroded arroyos and disturbed areas.

Sacred Datura

Datura wrightii

RDI

You might think I have big, showy flowers, but really those are hundreds of tiny flowers compressed into one flower-like head called a composite. Showy yellow to orange ray flowers surround the brown disk flowers that produce my seeds. My seeds are eaten by birds, squirrels, and even people. I am also used in making soap and paint. My heavy, stiff, hairy and rough stalk can grow up to 10 feet (3 meters) tall. My leaves are alternate and simple, rough and hairy, oval to heart shaped with toothed edges. Sometimes I have one very large flower head filled with nutritious seeds. Other times I produce many branches covered with flowers. Ladybugs, black ants, aphids and bees find food in my flowers and in turn are stalked by spiders and praying mantis. I provide erosion control by growing in places where soil is disturbed and grass is not competing for nutrients.

Sunflower

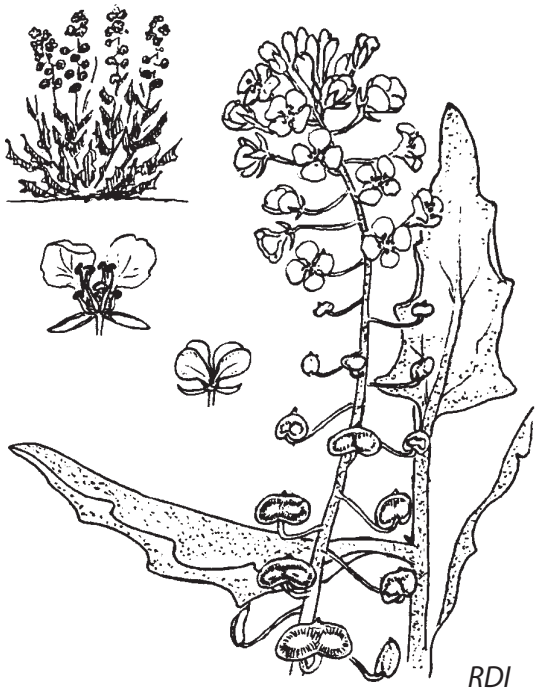
Helianthus annuus

RDI

My genus name means "two shields" in Greek. My fruit pod resembles a pair of round shields placed side by side. Others think this fruit looks like pair of old-fashioned eyeglasses. I am an erect annual herb with the characteristic four petals, four sepals and four anthers of the mustard family. I like open, sandy soil of disturbed areas. I grow 10–12 inches (25–30 centimeters) tall. As I grow I keep producing flowers at the top of my stem. Descending the stem one can observe various stages of ripening seeds; the first blooming flowers are the mature seeds at the bottom of the stem.

Spectacle pod

Dimorphocarpa wislizeni

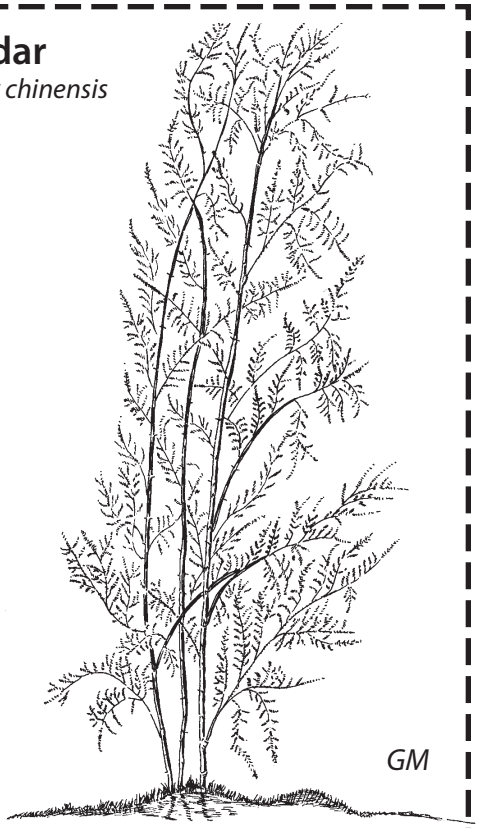


RDI

I have tiny green scale-like leaves and long narrow clusters of tiny pink blossoms. Birds and mammals use my branches for nesting and cover. Honeybees drink my nectar. I am known as a phreatophyte (free-AT-oh-fight) or a well plant because I have deep roots that drink a lot of water from the sandy soil. Where I grow, the soil is salty. Not only can I tolerate salt, but my leaf scales concentrate salt from soil and deposit the salt on the leaf surface. Each fall my leaves turn golden orange then fall to the ground. As my leaves decompose, the soil becomes saltier. My ancestors came from southern Europe or the Mediterranean region.

Saltcedar

Tamarix chinensis



GM

I come from China, but now I make my home in the Southwest, too. My huge compound leaves grow on stout twigs, and the oily glands on my leaves have a disagreeable odor. Clusters of my small yellow-green flowers bear fruits with dry creamy-pink wings. I am a survivor that can grow in very difficult conditions, such as near sea level or in very high mountains. I send up suckers from my roots, which form a thick grove of trees. My name comes from my height that reaches to the sky.

Tree of Heaven

Ailanthus altissima

RDI

Bees love the nectar from my tiny white flowers in the summer, and in the fall and winter goldfinches eat my seeds. Introduced from Europe, I have been planted in some places to stabilize soil, but I have spread along roadsides and other disturbed areas. As a member of the legume—or pea—family, my roots can enrich the soil by fixing nitrogen. I take two years to produce flowers and seeds and can reach 2 - 6 feet (0.06 – 2 meters) tall. In my first year, I am a tiny clump of leaves. My leaves have three leaflets with serrated—or jagged—edges. In my second year of growth I send up a stalk of tiny, white flowers that produce the nectar honey producers cherish. If cattle eat too much of me they can bloat.

White Sweet Clover

Melilotus alba

RDI

I am a native of Eurasia and was brought to New Mexico to prevent soil erosion, though I am also used in landscaping. Sandy soil suits me fine. In the bosque, I sometimes grow in thick clumps of small trees, and I often have sharp thorns. The top of my lance-shaped leaf is dark blue-green and covered with tiny, soft, star-shaped hairs. So many soft hairs cover the bottom leaf surface that it is silvery white. These hairs help keep moisture in my leaves in the hot sun. Bees collect nectar from my tubular, silvery-yellow, lovely-smelling flowers. My fleshy olive-like fruit is eaten by mice, rock squirrels, grosbeaks, towhees and robins who in turn help spread my seed. Because my fruit stays on my branches long after leaves have fallen, it provides food for wildlife in the winter.

Russian Olive

Elaeagnus angustifolia

RDI

My name refers to my ability to get a head start on other grasses by using winter and spring moisture to grow early in the season. While still young and tender, livestock graze my flat leaf blades, but when I mature I have nasty awns—bristle-like appendages—on my seeds. These awns stick in the animals' mouths if they eat me after I have gone to seed. The awns allow my seed to catch a ride in animal fur or people's socks to travel to a new home. When I reach maturity I dry out or "cure" and become a fire hazard. Because I like to grow in disturbed areas I can dominate an area after a fire. This creates a frequent fire cycle that favors my growth over the native grasses. I am relatively new to America but I now grow in much of the western U.S. I originally came from southern Europe and southwestern Asia.

Cheatgrass

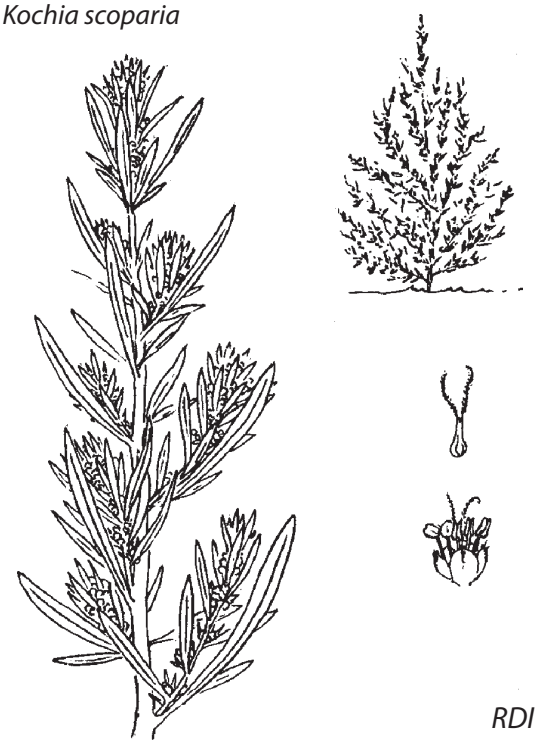
Bromus tectorum

RDI

In the same growing season I spring from a small, wedge-shaped seed to a large herb reaching as high as 6 feet (2 meters) tall. My stems have many round, slender and soft hairy branches. My alternate, lance-shaped leaves have edges fringed with hair and three or five prominent veins. My tiny green flowers are so small you may not notice their dense spikes, but when they bloom, they cause allergies in lots of people. I grow in cultivated fields, gardens and disturbed areas in the bosque where the soil has been disturbed. Birds and mice eat my dull brown seeds. Livestock will eat my leaves, but too many causes an upset stomach. An invasive species from Asia, I have spread all through the United States.

Kochia

Kochia scoparia



RDI