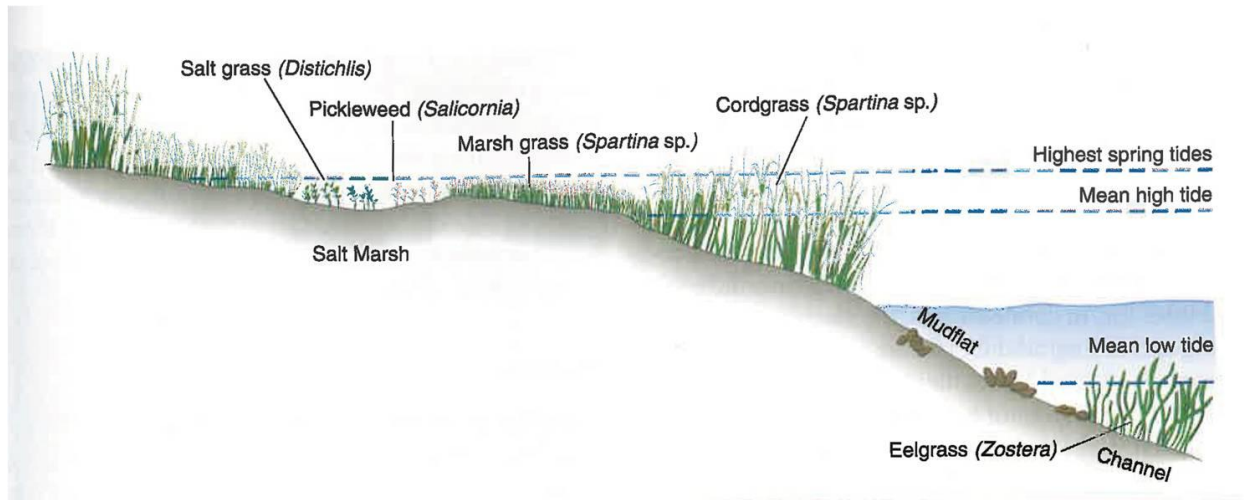


How Does Smooth Cordgrass Survive in a Salt Marsh?

Draft Version: Images will be updated.



Where and How *Spartina* Lives

Salt marshes are ecosystems in between land and sea. Salt marshes are full of nutrients that flow into them from freshwater streams from the land and the tide from the sea. They are extremely important because they act as nurseries for fish and invertebrates because of these nutrients. Because of the constant salinity changes from land and sea, plants and animals need to adapt to changing conditions. There are many different types of plants that live in different areas of the marsh based on where the tide flows to. This is called zonation.

As you can see in diagram above, there are plants that live in the low marsh, which is almost entirely underwater. There are also plants that live in the high marsh, which is almost entirely out of reach of the tides. One of the plants that lives in the low marsh is called Smooth

Cordgrass (*Spartina alterniflora*). It is a tall, smooth grass that can be as small as 6 inches tall, or as large as 7 feet tall. It grows tallest near the water, and shortest further away from the water. This plant is a perennial, which means it regrows every year without needing to be replanted. As well as growing in salt marshes, it grows in mud flats and sand flat habitats. It can grow on substrates that include sand, silt, gravel and clay. It prefers living in an area with low wave action.

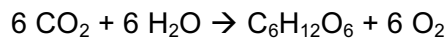
Smooth cordgrass is able to tolerate the constantly changing salinity due to specializations. Cordgrass utilizes its rhizomes, which is a form of asexual reproduction through its roots and allows the plant to colonize new places quickly. It also has the ability to expel the salt from the saltwater through its leaves so it is usable as freshwater. This allows the smooth cordgrass to be submerged for up to 12 hours at a time.

How Does *Spartina* Live and Grow?

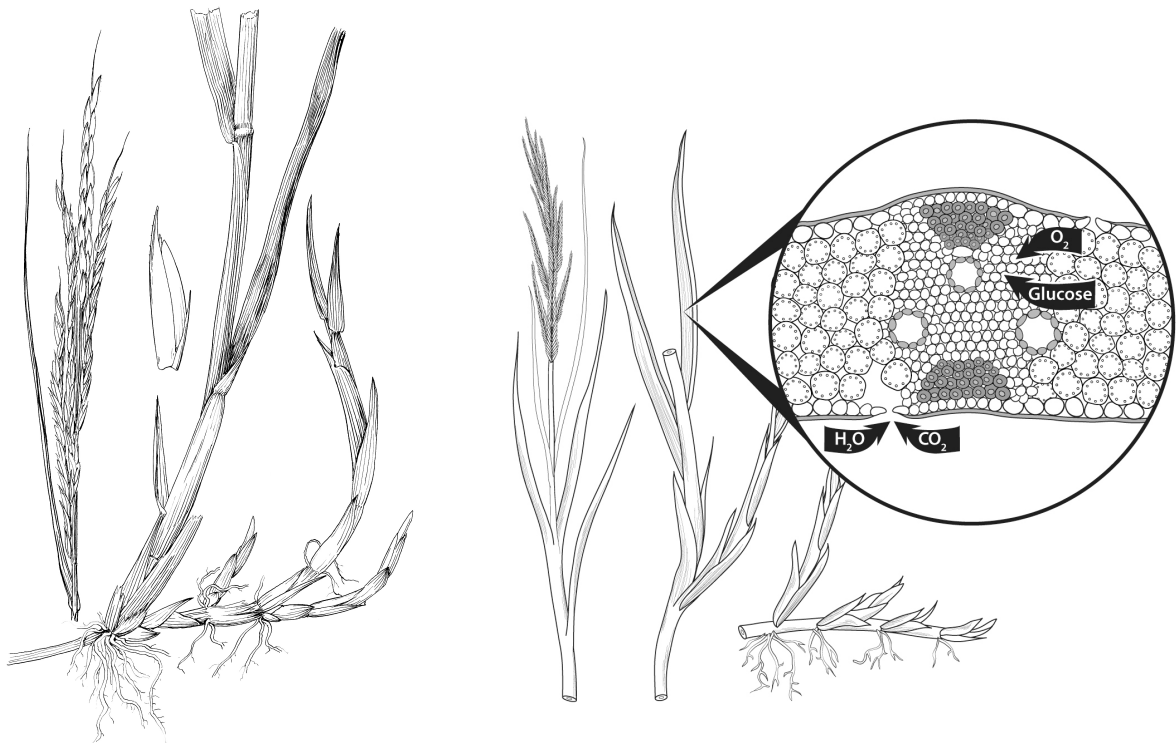
Like other plants *Spartina* makes its own food (glucose) through the process of photosynthesis, then all the cells in a *Spartina* plant use that food to live and grow. We can explain how *Spartina* does this in four steps.

Step 1: Cells in the leaves make sugar through the process of photosynthesis.

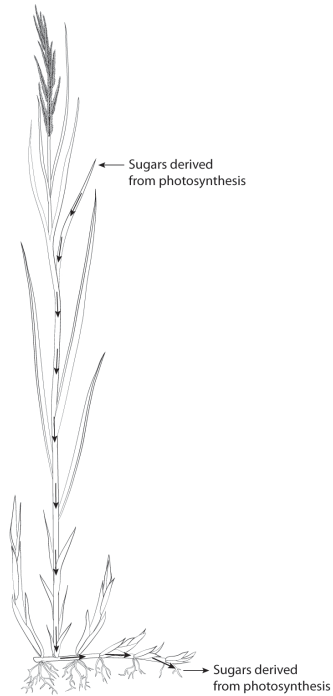
Like other plants *Spartina* has special cells in its leaves that take in carbon dioxide (CO₂) from the air and water from its roots. These cells use energy from sunlight to combine the CO₂ and water molecules, making glucose, a kind of sugar that stores chemical energy. You are familiar with the chemical equation for photosynthesis:



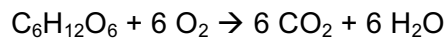
The leaf cells keep some of the glucose for their own energy and growth, but they send most of the sugar to the rest of the plant.



Step 2: Sugar moves to all the cells in the *Spartina* plant. Like other plants *Spartina* has specialized cells (called phloem) that move sugar from the leaf cells to all the other cells in the stem and roots.



Step 3: All the cells get energy by combining sugar with oxygen in the process of cellular respiration. All the cells need energy to carry out their life functions, and they get that energy by combining the sugar with oxygen. You are familiar with the chemical equation for cellular respiration:

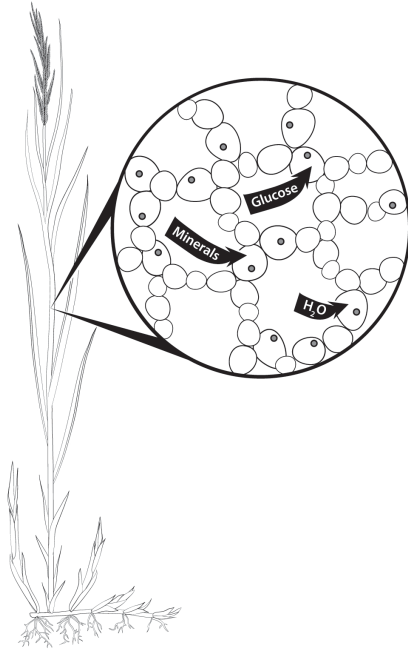


Spartina has a special problem, though. The soil around its roots is often underwater and has little or no oxygen. It is able to thrive in this environment because it moves oxygen to its roots through special tubes in its leaves and stems.



Step 4: Cells grow by making large organic molecules from sugar and minerals in the process of biosynthesis. Spartina plants also grow when their cells grow and divide. They grow by using glucose and minerals that come through the plants from the soil to make all their

other small and large organic molecules, including starches, cellulose, fats, proteins and other molecules.



Digging Deeper: Where You Can Learn More about Spartina

“What is a Salt Marsh?” -- <https://oceanservice.noaa.gov/facts/saltmarsh.html>

Spartina alterniflora Plant Profile -- <https://plants.usda.gov/core/profile?symbol=spal>

Salt Marsh Zonation Explanation--

<https://www.des.nh.gov/organization/commissioner/pip/factsheets/cp/documents/cp-06.pdf>