Quadrant II- Transcript

Welcome students,
Unit 4 adaptive and Protective systems

module name adaptations in Halophytes.

module #32
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In this module we are going to learn.

About the introduction to halophytes.
Classification of halophytes.
Morphological Adaptations of halophytes with respect to root stem leaves and the fruit.
We are also going to learn about the anatomical adaptations of halophyte with respect to the leaf stem and specialized root, which are called as the pneumatophores by the end of this session, the learner will be able to understand the morphological,anatomical, adaptations in halophytes.

Now what are halophytes?
Halophytes are plants that grow in salty or saline environments. These environments include Saline, ponds, seashores, islands, deltas,marshy areas or even the estuaries. Now in order to survive in such harsh conditions, the plant develops certain adaptations. The dormant species of salt tolerant plants includes rhizophora,soneratia,avicennia,acanthus, ceriops, excoecaria Etc. now this is a picture which shows the Halophytic plant growing in an estuarine environment.
Let us understand the classification halophytes are divided into 4 broad classes. First is the helophilous Here the plants grow in swampy or the marshy areas.Second is the lithophilous. Here the plants grow on rocks or the stones. Pelophilous the plants growing on muddy or the clay soil. Psammophilous here the plants grow on the sand. Helophilous are again divided into 2 salty swamp and the littoral swam forests in the salty swamp forest the plants are submerged in the water, and they are subjected to the tide action, whereas in the littoral the plants are at the edges and they are subjected to the tides. We're going to learn the plants with respect to littoral swamp forests. Those Includes the mangroves.

Now the morphological adaptations of mangroves. mangroves show a diversity in their roots. They can be stilt or the prop root you can see from the picture here what happens is the roots starts going obliquely down from the stem. These are the silt or the prop roots. Next we have the pneumatophores. Pneumatophores are specialized root structures found in the mangroves. They are negatively Geotropic in nature. Meaning they grow vertically upwards. Buttress root this type of roots can be compared to the stands of the photo frames moving on to the stem. The stem of Halophytes are succulent in nature and they show presence of lenticels. lenticels helps in gaseous exchange. The leaves of mangroves are

thick, succulent and leathery. The fruit is light in weight, an exhibits vivipary. Vivipary is a special kind of seed germination wherein the seeds germinate when it is attached to the parent plant itself. It elongates and forms a radical radical swells, and becomes heavy, and afterwards it gets detached from the parent plant when it gets detached, float over water and ultimately it sinks down into the shore. It Sinks in such a way that the leaves or the cotyledons. And the plumule is directed upwards, and it is about the sea level. moving on to the anatomical adaptations in leaf. leaf consists of a cuticle region which is a waxy layer which makes the leaf appears glassy or leathery in nature. It Helps the plant from fungal and pathogen attack. The epidermal cells consist of calcium oxalate crystals. These crystals provide defense mechanism to the plant. This defense is against the herbivores below the upper epidermis. There are several layers of thin walled cells which consist of water, oil and tannins. Tannins have an antinutritional effect on the herbivores. Mesophyll is well differentiated into palisade and spongy since they are well differentiated. They also consist chloroplast. Chloroplast Helps in photosynthesis, lower epidermis shows the presence of sunken stomata. Sunken stomata helps to reduce the rate of transpiration. The upper epidermis of the leaf also shows some water storage tissues. You can see from the picture. These Are the water storage tissues. Now, the main function of this is water storage. Tissues is that they maintain the osmotic balance or balance in their body with respect to the salt, so they also consist of salt glands. Now this salt glands helps the plant to give out excess of salt. Now in this picture we can see that the leaf is showing some salt exudation. OK, this is because the salt concentration in the plant body has increased. As a result they are excluding out through the salt glands. In some species like avicennia the lower epidermis shows T shaped hair. These hair are called as the trichomes and they help in defense. Moving on to the stem. The stem consists of cuticle epidermal region which consists of oil and the tannins. Hypodermal region which is several layers thick region. The cortex is differentiated into outer cortex and the inner cortex. The outer cortex consists of calcium oxalate crystals, tannins. oil an H shaped heavily thickened spicules, spicules are nothing but they're the needle shaped projections which helps the plant against predation. The inner cortex also consist sclereids, and thick walled cells. The Pericycle is several layered And is sclerenchymatous because it is sclerenchymatous in nature, it helps the plant in providing mechanical support. That is why the stem is hard and Woody. The vascular systems are very well developed. They Consist of well developed Xylem, and the phloem pith consists of lacunae, an H shaped spicules lacunae are small cavities which helps in storage, storage of food, material, H shaped spicules are again needle like projections which helps the plant against defense moving on to the root. The root shows five different layers. Cork, endodermis, Pericycle, vascular system, and the pith region. Let us understand the cork region first. When the plant is young,the cork region is absent. As the plant matures, the roots develop this cork region. This Cork region is four to six layered and It is suberized. The cork cells are dead in nature. Underlying the cork is present one or two layers of cork cambium. This region helps in providing new cells towards the upper side. The continuity of the cork layer is broken by at places by lenticels. Lenticels Are like the nose of the plant. They help in gaseous exchange.They help in breathing. OK, so

you can see a picture over here that there is a cork region. OK, this is the Cork region and the continuity is broken by the lenticels. This is how when you take a section of the pneumatophores, it will look like moving on to the next layer. That is the cortex. This is the cortex region. You can see the Cells are very large and they are widely spaced. this type of arrangement or this type of cells which are found here are aerenchymatous in nature aerenchymatous cells helps to give the buoyancy to this roots or they helped

the root to float over the water.Endodermis is a single layer barrel shaped cells. And they are well developed. Pericycle is multilayered and lies beneath the endodermis vascular bundle. Is conjoint meaning Xylem and phloem are together collateral. They are on the same radii. An open meaning they have a vascular cambium region. The Root exhibits endarch type of Xylem. It is round cells and they are loosely arranged. The most striking features of pneumatophores with respect to ecology is that they have a well developed cork region which communicates with the outer atmosphere through the lenticels. Now these are the pneumatophores you can see this they are negatively Geotrophic. The cortex is composed of large air chambers which helps it to remain above the water surface since they are arenchymatous in nature. Apart from that cortex. Also gives mechanical strength to this roots. Sclerenchymatous pericycle aids in giving mechanical strength. Pith is composed of loosely arranged
parenchymatous cells enclosing the intercellular spaces, which helps the roots to float. These are some of the references which you can refer for this module. Some web links.

Thank you.