Video #4

Let's Build Your Foundation For Success

Welcome to lesson 4:

In this lesson, we are going to build your strong foundation.

We will get to know these plants a little bit better.

We already know that succulents are plants that store water. They store water in either their leaves, their roots, their stems, or a combination of these parts.

The succulents' ability to store the water they absorbed is what makes them different from other plants we are used to seeing every day.

Their water-storing ability is also one of the reasons why they can survive in locations where water is limited. They can live off their stored moisture and they also have other ways to conserve it.

Succulents are good at **collecting**, **storing**, **conserving**, and **protecting** water.

To collect, they have a massive and shallow root system ready to absorb water anytime it rains. Even their structure is built to trap moisture or direct the moisture they've collected to their roots.

Some of them are even capable of growing aerial roots allowing them to absorb some moisture from the environment.

To store the water, they have storage areas where they keep their absorbed supply. These storage spaces shrink when water is depleted, and expand when water is abundant.

But succulents are not only good at collecting and storing water. They are also good at conserving and protecting it.

If you are going to think of it, if succulents are only good at storing water, and they allow it to escape that easily, they won't survive long. Their stored water would be depleted fast.

But they are very good at conserving it too.

One way they conserve water is through the special way they photosynthesize.

Succulents, as we know, are living plants. They need food to survive.

They utilize water, energy from sunlight, and carbon dioxide and convert them into food through photosynthesis.

During this process, the water they store is at risk of escaping through their pores when the exchange of gases occurs.

Well, some of these succulents are smart. They would close their stomata during the day and open them at night when it is cooler. By doing so, they dramatically reduce the amount of water that escapes.

This type of photosynthesis is called Crassulacean acid metabolism or in short CAM photosynthesis. This is what most cacti and succulent plants utilize.

Another way they conserve water is through their specialized structure.

Some of them have little and smaller pores, some have thick waxy leaf coatings. Others have tomentose leaves (matted woolly hairs), some have pruinose or powdery coatings, still, others have hair-like structures or spikes. All these help them prevent or reduce the moisture from escaping.

Their ability to keep the water depends also on their genes.

For example, let's compare this Corpuslacaria lehmannii 'Iceplant' and Aeonium castello-paivae variegata 'Suncup.'

If you compare their storage size, obviously this 'Iceplant' has more storage space as its leaves are more swollen compared to this Aeonium 'Suncup' with thinner leaves.

Most people would think that the 'Iceplant' can tolerate a longer period without being watered because of its storage area that is thicker than the Aeoniums.

But, guess what...the Iceplant would wrinkle faster than the Aeonium in the absence of water.

What's the difference between the two?

Aeonium belongs to the Crassulaceae family, so it's utilizing CAM photosynthesis. This unique way of photosynthesizing helps it prevent moisture from escaping, while this 'Iceplant' belongs to the Aizoaceae family—although some members of this family utilize CAM, not all of them do.

One way to also tell how good a plant can keep the water is through its outer leaf covering. Those with shiny, waxy coatings like this Aeonium can further seal its moisture. The 'Iceplant' has a leathery texture, but not waxy.

So, between the two, although the 'Iceplant' holds more water because it's fleshier, the Aeonium can tolerate drought longer because of its genes and how it is built.

Succulents' ability to store water also puts their lives in danger especially in the wild. They need to protect their stored water not only from environmental factors: sun, wind, and drought. They also need to protect it from thirsty insects and animals.

No wonder some of them are toxic. When wounded or punctured, they would excrete toxic latex that can paralyze or poison whatever attempts to take advantage of their supply.

And because they cannot run away, some of them have mastered the art of hiding. If you've seen the mimicry plants, they would mimic their surroundings as a defense mechanism, to hide in plain sight.

The lithops for example, 'aka' the 'living stone' would bury themselves underground and blend in with their environment to avoid being eaten.

Some of them are masters of disguise to scare insects away. Like those with cobwebby hairs or cocoon-like structure. They do these to discourage insects from coming close, thinking there is a trap.

Or they build their own defense—spikes to guard their supply or by making their leaves slippery so insects couldn't climb or cling to it.

How smart, right?

Most of their fascinating features are either to conserve water or protect their supply.

These plants, over time, evolved to survive in their challenging locations.

They are good at surviving in challenging locations where water is limited. What they are not good at is how to deal with the excess.

Their "being good" at handling water is a great disadvantage when water is in abundance.

Water is such a temptation that they cannot resist.

Succulent plants will not say no to water!

They are greedy when it comes to water.

They would suck it in as if there is no tomorrow.

The roots will keep on absorbing water even though their storage is full.

The problem is, there is a limit as to how much water their storage can hold.

The plant would initially expand to accommodate more. When it is beyond its ability to hold water, those storage cells can rupture or get damaged.

The succulents' skill in absorbing and keeping water shouldn't be a problem if they had a way of letting go of the excess which some of them do have.

I always use Portulacaria afra as an example.

Portulacaria afra is a facultative CAM species. When water is abundant, it photosynthesizes as most plants do, but when water is limited, it switches to CAM photosynthesis. So, this plant can survive in both situations—when there's an abundance of water as well as in drought.

But there are those that are really good at preventing the escape of water. Often, they are the ones that get damaged

So, knowing that they are skilled at surviving when water is not available for longer periods, should take away your fear of killing your plants if you do not water often. Giving them too much is what you should be worried about.

To grow colorful succulents, you need to take advantage of their skill to survive in challenging locations—in places where their access to water is limited.

In our next lesson, we will discuss **stress** and how it applies to achieving their colors. It's going to be exciting.

I will see you in the next video.