



PACHYPODIUM

The Complete Guide To Cultivation

Learn all the basics for success in growing these valuable plants

Pachypodiums are some of the most popular in-demand plants in horticulture today but unfortunately very little cultural information exists to help the large number of collectors attempting to grow them. The special appeal of these plants lies in their exotic form and very beautiful flowers both of which cannot be realized without a sound understanding of their culture.

You're On Your Own

Most of the truly interesting plants usually present us with a challenge on how to care for them. This is part of what makes them rare and interesting. Pachypodiums certainly fall in this category and require a certain degree of personal involvement a little beyond the "it's putting out leaves so I guess I should water it" level.

This guide is presented in the spirit of developing a consciousness or greater awareness of what you can learn from your plants just by trying out sound cultural practices along with your own ideas and observing the results. All of us possess, to some degree, the ability to "pick up" on these cultural ideas or we wouldn't be attracted to these strange plants in the first place. The solutions to our problems are usually there right in front of us. All that's left is to train ourselves to see them.

Your efforts will be rewarded. With a little experience, the end result will be a degree of independence in solving your own problems. If you want to grow very good plants, you actually have no choice. Your plants are totally dependent on you for their care and only you can make the most of them. You are in every sense on your own.

I. Form and Function

The Two Schools

Culture studies can usually be divided into two groups. One school of thought which you still see quite often is that plants should be grown in a manner that mimics their habitat conditions. This is a hold over from the early days of the 50's and 60's. The other more contemporary school favors maximizing their potential in the man-made artificial environments we have set up for them. This will be our method.

What exactly do we mean by maximizing their potential? Above all else, it means growing plants that look natural. No plant grown under artificial conditions will ever look exactly like those found in the wild but in most cases we can come very close. By the time you finish this guide, you will be able to recognize a natural looking plant.

All plants possess a genetic make-up which makes them favor conditions similar to those of their native habitat but when we are growing them under artificial conditions, all the rules change. It is totally impossible to duplicate habitat conditions but we do incorporate these habitat preferences into our cultural methods only however as one element and not the big picture.

Life Cycle

Good culture depends on your understanding of the different phases your plants undergo during the course of a year. When to water, feed, repot, prune, and rest all relate to an understanding of the basic life cycle for Pachypodiums. It is actually quite simple as follows: Reproduction - Growth - Rest.

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I. Form And Function

A little theory but not too much. We construct a cultural profile based on form and behavior.

II. Methodology

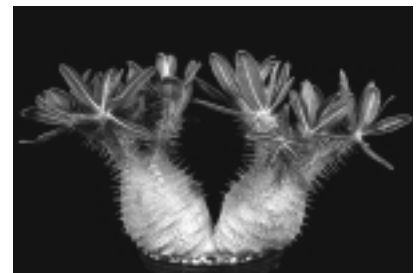
Now down to culture basics.

No laundry list of Do's and Don'ts but a highly integrated approach.

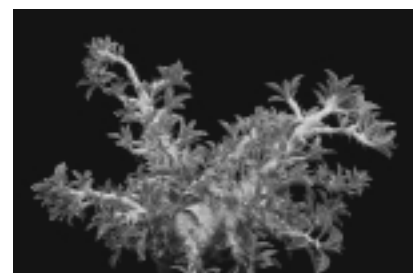
Key issues specific to Pachypodiums are examined in detail.

We examine all factors under our control and how to put them together in a way that's right for your growing conditions.

*Learn How To Grow Quality Plants
Like These Large Perfect Specimens:*



Pachypodium rosulatum - interesting twin stem plant. 5 years old grown from seed.



Pachypodium saundersii compactum - the beautiful Zimbabwe form. 6 years from seed.

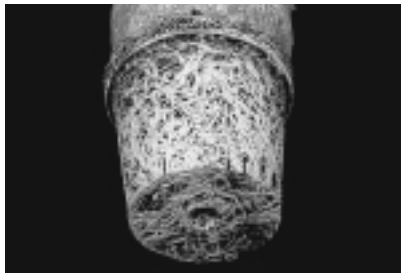


Figure 1. Healthy Pachypodium roots

Here in the northern hemisphere, flowering and hence reproduction for most species begins in late February and merges with the growth cycle in May. It can take from 4 to 10 weeks for flowers to fully develop on their long peduncles and is a slow process. Most are in full flower in April and May with a few taking until June. The rest period is from November - January when they will shed most or all of their leaves as they sleep for three months or longer.

Between reproduction and rest we of course have growth. Even though all species are indigenous to the African mainland and Madagascar, which is in the southern hemisphere where spring normally begins in September, they readily adapt to our northern biological clock and shift 180 degrees. The only exception is the rare *P. namaquanum* which does not have one set growing period in cultivation. Instead it will burst into growth usually three times per year roughly occurring in June, October, and January depending on your conditions. Many succulents exhibit this “confused” state and you simply must play along.

Most cultivation naturally must take place during the growth period but what is most critical is not stopping altogether during the rest period.

This is the number one reason for failure.

Certainly at this point you have a good idea that there is considerably more to cultivation than just watering. Pachypodiums must absolutely receive some moisture when dormant but by not stopping cultivating we mean you can't just forget about them until spring. All of your observations and attention to keeping conditions just right must also continue through the winter months. For example: moisture, temperature, and light levels must be monitored and you need to be constantly on the lookout for root loss, insects and a fungus that causes tip dieback. These are just a few.

A Starting Point

After you have grown many different types of plants, you easily see cultural patterns or traits begin to emerge. Often you can just look at a new plant and have some idea of how it should be treated. This is exactly what we mean by developing a greater sense of awareness about your plants. It's amazing what you can learn just from observation and it pays off with superb, not average plants.

In the natural world form usually follows function, so as a cultural starting point, let's make a few simple observations of the inner structure and outer form of a typical Pachypodium. We begin with the way water and nutrients move through the plant.

Pachypodiums have huge fibrous feeder roots (see Fig. 1) that mop up moisture very rapidly. In habitat, rains are far and few between so they must act quickly. By their very size you can see they mean business. Most succulents have much smaller, hair-like roots.

Most species have large leaves relative to body size and therefore transpiration is fast and plants rapidly make food. This is an obvious sign that they require generous amounts of moisture and nutrients compared to most succulents.

The caudex or stem is composed of a soft pith structure for water storage with the vascular tissue lying close to the epidermis as two narrow concentric rings. This enables plants to withstand periods of less than ideal moisture. Next time a plant is lost, make a cross section and you can see these features.

The epidermis or outer skin is bright and shiny. This highly reflective covering directs the harsh sun away from the body thereby conserving moisture.

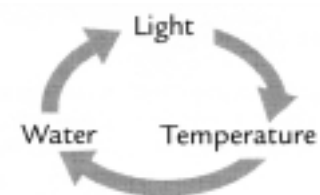
So what does all this tell us? If we sum it up, we must conclude that Pachypodiums are relatively fast growers and in general are very opportunistic plants. In habitat, the growing season is short so they must make the most of it. In cultivation where conditions are so much more generous they really move and this means that they will make too much of a good thing if given the chance. By comparison, plants in the wild are held in check by the ever present force of the elements and have that “natural” compact look so desired.

So our cultural profile can now be fairly well defined. Pachypodiums can be a little too robust in cultivation. We can't just let them go their own way so they must be held in check somewhat. We know that they must have a definite winter rest and be carefully monitored during this period. By holding them back a little we certainly don't mean starving them or making them weak. On the contrary, this will produce the exact opposite result which is a more compact natural looking plant. Many growing techniques are available to us which will work with this approach.

II. Methodology

The big three: Light, Temperature, and Water form the basis for most discussions on cultivation. All aspects of growing usually relate in some fashion to one of these key elements.

What is normally presented however is a big list of do's and don'ts which reduces cultivation to a mechanical process with little regard for the relationship between these primary elements. If you want to be a first rate grower, you must know why you are doing something. Merely following a prescribed list will take you nowhere. For example, no one can possibly tell you how often to water. You must determine this yourself.



Our approach will therefore be that the three elements Light, Temperature, and Water define your growing environment. They cannot be considered separate entities but are interdependent parts of your cultural formula. Change any one and the others must also change.

Light Requirements

All species of Pachypodium require strong, hard light. This means at least 3-4 hours of direct light each day. Direct light is defined as an unobstructed southern exposure. It does not mean so many hours of sunshine, but only that the exposure not be blocked by trees, house eaves, or anything that will create

shade. Nothing should come between the sun and your plants except the window or greenhouse glazing if that.

Pachypodiums grown in low light hardly resemble their true form and are indeed a sad sight with their etiolated (stretched out) stems and huge floppy leaves. Plants grown under such conditions become very weak over time and generally fail. The classic symptom that plants are not receiving sufficient light is that the new leaves will turn black.

Properly grown specimens will always have what is termed a small internode distance. This is the distance between the stipular spines. Figure 2 illustrates this point with two plants of the same species. Notice the distance between the spines is much greater for the poorly grown specimen on the left while the other is nice and compact.

Temperature

Maximum temperatures are usually not a concern as all species will tolerate the very hot and dry conditions of habitat. Plants grown in greenhouses without proper ventilation (total inside air replaced once per minute) can easily be damaged. The first sign of this is the clear sap weeping from the growing apex. This is permanent damage and branching occurs around such an injury. Quite often, plants grown in excessively hot conditions will just go dormant.

In cultivation our biggest concern is the minimum temperature which coincides for duration with the rest period. Due to the general robust nature of Pachypodiums with some moisture required during dormancy, a minimum of 55 degrees F. should be maintained while 60 degrees is preferable. Some will tolerate lower levels but most will not. The Highland reference collection of seed stock Pachypodiums, consisting of hundred of plants including all known species, is kept at 65 degrees Fahrenheit.

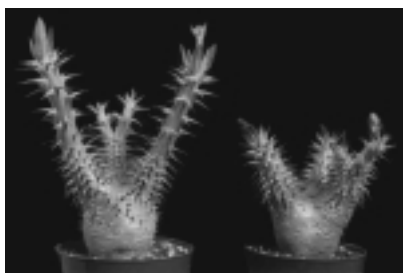


Figure 2. Internode distance for two plants the same age of horombense

Watering

Pachypodiums are heavy feeders requiring generous amounts of water. This is the main obstacle for growers new to the genus to overcome. It's a natural tendency to be overly conservative with watering especially with the rarer more costly species but the idea should be not how much but when to water. As a good starting point use this simple rule: do not let containers become dust dry at any time. It works. Water, wait until it uses what you gave it, then water again.

How can you tell if a plant has used what you have given it? Pick it up. If the pot feels light, water it. If you want to call yourself a real plant person learn to do this. Experienced growers can tell if a plant needs water just by looking. You won't catch them lugging pots around! Again it's that special sense of awareness that makes the difference.

Don't think of watering as an exact science where every drop must be measured. It's just not that critical. Make sure your plants are well watered and forget it. More plants are killed by under watering than everything else combined.

Finally do not push anything into the container to test the moisture level. This means your finger or those dreaded moisture meter probes. Succulents have delicate, fragile roots and you will only damage them. Pachypodiums are especially sensitive to this treatment and broken roots can rapidly lead to rotted plants from this bad habit.

The Dormancy Dilemma

The most critical and least understood time in caring for Pachypodiums is the dormancy or rest period. Most losses occur during this time because plants are kept too dry and not monitored. It's not that they are difficult and in fact are no more demanding than most caudiciforms. Due to their very robust nature and general character of quickly responding to culture, these plants will simply not survive long periods, i.e. months, with no moisture. Yes some will make it but many will not.

Dormancy is a fact of life. Plants gradually move into a rest period in response to dropping light and temperature levels. *You can't force them to do anything by applying or withholding water.* You simply must give them what they require.

Pachypodiums just don't sit there like rocks while dormant. You can't see much happening on the outside but on the inside transpiration is still going on at reduced levels and this moisture must be replaced. They need feeder roots to take up this moisture so naturally plants cannot be kept so dry that these roots are lost. This can easily happen and the consequences will not become apparent until spring when growth commences and plants begin to fail. Plants are failing not because of what you are doing in April but because of what you did over the winter months.

So how often should you water during dormancy? It largely depends on humidity levels, i.e. how fast plants dry out. If you live where it's cool during the winter, your house or greenhouse will be dry so one or two waterings per week may be required. If you live in a mild climate with little heating equipment operating, possibly once every other week will work. Just, water, give them a good dry spell to the point where pots feel light, then water again, but do not keep dust dry!

The relationship between light, temperature, and water should now be coming into focus. Each certainly is a topic by itself but often it is extremely helpful to think of them collectively. Solutions to problems can usually be found in the cause-effect type relations that exist.

As an example consider the winter situation for growers with no greenhouse. When you move your plants inside in autumn, you are significantly altering your environment. If you think of this in terms of the three key elements the most obvious change is a big decrease in available light. It thus becomes crucial to adjust temperature and water accordingly, keeping growth to a minimum and thereby avoiding ruinous etiolation. Conversely plants must be watered enough to maintain roots so you can easily see it becomes a delicate balancing act of providing the three essential elements in the correct amount.

Root Loss

With any sizeable collection you will have a few Pachypodiums each year that lose their roots and in this condition their survival depends on careful and quick treatment. Signs to look for are a shriveled caudex, small irregular leaves, pots that stay wet, and algae on soil.

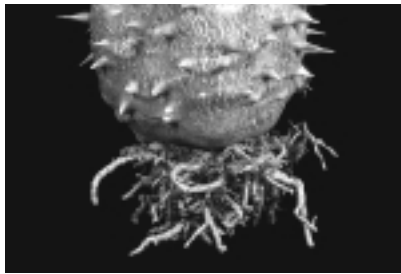


Figure 3. The proper removal of dead roots should be back to healthy white tissue

First, ascertain that the roots are in fact dead. Do not unpot to check this. Disturbing live roots is one of the worst things you can do. Water well and wait 7-10 days. If the caudex fills back out even a small degree, leave the plant alone and monitor it carefully until it recovers. It is very easy to make the diagnosis that a Pachypodium has rotted because the caudex has become soft only to find after removing all the soil, that the roots are in perfect shape and all it needed was a good watering. This is especially true in very hot weather when plants can desiccate in a few hours. Usually it takes much longer for a plant to fill back out than to shrink.

If the plant fails to respond to your initial watering, unpot and remove all mix. The dead roots will usually fall away with the mix but trim them back to clean white tissue and apply a rooting hormone. Fig. 3 illustrates the procedure where the dead feeder roots have been removed and the primary roots trimmed back.

Finally, let things dry for a few days to heal the root tips then pot in straight perlite or pumice. Place in bright but not direct light and keep evenly moist. When new growth is evident, unpot, shake off excess perlite or pumice and pot in your regular mix. It works just about every time. Plants can even stay in rerooting pots until the next season if it becomes too late in the year to disturb the delicate new roots. Timing is critical and must always be considered.



Figure 4. Ratio Rule applied to two plants the exact same age. L - 2.5" pot, R - 4" pot

Technique: The Ratio Rule

Now that we have the basics down we return to the idea of restraint developed in our cultural profile and explore techniques you can use to keep your plants in check. One of the most effective is the standard horticultural principle called the Ratio Rule. It states simply that for any plant there exists an ideal ratio between its roots, stem (caudex), and leaves. This is right from Hort 101.

This principle can be applied to Pachypodiums by restricting root space. In habitat they grow in cracks and chinks between rocks and this is what gives them their nice globular character. In cultivation most new growers overpot in the mistaken belief that you must give your plants plenty of root space if you want them to grow well. In fact it has the opposite effect as plants slow to a crawl. If roots are grown out of proportion to the rest of the plant, the growth energy will be channeled to the branches and leaves and not the caudex i.e. the ratio of roots to stem and leaves is not correct. Plants with a large crown of branches and leaves but without much of a caudex are usually in a container much too large in relation to plant size.

Figure 4 illustrates this principle applied to a pair of densiflorum. The nice fat one on the left is in the correct size container while the one on the right is over potted. When selecting a container choose one in which the plant will just fit and move up in increments of one half inch. This technique can be used with many types of plants and it works! Bonsai enthusiasts use it extensively to develop big fat trunks.

Growing Medium

The key factor for any good Pachypodium mix is light weight. The large roots can simply push themselves through a light and airy mix easier than a heavy one. A degree of moisture retention is also required as in any quality medium.

The new soilless mixes that have been developed for commercial growers the past few years are excellent. These come in a variety of formulations with the composted bark based being the best. Few growers today use soil based medium as the results realized with soilless mixes are so outstanding. You can adjust the porosity of any soilless product with perlite for an excellent Pachypodium

growing medium. Superior results are obtained with perlite over pumice. Avoid using any mix containing sand, gravel, or *any aggregate*. Sand based mixes are heavy, compact, and suffocate roots.

A constructive way to think about this subject is that any quality mix will provide a margin of error in watering. Your plants should be able to withstand short periods of over and under watering such as outside during summer rains. If you experience frequent plant losses, you may want to consider another mix no matter how good you think your current one is. Go slowly and experiment.

A constant low dosage feed strategy is best. Use a commercial brand of fertilizer with trace elements, such as Peters, at one-quarter strength or 50 ppm nitrogen every time you water. Avoid hobby or gimmick brand products. Your feeding program should commence in March and end in October.

Pests

Fortunately most insect pests are not attracted to Pachypodiums. Most collections will see the odd breakout of mealybug but difficult pests such as mites and whiteflies leave them alone. If the need arises for chemical controls, absolutely do not use petroleum based products. These are labeled "liquid" this or that such as malithion and are designated emulsifiable concentrate, "EC", or just "E". Systemics such as Cygon also fall in this group and are highly toxic to you and your plants. EC's will severely burn succulents so avoid them at all costs and use wettable powders and water based (aqua flow) products. It's up to you to do your homework on the insect you are trying to control and the right chemical to use for your plants.

The Big Picture

It is hoped that if you obtain one piece of practical advice from this guide it is that quality plants are the result of quality cultivation. Just about anyone can get Pachypodiums to grow even in the worst conditions. Cultivation can indeed be negative. It's the *quality* of that growth that is the whole point and true measure of your efforts.

Consider this guide as no more than a starting point. Use the ideas presented here along with your own to experiment and observe. You are on your own.