MR. GROW IT

THE VPD GUIDE

The temperature and humidity numbers I run, and how to read them as one number

What VPD is • The targets by stage • How to move it • A chart you can read in five seconds

The short version

Your plant pulls water up through its roots and lets it out through its leaves. How hard the air pulls on those leaves is what VPD measures. Too little pull and the plant sits in damp, lazy air where mold and root rot get started. Too much pull and it dries out faster than the roots can keep up. Keep the pull in the right range for the stage and the plant does the rest.

The numbers, up front. Everything else in this guide explains why.

Stage	Target VPD	Temperature	Humidity
Vegetative	0.8 – 1.2 kPa (1.0 is the sweet spot)	75–82 °F (24–28 °C)	60–70%
Flowering	1.2 – 1.6 kPa	75–82 °F (24–28 °C)	50–60%
Late flower & ripening	1.4 – 1.6 kPa	72–78 °F (22–26 °C)	40–55%

Measure at canopy level, where the plant actually lives. Not at the fixture, not at the floor.

SECTION 01

What VPD actually is

Vapor Pressure Deficit is the gap between the moisture the air is holding and the most it could hold at that temperature. It is the room left in the air for more water.

Think of air as a sponge. Warm air is a bigger sponge: it can hold more water. Cold air is a smaller one. How full the sponge is right now is your humidity. The empty space left in the sponge is the deficit, and that empty space is what pulls water out of your plant.

Two pieces make the number:

- **How much the air could hold** at this temperature. Goes up as the room warms.
- **How much it is holding right now.** That is your humidity reading.

Subtract one from the other and you have VPD, measured in kilopascals (kPa). If the air could hold 2.0 kPa and is holding 1.2, the VPD is 0.8.

Why not just watch humidity?

Because 60% humidity at 70 °F (21 °C) and 60% at 82 °F (28 °C) are two different rooms. The warmer one is pulling much harder on the plant. VPD puts temperature and humidity together into the one number that describes what the leaves feel.

Why the plant cares

Plants cool themselves and move nutrients by transpiring: water goes in at the roots, up the stem, and out through tiny pores on the underside of the leaves. VPD sets the pace of that. In the right range the plant moves water and nutrients steadily and runs at the right temperature. Outside it, one of two things goes wrong.

VPD too low (damp, still air)	VPD too high (hot, dry air)
Transpiration slows, so nutrient uptake slows with it	Transpiration races, more than the roots can replace
Moisture sits on leaves and in the canopy	Leaves lose water faster than they can take it in
Mold, bud rot and root rot get their opening	Leaf edges burn, plant droops, growth stalls
Common in cool rooms, small tents and crowded canopies	Common under strong lights with no humidifier

SECTION 02

The targets by stage

Change the target as the plant changes. VPD is a steering wheel, not an autopilot.

Vegetative: 0.8 to 1.2 kPa

Around 1.0 is where I like it. The plant is building leaves and roots and wants to take up as much as it can. A moderate pull keeps that steady without stressing young growth.

Flowering: 1.2 to 1.6 kPa

A little higher once buds are forming. The extra pull keeps air moving through the canopy and the humidity down, which is your best defense against pathogens, bud rot and mold at the point in the grow where they cost you the most.

Late flower and ripening: 1.4 to 1.6 kPa

Keep the pull at the high end for the last stretch. The buds are dense now and damp air is the biggest risk, so I let the room run a few degrees cooler and bring humidity down to 40 to 55%. The drier air keeps bud rot out of the colas while they finish.

One number is not a rule for every plant

These are the ranges I work in. Genetics, pot size, medium and how big your canopy is all shift what the plant wants. Treat the table as the starting point and read the plant. A plant can still struggle at a textbook VPD if the roots are unhappy.

Seedlings and clones

Young plants with tiny root systems cannot keep up with a strong pull. Run them lower, around 0.6 to 0.9 kPa, with higher humidity (65 to 80%) until they have roots to work with. That is why clones go under a dome.

SECTION 03

The three things that move VPD

You cannot set VPD directly. You set these.

Lever	Push it up (higher VPD)	Pull it down (lower VPD)
Temperature	Warmer room	Cooler room
Humidity	Drier air	Wetter air
Light intensity	More light warms the leaf and the room	Less light, or raise the fixture

In practice

- **Heat.** Lights are the main heat source. An inline exhaust fan pulls hot air out; a controller holds a set temperature.
- **Humidity.** A humidifier raises it, a dehumidifier lowers it. In flower the dehumidifier is usually the one doing the work.
- **Light.** Dimming or raising the fixture drops leaf temperature. Measure at the canopy, the leaf runs warmer than the room under a strong light.
- **Airflow.** Oscillating fans do not change VPD much on paper, but they stop pockets of damp air forming inside the canopy, which is where mold starts.

The common fix

Nine times out of ten, when VPD is off it is a temperature problem first. Get the room temperature stable and in range, then dial humidity to hit the target. Chasing humidity while the temperature swings all day never settles.

SECTION 04

The chart

Find your canopy temperature down the side (Fahrenheit in the first column, Celsius in the second) and your humidity across the top. The number where they meet is your VPD. Green is in range for most of the grow. Grey is outside it.

°F	°C	40% RH	45% RH	50% RH	55% RH	60% RH	65% RH	70% RH	75% RH	80% RH
66	19	1.3	1.2	1.1	1.0	0.9	0.8	0.7	0.5	0.4
68	20	1.4	1.3	1.2	1.1	0.9	0.8	0.7	0.6	0.5
70	21	1.5	1.4	1.3	1.1	1.0	0.9	0.8	0.6	0.5
72	22	1.6	1.5	1.3	1.2	1.1	0.9	0.8	0.7	0.5
74	23	1.7	1.6	1.4	1.3	1.1	1.0	0.9	0.7	0.6
76	24	1.8	1.7	1.5	1.4	1.2	1.1	0.9	0.8	0.6
78	26	2.0	1.8	1.6	1.5	1.3	1.1	1.0	0.8	0.7
80	27	2.1	1.9	1.7	1.6	1.4	1.2	1.0	0.9	0.7
82	28	2.2	2.1	1.9	1.7	1.5	1.3	1.1	0.9	0.7
84	29	2.4	2.2	2.0	1.8	1.6	1.4	1.2	1.0	0.8
86	30	2.5	2.3	2.1	1.9	1.7	1.5	1.3	1.1	0.8
88	31	2.7	2.5	2.3	2.0	1.8	1.6	1.4	1.1	0.9

Color	Means
Dark green	1.0 – 1.3 kPa. Safe almost any time: late veg, early flower.
Light green	0.8 – 1.6 kPa. In range; pick the end that matches your stage. Late flower and ripening sit at the top, 1.4 to 1.6.
Light grey	Just outside. Fine for a few hours, not for days.
Grey	Out of range. Fix the temperature first, then humidity.

Air VPD, calculated from room temperature and relative humidity. The leaf itself usually runs a degree or two cooler than the air under good airflow, which nudges the real number slightly lower. Close enough for a home grow.

SECTION 05

How to measure it without spending much

Two readings and the chart. That is the whole method.

- **A temperature and humidity monitor at canopy height.** Put it where the top of the plants sit, not on the tent floor or clipped to the pole up top.
- **An infrared thermometer** if you want to get closer to leaf temperature. Point it at a few leaves across the canopy and average them. Leaf temperature is what the plant actually feels.
- **The chart on the previous page.** Temperature down, humidity across, read the number.
- **A controller with a VPD readout** does the math for you and can run the fan, humidifier and dehumidifier to hold a target. Worth it once you are past your first grow.

Check it at two points in the day

Once an hour or two after lights-on, when the room has warmed up and the plants are working hardest. Once again before lights-off. If the two readings are far apart, the swing is the problem, not either number. A stable room at a slightly-off VPD beats a room that hits the perfect number for an hour and drifts the rest of the day.

The order to fix things in

1. Get temperature stable and in range. 2. Set humidity to land the VPD. 3. Add airflow through the canopy. 4. Then look at light intensity. Most people start at step 2 and wonder why nothing holds.

Where to go next

- The full breakdown of light, environment and feeding numbers is in the Grow Reference Pack → mrgrowit.com/grow-pack
- The controllers, fans and monitors I actually run → mrgrowit.com/equipment
- The long version of this guide, with sources → the article on mrgrowit.com

Based on my article “What Is the Best VPD for Cannabis?” Background reading: Pulse Grow, Alchimia, MSU Extension (VPD vs RH), Royal Queen Seeds. Chart values computed from the Tetens equation.