

Decoding Light

How PAR Meters and Grow Lights Help Plants
Thrive

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Today's Agenda

The Basics

- 🌿 Why indoor plants struggle
- 🌿 Definitions: PAR, PPF, PPFD
- 🌿 Lux vs PPFD differences

Practical Application

- 🌿 Shop lights vs grow lights
- 🌿 Target ranges for plant groups
- 🌿 Live demo + checklist

#1 Indoor Problem: Low Light

- 🌿 Light drops fast away from windows
- 🌿 Winter = shorter days + weaker sun
- 🌿 angles
“Looks bright” to us ≠ “bright” for plants



Plants Need a Daily "Light Budget"

Intensity

How strong the light is at the leaf

+ Time

Hours per day exposed to light

= Growth

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Key Definitions (Plain English)



PAR

The light range plants use (visible "plant light")



PPF

Total plant light coming out of a lamp



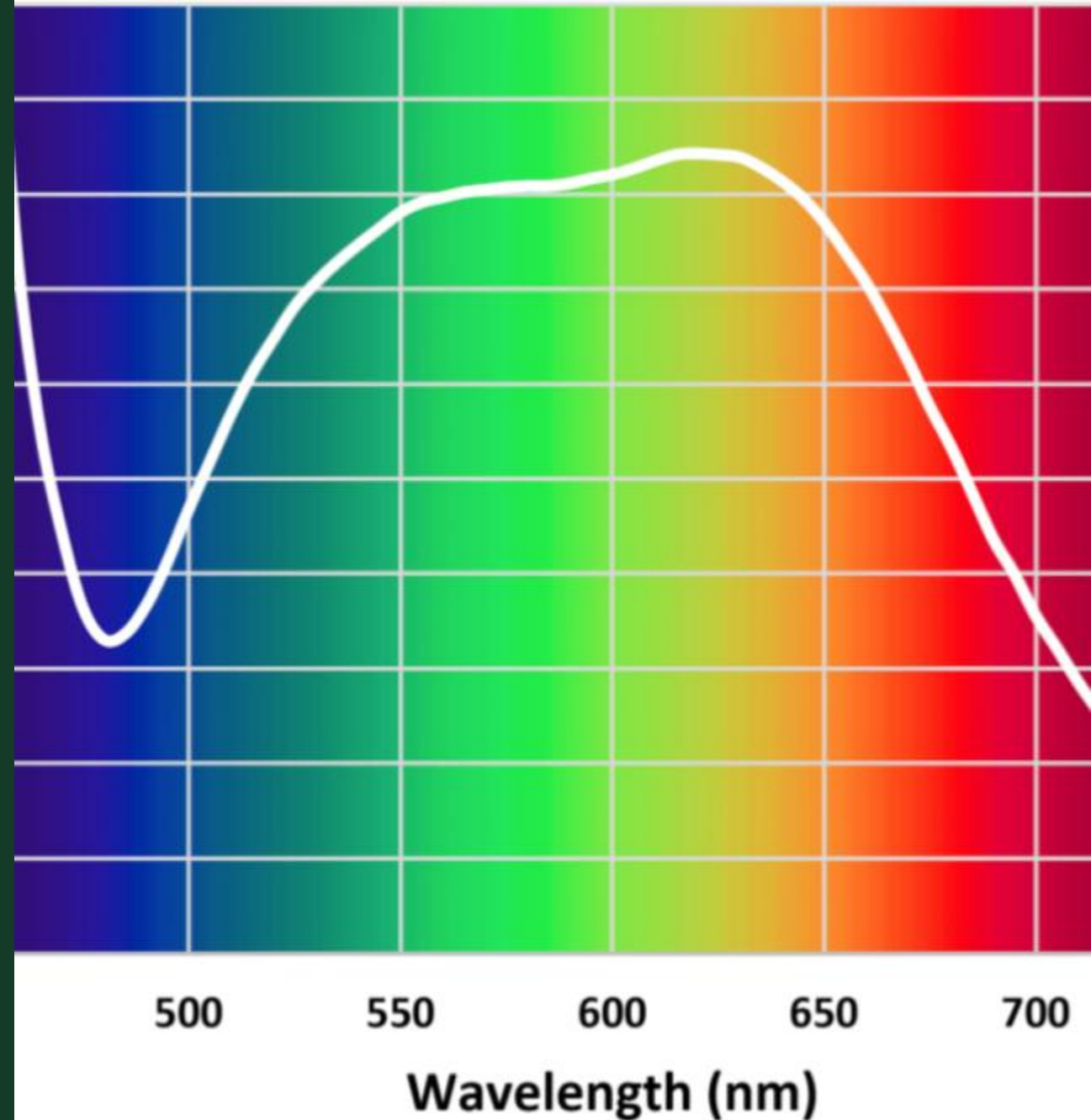
PPFD

Light actually landing on the leaves

What is PAR?

Photosynthetically Active Radiation

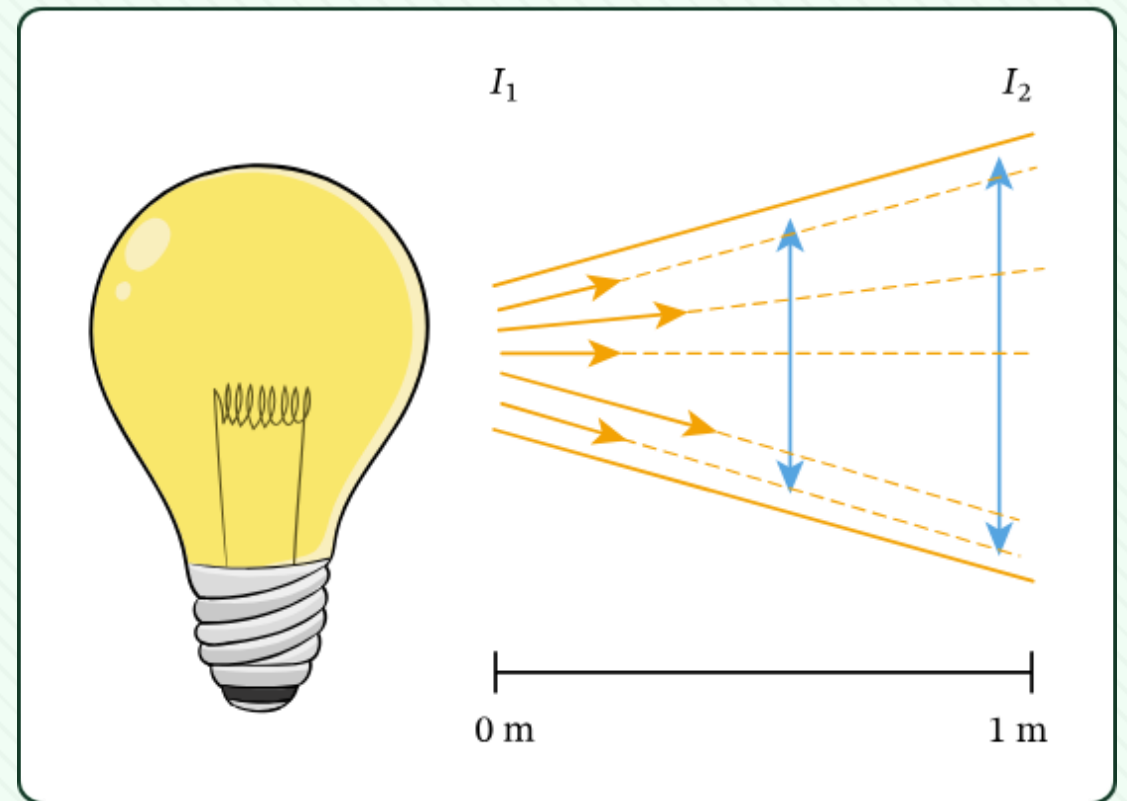
- The main light plants use for photosynthesis
- Measured in the 400–700 nm range
- Think of it as "food" for the plant



What is PPF?

Photosynthetic Photon Flux

- 🌿 Total plant-usable photons a fixture produces
- 🌿 Units: $\mu\text{mol}/\text{second}$ ($\mu\text{mol}/\text{s}$)
- 🌿 Good for comparing fixture output in general



What is PPFD?

Photosynthetic Photon Flux Density

- Light actually landing on leaves at a location
- Units: $\mu\text{mol}/\text{m}^2/\text{s}$
- This is what your PAR meter measures

the grower wants to measure how much useful light is penetrating through the leaves.



What is Lux?

- 🌿 Lux measures “brightness” weighted to human vision
- 🌿 Humans see green/yellow most strongly
- 🌿 Lux can be misleading under different LED spectra



What are Foot-Candles?

The Old Standard

- 🌿 Older brightness unit
- 🌿 Common in older plant guides
- 🌿 Based on human vision (like Lux)

Rough Conversion

1 Foot-Candle

$\approx$

10.8 Lux

Why PPFD?

- Plants don't "see" like humans
- PPFD measures plant-relevant light at leaf height
- Works better across different LED types
- Helps you set distance and avoid guesswork

the grower wants to measure how much useful light is penetrating through the leaves.



When Lux is Still OK

Lux is acceptable if you are:

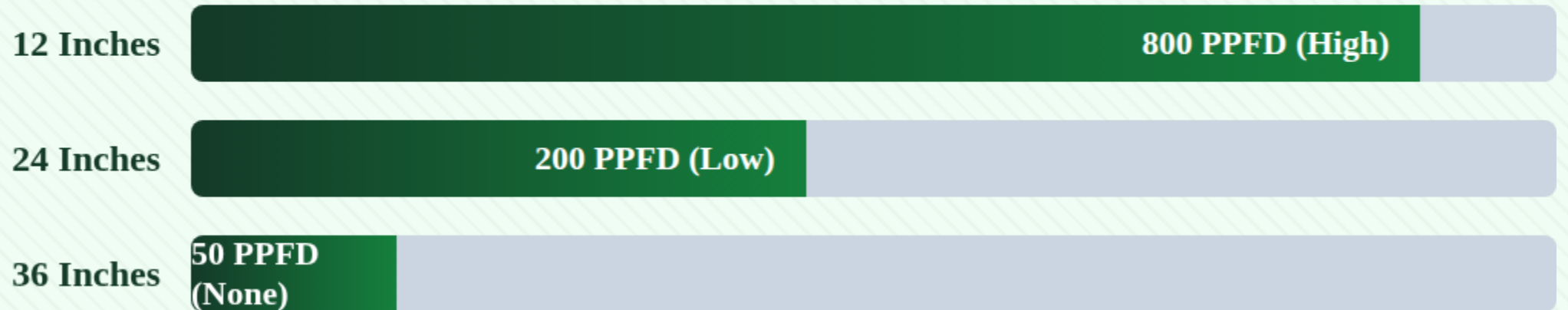
- 🌿 Using the same white light setup (same LED type)
- 🌿 Comparing spots in your own home (brighter vs dimmer)

Not Ideal For:

- 🌿 Comparing different spectra
- 🌿 Colored grow lights ("blurple")
- 🌿 Professional accuracy

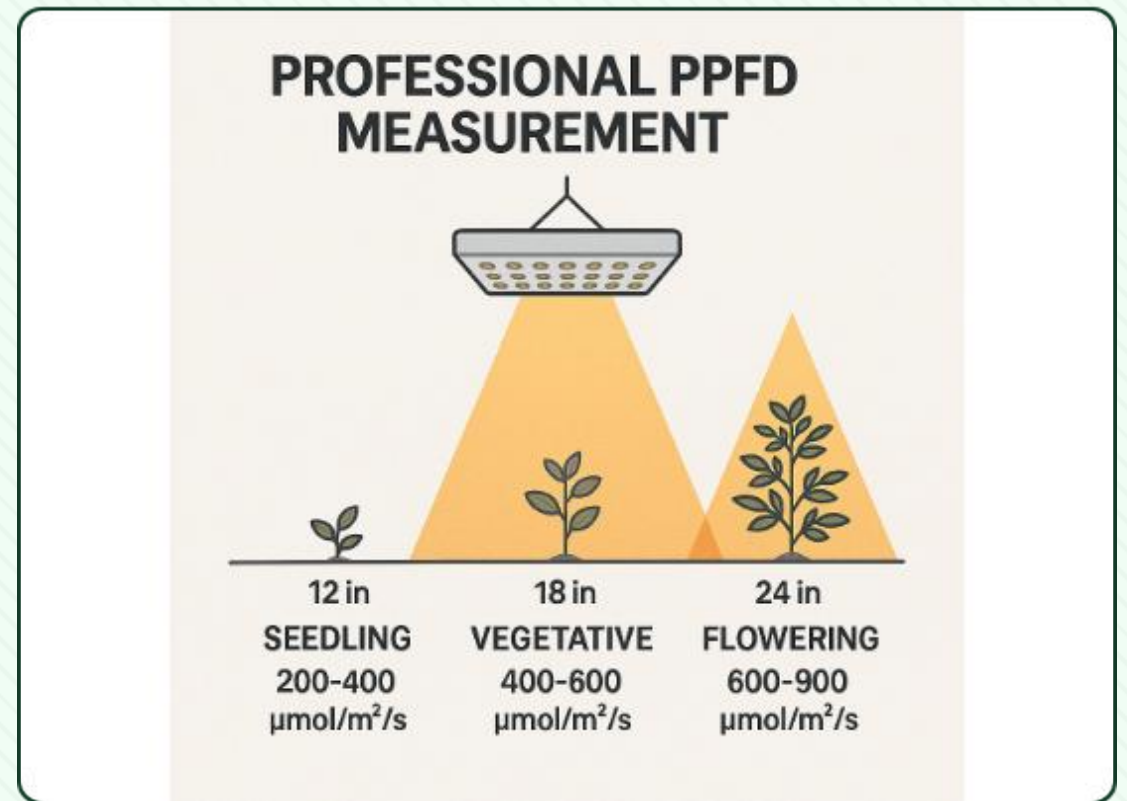
Distance is the "Dimmer Switch"

Light intensity drops rapidly as you move away



How to Read a Listing

- 🌿 Ignore “equivalent watts” (marketing trap)
- 🌿 Look for PPF ($\mu\text{mol/s}$) if available
- 🌿 Look for a PPFD chart by distance
- 🌿 Beam angle affects coverage (spot vs spread)



Shop Bars vs Grow Bars

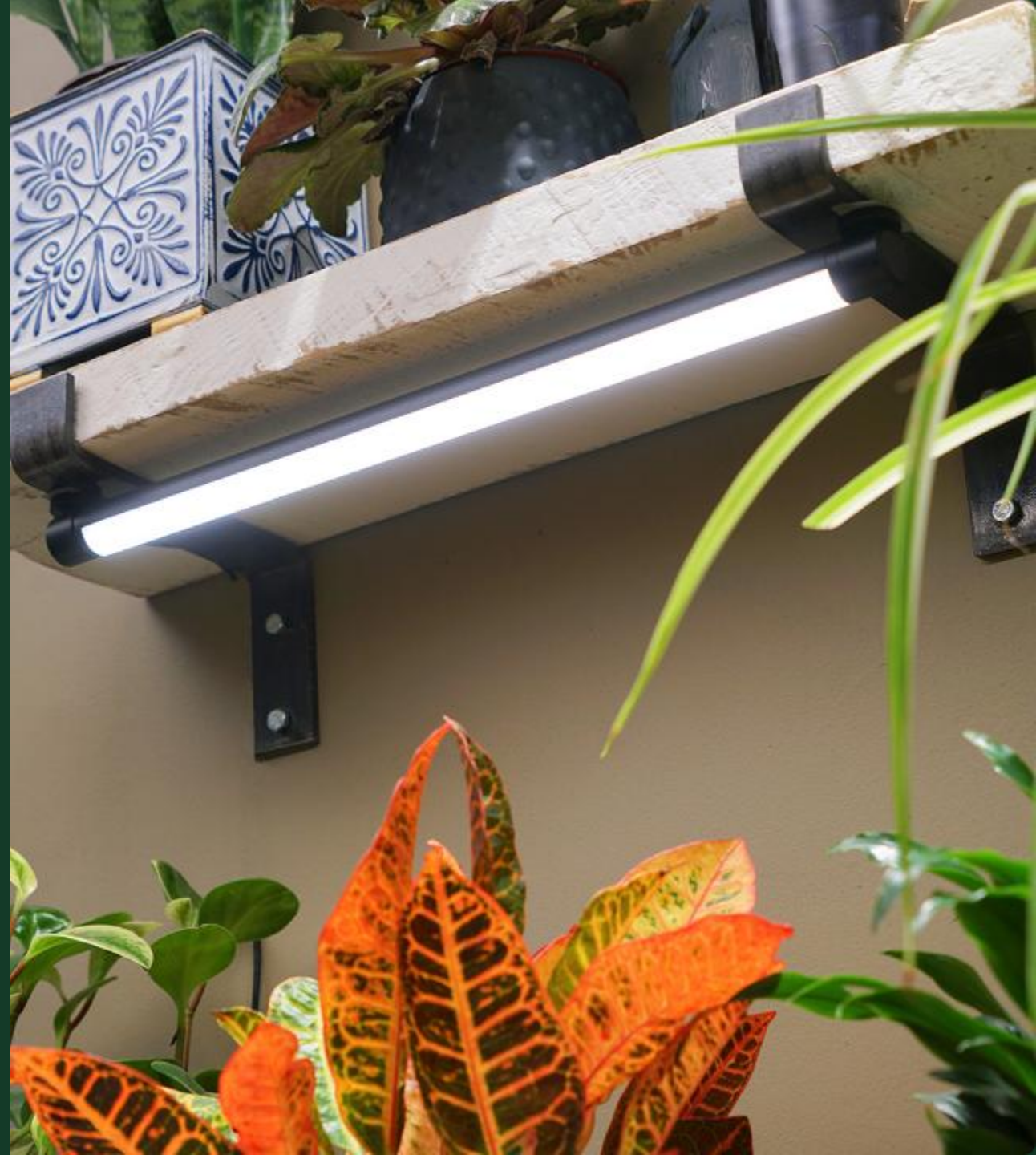
The Honest Truth

- 🌿 Plants care about PPFD + hours, not labels
- 🌿 Shop bars: Often win for wide, even shelves
- 🌿 Grow bars: Win for high intensity per fixture



Shop Lights Work For:

- Aroids & orchids on shelves
- Propagation / rehab shelves
- Affordable, even coverage
- **Key:** Must hang close enough to reach target PPFD

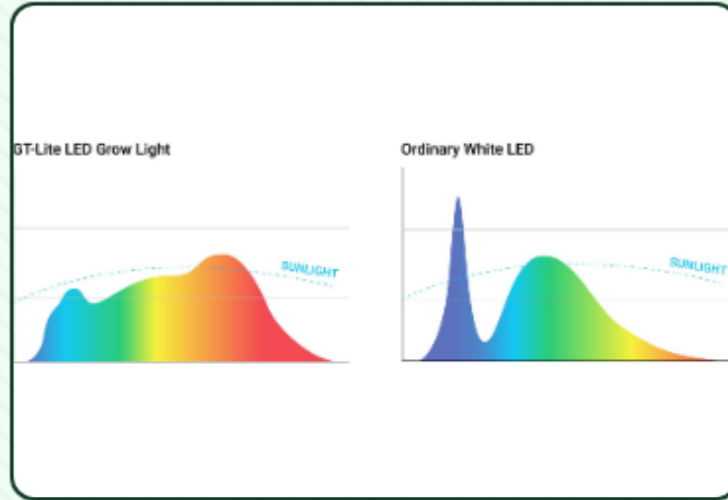


When Grow Lights Really Help



Seedlings

Prevent
legginess



Succulents

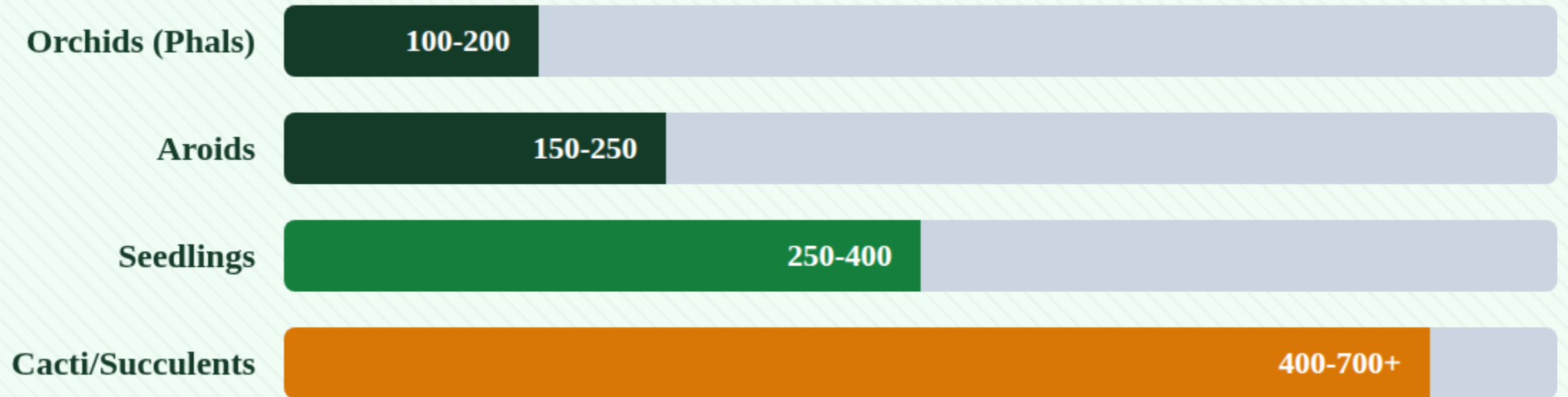
Keep compact
shape



Dark Corners

Pendant bulbs give
"punch"

Simple PPFD Targets (12 hrs/day)



Coverage: Center vs Corners

- Measure where leaves are, not at the bulb
- Check center **AND** corners of shelves
- Spot bulbs: strong center, weak edges
- Bars: more even coverage



Take-Home Checklist

Common Mistakes

- 🌿 Light too far away
- 🌿 Only measuring the center
- 🌿 Sudden increases (sunburn)

Your Plan

- 🌿 Identify plant group
- 🌿 Measure PPFD at leaf height
- 🌿 Adjust distance
- 🌿 Use a timer (12h)
- 🌿 Observe for 2 weeks

Grow Lights: What They Are

- 🌿 A grow light is simply a light that delivers enough **PPFD**
- 🌿 **Not magic:** plants still need water & nutrients
- 🌿 **Benefit:** consistent light in winter & dark rooms
- 🌿 Goal = thriving growth, not just survival



3 Types of Grow Light Setups

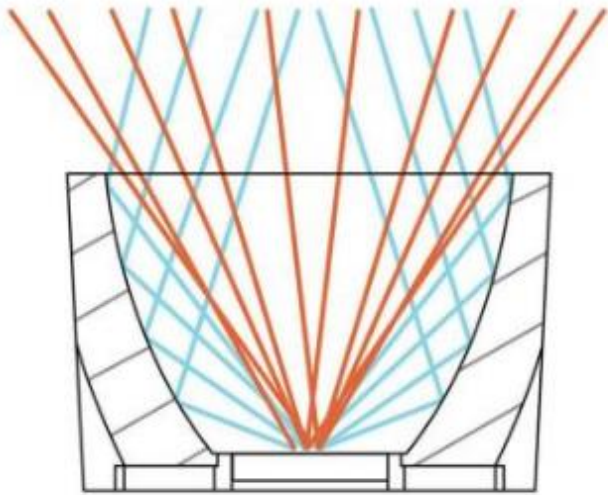
The Big Three

- 🌿 **Bulbs (Spots):** Best for 1–3 plants, dark corners
- 🌿 **Bars (Shelves):** Best for even coverage
- 🌿 **Panels (Tents):** Best for high PPFD (cacti, fruit)



Beam Angle & Coverage

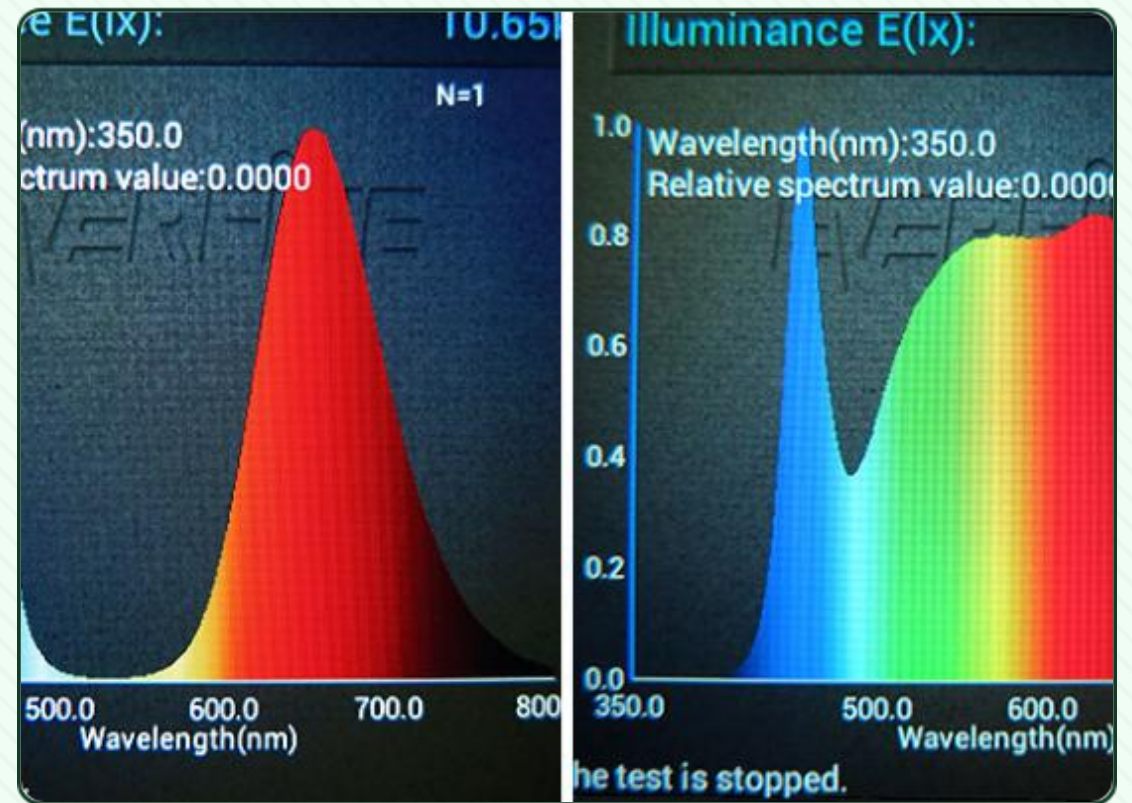
Legacy reflector



- 🌿 **Narrow beam:** Higher PPFD in center, weak edges
- 🌿 **Wide beam:** Even light, but less "punch"
- 🌿 Seed trays need even coverage (corners matter!)
- 🌿 Bulbs usually create a "hotspot" directly below

Spectrum Made Simple (No Jargon)

- Full-spectrum white works for almost everything
- "Blurple" works, but hard to see plant health
- Red helps flowering, but PPFD matters more
- Far-red can cause stretching if light is weak



LED vs Fluorescent

- 🌱 Both can grow plants well!
- 🌱 **LEDs:** More PPFD per watt (cheaper to run)
- 🌱 **Fluorescents:** Great for seed-start shelves
- 🌱 LEDs generally last longer and run cooler



How Much Light is "Enough"?

- 🌱 "Keep alive" is much lower than "grow well"
- 🌱 Seedlings & succulents need **more** than expected
- 🌱 Aim for target PPFD ranges at leaf height
- 🌱 Leggy? Increase PPFD or hours



Shop Bars or Grow Bars?



The Decision Rule:

- 🌿 If shop bars hit target PPFD evenly →
Good enough
- 🌿 If you need too many bars → **Grow fixture is simpler**
- 🌿 Tents reflect light, but don't rely on it alone
- 🌿 Always measure center + corners

Buying Checklist: What to Look For

✓ Look For

- 🌿 Real Wattage (from wall)
- 🌿 PPF or PPFD Map
- 🌿 Safety Certification (UL/ETL)
- 🌿 Beam Angle info

✗ Ignore

- 🌿 "1000W Equivalent" claims
- 🌿 Unverified spectrum graphs
- 🌿 "Magic" growth promises

Quick Recommendations

- 🌿 **Orchids/Aroids:** Bars (Shop/Grow) + Measure
- 🌿 **Seedlings:** Higher PPFD + Even Coverage
- 🌿 **Succulents:** High PPFD (Grow Fixture)
- 🌿 **Dark Corner:** Pendant Grow Bulb



Questions?

Ask anything about your plants or
lights.



Optional: Quick PPFD readings after talk

Stay Connected

 **Niverville Tropicals**

Follow my plant journey, get tips, and see updates from my collection.

@niverville_tropicals



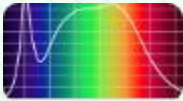
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Image Sources



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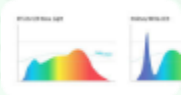
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Image Sources



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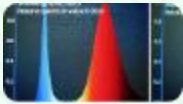
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Image Sources



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Source: www.ledgrowlightsdepot.com



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Source: albopepper.com



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