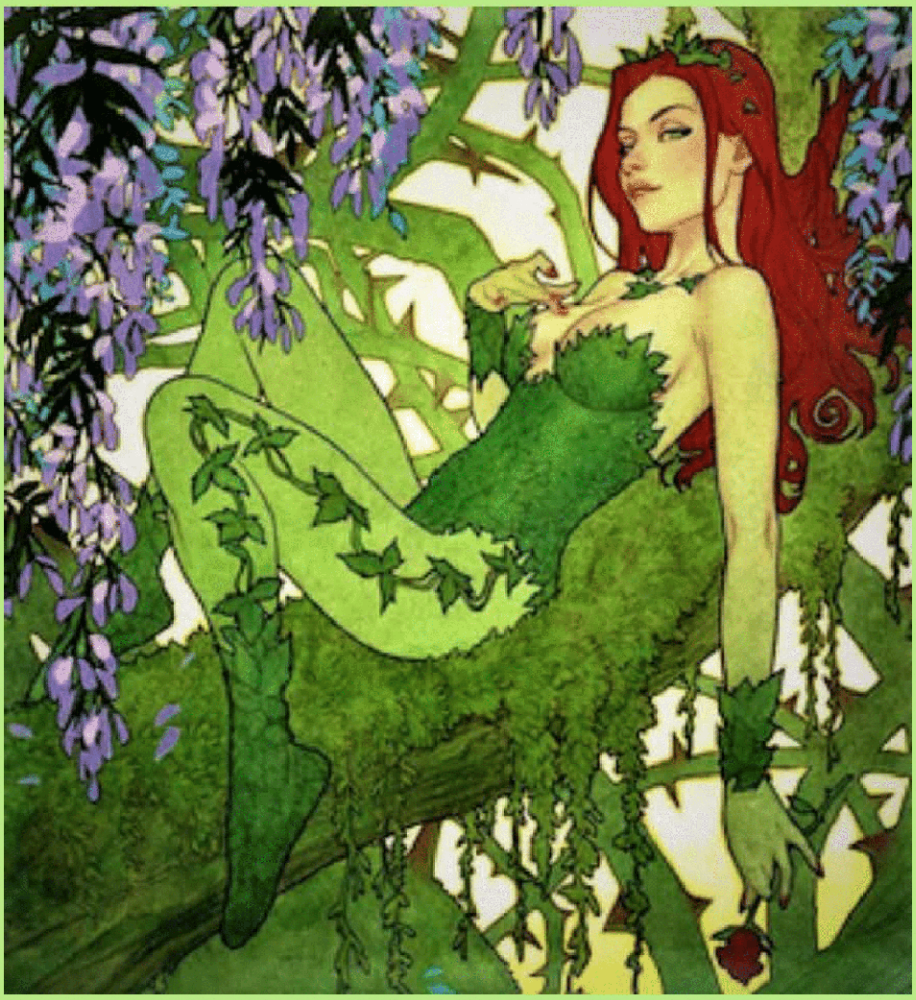
Poison Pothos!

Are your houseplants toxic to your fish?



Poison Ivy by Joshua Middleton for DC Comics

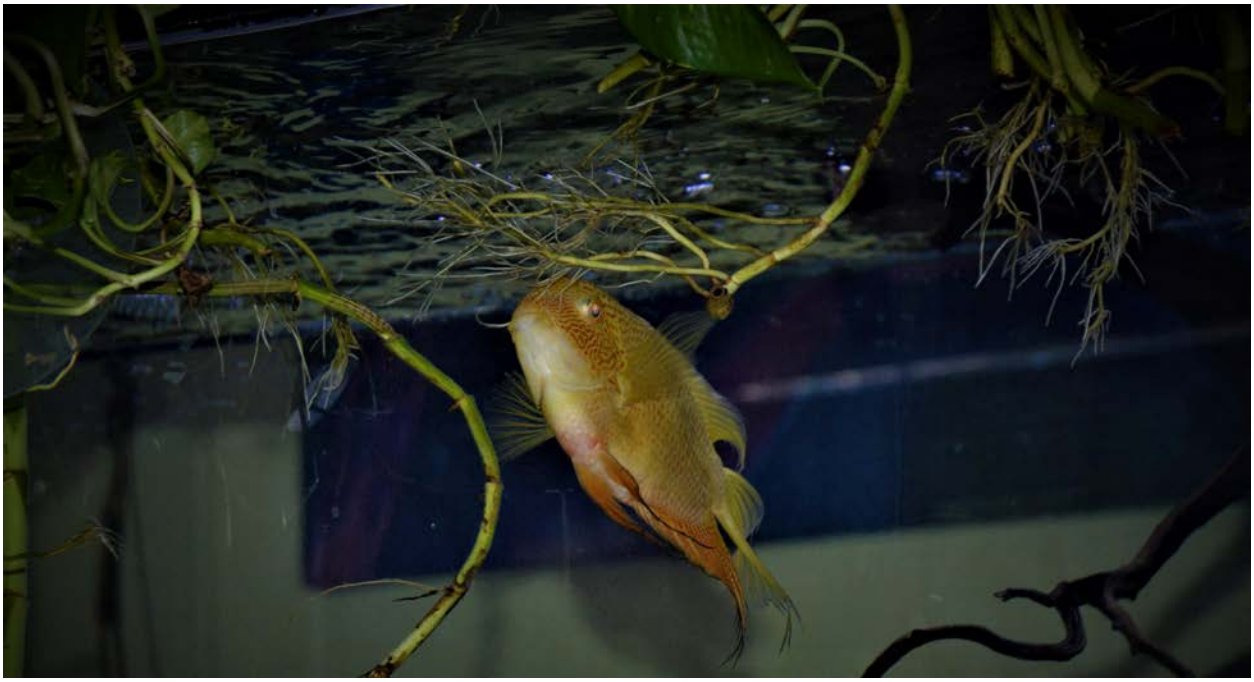
When you decide to use terrestrial plants in your aquarium, how do you know which plants are safe?

https://www.reverserespiration.com

Poison Pothos

(Epipremnum aureum)

One topic that will no doubt be raised when considering using terrestrial plants in aquariums, and rightfully so, is the toxicity of certain plants and their utility in an aquarium. In particular, *pothos* is thought to be toxic to some animals.



But in truth, nearly ALL plants such as Epipremnum aureum (pothos, sometimes known as Devil's Ivy), monstera, peace lilies, anthurium, or even riparian plants, have this same 'toxin' throughout the entire plant, leaves and roots. The 'toxin' is **calcium oxalate**. It's not actually toxic to fish due to its insolubility in water with a pH that supports fish. It requires a very acidic environment to leach into the water as it becomes soluble at <= pH 4.5. Above 4.5 it remains crystalline, which is the actual issue for dogs and cats, as the crystals can cause irritation or sores in mammals.

But even if it manifested any toxicity, if your pH is *above* 4.5, it cannot leach into the water as it's insoluble.

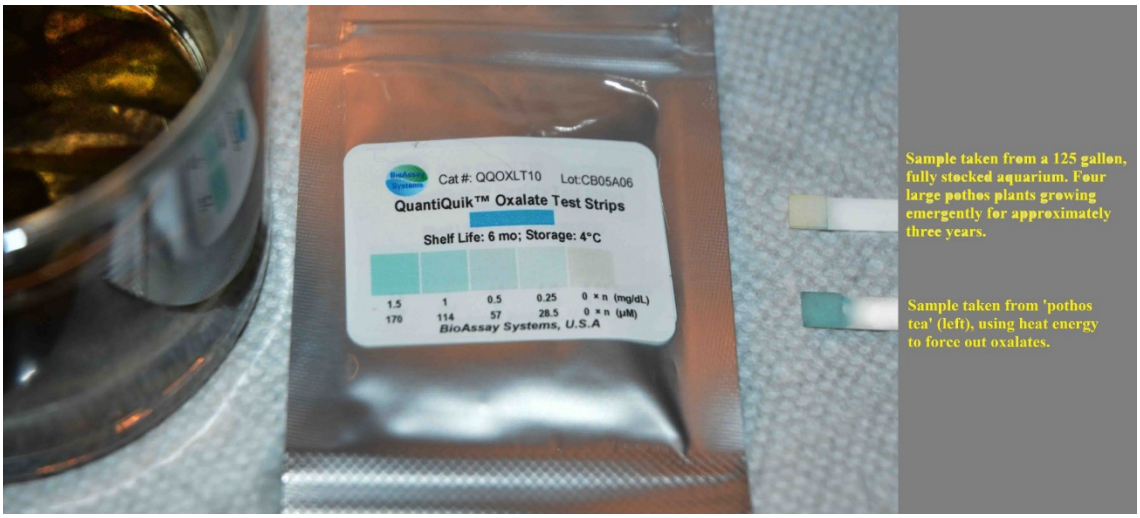
Significant solubility doesn't occur until the pH is under 3.5.

Should you harbor any doubts or concerns about using terrestrial plants due to this issue, you can actually test for the toxin yourself with simple, *home urinalysis test strips* such as the one below. These are calibrated in *mmol's* such that conversion to PPM would be required had we needed an absolute value, but we don't need one.

Below is a **Home Urinalysis Test Strip**. This indicates how much oxalate is present in urine and is used to determine the risk of kidney stone development.

Oxalates, as indicated above, cannot leach into water without additional energy being applied. If the water *pH is 4.5 or lower,* there are free electrons suppling this energy. Since this is far from the pH in most tanks (the test tank is pH=8), we made a 'tea' using heat energy to drive the oxalate from the pothos leaves (left). If ANY oxalate leached, the strips

would develop some blue color. If no change, the oxalate stayed in the plants:



[QuantiQuik Oxalate Quick Test Strips (10 Strips): Industrial & Scientific]

The test aquarium was a 125 gallon, overstocked cichlid tank with four large pothos plants. These have been growing out of the tank for approximately three years. If the tank's pH was indeed low enough to

dissolve the calcium oxalate crystals in the plants, calcium oxalate becomes **oxalic acid** when dissolved in water, which ironically is not toxic at all. In fact, if you've ever given your fish any fresh greens, in particular dark greens like spinach, you gave them oxalates.

Anecdotally, for what it's worth, the local fish store owners who facilitated the test below have actually not seen an incident of toxicity with epipremnum plants in any of their aquariums nor their customers. You may read the results of the original test here:

Alternative Nitrate Reduction via Emergents - Photos, Videos & Journals - C.A.R.E. (aquariumcoop.com)

In brief, there is no toxicity issue in using most terrestrial plants in freshwater aquariums.