

PermaClone™ Manual

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The PermaClone method yields consistent, perpetual success with hydroponic cloning systems. If a cloner is currently having slow root formation, follow **Regenerating A Failing Cloner** found on the last page. Once complete, start with step 2. of **Cloning with PermaClone Collars**, below. Don't void our warranty, follow our guidelines for sterilizing PermaClone Collars.

 **STERILIZE BEFORE FIRST USE** 

Cloning with PermaClone collars:



1. Fill your cloner with tap water and add 5 mL/gal (1 tsp/gal) bleach. With PermaClone collars in place, let this solution circulate 8 - 12 hours or overnight. Oxidizers are best at Low dose, longer exposure times.
2. Next, rinse your PermaClone™ collars in tap water. Our collars' open shape ensures exposure of all surfaces with a quick dunk-based rinse in 5-gallon buckets.
3. Last, choose **ONE** of the following sterilization techniques:
 - **Microwave:** Add 6 – 180 PermaClone collars in a loosely closed microwave safe container or True Liberty bag. Add ½ - 1 cup water and microwave at 1000 watts for 15 min.
CAUTION: (1) The container used must be loose enough to allow excess steam escape.
 (2) Ensure the bag or container doesn't touch the top of the microwave.
(3) Place a rag or paper towels between the True Liberty Bag and microwave's glass.
(4) Do not use ties provided with True Liberty Bags.
(5) Do not exceed 1000 Watts.
 - **Dry heat sterilization:** Bake collars at 300 °F (150 °C) for 1 hours on a cookie sheet or similar.
CAUTION: (1) DO NOT go over 300 °F (150 °C). The food-grade dyes will slightly darken.
 (2) Ensure your broiler (the top heating element) does NOT activate during baking.
(3) Ensure PermaClone Collars are 5-6 inches (15 cm) from heating elements.
(4) Ensure PermaClone collars are shielded from direct heat with a cookie sheet or similar.
 - **Chemical Sterilization:** PermaClone's chemical resistance and shape allow for dunk-based chemical sterilization. We recommend complete submersions in water containing 0.10mL/gal (2 drop/gal) concentrated dish soap and 5 mL/gal bleach. Soak for 8 – 12 hours or overnight. PermaClone collars are compatible with peroxide, peroxyacetic acid, and hypochlorous acid products. Please contact us when using alternatives.
 - **Pressure Cooker:** Ideally done in a loosely closed Chicken or Turkey bag at 15 psi, 30 minutes. Follow your pressure cooker's use and safety guidelines.
CAUTION: (1) DO NOT rapidly cool or depressurize Pressure Cooker.
(2) Ensure there's enough water to last for the entire sterilization cycle!
 - **Autoclave:** 15 psi, 121°C, 30 min following your system's manual.
4. With sterilized PermaClone collars ready, fill your sterilized cloner with water below 200 ppm. DO NOT add nutrients, additive, or pH adjusters until **Step 7**. First add one of the oxidizers listed in TABLE 1, below, at the dosage listed under **Primary Treatment**. NOTE: These dosages are safe for unrooted cuttings.

TABLE 1: Oxidizers & Dosing for Hydroponic Water Treatment

Oxidizer	Primary Treatment	Secondary Treatment
8.25% Sodium Hypochlorite (Bleach)	0.1 mL/gal (2 drops/gal)	0.1 mL/gal (2 drops/gal)
Hypochlorous Acid (e.g. UC Roots™)	5 mL/gal	5 mL/gal
29-30% Hydrogen Peroxide (e.g. H ₂ O ₂)	1.5 mL/gal	1.5 mL/gal
Peroxyacetic acid (Zerotol® 2.0)	1.9 mL/gal	1.9 mL/gal

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- Next, insert the collars with gloved hands and circulate treated water while you add your cuttings.
- Once ALL cuttings are in place, **BOOST** your oxidizer of choice at the rate outlined under **Secondary Treatment** in the TABLE 1. Circulate for a few minutes before step 7 to ensure all cuttings are surface sterilized. Oxidizer dissipate quickly and this double treatment ensures everything, including cuttings, are surface sterilized.
- LAST, add your additives. Pick **ONE Hormone Product AND ONE Mineral Nutrient** from the table based on your hydro store's stock. Contact us at info@permaclone.com if you have an alternative in mind.

Hormone Product*	Dosage Range	Mineral Nutrient	Dosage Range
Hormex Liquid Concentrate	1.5 – 3 mL/gal	Clonex® Clone Solution	20 – 40 mL/gal
KLN Cloning Solution	5 – 15 mL/gal	General Hydroponics®	
		FloraMicro	2 - 3 mL/gal
		FloraBloom	3 - 5 mL/gal
Rhizopon AA Salts	0.15 g/gal – 0.4 g/gal	Cutting Edge Solutions	
		CES Micro	2 - 3 mL/gal
		CES Bloom	3 - 5 mL/gal

* Reduce Hormone if you achieve over callousing. Some strains will respond more than others.

TIPS & CONSIDERATION WHEN CLONING:

Water Source: Clone with water under 200 ppm (500 scale; or 0.4 mS) TDS. Well water can contain pathogens and/or excess mineral content. If you use well water, water treatment (discussed below) is required and possibly reverse osmosis treatment if too high in minerals.

Water Treatment: Upon filling your system (but absolutely prior to ANY additives, nutrients, or clones) add 0.10 – 0.20 mL/gal of 8.25% Bleach® (2 - 4 drops/gal). This yield 2 ppm free chlorine, doses used in water treatment or swimming pools. It is very important oxidizer are added **BEFORE pH adjustment or additives** because they react and become ineffective. The goal is to focus their low doses on surface sterilizing your system and cuts. Most municipal water suppliers treat potable water at 4 ppm free chlorine. 2 – 4 ppm hypochlorite is safe for non-rooted cuttings. Once callous or root tissue forms, use 0.5 – 2 ppm free chlorine.

Hypochlorous Acid Products: Products like UC Roots™, Clear Rez™, or Watermax™ are effective at 10x – 100x lower chlorine concentrations than hypochlorite salts such as Pool Shock (calcium Hypochlorite) or Bleach (Sodium Hypochlorite). Hypochlorite cannot be dosed the same as Hypochlorous acid products. Hypochlorite products (such bleach) require **0.5 – 2 ppm** free chlorine in hydroponic culture, while Hypochlorous acid is effective at **0.05 – 0.5 ppm**. Pool test strips are a convenience way to verify free chlorine when using Hypochlorite salts. The most important rule for all oxidizers is they should be added BEFORE additives OR pH adjustment to focus their minimal oxidation on the system and cuts before reacting with additives.

Cloner Nutrients: Adding low strength bloom nutrients (200 – 600 ppm or 0.4 – 1.2 mS) improves rooting in speed and volume. We recommend nutrients intended for water culture. Avoid product which will inoculate or feed bacteria/fungi such as amino acids/protein hydrolysate, sugars/carbohydrates or “teas”. Do not add beneficial bacteria/fungi. There may be “safe” strains, but we haven’t found anything offering long-term effectiveness.

Hormone products: Auxins improve rooting time and volume, but gels and powders wash off and are time-consuming to apply. Water soluble hormones such as Hormex Liquid Concentrate, Rhizopon AA Salts, and KLN Cloning Solution each ensure adequate exposure times and eliminate workload of powders and gels.

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Water Temperature. In clonal propagation, warmer temperature speed cell divisions with diminishing returns at **87 °F (30 °C)**. However, this also speeds growth of bacteria and fungi. **Deep Water Culture (DWC)** use lower temperatures to improve oxygenation. The convention is currently 65 - 68 °F. For DWC and Aeroponic cloners we recommend **75 – 85 °F**. Use an **IR Thermometer** to quickly measure the temperature from outside of cloners. This is fast and prevents contamination. External IR readings will be within 0 – 2 degrees below the actual internal temperature. This range depends on the ambient room temperature. If your ambient temperature is 75 °F/cloner at 87 °F, IR readings may be 85 °F. Alternatively, at ambient temperature 75 °F/ cloner at 77 °F readings will be relatively precise.

Pump Cycle Times: Cycle timing is primarily used for temperature management caused by pump overheating the water. Through extensive testing we have found faster rooting at warmer temperatures with diminishing return above 87 ° F (31 °C). We suggest 75 – 85 °F (24 – 30 °C). Changing how long your pump is on vs off will help manage your temps. 45 min on/15 min off = 25% reduction in pump on time. 30 on/30 off would be 50% less pump time. Find the ratio that work for your cloner.

More Nodes & Shoot Apices: The more nodes left untrimmed above the collar, the more endogenous (natural) auxins will be produced and sent to the basal (bottom) end of the cuttings. The goal is 3 – 6 nodes left uncut above the collars. Another trick is to remove the top two leaves attached to the top apex of the cutting and leave the remaining leaves intact on the lower nodes. Completely trim all notes that will be within or below the collars. We recommend 2 – 3 nodes completely trimmed below the collar.

Avoid removing leaves: Cutting fan leaves has traditionally been intended to decrease transpiration, but that's not a concern in water culture. I recommend removing the two small leaves at the very top of the clone, the two leaves attached to the "terminal apex". Only trim additional leaves to avoid shading other clones or if the cutting is over-fed nitrogen.

Light & Spectrum: The general suggestion is minimal lighting. People often place a couple T5 fluorescent 1 – 2 feet above the cloner canopy. Over time we noticed shaded clones rooted slower or failed. We ramped up lighting to 4 bulb T5 fluorescent fixtures at 4" (10 cm) from the cloner canopy and achieved significant improvements in cloning rates with our recipe. 4000K light is more effective than 6000K T5's. This may be explained by research supporting red spectrum (650-700nm) and reduced far red (700-750 nm) for cutting propagation; a ratio found in the 4000K spectrum.

Callus Tissue: Non-specific plant tissue that may become different tissue types based on environmental factors or plant growth regulators. If you achieve extensive callusing, but root initiation lags, change the water, add your oxidizer according to **Table 1** (let circulate cloner for 1 min) then add your mineral nutrient alone according to **Table 2**. DO NOT add hormone product and prolific roots will initiate within 24 - 48 hours. Next cycle decrease your hormone dosage. Over callousing may also indicate you have a pathogen problem.

Mother Plants: Maintain mother plants on a low strength nutrient (TDS: 300 – 400; EC: 0.6 – 0.8 mS of base nutrients) while maintaining normal doses of Calcium (Ca) and Magnesium (Mg). Potassium Silicate (or Silicic acid), amino acid/protein hydrolysates, kelp-based products or etiolated seedling extract products are acceptable additives. Aim for a total TDS of 500 – 600 ppm (EC 1.0 – 1.2 mS) with additives. The goal is to minimize nitrogen to focus the plant on root generation and carbohydrate storage. Foliar applications of kelp-based products 4 – 12 hours before taking cutting boost natural auxins, improving rooting speed and volume. Foliar auxins travel downwards, towards the root system at rates of cm/hr. 4 – 12-hour timing ensures highest levels in the cuttings.

Water softeners swap random minerals for sodium ions. This because sodium salts are highly water soluble and will not leave deposit on home appliances. Calcium salts will leave deposits. Meanwhile, sodium (Na) is not needed in hydroponics and will antagonize essential plant nutrients such as potassium (K). If you use a softener, take note of the TDS/EC of Sodium. Reverse osmosis (RO) filtration is a cost-effective method to reduce mineral levels. If mineral content is high, your RO system (within a few uses) will only be able to reduce mineral content by 90%,

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leaving 10% residual mineral. For example, if your water source is at 500 ppm, you may end up with 50 ppm residual mineral content. And if a water softener is employed, that is 50 ppm of sodium ions. In this situation, we recommend switching to potassium salts so flow-through will be potassium (K) instead of sodium (Na). Potassium softeners are often sold where Sodium salts are found.

Regenerating a Failing Cloner

The following two changes will make sterilization between cloning cycles simple:

1. **Eliminate air stones and air-lines:** Eliminate air-stones for aeroponic systems. Simply having the air flow into the system, passing through the misters, is sufficient. For DWC systems, boil the air stones and lines between used for 5 – 10 minutes. For ALL system, add in-line AeroBlock™ Filters.
2. **Remove the back plate of your cloners' pumps,** found where the power cord enters the pump. It may require a flathead screwdriver to pop it off. Once removed, you will discover an orifice where enough liquid enters for pathogens to fester, but is not thoroughly flushed during sterilization!

Next, since your cloner has a biofilm or pathogen problem, you need to break-down and thoroughly clean your system. *With your parts disassembled, mix up a solution of 5 mL/gal 8.25% Bleach® (or 10 mL/gal 5.25% Bleach® solution) with 0.1 mL/gal (2 drops/gal) concentrated dish soap. Wearing latex or nitrile gloves, gently scrub and expose each part of your systems to bleach, knocking away biofilms. Consider all parts that may harbor pathogens: reservoir caps, bulk heads, grommets, gaskets and seals.*

This should include disassembling and clean your water pump and housing. You may find replacing the pump more convenient, just remember to remove the back plate on the new one!

Once reassembled, fill with HOT tap water and circulate. Not boiling water, just water heater maximums. Once cool, add 5 mL/gal Bleach and 2 drops/gal soap. Circulate for 24 hours, dump, and do not rinse the system. This should be the last time this amount of work is focused on sterilizing the system if you Follow the PermaClone methods.

Contact US

Reach out anytime for technical support on cloning!

info@permaclone.com

(800) 985-3730

www.PermaClone.com

Limited 5 Year Warranty

PermaClone™ (a trademark of PhenoSeleX, INC) offers a 5 year warranty on non-aesthetic functionality when used as outlined in official PermaClone publications. The warranty term is for five (5) years beginning on the date of purchase. Misuse, abuse, or failure to follow instructions is not covered under this warranty. PhenoSelex, INC will, at our discretion, replace the PermaClone collars covered under this warranty if returned to us preceded by email exchange to info@permaclone.com including a (1) a digital copy of the receipt or (2) forwarding the email receipt received upon purchase. If purchased through a third party, the warranty must be handle by the third party. The purchase date is based on the original PermaClone sales receipt. PhenoSelex, INC, at our discretion, may consider date of sale corroborated by a third-party seller in good standing with PhenoSelex, INC and its subsidiaries.