



St. Louis Greenhouse Plant Society, Inc.

Greenhouse Procedure Manual

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A. Beginning of Shift Duties

Use the shift checklist to help you remember these important functions.

1. Before starting work be sure to locate your name badge and wear it.
2. Turn on the lights or fans if necessary. It is important to ask someone familiar with the greenhouse operations if it is necessary to have the greenhouse fans on.
3. Sign in to the log book.
4. Open exterior doors and interior doors if necessary.
5. During your shift, check to make sure the mist irrigation system is working. Do this simply by taking note of the wetness of the pots and bench tops, as well as by watching to see if the misters come on periodically. If it isn't working and you know how to adjust it, then do so. Otherwise call for help and make a note that there was a problem. Plants on the misting tables are very delicate and can't go long without irrigation.
6. Check the "To-Do" list to see if something needs doing.
7. Make a note of supplies that are getting low or tools that need replacing or are missing.

B. End of Shift Duties

Use the shift checklist to help you remember these important functions.

1. Clean up tabletops, floors and planting tables. Use cans marked with a "T" for trash and the ones marked with a "C" for compostable materials.
2. Be sure to place the watering wands on top of the planting benches and off of the floor. This will keep them from leaking and getting dirty. Also keep the hoses out of the way of the corridors by coiling them up near the faucets.



Water wand on plant bench at end of shift

3. Turn off the faucets.
4. Take the fertilizer siphon tube out of the buckets and drape it over the faucet.
5. Shut all the doors between the greenhouses and the windows at the ends of the greenhouses. This will isolate each greenhouse from the rest and will help to control the spread of pests. Plus this will help preserve heat and moisture in each greenhouse should one of them become compromised (broken glass, door left open, etc.).
6. Turn off lights and fans if necessary.
7. Shut and lock the main door. It may also be necessary to shut and/or lock the back door or the garage doors.
8. Leave your name badge for next time.

C. Watering

1. The system

The watering system is set up with faucets, a hose and a watering wand at each end of each greenhouse. The faucets are similar to regular kitchen or bathroom faucets. There is both a cold and hot water faucet.

2. Water temperature

Plants should be watered with “room” temperature water at roughly 70 degrees Fahrenheit. Typically turning on just the cold water faucet is sufficient, but in cold months it may be necessary to use some hot water as well. Be very certain that the temperature is adjusted before watering plants.

The hoses are very long and it takes a while for the water to clear through them, so adjusting the temperature may take time and patience. While adjusting the temperature do NOT have the siphon tube in the fertilizer bucket since you will be wasting fertilizer while you wait for the temperature to stabilize.

3. Using the fertilizer buckets and siphon hoses

Each faucet has a small black siphon hose attached. When water rushes through the faucet it will create a vacuum in the siphon hose. If this hose is submerged in the fertilizer solution, then the vacuum will draw fertilizer solution up into the faucet where it will mix with the water and be sprayed out the watering wand. When you don't need to use fertilizer solution you should still submerge the siphon hose in a bucket of clear water. Otherwise the siphon will still work but it will be bringing in only air and that will make the water spit and sputter out of the watering wand.



Siphon tube in fertilizer bucket

4. Automatic watering system

Currently only the seedling/cuttings tables have an automatic watering system. This system operates misters that come on for a few seconds every few minutes (this misting rate can be changed). Not everyone needs to know how to reset the misting rate, but everyone does need to keep an eye on the misters to make sure they come on and that the plants are damp. Seedlings and fresh cuttings can't go long without moisture.



Misting sprayers on the seedling/cuttings beds in greenhouse #1

5. The water plant ponds

These ponds are maintained by certain people and it is not necessary for the rest of us to water them. However, if you notice that they are low, contaminated or otherwise compromised, let someone know.

D. Fertilizing

1. The system

Refer to the watering section for a complete picture of how the fertilizing system works.

2. Fertilizer packets

The fertilizer chemical will be pre-weighed and placed into individual baggies. Currently we are using 4 ounces (by weight) of Jack's All Purpose Water Soluble fertilizer in 3 gallons of water. This is a relatively light mixture since we fertilize frequently as is standard in many greenhouses. Generally annuals will need more fertilizing than perennials or more mature plants (such as the stock plants). This is because the fertilizer solution we are using has a fair bit of nitrogen and potassium which encourage top green growth and flowering at the expense of root growth. Perennials are better able to survive if they start out with good root systems.

3. Mixing the fertilizer

Take a pre-measured fertilizer baggie and dump it into one of the buckets under the faucets. Add the recommended amount of water. Mix it in well until the crystals have dissolved.

4. Fertilizer containers

Save the baggies that held the pre-measured fertilizer so that they can be re-used.

5. Water temperature

Adjust the temperature of the water coming out of the watering wand.

6. Siphon tube

Submerge the small black siphon tube into the mixed fertilizer solution.

7. Using the fertilizer

Use the wand to water the plants being sure to check to see if the fertilizer solution is running low. If it gets low, then you will need to mix up more. We are trying to save costs, so if you have fertilizer solution left over, see if someone else using a different bucket needs more. Generally speaking the solutions will all be the same.

E. Propagation

1. Propagating by Seed

- a. use a seedling soil mix (it should consist of very fine particles well mixed and homogenous), ask an experienced person to verify you are using the correct soil.
- b. pre-moisten the soil so that it can be formed into an easily crumbled ball, it does not need to be sopping wet (because of a phenomenon called surface tension it can be hard for water from the misters to penetrate into the soil unless it is pre-moistened).
- c. discuss with an experienced person which pots and trays should be used.
- d. most seeds do not need to be buried deeply; a good rule of thumb is to plant them at a depth equal to 2-3 times their length; for some seeds this means just sprinkling them on top of the soil, leaving them uncovered (this is one important reason why the soil should be pre-moistened since you will most likely wash the seeds away if you try to water them when they are small and uncovered, the misters will make sure the soil and seeds stay moist).
- e. labeling is extremely important (because we say so!), see the section below on labeling for details.
- f. place the seeded trays onto the misting tables (again, it is not necessary to water them by hand, especially the trays of small, uncovered seeds).

2. Propagating by Cuttings

- a. cuttings from plants will have stems and leaves, but be small; it is not necessary to have cuttings larger than 3-4 inches high; most of the leaves can be taken off or cut smaller (there are no roots to support a lot of leaves anyway)
- b. include a leaf node on your cutting (carefully remove the leaves from this node), the new roots will form from the cells of the leaf node (this is because plant cells are what we call pluripotent in that they retain the ability to become other cells if exposed to the right conditions).
- c. dip the leaf node into hormone powder (this will encourage those leaf node cells to become root cells, biology is amazing!); you do not need a lot of powder, just a quick dip resulting in a light dusting.
- d. find a tray of Oasis foam wedges and wet each wedge thoroughly by passing a hose across the surface several times (or you can submerged the whole tray into water); Oasis is a soil-less foam, the plants will go into soil when they are potted up.
- e. insert the powdered cutting into an Oasis foam wedge; the wedge will have a small hole in it to accommodate the cutting.
- f. labeling the trays is important, see the section below on labeling for details.
- g. place the cuttings tray on the misting tables (you do not have to water them since you wetted the Oasis wedges already); once root development occurs, the cuttings will be removed from the misting tables, potted up and allowed to grow on.
- h. most of our cuttings propagation is done in spring. We will also have a lot of stock plants that we can take cuttings from at any time.
- i. some plants such as Coleus are much less finicky and require less perfect cuttings.
- j. use clean and disinfected instruments to make cuttings, especially if you move from one plant to another; a 10% bleach solution is more than sufficient to disinfect cutting tools; make a 10% solution by mixing 1 part bleach with 9 parts water in a container you can dip your cutting tool into.

3. Propagating by Divisions

- a.** when plants become too large for their pots or we want to produce more of the same plant we will divide its root ball and then pot up the two divisions.
- b.** remove the plant from its pot and observe the root system; look for a logical place to make a cut through the root ball.
- c.** cut through the root ball as cleanly as possible, separating the root ball into approximately equal sections (you don't have to stop at two, you can cut a large root ball into 3, 4 or even more sections).
- d.** each division should be potted up into a container smaller than the original, a pot that's too large will mean that there will be too much soil (and water) for the now smaller root system. Use the recommended soil type (usually NOT the seedling mix).
- e.** water and fertilize according to the plants needs (it is not necessary to put these divisions onto the misting tables since they already have root systems).

F. Potting Up

1. Potting Up Seedlings or Rooted Cuttings

- a.** once roots have developed on seedlings or cuttings it is time to pot them up from their rooting pots (or Oasis foam wedges) into larger pots; the critical factor is how much water the small root systems can handle, a larger pot allows for more root growth but also stays wet too long, so there is a bit of an art involved in knowing when to remove small plants from the misting tables for potting up; we also have to be concerned with time and costs in that if we do the absolutely correct process of going from rooting containers to 2" pots, then to 4" pots and then maybe to a higher size, we will be spending lots of time and money; we have decided to compromise by letting the small plants stay on the mist tables a little bit longer than normal and then pot them up to 4" pots (skipping the intermediary 2" stage) and then be careful in our watering schedule (only watering if they need it, but not if they are still wet); by timing things correctly we should be able to leave most plants in the 4" pots.
- b.** use the recommended soil type (usually NOT the seedling mix) and wet it until you can form an easily crumbled ball. Ask an experienced person to verify you are using the correct soil.
- c.** fill the 4" (or other designated pot) about 1/3 full, then place the small plant into the pot and SUPPORT IT while adding more soil to cover the roots of a seedling or the Oasis wedge of a cutting.
- d.** put the pots into the appropriate tray, place them on the designated bench and water them in GENTLY.
- e.** labeling is essential and at least the tray must have a label, you will be told if each pot needs to be labeled. See the section below on labeling for details.

2. Potting Up Bulbs

- a.** bulbs will usually be potted during late winter.
- b.** use the appropriate container, tray, soil mix and planting depth as designated.
- c.** place the potted bulbs on the designated bench and water them in.
- d.** label the bulbs by following the detailed instructions in the section below.

G. Labeling

IT IS VERY IMPORTANT TO LABEL EVERYTHING

We have different people at different times and days working in the greenhouse, plus non-blooming plants often look alike (oh, and some folks can't identify the blooming ones either!).

1. Labeling Chemicals

- a. water (yes, it's a chemical!) should be labeled as such when it is in an unusual container such as a spray bottle (otherwise we don't know if it's a pesticide or someone's lunch drink).
- b. fertilizer should be labeled as "Fertilizer" with the concentration and the date weighed or mixed noted on label.
- c. pesticides will be labeled appropriately by the certified pesticide supervisor, we will try to use only pesticides manufactured for greenhouse use; pesticides will be applied at the end of a shift after most people have left and a re-entry sign will be posted (this sign lets you know when it is considered safe to re-enter a room where a pesticide has been used).
- d. soap solution (often used as a safe pesticide) should be labeled with an approximate concentration (usually about 10% or 1 part soap per 9 parts water) and have the date made on the label.

2. Labeling Pots and Trays

Pots and trays in the storage area will be labeled as to size for easy reference.

3. Labeling Stock Plants

- a. stock plants are plants that have matured over a growing season and that we will use to take cuttings from.
- b. label these plants with the following information:
 - plant's common name
 - plant's scientific name including varietal or trade names if these can be determined
 - name of person who brought in the plant (in case they want it back after cuttings have been taken); NOTE: stock plants are considered to be in the greenhouse for the purpose of taking cuttings, they are not there just for storage; however we can make an attempt to leave enough of the stock plant that it can be returned to its owner (or they can take one of the rooted cuttings).

4. Labeling Seedlings

- a. a newly seeded tray just needs one label for the whole tray, not each individual cell. If the tray contains more than one type of seed then more than one label will be needed.
- b. label the tray with the following information:
 - plant's common name
 - plant's scientific name including varietal or trade names if these can be determined
 - date when seeding took place
- c. once seedlings are ready to be potted up we will need to put a label in each pot that contains the following information:
 - plant's common name
 - plant's scientific name including varietal or trade names if these can be determined
 - distinguishing characteristics like color especially if the same species comes in many different colors
- d. sometimes we use commercially made labels and can use one hand written label per tray if waiting for the commercial labels to arrive.

5. Labeling Cuttings

- a. a new tray of cuttings just needs one label for the whole tray, not each individual cell. If the tray contains more than one type of cutting then more than one label will be needed.
- b. label the tray with the following information:
 - plant's common name
 - plant's scientific name including varietal or trade names if these can be determined
 - date when cutting was produced
- c. once cuttings are ready to be potted up we will need to put a label in each pot that contains the following information:
 - plant's common name
 - plant's scientific name including varietal or trade names if these can be determined
 - distinguishing characteristics like color especially if the same species comes in many different colors
- d. sometimes we use commercially made labels and can use one hand written label per tray if waiting for the commercial labels to arrive.

H. Stock Plants

These are plants that have grown for at least one season that we keep to take cuttings from. Often they are plants dug up from someone's garden, potted and brought in to the greenhouse. Stock plants can be perennials, annuals, tropicals and houseplants. Removing small portions of stems with a small number of leaves is called "taking a cutting". The cutting should contain a leaf node with its leaves carefully removed. The cells at the leaf node retain the ability to differentiate themselves into leaf, stem or root cells under the right conditions. We expose the cuttings to a root hormone to encourage those cells to become roots. Thus from one stock plant we can obtain several cuttings that will eventually grow into a full sized plant. Because there is no sexual reproduction involved these resulting plants will be identical to the original stock plant (this process is also known as cloning). These offspring of the original can also be cloned to get even more plants. Since you can keep this process going forever, it is easy to make many plants from one original.

1. Bringing in Stock Plants

Bringing stock plants into the greenhouse presents challenges in terms of pest control. All stock plants will be put into a quarantine area that separates them from other parts of the greenhouse.

2. Removing Pests and Labeling

Before bringing in stock plants they must be treated for pests in the following manner:

- a. thoroughly spray all surfaces (upper and lower sides of leaves, surface of soil, even the pot itself) with a shot of hose water as strong as the plant can withstand.
- b. all surfaces (upper and lower sides of leaves, surface of soil, even the pot itself) must be sprayed with a 10% solution of insecticidal soap (or a liquid dishwashing soap); a 10% solution is made by mixing 1 part soap with 9 parts of water.
- c. allow the first spraying to dry and then repeat at least once more.
- d. label the plant according to the instructions in the section on labeling.
- e. place plant in the designated quarantine area until it can be determined that it is pest free.

Shift Checklist

Start of shift:

- Wear your ID badge.
- Turn on lights or fans if necessary.
- Sign in to the logbook.
- During your shift, check to make sure the irrigation system is working. If not, then adjust it if you can or ask someone for help. Make a note that there was a problem.
- Check the "To-Do" list to see if something needs doing.
- Make a note of supplies that are getting low.

End of shift:

- Clean up tabletops, floors and planting tables. Use cans marked with a "T" for trash and the ones marked with a "C" for compostable materials. Be sure the cans are emptied at the end of the shift.
- Make sure water wands are on the plant benches, not on the floor.
- Turn off the faucets.
- Take the fertilizer siphon tubes out of the buckets and drape them over the faucets.
- Shut all the doors between the greenhouses.
- Turn off lights and fans if necessary.
- Shut and lock the main door (also check the back door and the garage doors).
- Leave your name badge for next time.