



Operations Manual & Helpful Tips Guide

Keeping you a successful and happy gardener is our goal

THE GREENHOUSE

When you think about owning a greenhouse you first must consider what you are going to use it for. The use will determine the size and type of greenhouse you should own. Since you have chosen a Solar Gem Greenhouse you most likely have decided to garden all year long. To do this it is necessary to provide the best possible climate. The best way to do this is to improve on nature rather than try to duplicate it. To accomplish this you must consider heat, water, including humidity and soil temperature, airflow and light. The degree in which you alter any of these must match the necessary requirements you need. In the Solar Gem Greenhouse most of these requirements are met automatically. However, there are some things you must do for yourself.

Placement - Your greenhouse should be placed in a position to receive the maximum amount of sunlight. The southeast corner of your house is usually the best position to place your greenhouse. The northwest corner is usually the worst place. While the Solar Gem Greenhouse will work better than others in any placement it will perform better for you if placed properly. Orientation of the Solar Gem Greenhouse should not be a big consideration of yours in regards to maximum sunlight because of the one-piece construction. The entire building is a light source maximizing the amount of light regardless of which direction it is pointing. Depending on the layout of your yard you might consider the elevation factor in placing your greenhouse. For instance, cool air tends to pool so if you set the greenhouse at the lowest point on your property it might cost you more to heat in the wintertime. Most importantly, it can become harder to create drainage inside the greenhouse if it is placed at lower elevations in your yard. Perhaps the biggest consideration should be how close you place the greenhouse to your house. Remember if the greenhouse is too far away from your house it can become a nuisance for you to walk out to it on a miserable day and it may cost more to run electricity or water to it if you decide to do so.

Foundation - To set your Solar Gem Greenhouse in place you need to measure the outside dimensions of the Greenhouse on the ground. This outside dimension should be 3 inches wider than the greenhouse you purchased. In other words if you purchased the 8' by 15' Solar Gem measure 8'3" by 15'3" on the ground. Then make your trench 10" wide (inside this measurement) and 3" deep. Try to make the trench as level as possible, this will make the greenhouse look best when placed.

Flooring – There are many types of flooring that may be used depending on your budget and the time you want to put into it. The ideal floor, especially if the greenhouse is placed in an area that has poor drainage, would consist of digging out six inches deep and laying a weed block or gardening cloth on the bottom. Cover the cloth with three inches of river rock or pea gravel topped with three inches of clean sand. Lightly cover the sand with a thin layer of crushed rock. This should eliminate any problems for the life of the greenhouse. There are other methods that are satisfactory and require a lot less work. Sand works quite well by itself. Crushed rock or lava rock may be used in a sandy or peat soil as long as it allows for drainage. You may also use raised beds on each side up to twelve inches deep with a stone or brick walkway in the center. In every case be sure to use the weed block before making your floor.

Helpful Tip – Avoid using a floor surface of light colored gravel or cement because the greenhouse could become too hot to use in the summer time. Mulch or sawdust can be used but you must be careful to watch out for bugs or fungus that can grow in this type of flooring.

PROPAGATION

With your new Solar Gem Greenhouse you can now start plants easily yourself without purchasing them from someone else.

There are three types of propagation. The first is growing from seeds. Instead of buying starters you can have enough for yourself and to give to your friends from one pack of seeds. For best results use a good potting soil or make your own. A good mixture must easily absorb and distribute water and nutrients to the plant and must be sterile.

The most common materials for a good mixture are peat, vermiculite, perlite, and sand. Different plants have different needs but the best general mixture is to leave out the sand and use an equal amount of the other three. The mixture has no nutritional value so you must supplement frequently with liquid fertilizer. Water washes out the nutrients so the more you water, the more you fertilize. On the average, fertilize every two weeks. If you want to grow plants to maturity in a sterile mix try using one of the two following mixes;

- 1 bushel peat, 1 bushel fine sand, ½ tablespoon potassium nitrate, ½ tablespoon potassium sulfate, 15 tablespoons dolomitic lime, 5 tablespoons super phosphate (20% powered) and 1 teaspoon chelated iron.
- 1-bushel peat, 1-bushel vermiculite or perlite, 10 tablespoons ground limestone, 5 teaspoons super phosphate, and 15 teaspoons 5-10-5 fertilizer.

Be sure to mix well and let set for a couple of days before using. If you find another mixture that includes garden soil you can sterilize it if you want. The easiest way to do this is to put it in an oven at 350 degrees for 10 minutes. Use a shallow pan and don't do it in the kitchen or the house will smell for days.

SEEDS

When you purchase seeds be sure to buy only the best available or take your own from good healthy plants. Bargain seeds are often taken from diseased plants and the seeds will also be diseased giving you lots of problems.

Always follow the directions on the package because some seeds need to germinate in the dark and a few minutes of bright sun will cook them.

Most new gardeners want to plant as many seeds as they can in a small area. Doing so will cause them to choke and not grow properly. When a seed package calls for spacing be sure to follow the directions. When planting very tiny seeds the best method is to hold them in the palm of your hand and gently blow them across the tray or planting area. The eye dropper method takes too much time and doesn't work as well. Large seeds with a hard shell such as pumpkin or corn will grow much faster if you clip off a corner with a pair of fingernail clippers before planting.

Most bedding plants prefer a fairly constant temperature of 75 to 80 degrees until germination. After they begin to develop the temperature may be reduced to 65 during the day and 55 at night. If you live in an area where the temperature is well below freezing in winter, make sure you have sufficient heat to maintain the climate you want.

Water seeds often and lightly. Do not soak. Soaking will wash away the seeds. A sprayer works best. Begin fertilizing weekly with a weak solution such as seaweed or rapid grow. Over fertilizing in winter or early spring when light is at low intensity will cause plants to become leggy. A 15-15-18 mixture will encourage root growth and produce healthy foliage.

The first leaves are seed leaves. Do not transplant until the true leaves form. If you are planting a lot of seeds you will have more luck by using flats and separating the seeds. For difficult transplanting, use peat pots or homemade newspaper pots that can be put into the soil intact without disturbing the roots. Always transplant at the same depth except for plants with fine hairs on the stem such as tomatoes. These should be planted as deep as possible because the hairs are potential roots. Gently firm the soil to prevent air pockets. Water with tepid water and create some shade until they get over the shock. Bring the plants in at night for a few days to harden them before leaving them out for good. If you are using egg shells or peat pots, do not rely on them to rot. Break them up slightly when planting.

CUTTINGS

Some plants will take by putting them in a glass of water while others require much more care. Take your cuttings from healthy pest-free plants. Pinch off all flower buds. Never use compost or garden dirt for cuttings. It is too heavy to allow good root growth. A warm temperature and high humidity are important but intense light is not necessary. In your Solar Gem Greenhouse the conditions are usually right for rooting but it is very difficult outside or in the kitchen.

Remember it is important to take cuttings from only healthy plants and to sterilize your tools. Use a marker to label the cutting. Include the date and the type of rooting solution. This information will help you later so you will know when the roots are taking hold. Cuttings that contain a lot of sap, such as cactus plants, should be dried out for a few days before planting.

Softwood cuttings should be taken in spring when they are producing new growth. Semi-hardwood cuttings should be taken in the late summer and fall, and hardwood cuttings in the winter when the plants are dormant.

When taking a cutting, cut off 3 to 6 inches with a razor blade or a very sharp knife. Remove most of the leaves, flowers, and buds. Do not let them dry out. (Note: Some plants like geraniums, for instance, are less apt to rot if allowed to dry for an hour before planting).

PROPAGATION FROM DIVISION

Some plants form suckers. Just remove these and replant with the same care as seeds. When plants have fleshy roots like iris cut off a portion with one or more eyes to get a new plant. Still others send out runners. Cut off a piece with a grow bud and plant it like a normal cutting. Be sure to use sharp clean tools.

If you are interested in layering or tissue culture contact a quality nursery for information.

FERTILIZERS

Although we recommend using soil-less mixtures for germination it is important to know that vermiculite is exploded mica and perlite is heated volcanic rock. Neither of them has any nutrient value. They are used to create air space and hold water. You must begin to fertilize as soon as the plants begin to form leaves. Your mixture must also be moistened well before planting.

When the leaves first appear begin with a very dilute solution that is high in phosphorous and low in nitrogen. You will have more problems by over feeding than by underfeeding. The same is true with watering. If the leaves start to turn purple or curl up it is from too low heat and not from fertilizer.

There are two types of fertilizer; organic and inorganic. Organic is something that once was living. It supplies nutrients at a slower rate and releases carbon dioxide which is good for plants. It will also contain many of the micro-ingredients that are necessary to the plants. Inorganic fertilizers release much faster but must be watched more closely because they can burn the plants.

PESTICIDES

Pesticides can also be organic or inorganic. One example of an organic pesticide is by using ladybugs to eat aphids. Another is by using plant material from an immune plant to protect another. Inorganic pesticides are sometimes dangerous to you and should be used only for a specific purpose.

One way to find out which pest is infesting your plants is to lay out some sticky cards similar to fly paper. Once you catch some of the pests you can take them to a nursery or other experts and find out which pesticide will help you the most.

Remember the saying, “an ounce of prevention is worth a pound of cure”. Keep your greenhouse clean, remove any diseased plants before they can infect others and remove any dead plants or weeds around the outside of the greenhouse. One very important step is to create a holding area for any plants you bring home and give them time to see if they develop diseases before putting them in the greenhouse.

To sterilize the soil in a pot you can submerge it in a tub of diluted diazanon until it stops bubbling. Soap makes a good remedy for many pests.

TOOLS

The following is a list of tools that can help you grow prize-winning plants:

- **Water Wand** – to reach the back of the shelf and hard to reach places. Whenever possible you want to avoid getting water on the leaves in hot weather.
- **Thermometer** – preferably a mini-max that will give you the temperature range. This will also show you the hot and cold spots.
- **Pruners** – these can also be scissors, exacta knife or razor blades.
- **Plant Labels**
- **Small 2 gallon sprayer** – (be sure to label it)
- **Magnifying glass** – (helps in identifying pests)
- **Notebook** – to keep records of your progress
- **Containers** – do not use metal. If you want to save money make your own from old newspapers. They can be planted right in the soil, as is.
- **Scoops** – make them yourself by cutting the bottom out of a plastic bottle.
- **Twine, Wheelbarrow, Clear Plastic Bags, Step Stool** – nice things to have around.

TIPS

1. Weigh your pots when wet. They will be about one third as heavy when the water is gone.
2. Pick up seedlings by the leaf and not the stem or you will damage them.
3. As a rule do not reuse planting soil.
4. Do not heat with kerosene.
5. For best results start plants with 15-15-18 fertilizer then switch to 20-20-20.

TROUBLESHOOTING

- **Temperature** – A cool greenhouse is kept between 45 and 55 degrees. A warm greenhouse should be between 60 and 70 degrees and a hot greenhouse should be kept between 70 and 80 degrees.
- **Humidity** – The average humidity of your greenhouse should be between 50 and 60 percent. Too damp encourages disease. If this happens increase air circulation. Too dry will affect your plant formation. If this happens dampen down the greenhouse.
- **Light (varies)** – Flowers need more light than foliage. Too little light – plants are leggy, have light green or yellow leaves, have underdeveloped flowers or too few buds. Too much light – plants have burned leaves, soil dries too fast or there is poor leaf development. Always check the package for necessary daylight hours. This is the only time it may be necessary to add a grow light.

- **Disease** – Usual causes – too much water, too little water, wrong light, too much or too little fertilizer.
- **Fungus** – Lack of ventilation, plants too close together, lack of sanitation. Also caused by bacteria.
- **Insects** – Aphids, white flies, and spider mites are the three most common in greenhouses. Aphids – small spec on new growth. Become 1/8 inch within a few days. Difficult to get rid of because they are born with a fertilized egg. White Fly – White, covered with powdery substance. Eggs are yellow cone shaped. You will find these on the underside of leaves. Spider Mites – Rusty specs on the underside of leaves.

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