



Greenhouses

Transcript – Shape & Location

Hello and welcome to Honor's Lab, Greenhouse Construction. This is module seven and today we're going to learn about the shape of your greenhouse, where to locate it and what orientation will be the best for your growing needs. So, most people are wanting a greenhouse so they can grow food in the winter months when the temperatures are cool or just downright cold. For me, I can extend my growing season from 120 days to 365 days with a greenhouse and some education. So that's a significant increase in the amount of time that I can grow food. So besides, I like to eat 365 days of the year. 120 days is just not quite enough. So, let's first consider the shape of your greenhouse. Most greenhouses are two to three times longer than they are wide, so for example, my little greenhouse is 40 feet long and it's 20 feet wide. The reason for this is so you can get the solar gain on your long side to get enough light for the plants and to warm the building. So, I've also been asked about the height of the greenhouse. So, most of you want something you can stand up in comfortably and some greenhouses are taller because of the span that the bows are trying to stretch. So, most greenhouses are between eight and 10 feet tall and I've found that in the shorter greenhouses, the heat has no place to escape and they get really, really hot inside. So, it's nice to have the heat collect above your head. So, greenhouses that are at least eight to 10 feet tall are really nice.

So, once you know your square footage, approximately 100-200 square feet per person, you can start to look at the shapes. So, if you're buying a kit, they will come in standard widths. Then you'll add the length that you want. For example, a frame might come in a 12-foot width, then the longest you would want would be 36 feet. So, most greenhouse frames, you can order in four to six-foot increments. Next, let's take a look around your yard to see what location you want to put the greenhouse. So, the angle of the sun and your latitude will determine how much light gets into your greenhouse. So basically, the sun has a higher arc in the sky in the summer and a lower arc in sky in the winter. So, the further away from the equator you are, the more exaggerated the arc from summer to winter. So, this is what makes the days shorter in the winter and longer in the summer. The other part of the sun equation is the angle that the sun is in the sky. So, in the summer, the elevation is higher making the light more intense and, in the winter, the elevation is lower, giving less light and less heat. The winter sun is the most important factor for your greenhouse. Another thing to consider is where buildings, trees and other obstructions will cast a shadow on your greenhouse. So, in the summer, a shadow might not be so bad, but in the winter, the shadow can drastically reduce your light and heat gate.

So, when considering where to put the greenhouse, think about the arc of the low winter sun in comparison to the shadows that may fall on your greenhouse. Also think about where the trees are, so if you have a deciduous tree, it will shed its leaves in the fall and let the light into your greenhouse. So, in the summer, the leaves will shade your greenhouse and give you a cooling effect. So, we have a big tree to the south of the greenhouse, and it does affect the light and the heat gate. Even in the winter, the bare branches do cut some of the light and the heat. So, if at all possible, don't have any trees to the south of your greenhouse. So, there's no one right answer for the orientation of your greenhouse. The orientation of your building will depend on a few factors: the style of your greenhouse, your latitude and climate and what space is available to you. So, if you want a pit or a solar greenhouse, most of those are insulated on the north and the big glazed solar gain wall is to the south. If you do an attached greenhouse, you may not have a choice of which direction it sits. If your only choice is on the north side of a building, then I would not do an attached greenhouse. The heat requirements and light requirements would make this a really bad choice and if there's only one spot in the yard where a greenhouse would fit, you may not have much choice where you put it. But if your whole yard is shady in the winter, I would not put up a greenhouse. I would just find some other place.

So, shifting 45 degrees off of south does not have a significant impact on the heat gain for your greenhouse. The greenhouse can still gain up to 90 percent solar light and heat at the 45 degree angle, so if your area has cloudy mornings and sunny afternoons, you might consider shifting to the southwest orientation to gain more of the afternoon sun. And if your location has sunny mornings and cloudy afternoons, then consider shifting the orientation to the southeast to catch more of the morning sun. So, I like the shift to the southeast because we have sun all day and the morning sun warms my buildings faster when I need the heat the most. The southwest orientation can overheat my buildings in the afternoon. I have three greenhouses oriented with the long wall east and west and two greenhouses where the long wall is north and south. So, let's take a look at each one and I'll explain the advantages and disadvantages to each orientation.

We're here next to the tomato house. It is about 9 o'clock in the morning. The sun is coming in, we're on the east side, we're just about to the fall equinox and as you can see the light is hitting this building really, really well on this side. The original consideration for where to put these buildings was space. We did not have room to orient the buildings with the long wall north/south, so we actually have three of our buildings in with the long wall on the east and the west which I found was really, really good for our location. See these are all free-standing buildings. You can see the sun is coming in. The sun in the wintertime comes directly in this wall; heats these buildings first thing in the morning and they're really nice to work in and then as the sun is setting in the evenings, I pick up all that solar gain from the west and we get heat into the building long into the evening in the wintertime. In the summer it doesn't matter; the fans come on. It vents all the heat out, but for us, here where we're at, this east/west is a really nice way to orient our buildings. And this building is sitting about 15 degrees east of south, so we are twisted just a little bit to the east, but a great way to orient. We get really nice heat in the morning times and I really like that.

All right, I'm standing here between the Odyssey and this is a solar house. These are both orientated with the long wall east and west. Same time of day as the tomato houses, about nine in the morning. We're right around the fall equinox and as you can see, the shadow from the Odyssey is up on the solar house and in the middle of winter, this shadow would be way up there. The solar house takes a lot longer to warm up then the Odyssey because of the shadowing effect. So, you want to think about how close you are to another building or structure so that you don't get that shadowing in the wintertime. So, if I had to do over again, I would probably move the buildings about another five feet apart just to help with the shadows that are falling on this building from the Odyssey in the wintertime.

Okay here we are at the little greenhouse. This is our pit greenhouse. It's got the insulated north wall. Half the roof is insulated, and this is our big southern wall. This is our solar gain wall. In the wintertime we can pull in quite a bit of heat into this wall, but what I notice is that this building is a little colder in the mornings than the ones with the east/west exposure and it does take a little longer for the sun to come around. It's just starting to come around. We're just starting to see little bit of light inside here. You can see that the sun is shining now on the plastic. So, if my goal is mostly the heat, the sun in the wintertime, this is a good orientation especially with the north being insulated because I don't want to lose any of the heat through the north. So, this orientation does work, it's just a little bit cooler in the mornings and this building is also tipped slightly to the east of south, so we do gain just a little bit more in the morning.

Okay we are standing next to the big greenhouse. This one is 30 feet wide and 100 feet long. It is oriented with the long walls north and south. The north wall is the passive thermal mass, so it does collect some heat that way, but this is not my favorite orientation for this building, a couple reasons why. In the wintertime it's the slowest one to warm up. It does not gain the afternoon heat. It's just kind of like cold all day long in there. Very, very different from the ones with the east/west orientation and part of that could be the thermal mass that we have in that building but I think a lot of it is just the way the sun comes in and in the wintertime, you can see the sun comes in the east end just slightly, but it takes til like 10-11 in the morning until we can get a lot of good sun on the south wall. And then if you notice, there's a great big tree. A great big tree that's been growing and growing and I don't have the heart to cut down this tree, but this tree with its branches and stuff blocks a lot of our solar gain and I think that's one of reasons -- another reason why this building is cold. So have even a deciduous tree on the south side of the greenhouse, not really a great idea; too much of a softie to cut it down, but if you have a choice, don't have any trees on the south side of your greenhouse.

So overall, my five greenhouses, my favorites are the ones where I can bring the sun in on the east side and collect that early morning sun and then also pull in the sun from the west side in the afternoons. I do gain that heat. It does warm the buildings really nicely and stuff grows really well in the wintertime for me. My least favorite is the big greenhouse where it's just cold in there all winter long. We have a hard time getting the snow to melt off the roof. Sometimes we're up there shoveling it and the little greenhouse with the solid north wall and no obstructions on the south side of the solar gain wall does a really good job in the wintertime. So, I do like that one; it just doesn't warm up as fast in the mornings.

To determine the best orientation for your greenhouse, you need to ask yourself these questions. Number one, how much heat and light do I need in the winter? Number two, when do I want the heat to come into the greenhouse? In the morning or in the afternoon? Number three, will anything block the light coming into the greenhouse in the winter? And number four, do I have morning sun or afternoon sun or all-day sun on a regular basis? So, your homework for this is to go out into your yard and look at the way the sun is shining across your yard and think about what light you would get in the middle of the winter. So, measure your spot to see if your greenhouse would fit and what orientation it would be. Consider if this is adequate for your growing needs. All right, this is the end of module seven and in the next module, we're going to learn about growing systems and if you want to grow your plants in the floor or in raised beds. So, I want to thank you for watching and I will see you in module eight.