Hello, and welcome to the Small Farms Podcast, a production of the Small Farms Program at Iowa State University Extension and Outreach. Our podcast covers the opportunities and challenges associated with rural life. In this episode, I visit with Joe Hannan, commercial horticulture specialist for Iowa State University Extension and Outreach on the effects of a colder spell in our weather on horticultural crops around the state of Iowa. I'm Christa Hartsook, small farms program coordinator, and we hope you enjoy the show. Joe, thanks for being back again.

Yeah, Christa. Thanks for having me again, today.

You bet. Joe, we're going to talk a little bit about some temperatures. Temperature, you know, the last couple of weeks has been really variable throughout the state. I know I was sitting in a football game one night, and it was 95 degrees. I was sitting at one the other night with a blanket on my lap. So you know, we really thought temperatures might reach freezing in the Upper Midwest by middle of September, but then we kind of got a little warm again. Are we getting closer, do you think to that likely first frost?

Yeah, we are getting closer some initial reports, were saying that we are going to have frost up in the middle of September and then that change quickly. And we got our nice hot days. And last couple of days have been more normal if you want to say normal. But we are expecting to
have frost sometime in the next two to four weeks, which is more on par with what we'd normally expect.

Christa Hartsook 01:44
Okay. So Joe, when we talk about that what kind of crops are going to require some protection from frost?

Joe Hannan 01:51
Well kind of depends on the weather that we see coming up here in a few weeks. I'll talk a little more about that in a second. But if you really look at cut and dry, the warm season crops like tomatoes, peppers, cucumbers, melons, they will not tolerate any frost. And they're the ones that are really going to need the frost protection if you want to extend the season. The cool season crops like lettuce, radish, any of the brassicas, they should tolerate a light frost and even a harder freeze. As long as we get a period of decreasing temperatures that we don't go from these 90s that we had a few days ago to freezing all within a week. As long as we get that spread out over the course of a couple of weeks. The cool season should be just fine. And it just be really those warm season crops like again, like the tomatoes, peppers that need protection.

Christa Hartsook 02:45
You bet. Do we still have a lot of farmers planting those cooler season crops, Joe as we're starting to wind down the season?

Joe Hannan 02:51
I don't know how many are still being planted as far as the cool seasons. But you can expect that if the weather stays there that we'll still see harvest going on upwards of you know, as close to Thanksgiving, maybe depending on how good the weather stays.

Christa Hartsook 03:06
Okay, great. So if farmers are looking at needing some frost protection, what can they do to protect vegetable crops?

Joe Hannan 03:15
Well, Christa, do they really have two options. One, they can either preserve the heat that's already there in our environment, or they can provide supplemental heat.
Okay, and when you say preserving heat, Joe, what do you mean by that?

Joe Hannan 03:29
I mean, we accumulate heat during the day with the sun. And then at night that heat is released and so it's protecting that heat that's released at night and keeping it down within our crop canopy. There's several different ways that we can do that or hold that energy down around our crop. The first thing you can do is a few days before we have a predicted frost coming is to irrigate the soil irrigate the plant beds irrigate in between the rows, wet soil will hold more energy than dry soil. So as that wet soil during the day will accumulate more energy. And then just like a battery at night it will release that energy up into the crop canopy providing some sort of protection. Now the caveat there is you have to have some sun outside in order for that to be effective and you need to start storing that energy a couple of days before a frost comes. That's not one of those things that we have frost come in and maybe your day to day and accumulate all that that energy again, it needs to be several days out.

Christa Hartsook 04:33
Okay.

Joe Hannan 04:35
Some other things that we can do going out particularly if you have a high tunnel greenhouse, is making sure that the building of the structure is sealed off that you don't have any air leaks or gaps in holes in the plastic gaps around vents, doors, baseboards, and walls, things like that. Make sure it's fairly well sealed up. It doesn't need to be perfect, but it should be a lot tighter than what you would have it just for normal summertime close up. And again, that'll hold a lot of that warm air within the high tunnel or greenhouse building. If you've got a high tunnel or greenhouse that has two layers of polyethylene plastic on top, make sure that the plastic is in good condition and that the ventilation fan the fan that blows in and separates these two layers is functioning and so that you have a nice air pocket between the two layers of plastic because it's not the plastic that's providing the protection is that air layer. So check out the fan, make sure all the plastic just sealed up and you're getting good insalation.

Christa Hartsook 05:45
All right.

Joe Hannan 05:47
So then, that brings us you know, to that day before that we have a frost you know, we have a day where it's cloudy, you're probably not opening up the high tunnel very much. But if we have a sunny day out, you're probably gonna have to open up that high tunnel so you don't burn up the crops. But come mid to late afternoon, you want to start shutting down that high tunnel maybe a little earlier than you normally would. And try to hold in again as much heat in
that structure as long as possible. So again, those are kind of high tunnel greenhouse things. If you're in the field, and, this can be used to high tunnels well, but you can also use spunbond polyester fabric products like Reemay or Agribon. They're they're basically blankets that will hold in heat but also allow some sunlight to come through. These work really well, they're they're effective. They're reasonable cost, they have a fairly good lifespan as long as you take care of them as long as you keep the rodents away from them when you're not using them. But outside in the field, those row covers polyester fabric material, you know, you can get two to three degrees of protection with the thinner type material, maybe five to seven degrees protection with the heavier weights material. The downside is it is extremely prone to being windblown. So you can imagine an Iowa trying to put out this big giant blanket on your crops outside can be a bit of a challenge, you're gonna need a weight it down. But it needs to be weighted down all the way down the row across the plants, Keep it keep it down. And then you know, you may have to take it off during the day, if we get a couple hot days we get a lot of sunlight, you can actually get too much heat build up under that fabric. So you may have take it off during the day. Inside the high tunnel, it's a lot easier to work with. You don't have any winds so you can just pull it across the plants going in tonight. Next morning, you can take it off the plants. So inside the high tunnel works a lot easier to use. It's also a lot more where there's a greater degree of protection, you know, I said two to three degrees of protection outside for the lightweight material. Well inside the high tunnel, you might have eight to 10 degrees protection on that same material. So there's a lot of value of using products like Reemay or Agribon inside the high tunnel to to provide frost protection.

Christa Hartsook 08:20
That makes a lot of sense, Joe and seems a lot less labor intensive inside a tunnel.

Joe Hannan 08:24
Oh yeah. Inside the tunnel This works great outside the tunnel, you better have some patients and some hands and some rocks.

Christa Hartsook 08:31
Yeah. So that's a little bit about preserving heat. Tell me a little bit about adding heat.

Joe Hannan 08:38
Well, Christa, as you can imagine, adding heat means using a furnace to supply heat, warmth to the area around the plants. Not something that you're probably going to use out in the field but again in a high tunnel can be very effective. Really where it makes sense to use heat over something like Reemay or Agribon for a little frost protection is when you have trellis crops like tomatoes or cucumbers where you can't really get Reemay up and over the plants very easily. So in this case, putting heaters into the building is a lot easier to do. Obviously there's some challenges and issues we'll try to talk about those. If we look at using heaters really in a 30 by 90 standard size high tunnel you're looking at having to have an output of about 40 to 50,000 BTUs under a hard freeze so you need to have something substantial you can't just have a little
single propane heater and make it work you're gonna have to have something larger like either a permanent furnace, you know I've seen diesel portable shock heaters used out there. I've seen the camp tight heaters that are mounted on propane tanks put out but again, with those You're not getting a lot of output per heater. So you're going to need three or four of those out there. You know, anytime you're burning something inside an enclosed building like that, if you've got, you know, those camp heaters, portable shop type heaters, all the ventilation for those heaters are actually going inside the buildings, you do have to be careful that you're not getting carbon dioxide, carbon monoxide buildup, or other gases. Ethylene is one that can build up quite often, that that can actually act on plants. Similar to herbicide drift, because definitely it is a plant hormone. So you gotta be careful a little bit with those. You also have to be careful when you're using those portable type heaters that you don't burn the plants either physically set them on fire, or just burn them with too much heat by having them having them set too close to where the plants are. And that's something I see very common in the springtime don't see quite as much in the fall is we're not not tendency to use them, the heaters quite as much in the fall. And that's, you know that the gas build up is really where we see the advantage of having some sort of permanent type furnace installed, the permanent furnace will vent out and away from the high tunnel, you can put some ventilation in through the high tunnel to move and circulate that air. But that's a significantly larger expense to have. And if you're just looking at one or two nights and frost protection, probably not the best bang for your buck. But if you're using it for spring production, turn it on in the fall for a night or two, you can be advantageous there.

Christa Hartsook 11:46
You bet. Those are all great points to consider Joe. And I would imagine somebody would really need to put pencil to paper to see if a furnace type would work in a high tunnel situation.

Joe Hannan 11:56
Yeah, one of the things to consider with putting a permanent furnace in the fall is we're already at a point where we're getting less, or reduced light quality and shorter days. So it doesn't make as much sense if you need to run heat all the time in the fall as it does in the springtime where you already have a lot of lights or not having to do supplemental light there as much. A couple safety things when when using heaters is good idea to have a carbon monoxide and carbon dioxide meter inside the building. So you have that alarm going off. When you go into the building, make sure you open it up and let it vent a little bit before walking into the building. Just again, kind of some safety things to be concerned with there.

Christa Hartsook 12:41
Makes sense. Joe, is there anything else we need to cover? You know, as we're going into a colder spell here?

Joe Hannan 12:48
Yeah, I guess one more thing I should probably mention on with adding supplemental heat is make sure you turn the heater on whether it's a portable system or a solid permanent system.
Make sure you turn the heater on whether it's a portable system or a solid permanent system. So that you're turning it on before you reach freezing, you know you're trying to maintain temp, you're not trying to heat a building back up. So if you want to maintain that 40 means you got to turn it on at 40.

Christa Hartsook  13:13
Good point. Good reminder for all of us.

Joe Hannan  13:15
Yes.

Christa Hartsook  13:15
All right. Well, thanks so much for being on Joe.

Joe Hannan  13:18
Yeah, thanks, Christa and always happy to come on and talk.

Christa Hartsook  13:21
Alright, thanks so much and we wish everyone great success on wrapping up a wonderful harvest season here.

Joe Hannan  13:27
I've been hearing nothing but good things. So...

Christa Hartsook  13:29
Thanks, Joe.

Joe Hannan  13:30
Thanks, Christa.