

Personal Weather Stations

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SPEAKERS

Christa Hartsook, Joe Hannan

C Christa Hartsook 00:15

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. I'm Christa Hartsook, small farms Program Coordinator with Iowa State University Extension and Outreach. Welcome to the small farms sustainability podcast. With me today is Joe Hannon, commercial horticulture field specialist with the Iowa State University Extension Outreach. Joe, welcome back. Always great to have you on.

J Joe Hannan 00:47


Yeah, Christa, thanks for having me on here again, today. I love coming in and having a chat with you.

C Christa Hartsook 00:52

So Joe, we both have quite a bit of interest in all things, technology related ways that we can make our jobs on the farm a little bit easier. And today, we're kind of talking about one of those components.

J Joe Hannan 01:04

Yeah, Christa, I love integrating technology on my farm. I like working with other folks integrating technology on their farm, I think it just makes life a little bit easier to take time upfront, and put some of that technology in place so that you can have a life elsewhere off the farm so that you can make informed decisions that you can manage your farm remotely. And that's why I kind of want to come on and talk to you today about personal weather stations.



C Christa Hartsook 01:31

I think it's a great idea. And definitely one where, you know, looking for any little bit of management expertise and efficiencies are a good thing. So let's start off by talking a little bit about what a personal weather station is.

J Joe Hannan 01:46

So Christa, this is my rough and dirty definition. A personal weather station is simply a bunch of, quote unquote tools integrated together that measure various weather variables such as temperature, humidity, rainfall, wind speed, direction, those type of things. And this is the big and is also affordable enough that you can actually have it on your own farm.

C Christa Hartsook 02:10

big kicker right there. Yeah, so talk to me a little bit about why a farm would want a personal weather station.

J Joe Hannan 02:17

Christa, there are two main reasons I think you would want to have a weather station on your farm. The first one is that weather data on the TV, on the internet, or wherever you get your information from is not from your farm, it's representative of what's going on in the area. But it's not exactly what's happening at your location, because there is a lot of variability due to hills, windbreaks, populations, pavement, all those different things on your farm, affect what's going on there. So when you have a cold event in the spring or fall at a frost or freeze you have when you have rainfall, there's tremendous variability that only you can measure if you have something directly on your farm. The other reason for having a personal weather station and this is what I'm really trying to push with the fruit crop growers I work with is using the information to model insects and disease basically predict when insects are going to be out and when you need to manage them, and predict when you need to do management for disease or basically when would you need to spray a fungicide for a particular disease that goes in conjunction with field scouting and weather data to pull together to do those models and determining when to take management. And that is regardless of whether you're organic regardless of whether you're conventional, you're still applying some sort of management tactic. And the more information that we have, the more precise we can be with those tactics.

C Christa Hartsook 03:53

That makes total sense. So in looking at all of this, Joe, I'm assuming that there are a lot of different options that are out there. What should we be looking for if we are going to purchase a personal weather station?

J Joe Hannan 04:06

So Christa there are kind of a whole host of things that I look at when I'm looking for a weather

station for the farm. And one is how am I going to access that data, and how is that data going to connect to me. There's two primary ways one is either connects via Wi Fi internet connection. So if you're able to put a weather station fairly close to the house where you can still get a Wi Fi connection, that'll be one way that you can connect to the data. The other is having a radio connectivity. So there's basically a radio signal that goes from the weather station to a module in your house and then it connects to your internet. So depending on where you actually have to put the station on the farm is going to dictate whether you can go with Wi Fi or radio the further the distance away from the house, the more likely you'll need to be with a radio connectivity station. The next thing I look at is what does it cost to get access to this data? A lot of times this is free, but there's no cost on a monthly or annual basis. But there are some weather stations that we'll talk about a little bit later that actually do have a cost associated with them on a monthly or annual basis.

C Christa Hartsook 05:17
Okay.

J Joe Hannan 05:18
So I also like to look at, does the station connect to like weather underground or some other third party network? Or does the station have its own private software that you can access the data via your phone or tablet or something like that? So it's all kind of characteristics that I'm looking for? I'm also looking for what does it cost? I don't want to spend \$10,000. But, you know, that I think gets beyond personal at that point.

C Christa Hartsook 05:47
Yes, I would agree.

J Joe Hannan 05:49
But I also don't necessarily want to spend just a \$200 station. And the reason being there, the more expensive the system, the more precise the instruments are, that are going to be measuring the data. So you know, I kind of shoot for somewhere in that \$500 to \$2,000 range, depending on what I'm all getting with that package.

C Christa Hartsook 06:09
Makes sense.

J Joe Hannan 06:10
And then the last two things that I look for on a personal weather station is a leaf wetness sensor, and rain buckets. So both of these are critical when you're looking at some of the disease models and trying to determine when you're going to have to do a fungicide

disease models and trying to determine when you're going to have to do a fungicide application. So rain buckets, are critical, leaf wetness sensors are critical for just some diseases. Okay, but not all, somehow, not all the stations will have a leaf wetness sensor.

C Christa Hartsook 06:37

And I'm assuming then Joe, we obviously want everything to relay to, you know, our own phone or our tablet, something that allows us some ease of use.

J Joe Hannan 06:47

Yeah, so that's why either look for Weather Underground, or a different third party connection that is supported by the company. Or if they have their own software package that has iPhone or Android apps, depending on what you have. I would look for something that has both iPhone and Android just because you never know what phone you're going to have next or tablet you're going to have next.

C Christa Hartsook 07:11

Yes, very true.

J Joe Hannan 07:13

Yeah, right now the system that I have on my farm, and a couple of the different systems that I work with for work, have both their own websites, I can log into the computer to get it, I can connect it to my tablet or my phone. Or I can connect it to weather underground or third party options. So there's three different options, even with just a couple of systems that I work with at home and with other farmers.

C Christa Hartsook 07:42

That's great. Yeah. You mentioned a little bit Joe about the specific sensors that a system is looking at measuring what are typically available.

J Joe Hannan 07:53

So temperature, obviously, that's probably the most common one. Humidity is probably the second most common than rainfall, wind speed, wind direction, soil moisture is not very common. But if it's important to you, it's going to likely be one of those stations, that's going to be more in that \$2,000 range to get that same with the leaf wetness sensor, you're not going to get a leaf wetness sensor, unless you're up on that \$2,000 station range. Those are the common sensors that'd be available.

C

Christa Hartsook 08:22

Sure. So then let's get into specifics here. What specific type of options are available out there for our farmers?

J

Joe Hannan 08:29

That's a complicated question, Christa, there's a lot of options. So the first one that I that I work with right now we have ISU has a station out at Will's family orchard. It's a spectrum technologies 2000 series station. And it has all the bells and whistles, temperature, wind speed direction. Rain buckets, actually has solar radiation, humidity, leaf wetness, soil moisture, the whole nine yards. What's nice about this station is it's plug and play everything just plug into the weather station, there's very little setup to do on your end. Basically, you just go in and tell the program. It's this type of sensor and slot one, this type of sensor in slot two, and we're down the line up to like about 10 or 12 different sensors. So there's a lot that can be put into that one. What's advantageous with the Spectrum Technology stations is they have built in insect and disease modeling packages through either their online web interface which I prefer, or a program that can download onto your computer, which makes it really easy to model a whole bunch of different insects and diseases based on the crops that you have. Obviously there's a cost with that. So the spectrum technologies 2000 series has roughly that \$2,000 range give or take a little bit and then you have an annual cost of \$500 which, in our case, that annual cost for \$500, is our software package was about 250 for that, and then the other half of that is our Verizon wireless network card, allowing us for access, the station is so far away that a radio signal or or a Wi Fi signal would not hit. So we had to go with the cellular modem in that case. super customizable to do what you need there, they support a ton of different crops, just about every single insect and disease model that's been published in research journals is available through there, great customer service. And generally I've had fairly positive experiences with that station. Okay. I should probably say, I'm not supporting any one of these. I'm just telling you how it is on a day to day basis of when you have to repair these.

C

Christa Hartsook 10:49

Yes, we probably should clarify no specific endorsements or implied here, right,

J

Joe Hannan 10:54

no endorsements, but I've had this particular station I've had for almost since I started extension, so 8 years ago, I think, and that I've had to make repairs to it and things like that. And when it's in warranty, it's no problem when it's out of warranty comes out on my bill, but you're gonna have that. So

C

Christa Hartsook 11:14

yeah. And maybe that's a good question, Joe, too, is how long should we expect something like this to last,

J Joe Hannan 11:20

but I think the life time of this spectrum station should be 10 or 15 years. The way it set up the module itself, I can change out all the parts. So my anemometer which measures wind speed, I took that in and had it rebuilt and replaced. Last year, I'm going to send the whole station in for not really repairs, but they're just going to go through and recalibrate make sure everything is fully working this fall. So I have a very long lifespan out of this. This is only your little modem I've had to replace a couple times because I keep getting hit by lightning out there. But that's that's a me thing, not a them thing.

C Christa Hartsook 12:01

Right. That's an Iowa thing.

J Joe Hannan 12:03

Yeah, that's an Iowa thing. So yeah. And you know, it's hanging on a piece of metal.

C Christa Hartsook 12:11

Probably not. No. So So that's option one. Yes, I'm assuming you have a couple more you'd like to kind of talk to us about

J Joe Hannan 12:17

I do. Yeah. So the the next one I'd want to talk about is a rain wise, MK3. This is the station that I have here at my farm. It has all the standards, sensors, except for leaf wetness and soil moisture. But I have a slightly cheaper version of that you can pay an extra \$200 and get the leaf wetness and soil moisture with that rain. Rain wise, MK3. So in hindsight, I wish I had but so that one must have been about \$500. So it was not very expensive at all. I'm still expecting to get several years out of it at least. The good thing is it's there's no setup to it. Literally you take it outside, you mounted a turn it on. And then you come inside and you plug in this the radio receiver and plug it into your internet router. And then I had to log on and actually register with a third party. So literally, there was no setup to this at all. Yeah, the advantage to this one is there's no ongoing fees. So I get access through the web app on my computer and the app on my phone for free. There's no cost or anything there. The downside here is that when it breaks, this is a unit component system, I think it's going to be cost prohibitive to send it in and get it repaired. I think it'd be cheaper to just turn around and buy a new one. Okay, not getting a lot of customer service there. Not to say that you couldn't. But I think by the time I sent today and got it repaired, I'd be about to the point where I can just buy a new one and

C Christa Hartsook 13:53

Buy another one. Yep, makes sense.

J

Joe Hannan 13:55

The rain wise does have like said you can get leaf wetness and soil moisture for an additional cost on some of the models. And I have a radio connectivity. But you can get Wi Fi or cellular modem connectivity with it as well. Not all stations support cellular modem connectivity. So that's, again, one of those. It's nice if your farm is not where you live, or something like that. The other downside with this particular system is data only. There's no modeling to it. So if you want to do modeling, that means doing it the old fashioned way through pulling the data down into Excel tables and things like that. I'll be very frank with some of the models with insects and things. That's not that big of a deal. Those are pretty easy to do, because they're just temperature related. When it gets into some of the diseases, we're finding there's a lot of tweaks to the disease models, anyway, that you need to customize them for Iowa. And so you're probably doing those by hand or on an Excel file anyway, so it's not a giant deal to have to pull it down and do that.

C

Christa Hartsook 14:59

Okay, so so just that makes sense.

J

Joe Hannan 15:01

It's just models aren't developed, and I will when it comes to diseases, and in order to make them actually work for us, we need to tweak them a little bit. We're windy and we're humid

C

Christa Hartsook 15:13

We are both for sure. Yeah.

J

Joe Hannan 15:14

All right. So I've done a fair bit of time here. So let me jump in and talk about a couple of the other stations. The other one that I see used fairly, fairly common is a Davis 6152 Vantage Pro, it will run you about \$1,000. There's a couple different models out there, the 6152. Vantage Pro is one of their nicer units, has all the same standard sensors that the rain wise and spec systems have, or Spectrum Technology system has, but no leaf wetness, and no soil moisture sensors on this one, it can be connected via either a radio signal only, or directly hardwired into your computer, which you have to bring it in and download the data. Yep, I think if you're on a radio receiver, you can set it up through some additional components that you buy separately and be able to plug into Weather Underground, but you're buying now multiple components in order to kind of pull everything together. And so as you can imagine, if you're not super tech savvy, or if something goes wrong in July, and you've got other things to do, it's not going to be a real simple solution to fix it. That's kind of my one hang up. Otherwise, similar to the rain wise, you have to download and pull the data into Excel sheets to actually do the insect and

disease modeling. This is the one station that I don't have, and they don't have a lot of experience. I don't want to rain on this parade too much. But it is an option out there. The Davis brand is pretty well known. So I expect its quality and lifespan to be fairly fairly good.

C Christa Hartsook 16:54
Sure. That makes sense.

J Joe Hannan 16:56
Okay, so we talked about the main systems that I would consider using on my actual farm. There are higher end systems either through Decin, or Campbell Scientific, the one through Campbell Scientific are what we have as part of the ISU soil moisture network. So if you look and go on Iowa State site, we have various weather stations across the state. And those are really nice stations, but they're 10 to \$12,000 apiece, and then you still have to do all the custom programming and things like that for them. So they're super nice. They're very accurate. The lifespan on those things is 15-20 years, I think. But probably not for personal on farm station not going to use it.

C Christa Hartsook 17:39
probably not Yeah,

J Joe Hannan 17:40
Either either one, then there's lots of lower end options. You can go to Amazon or any other place on the internet and find all sorts of options that are in that 150 to \$200 range, okay, you get what you pay for their sensors are not going to be as good as the spectrum or rain wise, or Davis systems are going to be a lower quality system, which means more room for error. Okay, one or two degrees isn't a big deal when you're doing an insect or disease model. But if you're trying to also track and monitor freezes or frost events, yeah, one or two degrees is big deal.

C Christa Hartsook 18:15
It's a really big deal.

J Joe Hannan 18:16
And then they're going to be a mixture of either connectivity through a proprietary app on your phone or tablet, or whether underground or some other third party connection, typically they're going to be connection through Wi Fi, cellular modem and radio connectivity is not likely going to be an option for those

C Christa Hartsook 18:35

and I would imagine maybe to a little bit shorter lifespan and a little bit less you know customer service on a replacement part per se Joe Versus just buying the whole new system.

J Joe Hannan 18:45

Oh yeah, that part you're just buying a whole new piece of it. There's there's no replacement part for for that costs, cost range but awesome if you're trying to put one in your high tunnel or your high tunnel in order to a you know what temperature is without walking outside because you still haven't got done drinking coffee in the morning. Or you are trying to determine wind direction and wind speed in your high tunnel and to determine what vents to open and close and things like that. So there's a time and a place for him and I just slightly too far from my Wi Fi signal currently Otherwise, I'd have one in my tunnel as well. But there's a time and place for them but probably not for your actual insect and disease modeling side of things.

C Christa Hartsook 19:27

Yeah. And the Wi Fi connection that's a really good point to to make that you know you. You can't have one clear across the section and expect your Wi Fi to reach

J Joe Hannan 19:36

Not without some additional components. You could set up and do some directional components to be able to to grab it and go but yeah, it's a radio option is going to be a better option if you're trying to reach across the section or something like that. And even then, like I have my radio receiver sitting like in my basement dugout window. Well, yeah, I have mine sitting there and I will lose connection on occasion with it. So it still needs to be somewhat line of sight. It'd be better if it was upstairs hanging out my bedroom window. But that's where my router risk portrait.

C Christa Hartsook 20:13

We had to pick one or the other, right? Yeah. Joe, what else do we need to talk about? If we're talking about personal weather stations? Are there any other final comments or tips or tricks for us that you really want to make sure we impart to our listeners?

J Joe Hannan 20:26

Yeah, so I really should have mentioned right at the get go of what crops have good insects and disease models to determine whether you really want to look at insect disease modeling. So our fruit crops our apples our grapes, and strawberries, we have insect and disease models for most of our major pest models, many of them are going to be pretty good. But the insect models also go hand in hand with an auxiliary event happening in the field, meaning you need to go out and scout and identify when egg laying is occurring. And then cumulate growing

degree days over time to figure out when the eggs are hatching and are actually causing damage, or something like that. So there's two parts to some of that. But something like anthraxnos on strawberries, that's just a moisture thing. So in growing degree days, that's pretty simple. We have models for some of our melon pest, we have models for sweet corn pest, obviously, with all the corn that's grown in the state, we have some models for some of our pest on pumpkins. So there's those more mainstream crops are more likely to find models that will actually specifically work. I want to make it very clear, though, that modeling does not get you away from actually doing a scouting in the field, you still got to get out and locate your crop.

C Christa Hartsook 21:42

Yep, we talked about very early on the whole point of having this was because there's such variability, you know, from what you're seeing on the TV or the internet, from farm to farm to farm. So it's a very good point.

J Joe Hannan 21:54

Yeah. And when I talk to I do a fair bit of Fireblight modeling with my apple growers, and what's going on in and around me, so I work with deals orchard and Will's family orchard two model Fireblight. Well, what's going on, and even just from Deals to Will's orchard, which are only an hour drive, and 45 minutes, north, south difference is not a huge difference. There's still a couple of days difference, and still differences in temperature and moisture. And then you spread that out across statewide. And there's huge differences. So calling your friend and seeing what's going on, isn't necessarily going to get you where you need to be.

C Christa Hartsook 22:37

Now, that's a good point. Anything else Joe?

J Joe Hannan 22:40

No, I think I've probably talked enough.

C Christa Hartsook 22:43

I think you're great. I think this is something that a lot of our listeners will be interested in and could see readily, you know, applying on their own operations. So good information today.

J Joe Hannan 22:52

Now that I have one on my farm, I check it multiple times a day just to know what temperature and wind speed and wind direction are coming. Sometimes I do it in the winter just to see how much clothes I gotta put on for going outside. And some of it is just trying to gauge how warm

it is my high tunnel and things so



Christa Hartsook 23:11

lots of good applications out there for something like this. Yeah. Joe, thanks so much for being on today. We appreciate it.



Joe Hannan 23:17

Thanks for having me, Christa.



23:18

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