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SPEAKERS

Ed Zaworski, Brandon Kleinke

B **Brandon Kleinke** 00:00

I see that plants podcast shares the stories of people in plants, pests and pathogens and the conflicts among them. Join us as we speak to the folks who are helping the rest of us live healthier, more productive lives through pest management research. We strive to make science accessible. I see dead plants created by the Crop Protection Network and hosted by Ed Zaworski. The Crop Protection Network is a product of land grant universities.

E **Ed Zaworski** 00:21

Welcome back to the icy dead plants podcast. As always, I'm your host, Ed Zaworski. And today, I'm joined by Wade Webster, PhD student at the University of Wisconsin. Just a brief background on Wade got his bachelor's and Crop Science at Montana State University. And he's doing his PhD, like I said, and Plant Pathology at the University of Wisconsin. How're you doing, Wade?

00:48

Good. Thanks, Ed, for having me on today.

E **Ed Zaworski** 00:50

Yeah. And you sent me a little brief background of kind of how you got where you are. So tell us tell us how you you made the jump to plant pathology. It's always interesting, because nobody, you know, as a five year old was like, Hey, I'm gonna be a plant pathologist.

01:07

Yeah, so growing up, so I'm originally from south southeast Iowa, eastern Iowa. And my my

mom's side of families, all farmers grew up, down, and I'm hanging out at my grandpa's farm my whole life. So I was always interested in agriculture, and grew up wanting to be a farmer. I ended up going to college with the degree in crop science, and then just kind of interacted with a couple of professors and Plant Pathology kind of took to my heart a little bit, thought it was interesting, that and plant breeding. And then I had an opportunity to come to Wisconsin, and I met Damon Smith, who I'm now working with, and we just really connected well, and things kind of gone for went from there.

E Ed Zaworski 01:55

Yeah, it's a similar story for a lot of us. And here we are in plant pathology is a great and helpful place to be. But yeah, today, we have Wade on because he's studying a pathogen called white mold. Up in Wisconsin, it's a pathogen of the upper Midwest. And it's very prevalent in Wisconsin, a lot of folks working on it up there. And we have him here to kind of give us a, you know, two parts here, we're going to do a brief overview of what white mold is, you know, how it affects plants, what it looks like, all that kind of stuff. And then we're gonna go into some current research that actually Wade himself is working on. So that's what you can expect today. So let's go right in and, and, you know, if, if there's something we missed, or if you want to read more about white mold, maybe you know, you don't pick up everything listening a lot, is the first part when we talked about white mold, kind of in a profile format is available on the Crop Protection Network website. So you can find it there. You can share it with your friends. But for now, we're gonna have Wade, tell us about it. So what what is white mold?

03:06

Wait, yes, so So what mold is caused by a fungal pathogen, so it is a fungus. It's called sclerotinia sclerotiorum. It's, it persists in the soil, so it survives in the soil for many years. And that's, that's going to be an important part of, of management here. But this particular pathogen, will then really spores on to the soybean or other crops, creating these these little white puff balls that kind of resemble cotton balls, leads to bleaching of the stem. So you'll see the soybean stem potentially turning white or brown in color, kind of getting soft to the touch and little squishy, and eventually leading to plant death. So that is white mold. It's a pretty ugly disease. I like to say it's beautifully ugly. But that's that's just my own personal opinion. It's a great, great pathogen to work with, but it is incredibly devastating for a lot of farmers and producers out there.

E Ed Zaworski 04:12

So the common name white mold comes from the symptom that it portrays, right. So the white fluffy substance or the white fluffy what we know is my Celia right on the stem of the plant. So when I mentioned that it is you know, a disease of the Upper Midwest, give me like a you know, obviously without a map, give me like a where can you find white bowl generally maybe named some states that kind of

04:42

thing. So Minnesota all the way over to the East Coast. We have been seeing it a little bit in

thing. So Minnesota all the way over to the East Coast. We have been seeing it a little bit in Pennsylvania and upstate New York, South Dakota and North Dakota has also been seeing it a lot more in sunflower production over there. Right. But generally across the entire upper midwest, where wherever it's cooler, cooler growing seasons and wet summers, is kind of important for this, this particular pathogen. It's been seen as far south as the southern Iowa. Okay. And then Illinois, but but it is it is present around this whole area.

E Ed Zaworski 05:24

Perfect. You touched a little bit about on this, but if you're a grower or a Field Scout or somebody out in a soybean field, how do you identify it? What? What kind of process would you go through? If you're out there trying to say, Hey, I've got white mold, or I've got something else? Yeah,

05:43

so flag leafing is is really important for this particular disease trying to identify it. If you drive along side of the field, and you see that there are some some wilting plants, some brown wilting plants called flag leaves out there, then that's an indicator that this disease is present. And it's taking hold. Unfortunately, for this disease, once you start to see that it's a little too late for any management decisions, just because that disease has already taken and it is kind of a one and done kind of disease, once it starts, it's there. And it's it can't be managed until the following season.

E Ed Zaworski 06:21

Gotcha. And then yeah, so I mean, one other thing that I always look for when I'm out there scouting for white mold, if I'm trying to decide between white mold and other diseases, and I got to tell this story, because you know, it's the one thing I think of when I think white mold is it produces structures called sclerotia. And they're hard black, you know, they're scleritis structures that are used to survive by the fungus. And if you a lot of times, right, where if you split the stem, you can find the sclerotia inside of the path, right,

06:56

this particular pattern, as you said, it does create the sclerotia and the sclerotia can either be on the outside or the inside of the stem. So early in the season, when you start to see that that white, my Celia, as you mentioned, you may see those flourish on the outside, if you get a heavy rainfall event, then those sclerotia may fall off of the outside of the stem. But they will also be present within the inside in the pith of that sweet bean stem. So it's a good way to distinguish it from other diseases out there.

E Ed Zaworski 07:30

Way back a while ago when I was in plant pathology 401 I think here at Iowa State the intro to plant pathology, the professor at the time, explain those sclerotia inside the stem as rat turds.

07:47

Good description.

E Ed Zaworski 07:50

So so if you're unsure if you're having a hard time picturing what sclerotia look like, they look like little rats or I mean, there's a it's pretty accurate, as far as I'm concerned, as far as describing them. So. So those are some ways that you can pick out white mold in the field, if you're out there looking for it. What's happening to the plants, you know, you mentioned the the flagging, and then probably yield loss after that, how what's happening to the plant as far as what is white mold doing to it? And what is it? It's

08:25

a good point. So once once that fungus gets onto the plant, and it grows into this main stem, where you see that that cotton ball forming, the fungus will actually just clog up and break down all of the vasculature within that plant. So if you think about a plant, it pulls water from the roots all the way up to the leaves. But if if the fungus is breaking down that tissue, then the plant isn't able to get the water up to the top anymore. So because of that the plants wilting due to a lack of water. And if it's, it's early in the season, you're gonna see a reduction in pod fill because of that. So those pods need the water in order to fill. But if there's no water, those pods will either be aborted, or they will just not fill completely.

E Ed Zaworski 09:15

Gotcha. Yeah, it's like just like so many fungal diseases on all different kinds of hosts. I like to tell people when I'm doing diagnostics in the clinic when we come upon, you know, fungal canker disease, for example, which is like a, like a fungus that infects the lives of a tree. I tell them, it's like a tourniquet. If you were to apply a tourniquet to your arm, the tip of your fingers wouldn't get any blood and it would eventually die. And it's kind of the same concept. Right?

09:41

Exactly. Yep.

E Ed Zaworski 09:43

So what, what conditions Wait are what what what makes white mold tick? What's good for white mold and what causes a bad white mold infection?

09:54

Yeah, so I kind of briefly mentioned this earlier. cool temperatures and high moisture Are is really important for this pathogen. And so, there are certain years when this is this is more prevalent than others, this is very much dependent on the weather conditions. So the the development of moisture within the under canopy in the soil surface, as long as that's prolonged wet conditions for about two weeks, then those those sclerotia as we imagined, they will produce these little cups called apathy show those apathy sure relief spores into the under canopy, which then leads to the infection. Another important part that has kind of just recently been uncovered is the importance of canopy closure within the soybean crop. And these sclerotia will not form these apophenia unless canopy closure has occurred. So that's it'll kind of lead into the work that that I've done here that we'll talk about later on. But definitely moisture, cool temperatures and canopy closure are going to be the most important factors.

E Ed Zaworski 11:08

Right. And that's, that's it, that is another good point. Do you ever scout for these FTC? They're they're kind of like a mushroom, right?

11:18

Oh, these are? Yes, we have. It's a terrible job. And we all know, hate to do it. But it is important to do and we have done it in the past. They are very fickle. And they may show up one day, and they may disappear the next day. But if they do appear at all, there's a high chance that infection is going to occur.

E Ed Zaworski 11:38

Gotcha. So maybe not the most reliable thing to scout for. But I personally have never seen him. I've looked a lot. And I wish that I hope that someday I'll be able to find myself some apathy. Sure, but so yeah, right. So they're harder to find,

11:55

and maybe not the most, they are hard. Yeah, they're absolutely hard. And I'll cover this as well. But we've done a lot of this work. We've developed some models for this so that we can actually predict when those apathy are going to be present. So if you're talking about scouting for these, we already did the hard work for you. All you need to do is download our Sport Caster app. And that will be your scouting of that field for risk of these eficacia to develop.

E Ed Zaworski 12:22

Shameless plug and yeah, no, I think I think we'll talk more about the sportscaster app later, too. But it's one of those things, check out our show notes. We'll definitely have some info there for you on that.

B Brandon Kleinke 12:36

Are you tired of seeing dead plants everywhere? Wish you could help but don't know how do you sometimes wonder what life would have been like if you had gone to school to be a plant doctor or an insect expert. It's not too late, make up for lost time visiting the Crop Protection Network for your pest management information. Remember, every plant dies, but not every plant truly.

E Ed Zaworski 13:05

Alright, so now that we know what wait till it is, what conditions and thrives in what came out growers do about white mold once they know it's there. Yeah,

13:15

so it's gonna be important to scout those fields kind of identify the areas of where the that white mold is present. So might be a low spot in the field going out and identifying where those those infections are occurring one year is going to be important for the following years. So after after you do that if you're into the next season, you're trying to make decisions from there. They're one of the big points that I'm always going to recommend is choose your varieties, or, crucially, it's crucial to pick the right varieties. Some of those varieties will have improved genetic resistance compared to others. And that's kind of one of the issues that we're seeing is sometimes due to seed restrictions and availability. Certain areas will have a large amount of susceptible cultivars grown, leading to high infections. However, there's there's there's good opportunities out there for for genetic resistance. While there is no complete resistance, while there is two other diseases, it's it's there are options for good good control in that regard. There's a bunch of other opportunities as well. Such as maturity, we found that there are certain maturity groups that are more susceptible to this because of the the flowering window. So this this disease, it needs the flowers to be present in order to effect and so if you think about a particular cultivar if it has a flowering window of you know, a higher maturity group it's going to be in that flower period for a longer amount of time. So sometimes pushing those maturity groups may be beneficial for yield. But you may also allow yourself a greater window of susceptibility to this disease. Gotcha. In addition to that irrigation, so we already talked about the importance of moisture in that in that crop, to for infection to occur. So, I guess, again, one of my recommendations is irrigation around that flowering period is going to be critical. So, maybe delay irrigation until after the flowers have all fallen off and the pods have started to set just to kind of get out of that window of susceptibility again. Sure, and fungicides, again, going to be important. We've actually just just got done analyzing summary of our data, coordinated fungicide trials over the 2021 season. And we've seen that there are quite a few good products out there for reducing disease levels. Some of those include, you know, indura, or Cobra, which which we found to be really important, especially applied indura between the R one and R three window. And specifically using our Sport Caster app for for recommendations I went to fungicide to be sprayed actually turned out to be the lowest disease levels of any of the fungicide trials or treatments. Was was

E Ed Zaworski 16:26

when you use forecaster. Yeah,

16:28

it was when they were Castor, which is very reassuring for for models that we've developed. And then Cobra at, you know, the the V five growth stage, so right before flowering occurs, and that's an oldie but a goodie. And it's still still still holds up within the trials that we've ran this past year.

E Ed Zaworski 16:47

Gotcha. Yeah, we may as well talk about sportscaster now since we've mentioned it a couple of times, I thought maybe wait until the end. But I think it'd be a good idea. What is forecaster when forecaster

16:59

that's Damien's little baby? So his one of his old grad students who just now a professor at Michigan State University, Dr. Jamie Wilber, actually kind of led the charge on this, this project. And she she went out and she scattered for those apathy shows we discussed earlier. And she she was able to predict when those apathy show are going to be present within the field, using weather conditions, such as temperature and moisture, wind speed. And so those those, that data turned into certain models that we're using for predictive ability of those. And they actually got transferred and into an app called sportscaster. available. If you go into the app store on your smartphone, you'll be able to find this, if you haven't already, what you do is you go into the app, you enter your field location, it does this on a small grid. So one field may have a different risk level than another field, just a mile down the road. And once you put in your your GPS coordinates for that particular field, you can get a daily risk level, we within the app, then we have certain action thresholds, which was where we recommend a fungicide application. Currently, the default is about 40%. So once it gets above that 40% action threshold, then that's where we recommend an application. All

E Ed Zaworski 18:32

right, well, now we're moving on to the part you've been waiting for summarizing years of research into just a few minutes for a podcast. So we're going to talk about two of your research publications here regarding white mold. And the first one is titled integration of row spacing, seeding rates and fungicide applications for control of sclerotinia stem rat in glycine Max, which is soybean. So yeah, tell us about that one, there's a lot going on in that title. So break it down as best you can here and

19:08

we had 18 individual locations that we use for this, this trial spanning across, I think, four or five different states, all across the upper Midwest. And within these we so we looked at as the

title suggests, we looked at two different row spacings 15 inch and 30 inch rows, we looked at for seeding rates from 110,000 seeds to Acre to 200,000 seeds to an acre and then fungicide applications and we fell in two different programs. So one was our standard, which was applications of approach at both R one and R three Crusaders, and then a fungicide program falling hours forecaster app

E Ed Zaworski 19:51

before we before we get too far. Explain row spacing and seeding rates to the layperson who may not be II in deep and agriculture, what do we got there, what a

20:03

row spacing is going to be the amount of space in between individual rows planted. And so that's, that's going to be important, especially for this disease. So if we kind of mentioned this earlier, it's important for canopy closure for this disease to develop. And so the thought here is that if we have wider rows, so more space in between each row, then canopy closure will take longer to occur. If we bring it down to 15 inches, then that canopy closure may, you know, be a little quicker to get to that that point.

E Ed Zaworski 20:38

And those mushrooms those apathy, shell like the canopy closure, right?

20:42

Absolutely, they do. Yeah. And then seeding rate again. So that's that's just the amount of seeds put into the ground on a per acre basis. So 110,000 seeds per acre was the low end with about 200,000 seeds per acre on the high end.

E Ed Zaworski 21:00

Do you know what average is for that? Like, as far as what is the average grower do? And I probably that's probably a loaded question. Very early version. Yeah.

21:09

So I guess generally, I would say that if farmers are trying to push yields, they're going to try to bump up the seeding rates has been kind of shown that that that does result in higher yields. However I do, I have seen farmers up north where white mold is much bigger of an issue due to the cooler conditions during the summer months, they're actually dropping the populations down to 65 to 80,000 seeds per acre. And soybeans are actually really okay with being grown

in that low seeding rates, because they they kind of have been have been bred to Bush and create these small bushes. So they do fill out that space pretty well. However, there is going to be a slight decrease in yield that has been shown to be associated with lower seeding rates.

E Ed Zaworski 22:02

Gotcha. Thanks for the background. Yeah, of course. Hopefully, I didn't derail? Yeah,

22:07

you're fine. Yeah. So So I guess getting back into the research. Yeah. So as I said, we did 18 different locations. Some were research plots on research farms, other ones were actually in pharma fields. So we had a good mix of both environments where disease did occur, and environments where disease did not occur. So we kind of got a good representation of all environmental where we might, you know, have soybeans grown. So within that, if you don't mind, I'll just kind of jump right into what we kind of found. Don't mind at all. Yeah, so this is this is actually pretty cool to me. As we would expect, we did see that within the wide rows, we did start to see that disease was lower. And together when when you couple the wide rows and the fungicide applications, we saw that within the right wide rows, the non treated plots. So if you just widen the rows, you actually reduce disease to the levels of 15 inch rows with fungicide applications made. So just by widening the rows, you may save yourself a cost of an application or to a fungicide. Gotcha. In addition to that, we also saw that if you widen the rows and make fungicide applications, you reduce disease even further, which makes it cool. So it's, it's cool to show that that that that interaction is actually occurring. And that's actually present. As kind of going forward. If that then we saw that seeding rate was actually important as well. Kind of shown by other other research as well that the lower seeding rates resulted in, in less disease, specifically the 110,000. So the lowest seeding rate actually had the lowest amount of disease. And the thought behind that is that the the lower seeding rates allow for greater greater airflow throughout that soybean canopy. And if we have greater airflow, we have reduced moisture. And so it's all all trying to change the environment within that soybean crop. So create, you know, a slower environment for that those epi Fisher to develop. And so we saw that with disease disease levels, but then again, we did see a slight decrease in yield associated with those with those wide rows and those lower seeding rates. So it is a bit of a trade off as

E Ed Zaworski 24:42

well which would Yeah, that would be every groaners first question.

24:47

Yield is king as they say, right. But so that that did happen is you know, as we decreased seeding rates, we saw lower yields, but we He did see that within wide rows, that when you decreased the seeding rate that the difference between the seeding rates difference of yields between the seeding rates was actually a lot more stable.

Ed Zaworski 25:11

Okay, so with the wider rows, the wider rows, exactly.

25:15

So when we got to wide rows, then we started to see, you know, yield being pretty similar between all the seeding rates, whereas with, you know, 15 inch rows, it was a little bit more dynamic, quicker responses teach seeding. Right.

Ed Zaworski 25:31

Gotcha. Yeah. So

25:34

any questions on that? Yeah, absolutely. Yeah.

Ed Zaworski 25:37

So, I mean, so you saw the reduction in disease with, you know, adding each of these factors, the lower seeding rate and the wider row spacing, I put that you saw a reduction in yield. So I'm assuming that there's a, there's a happy place where if you have a lot of disease, it still might pay dividends to do certain things. Right. Talk to me about that a little bit.

26:05

Yeah. So that's, that's, that's the next thing I'm getting into. And the perfect segue. Yeah, great, great segue. And it's like, we set this up ahead of time. Yeah, so we actually did a small economic analysis, looking at partial profit. So looking at comparing the treatments and how the profits work themselves out within that. So specifically, we looked at three different sale prices for soybeans, so 912 and $15 a bushel. And that actually was pretty important within this analysis. So within seeding rate, we kind of looked at that. And that, also, we separated them out into environments where either white mold was present or not present, as I kind of mentioned. So there are going to be differences, you know, within seeding rate, for example, we saw that with when white mold wasn't present, that, you know, the 200,000 seeds per acre actually had the highest highest returns at all, all the sale prices. However, when white mold is present, that that 200,000 seeds per acre, coincidentally, actually became the least profitable of all of them. Wow.

Ed Zaworski 27:17

Which that's what you want to see in research. Exactly.

27:21

No, that's it was phenomenal. It was too good to be true. When I worked it out. I had had to do a double take on that for sure. Yeah, but so the majority of that loss of yield, suspected to be due to white mold. And those instances, you know, we just had so high of disease pressure within those those plots that that yield just took such a hit. So I guess the the main takeaway point from that was that if you want to maintain high yields, or high high high returns on the on that investment that you put into the, into the ground, if you have areas where you know, there is disease present. So this is where the scouting comes in. So if you if you have identified certain areas or certain fields with very high levels of disease, then you may want to drop the seating right down in those particular spots. I'm not saying do it in every spot, I know, every farmers are going to want to drop down there, their seeding rate, so 110,000 seeds per acre, just because you're giving up money at that point. But dropping those rates in those certain areas is going to be where it's most important. Gotcha. One other point that I really liked to make here, and this is something that that has been a personal interest of mine has been the production of new sclerotia in the field after that, and it's a point that a lot of people haven't made up to this point, especially within whey mold. And so everyone looks at the dollars per acre of what you're bringing in. But if you think about it, if you're putting more sclerotia back into the field, you're setting yourself up for, you know, potential for severe diseases in the future years. So there's actually work done out of Brazil a couple of years ago, that showed that every 10% of incidents led to one kilogram or 2.2 pounds being produced and putting back into the field. So we actually did an analysis of that as well. Of sclerotia sclerotia. Yeah. Okay, and so, so we actually found I'm just gonna talk about the two extremes here. But at the high seeding rate, we saw about a third of a pound of the sclerotia being put back into the field. And I know a third of a pound doesn't really seem like much right now just talking about it. But if you if you think about a third of a pound of records, that's

E Ed Zaworski 29:44

exactly what I was gonna say.

29:48

But as soon as soy so it's about a third of a pound for the high seeding rate but once we dropped down to the low seeding rate is point 07 pounds. So that's less than a 10th of a pound of the Richard's being put back into the field. And so I don't know about you, but I'm a betting man. And if there's a lot of lot of sclerotia out there in the field, I'm gonna bet, you know, some of them are going to germinate and grow into these deputyship. But if you're putting less out there, you have less chances of that happening.

E Ed Zaworski 30:19

So, strange to ask, but how did you how did you collect these sclerotia from the fields that are out there? So so it sounds like a fun?

30:31

Wow. So all this data right now, this, this is all been all been just predicted from that, from that, that analysis done in 20. Oh, okay. But this has kind of led me into a little side project of my own. And I've actually been doing this myself through a couple other projects. And this does hold out. And we're seeing pretty cool interactions of actually collecting this blur shop. And I'll just leave it at that for now, until things kind of progressed a little further, but

E Ed Zaworski 31:03

I imagine you out there like, like a prospector panning for gold and No,

31:12

no, but what we would do is actually harvest a couple of individual these plants, like a five foot section of that pipe, actually run it through a thresher, collect all of the, all of the everything that gets spit out and then collect the grain. And then I pick out all the disclosure from their way those out for each individual plot each individual variety. And then that's kind of how we would do it. So that is

E Ed Zaworski 31:39

a pretty striking image for folks, if you just want to look up some time in your free time, just sclerotia for white mold and a grain bin. I've seen some some photos where it's pretty high severity and it's imagine all the nice soybean grain with a bunch of renter's mixed

31:58

into the elevator.

E Ed Zaworski 32:01

Um, so going back that regard, but you mentioned that reducing your seeding rate was a good thing in the presence of white mold. What about the row spacing?

32:12

Yeah, so that was that was something that was kind of difficult within this particular economic analysis, just because of how variable equipment is between you know, 15 and 30 inch rows. Gotcha farmers, you know, typically are going to be planting in these 15 inch rows, but they most likely have the ability for to plant 30 inch rows, if they're planting corn potentially. So it was it was much more difficult to kind of identify the differences because okay,

Ed Zaworski 32:42

we do the cost analysis. Exactly. Okay.

32:45

So we did not do the row spacing, we only did seeding rate and fungicide applications. Gotcha. So, but the fungicide applications, if I'm just going to jump into that, I guess, same thing, we're looking at the three fungicide application. So application that R one and R three. So that was like our standard two pass approach. And then we had our Sport Caster program that we use, and then our non treated which we compare everything against, again, the same three points 912 $15 A bushel for these, and we did see that fungicide was not profitable, or it did not match the level of profits is the non treated dead within a $9 bushel an acre or a $9 per bushel. But once we moved into the $12 a bushel bushel, both applications or both programs of fungicide actually were important. disease was present. But when disease wasn't present, there was still a loss of profits due to fungicide applications,

Ed Zaworski 33:56

no matter what the cost price of soybeans was

34:02

at $12 a bushel. That's that's. So I guess the main point from here is that, you know, fungicide applications, if there's no disease wasn't profitable until a very high price point or sale price. Gotcha. So right, because the cost of fungicides, right, exactly, no, it's and they're not cheap. I mean, especially if you're going for a premium product, there's going to be a pretty steep price point, and you want to make sure that you make up those games. So with white mold present, then applications are going to be a lot more profitable, especially starting at a $12 bushel price point. So that's that's kind of the biggest takeaway from that. Again, just make those applications get that timing window right. And they will pay for themselves. If If white mold is present within those price points. So

Ed Zaworski 34:58

did you see a difference? So between your standard what was it? What were the two timings versus this forecast? One

35:05

and R three, R one and R three. Within this analysis, we did not see any differences between those.

Ed Zaworski 35:11

Ed Zaworski 35:11

So same for the r1 R three and sportscaster Yep, gotcha. Both of them. Yep.

35:17

So gotcha against forecasters working. So that's, that's good. For us.

Ed Zaworski 35:21

That is good. That is good. So yeah. So overall, do me do me a big summary of this, this first study before we jumped to the next one? What did growers take away from this?

35:35

Yeah, so if, if you're planting into a field, and you know, you have white mold, and it's severe white mold, drop the planning population, or the seeding rate for sure. If you have the option to also move to 30 inch rows do that as well, if it's very severe history, if you know that, that that field has had some but it wasn't ever yield limiting, maybe drop it down 30,000 seeds per acre, drop it down just a little bit than you would comparatively to the other fields. In addition to that, fungicides still work, but you got to get it in the right window, if you don't get it in the right window, then it's not going to pay for themselves. And it's just a waste of money at that point. And then I guess the last point that that I'm trying to try to change people's mind and make them think a little bit differently is think about the return of that inoculum, the return of sclerotia back into the field after that crop. So don't don't think about just the money being lost in that single season, think long term, think four or 510 years out, and think about how much you want that field to be protected against future future infections. And so that's going to be important as well.

Ed Zaworski 36:50

Why old's unique in that there is there's actually like a visual and like you say, a weight kind of visual of what's being left behind between yours. So all right. So that was study number one. And again, that was integration of row spacing, seeding rates and fungicide applications for control of sclerotinia stem right on glycine max. So you can go check that out, you can read it in more detail if you want, written by weight. So we got one more publication to cover here with weight. And this one's titled, identification of soybean, Glycine Max, you know, it's genus and species check lines for evaluating genetic resistance to Sclerostin sclerotinia stem rot. And that was from plant disease. So that was a mouthful again.

37:46

I diversity my title is short.

Ed Zaworski 37:49

That's that's very common theme I feel like in in scientific publications is, I mean, you gotta get you got to get all that information out there to draw in the, the scientific reader, I suppose. But I suppose

38:00

yeah. Yeah. So if you go to any seed catalog, you look at any any cultivars that has resistance to white mold, they're going to give you a ranking of what it is. And usually, it's on a scale of, I don't know, something one to nine, one to 10, something like that. You go in there, everything. And I holds true, pretty pretty dang, well, everything's between a four and a SIX. What's the difference between a four and a five or a four and a SIX? I don't know, the farmers probably not going to know. And that's that's kind of a hard a hard guess, to make. Potentially, for some of these farmers who are white mold a year in and year out, it's a big issue for them. And so that was something that I saw is kind of being a big issue, and not present within within our current understanding of genetic resistance for this disease. So what I wanted to do was find some some, some soybean lines or varieties that were consistent, and we knew exactly what their their resistance levels were to this disease. And so we took a public cultivar. The white is what it's called, and then three breeding lions from our breeding program. Dr. Craig Grau, who was Damon's predecessor here at UW Madison actually helped develop these lines. And from that we performed greenhouse trials infected these knees for soybeans against nine different isolates of white mold. These these different isolates are thinking are considered like different cousins of each other, very same species, just slight differences. They were found different fields and they all had different aggressiveness levels. So they were able to infect the soybeans at different levels in different rates. What we found from that was that these these particular lines, these four lines that we had, which we call our check lines,

E Ed Zaworski 40:01

All four soybean

40:02

varieties are soybean lines. Yeah, exactly. And all four of those sweeping lines all responded consistently to all nine, nine isolates. Gotcha, awesome. That means that those lines can be used consistently to rank out resistance levels. So Dwight was found to be are susceptible. And then we had one called 50 to 82 B, which is our highly resistant line within the greenhouse, the other two turning lines are right in the middle. And so that kind of helps us give an idea of where resistance might be. Then what we did was we took those four lines, screened them against a bunch of other lines, 11 different lines, some experimental lines that we had had some other public cultivars and other commercial cultivars that are out there. We we had field data from these commercial cultivars showing that they did have high resistance to white mold. So we threw these in here as well, just to confirm that, in fact, these these do hold up within within our assays within our experiments, sure that they are highly resistant. And so within that we screened them, they all checked out, again, our our four check lines were consistent. And we were able to give these these sweeping lines, our public lines, our commercial cultivars, and accurate rating for what their disease levels were. So that's really cool. I'm excited about that we've done we've used these four check lines and all of our other greenhouse trials and within

our field trials, they hold true. And they help us give a good sense of what these resistance levels are. Within, you know, a lot of different commercial cultivars and other projects that we have going on so far. Gotcha.

E Ed Zaworski 41:57

So and so the future, we can hope to look into a seed catalog and instead of just seeing kind of a average rating, maybe we'll see a little bit of difference between that's my low, medium. Good. Good, good. And yeah, it was it was interesting to hear that didn't those tech lines that you developed? Even with it, you went on to say you had nine different isolates? Yeah, so that's showing, hey, look, we've got pretty big diversity in white mold. But these lines are consistent here. So you can really check because I'm assuming that those nine isolates or they're separated regionally, probably right or Yeah, or

42:38

they do Yeah. Okay.

E Ed Zaworski 42:41

Perfect. Awesome. That's a That's great news. All right. Give me one more elevator here. What? What can growers take away from this research? What can they expect to see in the future? What can you What do you hope they can expect that maybe is the better question, focus

42:59

on resistance to sclerotinia, or white mold. So, fungicide might have a huge cost. But if you get a line with high resistance, and you're not, you may not be able to make need to make an application. So you may be saving yourself money in that regard. If there's very unclear what the white mold resistance is, ask, ask people around, ask your dealer, ask your extension agent, ask whoever you're around, or even contact us. If you'd like us to screen some of the seed, we will probably be very willing to do that and try to help out. But genetic resistance to these diseases is important. And so I think it's important to just kind of keep pushing.

E Ed Zaworski 43:46

Well, yeah, and it is important to say like, you know, there's a there's a lot of components to the genetics of any soybeans and sclerotinia. Resistance is one of those things. So if you've got a lot of white mold, right, it's okay. You want to keep in mind, it's important. All right. Well, now we've got now we've gone through the full gamut, right? We've talked about white mold. We've talked about some of your research here. Now we can kind of wrap up. So I know we've talked about spore cast or a lot. I want to ask you, though, what are some good resources that you would give to listeners of this podcast to say, Hey, you want to learn more about white mold? You should go check this out and score highest is one of them. But give me the other things up front and then we'll talk a little bit more about sportscaster.

44:37

Yeah, so as as you mentioned and is I'd be remiss to say this, obviously go on to a crop protection network. There's a lot of resources on there. My advisor David Smith also has a website. It's called badger crop doc.com has a lot of resources on there for white mold and all the other diseases that you may be dealing with. You can also Go on Twitter, you can follow me, Wade Webster, W underscore Webster 74. And Damon as well, badger crop doc on there. And then Sport Caster. And we have another app called spore Buster, which talks about the cost price for fungicides. And that's a good resource as well. But also spore casters on there. It's it's been out since 2018, I believe was the first year constantly making improvements to that. And every year, we're getting better. Maybe yes, yeah, yep.

E Ed Zaworski 45:34

It's important to know if any model folks like there's there's a lot of models out there for a lot of different diseases and pests. And I mean, would you agree with there's no perfect model, there's always improvements to be made, especially as time goes on. Well,

45:48

as Damon likes to say, and I, he's absolutely right. It's better than a flip of a coin, at least you have some sort of an informed decision.

E Ed Zaworski 45:55

Absolutely. Yeah. And then, and you mentioned spore buster. So you could use these two apps to kind of help each other out right, like so you know, when to spray, you can also know what to pack a little bit about spore Buster, what's what are some of the inputs that go into there? You mentioned whether first forecast or what, what do you what goes into spore buster?

46:17

Yeah, so I'm not as familiar with spore buster. Okay, should be, but I believe it's just putting in the products, looking at your expected yield. And then you'll getting a you know, return on investment from there. And then you can kind of decide which of the products that would be best.

E Ed Zaworski 46:35

So you're putting in some input costs, whatever those are, and then what your expected outputs are. And then it's done. Yeah, totally simple. Yep. Gotcha. Awesome. Well, last thing I like to do is give you the floor. Wait. You can thank anybody you want make any acknowledgments? You've got it.

46:58

Well, I mean, I guess, thanks. Thanks to everyone who's supported me. As everyone probably always says, but I guess, thank you, especially to Damon for giving me the opportunity here. You know, it's always been my kind of life's dream to be involved with agriculture and help farmers out as much as I could. And without him, I mean, I wouldn't be in this position, obviously. But I'm credibly happy where I am. And I love working with this particular pathogen, working in plant pathology and interaction with great farmers every day. So thanks, everyone, I guess. Yeah. And thank you, Ed, for having me on today.

E Ed Zaworski 47:42

Oh, not a problem. Thank you so much for doing this certainly seems like you've made a big impact on white mold and the people who have white mold problems. So yeah, with that, again, thank you so much for coming on wet and talking to us about white mold. And we'll see you next time folks.

B Brandon Kleinke 48:03

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