Title: Utilizing a disease risk model to enhance anthracnose fruit rot spray programs for Georgia blueberries

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Public Abstract

Fruit rots, including anthracnose fruit rot, can cause significant losses for blueberry growers in the southeastern U.S. To manage fruit rot diseases, commercial blueberry growers often make multiple fungicide applications from bloom to harvest. In recent years, a tool for predicting periods of risk for infection with the fungi that cause anthracnose fruit rot has been extended to blueberry growers in Florida through the Blueberry Advisory System (available through Agroclimate.org). This advisory system utilizes weather data to estimate the risk ("low", "moderate", or "high") of new fungal infections occurring. During the 2022 growing season, this advisory system was connected to 16 weather stations in Georgia for the first time. To provide Georgia blueberry growers with information regarding the use of this advisory system, multi-site field trials were conducted at seven locations within Georgia's primary blueberry growing area during the 2023 growing season. Standard, calendar-based spray programs currently utilized by growers were compared with an alternative spray program based upon risk information provided by the Blueberry Advisory System. Trial results indicated that the spray program based on the advisory system was able to provide effective control of anthracnose fruit rot and other fruit rots that was at least as good as the control provided by the standard, calendar-based spray program. In addition, because the advisory system-based program allowed for the judicious selection of fungicides based on the relative risk of new infections occurring at a given time/location, the advisory system-based fungicide program was generally cheaper at most locations relative to the standard program. Based on the results of these trials, recommendations and best practices for use of the Blueberry Advisory System in Georgia have been extended to Georgia blueberry growers.

Introduction

Among the numerous diseases that affect blueberry production in the southeastern U.S., fruit rots can be the most devastating and are a major focus of commercial spray programs (Sial et al. 2023). Among these, anthracnose fruit rot, caused by members of the *Colletotrichum acutatum* and *C. gloeosporioides* species complexes, is typically the most problematic for Georgia blueberry growers (Mehra et al. 2013). Anthracnose fruit rot can affect blueberry fruit either before or after harvest and can cause significant losses when warm, wet weather occurs during bloom or just prior to harvest (Milholland 2017). Though infection with anthracnose fruit rot fungi can occur as early as bloom, symptoms typically don't appear until fruit ripens. On infected fruit, salmon-

Figure 1. Sporulation of *Colletotrichum sp.* on blueberry with anthracnose fruit rot.

colored spore masses can be produced (**Figure 1)** which allow the fungus to easily infect other fruit on the plant or other fruit in the same packing line or clamshell. As a result, anthracnose fruit rot can cause significant losses in blueberry production. Typically, field losses due to anthracnose fruit rot increase in successive pickings, and in poor storage conditions postharvest losses can approach 100% (Milholland 2017). In the southeastern United States, anthracnose also causes a damaging leaf spot as well, and severe disease can result in premature defoliation.

In commercial blueberry production, anthracnose fruit rot is managed through multiple applications of fungicides from bloom until harvest, and it is not uncommon for growers to make 5-8 fungicide applications on a calendar basis (every 10-14 days) during that time period to manage anthracnose fruit rot (Sial et al. 2023). Unfortunately, growers and packinghouses have reported increasing problems with anthracnose fruit rot, and *Colletotrichum spp.* isolates with resistance to broadly-utilized QoI (Quinone outside inhibitor) fungicides have been identified in blueberries in FL, SC, and GA in recent years (Ali et al. 2019, Hu et al. 2015, Phillips et al. 2018). This situation has placed even more pressure on the remaining effective fungicides and has forced growers to become even more judicious in their selection and use of fungicides for anthracnose fruit rot management.

The weather plays a significant role in the development of diseases caused by *Colletotrichum* spp., and the conditions necessary for infection with this fungus have been precisely determined. At least eight hours of continual surface wetness are necessary at 25°C (77°F) for infection to occur, and optimal growth of the fungus occurs at around this same temperature (26°C or 79°F). Longer wetness durations are necessary for infection to occur at higher or lower temperatures. For example, at 10°C (50°F) nearly 36 hours of wetness are needed (Milholland 2017). Based on this information, infection models have been developed that utilize environmental parameters to determine the risk of infection with *Colletotrichum* spp. One of these infection models was previously adapted successfully to assess the risk of anthracnose fruit rot development on strawberry (MacKenzie and Peres 2012), and this model was recently extended to blueberry as the Blueberry Advisory System.

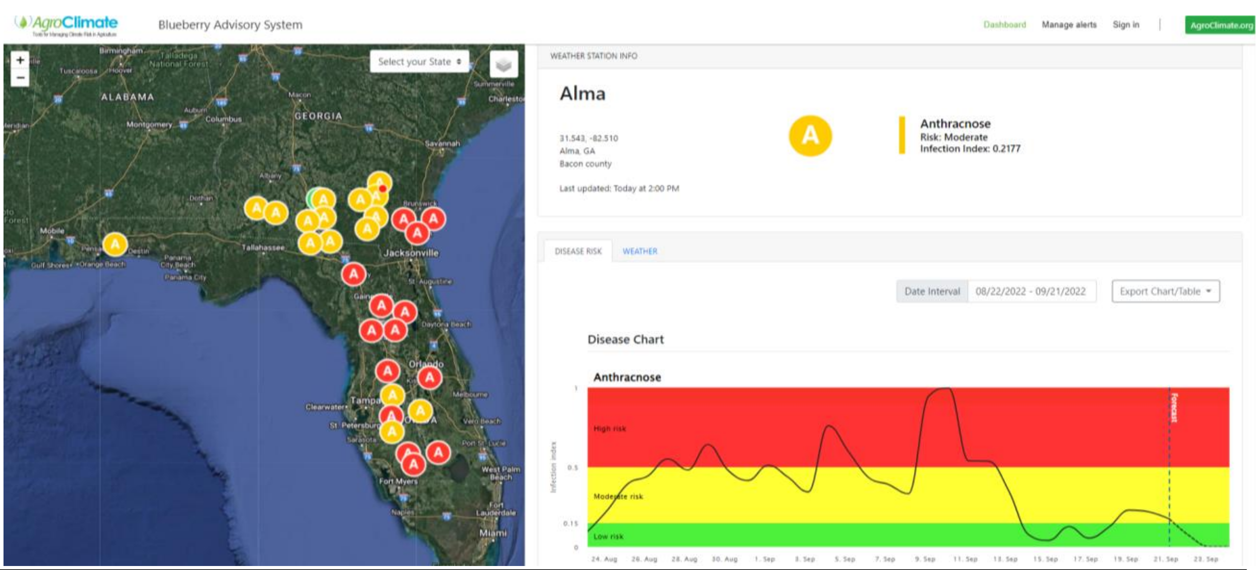

Figure 2. Screenshot of Blueberry Advisory System output. At left, a map of weather stations linked to the anthracnose disease risk model is shown. On top right, the current disease risk is shown for a single weather station. On bottom right, a graph is shown of the disease risk over time for this location as well as the current and expected forecast for disease risk. Disease risk is color-coded so that **Red** indicates "High" risk, **Yellow** indicates "Moderate" risk, and **Green** indicates "Low" risk.

The Blueberry Advisory System, which is available through AgroClimate (http://cloud.agroclimate.org/tools/bas/dashboard/disease), links with local weather stations to provide a user-friendly interface that indicates the current risk of anthracnose development for a given location based on local weather parameters (**Figure 2**). Using this system, growers can sign up to receive mobile alerts or emails whenever the model predicts that a significant risk of anthracnose infection is present at their chosen location. For the past several years, the Blueberry Advisory System has been linked to multiple weather stations in Florida, and in 2022 it was linked to several weather stations in southern Georgia for the first time. In total, 16 weather stations spanning across Georgia's primary blueberry production region were linked to the Blueberry Advisory System midway through the 2022 season (March 2022).

With aid from the Blueberry Advisory System tool, growers may be able to reduce pesticide applications for anthracnose fruit rot by using disease risk model-based sprayed programs instead of the calendar-based spray programs currently utilized. Initial validation work carried out in Florida (Gama et al. 2021) showed that by targeting fungicide sprays to periods of higher risk for infection with anthracnose using the Blueberry Advisory System, Florida blueberry growers could reduce their total numbers of applications per season while continuing to maintain equivalent control of anthracnose fruit rot (relative to calendar-based application schedules). However, as this tool was just connected to Georgia weather stations during 2022, no trial work had previously been carried out in Georgia to assess the usefulness of this model for Georgia blueberry producers and many growers have remained unsure how best to utilize this disease risk model in disease management programs. While the same pathogens (*C. gloeosporioides* and *C. acutatum*) cause anthracnose fruit rot in both Florida and Georgia production systems, validation work with this model on blueberries in Florida used only southern highbush (SHB) blueberry (*Vaccinium corymbosum* interspecific hybrids) cultivars and no rabbiteye (*V. virgatum*) cultivars were included in those trials. Rabbiteye cultivars, which represent nearly half of the blueberry acreage in Georgia, tend to bloom and fruit later in the season during warmer weather and in the presence of frequent spring rainfall events. Given the higher frequency of warm temperatures and wetness events during rabbiteye fruit development, it is possible that persistently higher risks of anthracnose fruit rot infection exist during this period. This has the potential to make it more complicated for Georgia rabbiteye growers to utilize an infection model to time fungicide applications. Accordingly, to address the absence of trial work with this model in Georgia and the lack of data from rabbiteye production systems, we carried out the following objectives during 2023:

1. Conduct fungicide trials to compare current grower practices for anthracnose fruit rot management in Georgia to fungicide application timings based on output from the Blueberry Advisory System.
2. Based upon fungicide trial results, develop best practices and recommendations for optimal use of the Blueberry Advisory System and disseminate this information to Georgia blueberry growers through educational presentations and extension materials.

Materials and Methods

Field trial locations. Seven field trials were carried out including four trials on SHB cultivar 'Farthing' and three trials on rabbiteye cultivar 'Brightwell'. Trial sites for both rabbiteye and SHB were located near Alma, Homerville, and Nahunta, Georgia, and one additional SHB trial took place at the Blueberry Research Farm in Alma, Georgia. All trial locations were located in close proximity to Georgia weather network stations linked to the Blueberry Advisory System.

Trial set-up. Field trials were set up to compare the model-guided spray program with standard calendar-based spray programs currently in use by growers in Georgia. As such, each trial included three different treatment programs: (1) standard [calendar-based] spray applications, (2) Blueberry Advisory System (BAS) model-based spray applications, and (3) an untreated [unsprayed] control treatment. For the standard [calendar-based] spray program, fungicide application timings coincided with a 5-spray program currently utilized by many commercial blueberry growers. Fungicide applications began at 10% bloom and additional applications were made every 10-14 days until harvest. (Accordingly, applications were made at "10% bloom", "petal fall", "10-14 days after petal fall", "21-24 days after petal fall", & "preharvest"). For the model-based spray program, fungicide applications were also initiated at 10-20% bloom, but applications were only made following "high" (red) or "moderate" (yellow) risk infection events as defined by the Blueberry Advisory System (**Figure 3**). At each trial site, there were five replicates per treatment in a randomized complete block design. Fungicides were applied to small plots consisting of three plant plots separated from one another by a single unsprayed buffer plant. Applications were made using a CO_2 backpack sprayer by personnel from Dr. Oliver's research program (the UGA-Tifton Fruit Pathology Laboratory).

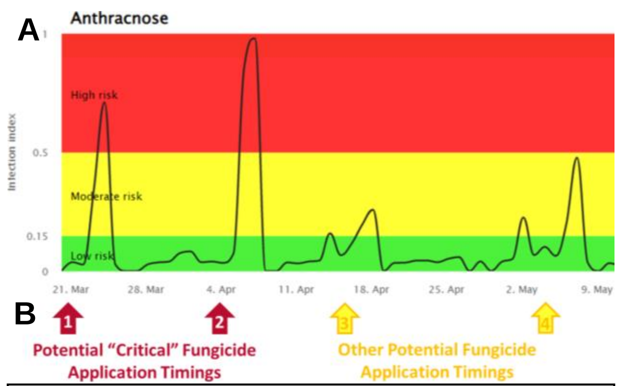

Figure 3. (A) Graph of disease risk over time from the Blueberry Advisory System for one Georgia location; (B) Potential* depiction of timings for spray applications targeted at anthracnose fruit rot based on this disease risk forecast. ***Note**: **Panel B is added for illustration purposes and is NOT part of the Blueberry Advisory System output.**

Fungicide selection. In recent years, *Colletotrichum* spp. with resistance to QoI fungicides have been identified in Georgia blueberries. For some growers, this has limited the efficacy of the QoI fungicides (including Pristine, Quilt Xcel, and Abound). Therefore, to prevent QoI resistance issues from affecting the outcome of these field trials, QoI fungicides were avoided and other materials recommended for anthracnose fruit rot control were utilized (**Table 1**). In general, Switch or Miravis Prime (rated "Excellent") were utilized for "High" disease risk events (**Figure 3B** [red arrows]), Omega (rated "Good") was utilized for "Moderate" disease risk events (**Figure 3B** [yellow arrows]) early in the season, and Captan (rated "Good") was utilized for "Moderate" disease risk events within 30 days of harvest (due to the 30 day pre-harvest interval for Omega).

Table 1. Fungicides utilized in field trials and their efficacy versus anthracnose fruit rot.

Treatment	Active Ingredients	FRAC MoA	Preharvest Interval	Efficacy*
Switch 62.5WG	cyprodinil+fludioxonil	9+12	0 days	Excellent
Miravis Prime	pydiflumetofen+fludioxonil	7+12	0 days	Excellent
Omega 500F	fluazinam	29	30 days	Good
Captan Gold 4L	captan	M4	0 days	Good

*Efficacy ratings from the 2023 SE Regional Blueberry Integrated Management Guide (Sial et al. 2023).

Assessment of anthracnose fruit rot and other fruit rots. Disease incidence was assessed on ~100-150 ripe fruit harvested from each plot immediately prior to the first grower harvest. Fruit was hand-harvested from the center plant of each plot and placed into a plastic clamshell container for transport to UGA-Tifton Fruit Pathology Laboratory for assessment. Harvested fruit were maintained at room temperature and initially evaluated for fruit rot within 48 hours of harvest, then observed for additional rot development after a period of 5 days at room temperature. Fruit was evaluated for marketability, with soft, leaky, or sporulating berries considered unmarketable. The incidence of anthracnose fruit rot and other rots were evaluated based on visual signs.

Develop best practices and disseminate information to Georgia blueberry growers. Following the field trial work above, several best practices and recommendations for optimal use of the Blueberry Advisory System were formulated. This information was disseminated to Georgia blueberry growers through educational presentations and extension materials.

Results

Fungicide trial results. Conditions for rot development were present at all locations, and anthracnose fruit rot, Alternaria fruit rot, and other types of rot were identified in all trial locations. Overall rot incidence varied considerably between locations from a low incidence in the Homerville 'Brightwell' site of 1.6% of berries affected to a high incidence in the Nahunta 'Brightwell' site of 28.6% of berries affected (**Table 2**). Overall, trial results from all seven locations showed that both spray schedules ('Standard' [based on plant development] and 'BAS' [based on the Blueberry Advisory System]) resulted in numerically less anthracnose fruit rot and all rots relative to the untreated controls with statistically significant reductions in anthracnose and/or all rots versus the untreated control being observed in all seven trial locations during 2023. In general, there were no significant differences noted between the efficacy of the 'Standard' and 'BAS' programs, except in the Nahunta rabbiteye site where very high levels of anthracnose were noted. In this case, the 'BAS' program appeared to out-perform the 'Standard' program numerically and in terms of significantly reducing disease relative to the untreated control.

Table 2. Fruit rot incidence from Blueberry Advisory System (BAS) based sprays vs. untreated control and standard spray schedule.

		[z]Fruit Rot Incidence (%)						
		[y]Southern Highbush 'Farthing'				[x]Rabbiteye 'Brightwell'		
		Research Farm	Alma	Homerville	Nahunta	Alma	Homerville	Nahunta
Anthracnose Fruit Rot	Untreated	2.7	1.5	2.7	7.2	0.6	1.2	26.8
	Standard	0	0.2*	0.2*	1.1	0	0.4	10.2
	BAS	0.2	0*	0*	1.2	0	0	1.6*
Alternaria Fruit Rot	Untreated	5.2	0.9	0.4	1.6	3.2	0.8	5.2
	Standard	0.2*	0.4	0	0.6	0.2*	0.7	3.8
	BAS	0.5*	0.4	0.4	0.2*	1.6	0.6	0.2
[w]All Rots	Untreated	6.2	2.7	3.4	9.2	6.2	1.6	28.6
	Standard	0.4*	0.9*	0.2	1.7*	0.8*	0.7*	10.6
	BAS	1*	0.6*	0.8	1.4*	2.2*	0.6*	2.4*

[z]Recorded for ~100-150 fruit collected immediately prior to the first grower harvest. Rots identified based on visual observations, [y]'Farthing' harvest dates were 12 Apr (Research Farm), 17 Apr (Alma), 10 Apr (Homerville), and 10 Apr (Nahunta), [x]'Brightwell' harvest dates were 30 May (Alma), 25 May (Homerville), and 25 May (Nahunta), [w]Rots caused by *Colletotrichum* spp., *Alternaria* spp., *Botrytis cinerea* and other unidentified fungi.

Red indicates the max disease values. **Dark Green** indicates no detectable disease. **Light green**/**Yellow**/**Orange** indicates increasing levels of disease from 0 to the maximum value recorded. *indicates value is significantly less than the untreated control according to the least significant difference test (LSD) (α=0.05).

Best practices and dissemination of recommendations to Georgia blueberry growers. Following the field trial work above, several best practices and recommendations for optimal use of the Blueberry Advisory System were formulated (see "Discussion and Major Conclusions" below for a summary). This information was disseminated to Georgia blueberry growers through educational presentations and extension materials during Fall 2023. Blueberry production meetings were held in Clinch, Ware, Pierce, and Appling Counties in September and October 2023. At these meetings, Dr. Oliver presented the results of the Blueberry Advisory System trial work and also highlighted both the benefits of and difficulties with using the Blueberry Advisory System as a guide for anthracnose fruit rot spray applications in Georgia. In total, 106 growers attended these meetings and received recommendations regarding the use of the Blueberry Advisory System. Dr. Oliver's upcoming presentation during the 2024

Alma Blueberry Meeting in January will also feature this information. In addition to these efforts, to further educate growers on the use of this system, Dr. Oliver also prepared an article and submitted it for publication in an upcoming issue of a newsletter for Georgia's blueberry growers.

Discussion and Major Conclusions

Based on the trials described above and our experiences with the Blueberry Advisory System during 2023, several major findings and lessons can be drawn. These are detailed below:

1. **Both the calendar-based ['Standard'] spray program and the model-based ['BAS'] spray program can be used to reduce issues with anthracnose fruit rot and other fruit rots in Georgia blueberry production.** Relative to the untreated (unsprayed) controls, in every location, the incidence of anthracnose fruit rot and all detectable rots were lower regardless of which spray program was utilized. As such, this work further demonstrates the potential benefits of using effective fungicides for managing fruit rots in SHB and rabbiteye blueberry production in Georgia.

2. **The spray program based on the Blueberry Advisory System performed as well as the calendar-based program in our trials during 2023.** Major differences were not observed between the 'BAS' program and the 'Standard' program in our trials, suggesting that Georgia growers of both rabbiteye and SHB blueberries may utilize the Blueberry Advisory System for making fruit rot spray decisions instead of the 'Standard' program, if preferred, without an apparent drop off in control efficacy.

3. **Using the 'BAS' program <u>did not</u> result in lower numbers of sprays per season versus the 'Standard' schedule of sprays in our trials.** Since BAS allows for sprays to be targeted to the periods of the season where a high risk of anthracnose infection is present, it was hoped that utilizing the BAS program would result in fewer numbers of sprays per season relative to the calendar-based program. While prior work done in Florida with the BAS system showed a reduction in the number of sprays per season (in some seasons) (Gama et al. 2021), this was not the case during our trials in 2023. In our trials, the 'BAS' program resulted in an equal number of sprays (5 of 7 trials) or more sprays (in 2 of 7 trials) versus the 'Standard' program (**Table 3**). It is possible that in drier years (with fewer high/moderate risk events), better control of anthracnose fruit rot may be achieved with fewer sprays using the BAS system. Follow-up trials during upcoming seasons should be conducted, because results may differ across seasons with differing weather conditions.

Table 3. Spray program comparison for each location in terms of total sprays and estimated costs.

Location	Program	Sprays	Est. $/Acre[z]	Sprays (Dates)
Research	Standard	5	$262	Switch (2/6), Omega (2/20), Miravis Prime (3/2, 3/29), Captan (3/16)
Farm SHB	BAS	5	$184	Switch (2/6), Omega (2/27), Omega (3/13). Captan (3/29, 4/7)
Alma	Standard	5	$262	Switch (2/13), Omega (2/24), Miravis Prime (3/9 & 4/5), Captan (3/21)
SHB	BAS	5	$184	Switch (2/13), Omega (2/27, 3/13), Captan (3/29, 4/7)
Homerville	Standard	5	$262	Switch (2/7), Omega (2/20), Miravis Prime (3/2, 3/29), Captan (3/14)
SHB	BAS	6	$312	Switch (2/7), Omega (2/20, 3/2), Miravis Prime (3/14, 3/29), Captan (4/7)
Nahunta	Standard	5	$262	Switch (2/2), Omega (2/16), Miravis Prime (2/27, 3/29), Captan (3/9)
SHB	BAS	5	$262	Switch (2/2), Miravis Prime (2/14, 3/29), Omega (2/27), Captan (4/7)
Alma	Standard	5	$262	Switch (3/16), Omega (3/29), Miravis Prime (4/12, 5/10), Captan (4/26)
RE	BAS	5	$184	Switch (3/16), Omega (3/29, 4/7), Captan (4/26, 5/10)
Homerville	Standard	5	$262	Switch (3/8), Omega (3/21), Miravis Prime (3/29, 5/1)), Captan (4/14)
RE	BAS	5	$204	Switch (3/8), Miravis Prime (3/29), Omega (4/7), Captan (5/1, 5/12)
Nahunta	Standard	5	$262	Switch (3/6), Omega (3/16), Miravis Prime (3/29 & 5/1), Captan (4/14)
RE	BAS	6	$216	Switch (3/6), Miravis Prime (3/29), Omega (4/7), Captan (4/14, 5/1, 5/12)

[z]The estimated cost per acre was based on fungicide costs estimate provided by a single source in August 2023. Fungicide costs can vary significantly over time and by formulation (generic vs. brand name equivalent), so actual costs may vary considerably.

4. **Utilizing Captan or Omega (i.e. "Good" efficacy fungicides) during "Moderate" risk events often resulted in the 'BAS' program being cheaper overall than the 'Standard' program.** Whereas the standard program generally emphasizes a rotation of fungicides and includes a high number of sprays of fungicides rated as "Excellent", the BAS program allowed for fungicide choices to be made based on the particular risk of infection at a particular site (based on the BAS infection risk prediction model). As a result, during "Moderate" risk events, the fungicides Omega or Captan were utilized for sprays made to plots under the BAS program. Since, in general, Omega and Captan are somewhat cheaper on a per acre basis, more sprays with these products (vs. Switch or Miravis Prime) resulted in the estimated costs of the BAS spray program being cheaper in 5 of 7 locations and both programs being of equal cost in one additional location (**Table 3**). Despite the use of relatively cheaper, and theoretically less effective fungicides (based on efficacy ratings in the Southeast Regional Blueberry Integrated Management Guide) in the BAS program, the ability to target these applications to periods of "Moderate" risk using the BAS system resulted in the BAS program providing control that was at least as good, if not better, than the standard program (See conclusion #2 above) during our trials in 2023.

5. **The risk forecast provided by BAS was not accurate enough at predicting future risk events to use for spray scheduling prior to risk events.** While the BAS system interface does provide a forecast for infection risk for the next few days (see dotted "Forecast line" in **Figures 2 & 4**) and this theoretically would allow for fungicide applications to be made up to 24-hours prior to risk events occurring, our use of the BAS system during these trials revealed that this function was not accurate enough to be useful. Often, the 2-3 day forecast failed to predict the occurrence of risk events ahead of time (**Figure 4**). As such, all fungicide applications in our trials had to be made within 24 hours AFTER the risk event, and none of the applications were able to be made in advance of a risk event. Growers should be aware of this limitation of the BAS system and they should likely not put too much stock in forecast function of this system. As such, for growers seeking to utilize the BAS system, we would recommend that sprays be made within 24-36 hours <u>after</u> a risk event.

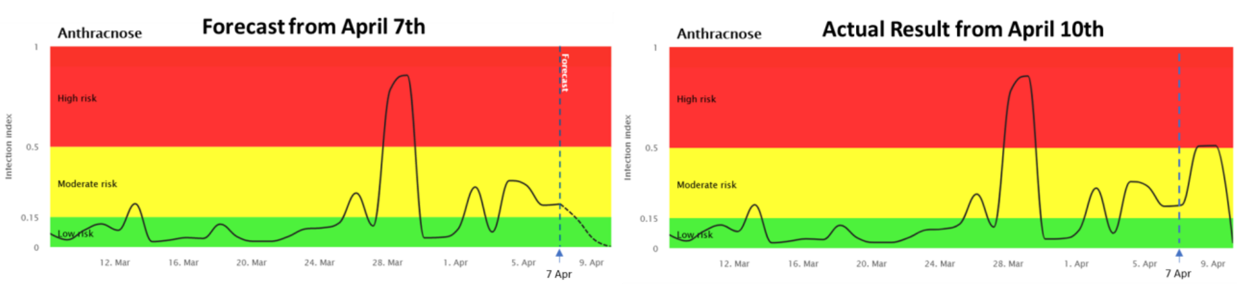

Figure 4. Left image depicts the output from the Blueberry Advisory System for Homerville, GA on April 7th, 2023. In this image the dotted line after April 7th indicates the forecast risk prediction for April 8th-10th. The right image depicts the same image as the left image except the information to the right of the forecast line shows the actual risk data from April 8th-10th. While the Blueberry Advisory System forecast on April 7th was for a decline from moderate to low risk (left image), the actual risk on April 8th and 9th increased to high risk (right image).

6. **Nearly twice as many "Moderate" and "High" risk events were recorded during the rabbiteye season versus the southern highbush season.** Given that rabbiteye blueberries bloom and ripen later in Georgia relative to SHB blueberries, the rabbiteye season is generally warmer (and possibly wetter/more humid) than the SHB season. Since the BAS system estimates infection risk based on a model that incorporates (warm) temperature and leaf wetness data, this would mean that more

"Moderate" or "High" risk events are likely to occur during the rabbiteye season (bloom through harvest) relative to during the SHB season. One question we had going into our trials in 2023 was whether the BAS system would send out alerts constantly during parts of the rabbiteye season and thereby suggest spray events more often than is practical.

Based on our observations during the 2023 season, we did see that there were substantially more high and moderate risk events during the rabbiteye seasons versus the SHB season (**Table 4**) including some periods during the later portion of the season where multiple moderate risk events were registered for 7-10 days straight in some locations. Though many of the high-risk events early in the season were associated with rainfall events/storm fronts, it is likely that many of these late season moderate risk events occurred due to the relatively warmer temperatures and other sources of leaf wetness. While rainfall is a common source of leaf wetness, only a thin film of water is required for fungal spore germination and infection to occur. As such, other sources of moisture including heavy dew or fog may also provide sufficient wetness for infection to occur if temperature and other conditions are right. Growers should be aware of this tendency when warm, humid conditions occur, even when there is a lack of substantial rainfall.

Table 4. Moderate and high-risk events according to the Blueberry Advisory System in 2023.

		Locations								
	Time	Homerville[z]			Alma[y]			Nahunta[x]		
	Period	Moderate	High	Mod+High	Moderate	High	Mod+High	Moderate	High	Mod+High
SHB	Bloom	3	3	**6**	0	4	**4**	2	2	**4**
	Harvest	15	2	**17**	13	0	**13**	16	0	**16**
	Season	29	7	**36**	18	4	**22**	21	3	**24**
RE	Bloom	3	0	**3**	3	0	**3**	0	0	**0**
	Harvest	21	9	**30**	17	4	**21**	25	4	**29**
	Season	39	13	**52**	28	6	**42**	42	5	**47**

[z]Homerville SHB: Bloom (Feb 1-Feb 21), Harvest (Apr 1-May 15), RE: Bloom (Mar 1-Mar 21), Harvest (May 15-Jun 30)
[y]Alma SHB: Bloom (Feb 1-Feb 21), Harvest (Apr 1-May 15), RE: Bloom (Mar 11-Mar 31), Harvest (May 25-Jul 10)
[x]Nahunta SHB: Bloom (Feb 1-Feb 21), Harvest (Apr 1-May 15), RE: Bloom (Mar 1-Mar 21), Harvest (May 15-Jun 30)

Despite the higher numbers of high risk and moderate risk events that occurred during the rabbiteye season, it should be noted that we did not end up making any more fungicide applications in our rabbiteye trials than we did in our SHB trials. This is due to our decision, ahead of time, to not make repeated fungicide applications to the same plants less than 7 days apart regardless of where there were intervening risk events. Overall, our spray programs were still similarly effective for both our SHB and our rabbiteye trials.

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