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Early Herbicide Success Keeps Late Season Budget in Check

By Allison Jonjak

As many of you are working on or finishing up your Casoron applications against broadleaves, I wanted to share some reminders for the rest of your spring weed control. Setting up a strong offense early in the year when weeds are germinating and small can keep you within budget. The better your early treatment works, the less time and money you will spend cleaning up escapes.

Timing is critical in our spring applications. Broadleaf weeds are most susceptible to herbicides when they are actively growing, but smaller than a soda can. Annual and perennial grasses are vulnerable when they're in phases of active growth.

Evital 5G is effective on several grasses and sedges, but also has some action against cranberry. Reduce your rates on sandy soils, or if you grow Stevens, McFarlins, or the descendents of these varieties. Sedges have edges, rushes are round, grasses have joints all the way to the ground: Poast and Select Max will work only on grasses. To reduce vine damage, do not apply during the heat of the day. QuinStar is effective against dodder, as well as some broadleaves and other grasses, but it shouldn't be applied to weak vines. QuinStar does have restrictions from many handlers. With this and every herbicide, check with your handler for current-year restrictions before you make an application!

If you have escapes from your strong spring program, you can always fall back to your wiping defenses: 2,4-D (Weedar 64) and glyphosate (not all formulations are registered for cranberry so check the label) can be wiped on weeds while avoiding cranberry vines. These are both systemic herbicides, so you will not see damage on day 1 of application, and plants may take several days to die. It is better NOT to do tank-mixes of systemic and contact herbicides, because contact herbicides will arrest plant growth, leading to poor uptake and circulation of the systemic herbicide.

Mesotrione (Callisto) can be a useful backup for sedges and rushes as well—be sure to use a non-ionic surfactant to get the best coverage.

One of my favorite papers, an oldie but a goodie, compares emergence habits in 12 biotypes of Giant Ragweed to explore why G-rag is harder to fight in some regions. Some biotypes emerge over a very tight time window, and some emerge across a longer date range. People who face the wide germination window G-rag are likely to think "I didn't get good coverage," or maybe "my G-rag is showing resistance to the herbicide I just used," when in fact they had good coverage and their weeds are susceptible—but new weeds emerged after the application. Anecdotally I've seen similar patterns from other weeds too, so I always want to remember this advice:

"There is a tendency to blame all problems in weed management on a weed's ability to survive herbicides. This study illustrates that factors totally unrelated to herbicide tolerance can have a significant impact on the efficacy of weed management programs. It is critical to understand why weeds are able to survive management tactics."

If you assume you know why weeds are surviving, and you're getting it wrong—you're going to solve the wrong problem. Take a look at your bed (after the reentry interval!) to see if your escaped weeds were damaged but survived—or if they hadn't germinated at all—or something else!

Easy Online Resources to Help Anticipate and Understand High Precipitation Weather Events

By Jed Colquhoun

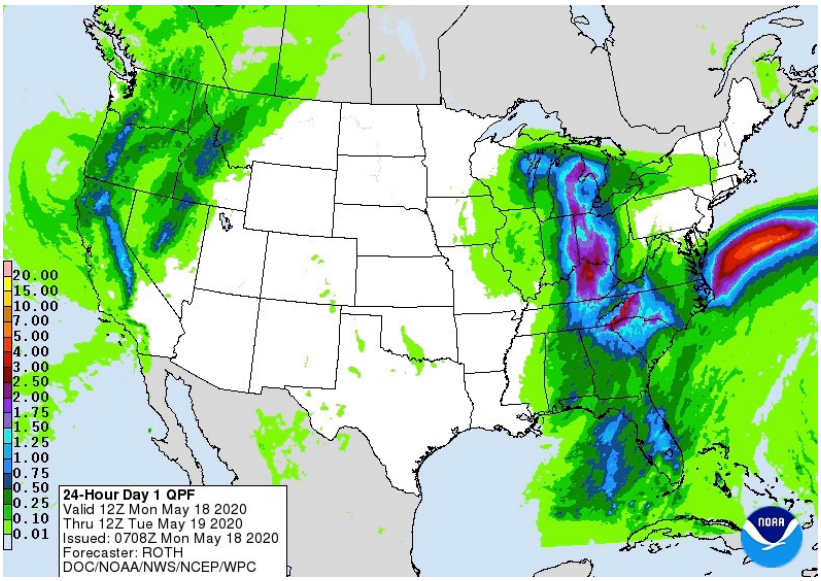
I'll be the first to admit that I'm a bit of a weather geek, and as such was quite intrigued by Dr. Shane Hubbard's presentation at this year's Cranberry School. In particular, I followed up with Dr. Hubbard to learn more about the current ability to forecast high precipitation weather events that affect cranberry production in several ways, such as:

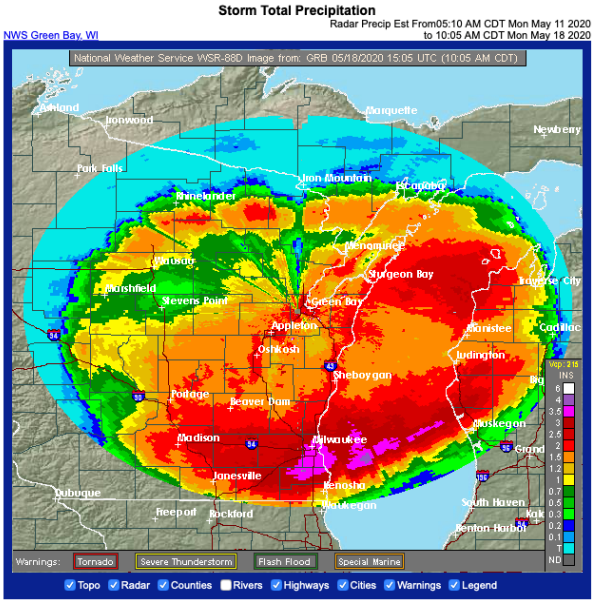
- Cranberry growers are also hydrologists and spend a lot of time managing soil moisture to optimize vine health and berry production, but a heavy rainfall throws a wrench in that process.
- Unanticipated high rainfall events can also impact the utility and risk related to fertilizer and pesticide crop inputs. Heavy rainfall can not only dilute or reduce the efficiency of residual crop inputs such as fertilizer and herbicides, but also pose environmental risk from leaching, runoff or flooding.
- These events have been more common lately. For example, from May 1 to October 31, 2019 the Hancock Agricultural Research Station recorded 11 days with precipitation between a half and one inch and 8 days with over one inch. This past weekend was a stark example, where areas surrounding cranberry country have reports of flooded streets and wet basements. The National Weather Service storm total precipitation map looks like an unwelcome rainbow.

Dr. Hubbard points out that extreme precipitation events with record rainfall amounts are still difficult to forecast, particularly when related to thunderstorms common in summer months. We've all had that experience where the wipers can't keep up and a mile later the road is dry. With that said, he pointed me toward some online forecasting resources that I've found worth bookmarking to get a sense of what's potentially coming in the next few days. I've shared these with a few growers and they've found them interesting and useful in planning crop management activities. There are two National Weather Service sites that I've found particularly useful:

- The Weather Prediction Center's precipitation forecast maps. Here's an example from that site of what the map shows for precipitation forecasts as the system shown in the storm totals image above moves across the lake to Michigan.
- The Weather Prediction Center also has a very useful site that puts a probability on rainfall amounts, and the user can select both the rainfall amount and forecast timeframeI find myself checking this site most often as we plan our field activities across the state.

As Mark Twain said, "climate is what we expect, weather is what we get". While that's still true, I hope that you also find these refined resources useful in thinking about your crop management activities.





Rusty-Patched Bumble Bee: A Beloved Bumble Bee That Needs Our Help!

By Christelle Guédot

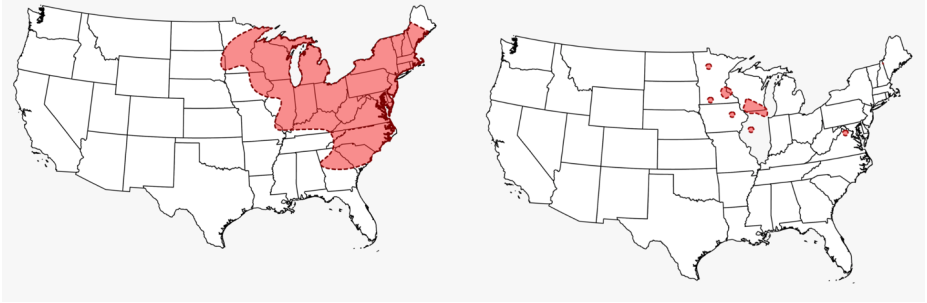
The rusty patched-bumble bee (RPBB), Bombus affinis (Fig 1), is one of the 21 bumble bee species in the Eastern/Midwestern region out of 48 bumble bee species documented in the United States. RPBB used to be widespread throughout the region but has declined recently to small pockets in a few states, including Wisconsin (Fig 2). RPBB holds a special place for us here as Wisconsin represents one of the bigger areas where they are found as well as where suitable habitat for this species is present (Fig 3).

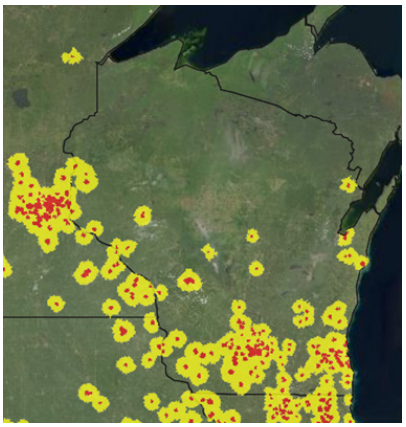
RRBB is not the only species of bumble bees (e.g., Cameron et al. 2011), bees overall (e.g., Potts et al. 2010), and insects in general (e.g., Hallman et al. 2017), that have been reported in sharp declines over the last decades. This overall trend in bee declines has, at least in some way, contributed to RPBB becoming the poster child for bee conservation efforts. In 2017, RPBB became the first bee species to be placed on the Endangered Species Act by the U.S. Fish and Wildlife Service as it was reported to have declined by almost 90% since the late 1990s in addition to its rapidly shrinking range. RPBB's drastic decline has been attributed to a combination of factors, including pathogens, exposure to pesticides, habitat loss and degradation, competition and disease introduction from commercial bees, and climate change.

RPBB, like other bumble bee species, lives in colonies formed by solitary queens that emerge from overwintering sites in early spring. At this time of year (April/May), the bumble bees are bigger than later in the spring and summer as they are the overwintering queens. Bumble bee queens are some of the first bees we see flying around in the spring. The queens require nectar and pollen-producing flowers for food and undisturbed nesting habitat near food sources to survive and start a new nest. Once the queen has provisioned the nest and laid the first brood, the bees that then emerge will take over the foraging for food and taking care of the nest for the rest of the summer. These new bees are

HISTORIC RANGE OF RUSTY-PATCHED BUMBLE BEE (FROM MUSEUM RECORDS)

CURRENT RANGE OF RUSTY-PATCHED BUMBLE BEE (FROM RECENT SURVEY EFFORTS)





worker bumble bees and are smaller than the queen. All the workers and the founding queen will die at the end of the summer and the new queens produced at the end of the summer will mate and find a hiding place to overwinter in.

RPBB (as well as other pollinators) requires high quality foraging resources, nesting sites, overwintering sites, and protection from pesticides, introduced diseases, and landscape disturbances. What can we do? It is important to be good stewards of our land and provide floral resources, minimize soil disturbances to protect nesting sites, and to protect pollinators from harmful pesticides. Tables 1 and 2 taken from the publication Protecting pollinators and improving pollination on Wisconsin cranberry marshes show the relative toxicity of insecticides and fungicides, respectively, to bees. Please note that these tables were put together in 2018 and some products may no longer be registered or allowed by handlers.

TABLE 1. Registered insecticides for cranberry with relative toxicity to bees as of 2018.

Toxicity to bees	Class (and IRAC* code)	Example active ingredients	Example trade names
relatively nontoxic	diacylhydrazines (18)	methoxyfenozide, tebufenozide	Intrepid, Confirm
	diamides (28)	chlorantraniliprole	Altacor
	biologicals	*Bacillus thuringiensis*	Biobit, Dipel
moderately toxic	benzoylureas (15)	novaluron	RimOn
	acetyl CoA inhibitors (23)	spirotetramat	Movento
	biologicals	*Burkholderia spp.*, strain *Chromobacterium subtsugae*	Venerate, Grandevo
highly toxic	carbamates (1A)	carbaryl	Sevin
	organophosphates (1B)	acephate, chlorpyrifos, diazinon, phosmet	Acephate, Orthene, Lorsban, Hatchet, Diazinon, Imidan
	neonicotinoids (4A)	acetamiprid, imidacloprid, thiamethoxam	Assail, Admire Pro, Alias, Widow, Actara
	spinosyns (5)	spinetoram, spinosad	Delegate, Entrust, Success
	oxadiazines (22A)	indoxacarb	Avaunt

*Insecticide Resistance Action Committee chemical class codes based on modes of action.

TABLE 2. **Registered and commonly used fungicides for cranberry with relative toxicity to bees as of 2018.**

Toxicity to bees	Class (and FRAC* code)	Example active ingredients	Example trade names
relatively nontoxic	sterol demethylation inhibitors (3)	fenbuconazole, prothioconazole	Indar, Proline
	strobilurins (also called quinone outside inhibitors, QoI) (11)	azoxystrobin, fluoxastrobin	Abound, Evito
	chitin synthase inhibitors (19)	polyoxin D zinc salt	Oso
	botanical	*Reynoutria sachalinensis*	Regalia
	dithiocarbamate (M3)	mancozeb	Dithane, Penncozeb
moderately toxic	sterol demethylation inhibitors (3)	propiconazole	Orbit, Tilt, Topaz
	inorganics (M1)	copper hydroxide	Kocide, Champion
	chloronitrile (M5)	chlorothalonil	Bravo, Echo, Equus
highly toxic	inorganics	hydrogen dioxide	OxiDate

*Note that rotating Fungicide Resistance Action Committee (FRAC) class codes (modes of action) will help delay fungicide resistance.

It is also very important to think about the residual activity of some of our pesticides when bringing managed bees on the marsh. Some pesticides, such as Lorsban, have fairly long residual activities, and we should think about holding off broad spectrum insecticide applications at the very least 3 days before managed bees arrive on the marsh (Cutler et al 2014). In addition, it is important to remember that native bees, such as RPBB, are present on the marsh throughout the year and spraying less toxic pesticides and in the evening, can help reduce exposure. For more info on how to protect and promote pollinators, refer to the publication Protecting pollinators and improving pollination on Wisconsin cranberry marshes.

Happy growing season!

Update from the Wisconsin Cranberry Research Station

By Wade Brockman

The weather has really helped push our new plantings along. It's been almost 3 weeks and starting to see signs of growth. Now today we got a much needed rain but of course that comes with obstacles like heavy downpours to wash out new dikes and pea size hail. Looks to be a cool weekend with the possibility of frost watch.

Grower Updates

Flying Dollar Cranberry

By Seth Rice

Hello again from Flying Dollar Cranberry! Well Mother Nature just does not seem to make up her mind and as usual we just have to roll with the punches.

We got some of our problem spots planted that we are dealing with. We also love this time of year because we get to see what the next cycle of life brings to us on the marsh.

We have been applying herbicides all over our marsh. Let's hope the worst of our spring frost watch days are behind us. Until next time!

Gardner Cranberry

By Willow Eastling

I hope everyone had a great Memorial Day weekend! The thunderstorms and heat will really get the buds moving. We are seeing more cabbagehead and bud break throughout our regions. Our advanced varieties are showing great elongation. I found very few pests on our Sundance and BL.

I don't anticipate any threshold levels coming into play until we get closer to June. The crews are busy working on underground irrigation, mowing and planting both in Pittsville and up north.