Disease and Resistance Management in Strawberry; Top Considerations for the Coming Season

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The new strawberry season is just around the corner and we need to make smart choices for pest and disease management. At the Strawberry Expo 2014 in Pinehurst we talked about some important things to consider this coming season to ensure maximum disease and resistance management. Here they are in a nutshell:

Implement IPM practices in nurseries. It is not a secret that diseases often come in with transplants and we must do a better job avoiding that. Luckily, we received some funding that will enable us to work with nurseries, investigate their practices, and develop solutions to current problems. This will not happen overnight but will rather be work in progress over the next years.

Avoid Key Selectors. Some fungicides are key selectors for resistance to multiple fungicides in the gray mold fungus on the east coast. Resistance to multiple fungicides has built up in a stepwise fashion over time and resistance to some fungicides is the backbone of resistance to newer chemistries. Basically, if new resistance emerges, it is most often from a population that is already resistant to established fungicides. In particular, applications of fungicides from FRAC (Fungicide Resistance Action Committee) group 1 (e.g. Topsin M) and to some degree FRAC 11 (Abound, Cabrio, Pristine, Merivon) are frequently associated with resistance to other FRAC groups that we need for disease control. Our recommendation:

- Avoid FRAC 1 fungicides
- Use FRAC 7/11 premixtures (Merivon, Pristine) ONLY if gray mold AND anthracnose are a threat BUT NOT for routine gray mold control.
- Use FRAC 11 solo products (Abound, Cabrio) only for anthracnose control
- Do not use FRAC 7/11 premixtures or FRAC 11 solo products more than twice per season.

Spray Strategically. If applications are needed prior to bloom, thiram, captan, and maybe biologicals should be used. During bloom, stick with captan as much as possible and use the 'at risk fungicides' (including FRAC 1, 2, 7, 9, 11, 12, and 17) only when the weather is favorable for disease development (Table 1).

Table 1. FRAC code, trade name, and primary target of fungicides frequently used for disease control in strawberry

FRAC Code	Trade Name Examples	Primary Target
1	Topsin M	Gray mold
2	Rovral	Gray mold
7	Fontelis	Gray mold
7/11	Pristine	Gray mold and anthracnose
	Merivon	Gray mold and anthracnose
9	Scala	Gray mold
9/12	Switch	Gray mold and anthracnose
11	Abound	Anthracnose
	Azaka	Anthracnose
	Cabrio	Anthracnose
17	Elevate	Gray mold

Botrytis control success is vastly improved if you know the resistance profile of your fields. Make sure you get the gray mold fungus tested. Download instructions at http://www.clemson.edu/extension/horticulture/fruit_vegetable/peach/diseases/br_strawberry.html.

Spray less. Spraying less is the ultimate resistance management tool because we are selecting less. But that is only an option if we do not compromise disease control success. Research has shown that we are spraying way too many times and that often more than 50% of our applications are unnecessary. We are implementing an online tool, the Strawberry Advisory System (SAS), in southern states that notifies growers when an application is truly necessary. Growers will need to be near a weather station that is hooked up through the internet to a weather database. Contact us for more information if you are interested. But if you do not have access to this system, table 2 shows the weather conditions that you may use to decide whether to spray or not. You might be surprised how many sprays you can save without compromising control especially in a reasonably dry year.

Table 2. Decision Support Chart for Gray Mold Management in Strawberry

Weather Conditions*		Peak	
LWD (h)	Temp (°C)	Bloom	Recommended Spray Strategy
< 13	any	Yes or No	No spray
> 14	17-25	No	Captan, Thiram
		Yes	FRAC 17 (e.g. Elevate); FRAC 7 (e.g. Fontelis)
> 18	17-25	No	Captan or Thiram + FRAC 17 (e.g. Elevate) or FRAC 7 (e.g. Fontelis)
		Yes	FRAC 12 (e.g. Switch)

*LWD = Leaf Wetness Duration in hours and Temp = temperature in Celsius during leaf wetness period.

In conclusion, after more than a decade of applying multiple fungicides of multiple FRAC codes, resistance is now common in the gray mold pathogen *Botrytis cinerea*. But the resistance profile is different from location to location and depends on spray history, nursery source, and nearby crops hosting the pathogen. Knowing your resistance profile will enable you to prevent ineffective sprays and improve preharvest and postharvest disease control. We must make every effort to spray strategically and to limit the number of sprays and we must include nurseries in our efforts to control pests and diseases. Good luck!