**President’s Message**

Well, the freezing fog of winter has set in, and I for one would prefer to be on a warm tropical beach in Hawaii. That, however, is not in the cards, so I am here at my desk preparing the December newsletter. As I’m sure you want to share the pain of my vineyard removal, I will tell you that we have completed the trimming and shredding all of the shoot growth from 2017 on the plants we are removing, and will start on removing and chipping the cordons this week. At least there’s plenty to keep us busy in this otherwise dead time of year.

RVWA had a very nice event at 2 Hawk Winery in November, the end of year “Wrap-up.” Good crowd and interesting speakers. Thanks to Ross Allen for the hospitality. Thanks to Alex Levin and Randy Gold and the technical committee not only for that event but for the whole year of informative educational events in the Rogue Valley.

We will hold our **annual meeting and dinner at the U S hotel in Jacksonville, February 3, from 5-9pm**. Platon and the crew from Jacksonville Inn will cater the food, and Greg Jones will once again be the keynote speaker. Registration and social hour from 5-6pm, meeting and presentations from 6-7pm, and dinner starting at 7pm. Please RSVP to [kjohnpratt@gmail.com](mailto:kjohnpratt@gmail.com). The cost satys the same as always, $37.50 per person, and you can send a check before hand or pay at the door, or pay at the rvwinegrowers.org website. We filled the room last year, and hope to again this year. Please bring a bottle of local wine to share.

We had an interesting OWB Research Committee event in Corvallis on November 15. We opened the door for researchers to present “pre-proposals” on ideas they would like to investigate next year. Each faculty member had 15 minutes to present pre-proposals and hear feedback from industry members. Our own Alex Levin had four ideas to present, so he was up in front for almost an hour, and it was the first opportunity for people in the north part of the state to meet our new viticulture specialist. He impressed all with his intelligence and energy. I am very hopeful that he will get OWB support for some of his proposals.

We had good presentations from many other researchers, but a few stood out. Walt Mahaffee spoke for a while on powdery mildew resistance to FRAC 3 and FRAC 11 fungicides, and told us some exciting news: he has preliminary evidence that resistance developed in the PM fungus has some detrimental effects on its ability to procreate, and that if we can halt using those chemicals for a few years, the resistant population will die out and the chemicals will once again be effective. Hopefully we have all learned our lesson about overusing any chemical so we don’t develop any more resistant populations.

Vaughn Walton has been doing some good work on identifying the Red Blotch vector, and has found that although pheromone traps don’t work for the tree hopper type of incriminated insect, certain kind of vibration traps do work. These insects use vibrations to attract mates, and since most populations tend to come from surrounding riparian areas, we could conceivably set up traps at the edges of our vineyards to lure and trap the insects before they enter our vineyards.

We also had three different pre-proposals looking at brettanomyces, two for looking at weed control, and a pre-proposal from Patty Skinkis for examining crop load dynamics in Chardonnay. The ResComm did not give any commitments to any researcher, but rather engaged in dialogue that will hopefully result in research more directly aimed to achieve industry goals.

I hope all of you are resting during this “slow” time and preparing for a wonderful holiday time. I want to thank you all for being supportive of our industry throughout the year. I am looking forward to an even better year in 2018. Paz—John

**Upcoming Events**

**Annual Industry Party at Serra Vineyards**

When: Friday, December 8th  
Location: Serra Vineyards  
222 Missouri Flat Road ~ Grants Pass, OR 97527  
(541)846-9223  
Time: 530pm Appetizers & Wine ~ 630pm Dinner  
Live Music & Eat When You Wish - No Formal Seating  
  
[Jeff Kloetzel](http://www.youtube.com/c/JeffKloetzel) will be playing live music from 6pm to 9pm and we hear that there may be several impromptu jam sessions happening, so if you are musically gifted please feel free to bring along your instrument! At 630pm the Serra Vineyards team will unveil a buffet of deliciousness. You may bring wine, appetizers or anything else you'd like to share but are not required to bring anything.  
  
There is no cost to attend and the whole team is welcome!  
Please RSVP by emailing Liz at liz@vino-verse.com

**ODA Pesticide Applicator CORE Credits**

When: December 13, 10am -3pm

Where: SOREC LIBRARY

**9:45 - 10:00 am**   Welcome, Orientation and Local Updates – Host County Extension Faculty

**10:00 – 11:00 am**  *Worker Protection Standards (WPS) – Kaci Buhl, OSU*

**11:00 – 12:00 pm**  *ODA Laws & Regulations Update – ODA Representative*

**12:00**   Sign up for AM Session recertification credits (2)

*Noon to 1:00 pm. Bring your own lunch*

**1:00 – 2:00 pm**    *ODA Case Studies & Lessons Learned – ODA Representative*

**2:00 – 3:00 pm**   First Aid & Spills Containment – Kaci Buhl, OSU

**3:00**     Sign up for PM Session recertification credits (2)

 This event is free, and you do not need to register beforehand.

**RVWA Annual Dinner/Meeting**

When: February 3, 2018, 5-9pm

Where: U S Hotel Jacksonville

Cost: $37.50 per person, pay in check or cash at door or at rvwinegrowers.org

RSVP to [kjohnpratt@gmail.com](mailto:kjohnpratt@gmail.com)

Oregon Wine Symposium

Learn, connect and grow at the Oregon Wine Symposium, the premier educational event and trade show for the Northwest wine community. The Symposium is comprised of two full days of panel discussions and presentations covering the most relevant topics in viticulture, enology and wine business. Presented by the wine industry’s leading experts, the Symposium is a must-attend event for winery and vineyard owners, vineyard managers, winemakers, marketing and sales managers and winery staff. Registration includes access to the Northwest’s biggest wine industry trade show, featuring more than 170 exhibitors.

**What**: Oregon Wine Symposium

**When**: Tuesday, February 20, 2018 8:00 AM - Wednesday, February 21, 2018 5:00 PM

**Where:** Oregon Convention Center, 777 NE Martin Luther King Jr. Boulevard, Portland, Oregon 97232, USA.  Registration & Cost: $20-$240. **OWA members receive a discount on registration.**

**Who Attends:** winery and vineyard owners, vineyard managers, winemakers, marketing and sales managers and winery staff.

New OR Wine Press Article about So OR

Authored by our own Maureen Battistella, the Wine Press ran an excellent article about the new research vineyards at SOREC, along with some great historical perspective on the development of the wine industry in our area. For any of you who have worked with the indefatigable Porter Lombard, it will bring a smile to your face to see what he endured and eventually overcame. <https://www.oregonwinepress.com/comince-to-cabernet>

Greg Jones Climate Report

Greg’s monthly climate report is posted as usual on our website, rvwinegrowers.org You can go to the website at any time to see the latest of Greg’s reports.

**Walt Mahaffee on Powdery Mildew Current Issues**

**What the mildew? A perspective on another challenging year managing powdery mildew**

*Dr. Walt Mahaffee, Research Plant Pathologist, USDA-ARS Horticulture Crops Research Unit*

There has been a lot of talk this season about powdery mildew pressure that has been difficult to manage. It might be easy to write off mildew management problems to fungicide resistance, since both FRAC 3 (DMI) and FRAC 11 (strobulorins) resistance have been found to occur at a high frequency in isolates of *E. necator* (powdery mildew pathogen) from Oregon, Washington, and California. However, the occurrence of resistance is not always directly correlated to loss of field control. There are fields with severe disease pressure where we did not find fungicide resistance and low disease levels in fields using FRAC 3 and FRAC11 fungicides with resistance.

There are a multitude of factors that go into managing powdery mildew, and a miscalculation in any one of them can result in a mildew epidemic that is difficult to manage. Even if you have fungicide resistant isolates, they may not be the main cause of a mildew outbreak.

Fungicide application interval is often the cause of run-away powdery mildew epidemics. Folks say I was on a “X day” application interval so there is no way that interval was the cause. However, days between applications is not what manages an epidemic. Epidemics are a function of the time susceptible plant tissue is left unprotected and the amount of inoculum deposited onto it. Thus, in a season like this one, with rapid shoot growth, a significant portion of tissue could be unprotected or minimally protected, for example, when a young leaf receives sulfur and then triples in size in the next few days. Even systemic fungicides can be diluted by rapid plant growth. Even short periods of inadequate fungicide coverage could be long enough for disease to get a foothold because we do not have eradicative fungicide options. I do not know of data showing a product will eradicate established mildew colonies other than time. This inoculum source will be a constant frustration and require shorter intervals than you might think.

Long application intervals in the spring are usually fine because the typical cool and overcast spring weather in the Pacific Northwest slows plant growth and is less favorable to disease development with a new generation every 15 to 21 days. However, the same conditions that are conducive for rapid plant growth also favor rapid fungal growth and spore production with as few as five days between generations. If you see more than two or three nodes added to shoots or laterals, it is time to get the sprayer back out for another round.

Fungicide selection is another potential reason for disease control failure. Oils are popular and have their place in a management program; however, they do not offer prolonged protection from infections. I have not seen any data that convinces me they are eradicants. Instead, I consider them as “knock-down” products that can delay sporulation and growth for a few days but do not kill sporulating colonies or give suitable protection against new infections after application. Oils are best mixed with a protectant, particularly if using them back-to-back in the early spring. Growers must also consider how oils affect the ability to alter a spray program. If it’s necessary to wait 14 days before following with a sulfur application; is there enough management flexibility to react to rapid shoot growth that can occur in warm spring?

Now to consider sprayer calibration and coverage. These are two different concepts. Spray calibration is essentially the volume of spray material from each nozzle. It is relatively easy to measure but it only predicts the potential of how much fungicide will land on the leaf. How much is actually getting there is a far more difficult measurement and is a function of tractor speed, droplet size and velocity, leaf area in the canopy, and nozzle orientation. The slower the tractor speed the better coverage; even without changing the gallons per acre. Droplet size is a function of nozzle traits and pressure that changes as the nozzle wears – droplets get larger as the nozzle orifice enlarges due to abrasion caused by high pressure water with particles (e.g. sulfur, wettable powders) flowing through it. Bigger droplets bounce more often from plant surfaces which results in a lot of wasted fungicide on the ground. Smaller droplet sizes can dry up before hitting the leaf and float away with the air currents – especially if spraying every other row. It is a good idea to use spray cards every application to check coverage of the targets you are most concerned about – fruit and leaves deep in the canopy. Put cards on the sides of clusters and underside of leaves because most mildew is found on the underside of leaves in the spring. You might be surprised by how little coverage you get.

An improperly calibrated sprayer is throwing money away. Let’s do some math. Conservatively, assume a sprayer is overspraying by 1 gal/A after every 100 acres treated and seven applications to 50 acres are made per season. That means you will be losing 3 gallons/A at the last application or 150 gallons over 50 acres. That is 3 acres of an application and 4 hours of time. These numbers do not account for the reduction in coverage or disease control.

Now let’s talk about coverage, i.e. getting droplets to both sides of the leaves and around all the berries. Some will say that they are only concerned about the fruiting zone, since this is what will be harvested. However, the odds do not bode well for this approach. Optimistically assume that 95% coverage from a fungicide application resulting in a one in million chance a spore will land on an unprotected surface. Further assume on May 15th there are 53 leaves per foot of row (leaf area index ~0.5) with 1% of the leaves infected with a single 0.25 in2 mildew colony that can produce 10,000 spores a day. This means that every day on a 100 foot row you will have 53 new infections occurring with the inoculum load compounding every 5 to 10 days. There are going to be millions of spores a day bombarding the fruit once fruit set arrives. The odds are just not in our favor.

Common coverage issues include: 1) suckers that are almost completely missed by the sprayer; 2) shoots well above the top wire or draping over sprayers such that little deposition of fungicide occurs to the shoot tips; 3) too little air or spray velocity, or turbulence so that only the outer leaves are covered and insufficient spray material reaches the underside of leaves or the clusters; 4) spray volumes that are too small for the leaf area present; 5) spray floating to the sky because nozzles are not pointing at the canopy; 6) uneven canopy growth with sprayer nozzles aimed for the average, leaving a fair bit of tissue unprotected. All of these can result in an epidemic that is harder to control and may appear like fungicide resistance. It also will speed the development of fungicide resistance since mildew will be exposed to less than optimal doses.

Many growers wondered why the epidemic roared on despite the high temperatures this season. Isn’t mildew supposed to be killed by temperature above 95℉? The effect of temperature is at the scale of the fungus. Think of a spore as the Goodyear Blimp and a leaf as the Willamette Valley. There is a wide range of microclimates where the blimp can land. This year there was ample soil moisture, resulting in vigorous shoot growth. This resulted in a lot of shaded leaves and plenty of water for evaporative cooling at the leaf surface due to transpiration. In other words, there was a lot of leaf area that did not see temperatures above 95℉. Also, high vigor means more hedging and more lateral development, making denser canopies that reduce spray coverage and more young succulent tissue for infection. The odds really are not in our favor.

Grape Disease Control: Taking Stock and Looking Forward

By Wayne Wilcox, Cornell University

Controlling the plethora of fungal diseases common to our climate has always been an important part of growing grapes in New York and other Eastern regions. This has only become more important since I assumed the lead of Cornell’s grape pathology program in 1994. Major segments of the industry have shifted their focus to *V. vinifera* and interspecific hybrid varieties that typically are more dis­ease susceptible (sometimes, much more) than the native cultivars long traditional to the area. At the same time, those who do grow the natives have been squeezed financially to maximize tonnage while limiting both disease losses and the inputs to control them. All while the market’s demand for quality keeps rising.

Because of these trends, Eastern growers and their advisors have be­come increasingly sophisticated in their management of the fungal disease complex that they must contend with every year. It has always been my goal to help provide them with the knowledge to support this, by focusing on the three pillars of what I consider to be IPM, that is, Intelligent Pest Management:

1. **Understand the biology of a specific disease.** What are the environmental factors that make it click? How does it get started in the first place each year? When during the season is the pathogen that causes it most active? Knowing the above, what non-chemical viticultural practices can we employ to reduce disease development?
2. **Understand the vine’s susceptibility to specific diseases.** What are the differences among grape species and cultivars? What are the seasonal changes in susceptibility—particularly, *when* during the crop’s development is it critical to focus your spray program and when can you afford to save some time/ money and ease up?
3. **Understand the characteristics of the individual fungicide tools available.** How well does each work against specific diseases? What is its so-called physical mode of action—does it provide protective, post-infection, and/or antisporulant activity? What is the risk of resistance development, and how can we help manage that?

As I prepare to retire from Cornell, I’d like to take this opportunity look back on a few aspects of the work that’s been done by those in my program and with whom I’ve cooperated to answer some of these questions as they pertain to the major fungal diseases of grapes in New York and other regions.

Powdery mildew is a unique disease in the sense that the causal fun­gus colonizes infected leaves and berries almost entirely on their **surface**, whereas all of our other fungal pathogens grow within the infected organs.

Thus, the PM fungus is uniquely affected by envi­ronmental variables such as relative humidity (RH), since the fungus draws its water from the vapors in the air; ultraviolet (UV) radiation; and various topi­cal chemicals (e.g., oils, salts such as bicarbonates) that growers might apply—all of which are largely irrelevant to other pathogens that are living within the leaves and berries.

*Relative humidity.* In an extensive series of lab experi­ments, postdoctoral associate Julie Carroll showed that RH has a major effect on PM development. As shown in **Figure 1**, the percentage of inoculated Ries­ling leaves covered with mildew more than doubled when they were subsequently held at 80% RH than when they were held at 40% RH.

*Effect of sun exposure.* Although it has long been “common knowledge” that PM is more severe in shaded regions of the vineyard (along wood edges, within dense canopies, etc.), graduate student Craig Austin showed just how dramatic this effect is *(See* Heat and UV Radiation from Sunlight Ex­posure Inhibit Powdery Mildew *in Appellation Cornell Issue #2)*. For example, he inoculated leaves of Chardonnay vines that were locat­ed either (i) immediately either next to or (ii) about 200 feet away from a tall group of trees, on either (a) the sun-exposed outer edge of the canopy, or (b) within the inner portion of their dense canopy, thereby providing four different treatments with varying levels of natural shade (**Fig. 2**).

The resulting disease severity increased sub­stantially with each increasing level of shade, becoming **8 to 40 times more severe** on the most heavily shaded leaves (interior canopy of vines next to the trees) compared to the no-shade leaves on the exterior of vines away from the trees, depending on the year.

Compared to leaves in full sun, those in the shade had both (i) lower temperatures (an av­erage of 12°F lower than leaves in the sun), and (ii) just a fraction of the exposure to UV radia­tion. The PM fungus stops growing and can even die at temperatures >90°F (common on the leaves on a sunny summer day, when they are 12° hotter than the ambient air). And in both field and lab studies, Craig showed the even more dramatically harmful effect of UV radiation on this non-pigmented fungus PLUS the fact that UV combines with high tempera­tures to suppress disease development in a synergis­tic manner (2 + 2 = 5).

Given the above, we would expect that canopy man­agement practices that promote balanced levels of sun exposure on the clusters would help to reduce PM on them. This was shown to be true when we compared an Umbrella-Kniffen training system ver­sus a VSP system (which provided fewer shoots per foot of row) and employed leaf pulling treatments around the clusters that began either at fruit set or 5 weeks later. Using the VSP system and removing the cluster-surrounding leaves at fruit set (but not 5 weeks later, when berries were no longer susceptible to infection) reduced PM on the clusters by nearly 40% relative to UK-trained vines with no leaf remov­al.

*Canopy management and spray deposition.* Of course, canopy management practices that promote light penetration also promote spray penetration.

Using the different canopy densities in the Umbrel­la-Kniffen/VSP vineyard, Craig showed that for each leaf layer between the sprayer and the cluster, spray deposition on that cluster was reduced by one-half (!).

In subsequent cooperative work with Dr. Andrew Landers, we expanded this portion of the study to include commercial Finger Lakes vineyards of dif­ferent cultivars and training systems. This greatly expanded data set showed the same thing: For each increase of 1.0 in the Cluster Exposure Layer (CEL) value (basically, the average number of leaves be­tween the cluster and the sprayer), deposition was reduced by 50% *PM fungicides.* With the “help” (i.e., they did all of the work) of long-time technician Duane Riegel and, more recently, Dave Combs, we have conducted a series of fungicides trials every year on hybrid and *vinifera* (Chardonnay) grapes in Geneva. Ditto for many years on Concords in Fredonia with the help of Rick Dunst and Mike Vercant. This has provided invaluable help in determining the basic efficacy of new materials against various diseases as they be­come available and comparing them to other current options. These detailed fungicide trials have also al­lowed us to examine specific fungicide activities in more depth.

For example, in a series of field and lab experiments (the latter conducted primarily by technician Judy Burr) examining the activities of sulfur, we found that:

1. Contrary to previous “conventional wisdom” that it is strictly a protective fungicide, sulfur provides significant post-infection and even eradicative activity if applied from the time that a spore lands on the vine until a readily-visible colony has developed (about a week under typi­cal summer conditions).
2. Contrary to previous “conventional wisdom” that it is relatively ineffective at temperatures below 65°F, sprayable sulfur formulations are comparably active at all temperatures where the PM fungus is active.
3. In rainy seasons especially, sulfur activity is increased by any of the following: utilizing a “micronized” rather than wettable powder formulation; increasing the rate; and/or adding a spreader-sticker adjuvant.

*Sulfur residue persistence in the field.* In another study conducted in cooperation with Dr. Gavin Sacks in the Department of Food Science, graduate student Misha Kwasniewski examined the potential role be­tween late-season sulfur (S) applications and wine defects resulting from excessive residues at harvest. A major question for both producers and wineries, this issue had seldom been addressed experimen­tally due to the lack of technology for measuring S residues in a way that would allow it. Misha and Gavin first developed a technique to make such measurements, then we undertook a series of field experiments.

We found, unsurprisingly, that residues decreased as we reduced the rate of S applied and if we used a wettable powder rather than micronized formula­tion (the tenacity of the micronized formulations, which improves disease control, also causes higher residues with late-season use). For red-wine pro­duction, S residues generally regarded as “safe” re­quired that applications be stopped 5 weeks before harvest. However, Misha showed that for typical white wine production, where the must is clarified prior to fer­mentation, virtually all of the sulfur residues settle into the lees at the bottom of the tank within 24 hr after crushing, regardless of how high they were to begin with. In other words, late-season sulfur use should be a non-issue for standard white wine pro­duction.

*Fungicide resistance.* By the mid-1990s, the available sterol-inhibitor (more specifically, the DMI or FRAC Group 3) fungicides were beginning to lose potency due to resistance development. Over a number of years since, efforts by graduate students Eugene Er­ickson, Frank Wong, and technicians Judy Burr and Duane Riegel shed a lot of light onto how such resis­tance develops and how to manage it.

Monitoring sensitivities of the PM fungus popula­tion in a “resistant” vineyard and comparing that to the population in a “baseline” vineyard (never ex­posed to these materials) showed that the population “shifted” over time in the resistant vineyard to be­come predominated by individual PM colonies that required higher and higher doses of these fungicides to get a certain level of control.

For example, in 1995, the most common cohort of individuals in the resistant vineyard needed 8 times as much myclobutanil (active ingredient in Rally) for control as those in the baseline population (0.25 vs. 0.03 μg/ml), and 4 years later they required 20 times as much (1.02 vs. 0.03 μg/ml) The practical effect of such rate-dependent shifts was illustrated when we sprayed Rally at either 2 or 4 oz/A in the resistant vineyard in 2000. We obtained approximately 80% control with the higher rate and only 30% control with the lower rate.

When we assayed populations of the PM colonies that developed in the two treatment groups and compared them to the unsprayed vines, we found that both rates provided almost complete control of DMI-sensitive individuals (the types making up the vast majority of the baseline population) but that the lower rate provided far less control of the “partially resistant” ones that required a higher dose for con­trol.

This meant that not only was control compromised by the lower dose, but that it kept “shifting” the population by preferentially allowing these less-sen­sitive individuals to survive. Thus, full dosage (rate in the tank + coverage) proved to be critical.

As time went on, even full rates of the older DMIs became inadequate in some vineyards. However, we found that some of the newer DMIs that have become available over the past decade, particularly difeno­conazole (Revus Top, Quadris Top, Inspire Super) were far more active than the previous materials on an ounce-for-ounce basis of active ingredient. This means that applying difenoconazole at its label rate is like applying the older materials at several mul­tiples of their allowable rates.

In our field trials, this more-active compound pro­vided good control even when some of the older products did not. Recent trials indicate that the same may be true for the active ingredient flutriafol (Rhyme, Topguard EQ). Unlike the DMI fungicides, resistance to the QoI or strobilurin fungicides is NOT rate dependent, and mixes with an effective partner (e.g., the boscalid component of Pristine) is the only way of controlling individuals resistant to these ma­terials once they are present.

*Period of berry susceptibility.* Work by my colleague David Gadoury established that grape berries are ex­tremely susceptible to PM from the time that flowers are ready to open (the fungus can establish itself in the flower stem and then move onto the berry as it forms) through the time that berries are BB-sized or a bit larger; then, they begin to develop age-related resistance and few new infections develop once they are about 4 weeks old.

Over the years, we have run numerous fungicide tri­als in which we vary our spray programs during this immediate pre-bloom through early post-bloom pe­riod. Not surprisingly, we have consistently found that we get our best control of cluster infections when we focus use of our best fungicides and/or em­ploy conservative spray intervals during that period of maximum berry susceptibility.

Michelle Moyer, a former graduate student with David Gadoury and Bob Seem, made a nice start on identifying the environmental conditions during this period that would trigger a red flag to amp up the spray program (or, conversely, the conditions that would indicate a less-severe situation where “aver­age” vigilance is sufficient).

Seems that it could be beneficial in the future to de­velop a specific set of guidelines to give to growers and advisors based on this information (e.g., a dis­ease risk index), then put it to the test in various situ­ations to see how well it works.

***Botrytis* Bunch Rot (BBR).** In addition to multiple spray trials examining product ef­ficacy, fungicide physical modes of action, and spray timing effects, much of our work on BBR has focused on various factors that initiate BBR and cause it to spread.

Much of this work, spear­headed by graduate student and subsequent post-doc Stella Zitter, was detailed in a 2016 edition of this newsletter *(See Botrytis Bunch Rot: A Disease Requir­ing Integrated Control in Appellation Cornell, Issue #27).* Some of these take-home messages were:

1. Although infections can occur during the flowering period and remain latent (dormant) until the preharvest period, relatively few of them become active then and cause rot.
2. Nevertheless, those bloom-initiated infections that do become active post-veraison can be critically important initial sources of disease for rapid spread during the last few weeks before harvest.
3. Preharvest spread is MUCH greater through tight clusters as a result of berry-to-berry spread at the point of their physical contact.
4. Such spread is even greater in berries with high nitrogen or high water content.
5. Relatively little berry-to-berry spread occurs in
6. loose clusters where berries have limited contact with each other.
7. • Factors that promote the activation of latent infections (i.e., cause them to rot berries rather than remain dormant) appear to be a result of the vine’s response to various environmental factors, including high relative humidity in the atmosphere, high water content in the soil, and high nitrogen availability.
8. • The most important crop development stage or states for potentially applying BBR fungicides (i.e., late bloom, bunch closure, veraison, pre-harvest) varies among years, probably as a result of varying climatic conditions at these stages in the individual growing seasons.
9. As per the last point, better defining the conditions under which fungicides are recommended at these various stages (beyond “wet is more dangerous than dry”) would be a major service to those who must manage the disease.

**Black Rot.** In a 5-year series of fungicide trials, we found that we always got near-perfect control of black rot when we applied ef­fective fungicides at the start of bloom plus 2 and 4 weeks later, but omitting one of these three sprays often resulted in decreased control. Graduate student Lisa Hoffman looked into the details behind these results, and showed that it is because such sprays pro­tect the berries throughout their period of susceptibility Among her other findings, Lisa demonstrated the major impact of a simple sanitation program, re­moving mummified berries from the vine during dormant pruning operations.

1. As shown in **Figure 6**, mummies on the ground fin­ish producing their overwintering spores shortly af­ter the start of bloom, whereas those retained in the trellis produce spores throughout the period of berry susceptibility into the summer. Furthermore, mum­mies in the trellis produce many more total spores (probably because they don’t decompose as rapidly) AND they produce these spores immediately next to the new season’s crop, making it more likely that the spores will find this “target”. Lisa also showed that DMI fungicides (she used Ral­ly as an example) provide 7 to 10 days of post-infec­tion activity against leaf infections, far more than in­dicated on the label. In subsequent experiments, we showed that these fungicides also provided nearly 90% control of berry infections when applied even 7 days after an infection period in the field, although their residual protective ability is limited. In con­trast, the strobilurin fungicides (we used Abound as an example) provide much more protective activity but very limited post-infection activity.

**Sour Rot.** Graduate stu­dent Megan Hall has just completed her project examining the causes and control of sour rot. (Entomologist Greg Loeb and members of his lab deserve recognition here for their critical collaborative contributions).

This work was recently described in detail *(See* **De­fining and Developing Management Strategies for Sour Rot** *in Appellation Cornell Issue #30),* but the ma­jor findings were:

1. The acetic acid (vinegar smell) production that gives sour rot its name is the culmination of a process that initially involves conversion of grape juice into ethanol by yeast (many capable of doing so are present in and on grapes everywhere), followed by its oxidation to acetic acid by a few specific bacteria.
2. This process is greatly aided by the presence of *Drosophila* fruit flies. Indeed, classic sour rot symptoms, which include the breakdown of diseased berries and leakage of their contents, did not develop in controlled studies unless these flies were present along with the necessary yeast and bacteria.
3. • In the field, fruit flies carry the yeast and bacteria on their bodies and in their guts, and are responsible for spreading them and the disease that they cause as these insects move among clusters in the vineyard. However, using axenic (“sterile”) flies in the laboratory, we found that these insects also have a major effect that is independent of microorganisms.
4. • In repeated vineyard trials, we obtained significant control of sour rot by spraying an insecticide (Mustang Maxx) for control of the flies after berries became susceptible to infection at 15°Brix (recognition goes to Wendy McFadden-Smith in Ontario for determining when berries become susceptible). Control was improved further when general antimicrobial compounds were applied with the insecticide, but antimicrobials without insecticide were generally not very effective.
5. • Less sour rot developed in a VSP training system than in a high-wire cordon system, probably a result of the improved ventilation around the berries in the former.
6. As a final sign-off, I’d like to thank the many students, technicians, fac­ulty, and exten­sion educators with whom I’ve worked over the years but did not get an op­portunity to men­tion specifically in the text above. And most of all, I’d like to thank members of multiple segments of the grape industry here in New York and beyond, who have been so supportive of this program over the years. It’s been a dream job, and I’ll miss it (But not enough to reconsider retirement!).