Danielle’s Discourse

What Drives Your Vehicle?

At the heart of Project Apis m.’s mission is research: the organization was created as a vehicle to gather donations and fund projects that would make a real difference for growers and beekeepers. Although we have grown and now manage a more complex suite of donors, initiatives and projects, science and research still drive this vehicle. Over the past 10 years, we have raised and distributed over $6.2 million toward practical, applied research projects and forage programs that support commercial honey bee health. That represents over 100 research projects and programs...none of which would have been possible without our panel of Scientific Advisors, who donate their expertise and time to review the many proposals submitted for PAm funding.

I want to take this opportunity to express my gratitude to each of those individuals and recognize how critical they are to our mission. We could not do this without them! Take a look at this ‘All-Star’ team; familiar faces in our industry: Randy Oliver, Jerry Hayes, Dr. Frank Drummond and Dr. Eric Mussen are industry advocates at PAm to recommend research projects: They bring over a century of combined experience and represent myriad interests and perspectives.

As PAm continues to grow and increase the available funding for research, I also am very excited to add an excellent new Scientific Advisor to the team and welcome Dr. Michelle Flenniken to Project Apis m. Michelle is an Assistant Professor in the Plant Sciences Department at Montana State University, where she investigates honey bee host-pathogen interactions. She is also Co-Director of Montana State University’s Pollinator Health Center and the recent recipient of a prestigious NSF CAREER award.
Michelle received a B.S. in Biology from the University of Iowa and was a Peace Corps volunteer in Ghana before obtaining her Ph.D. in Microbiology from Montana State University. She did postdoctoral research at the University of California, San Francisco, with Dr. Raul Andino (and RNA virologist) and collaborated on a honey bee colony monitoring project with Dr. Joe DeRisi, who received funding from PAm in 2008. When she emailed Eric Mussen (small world!) about a research project on RNAi in honey bees, it led to a UC-Davis / Haagen Daz sponsored fellowship that supported her initial independent research on honey bee viruses and the mechanisms of honey bee antiviral defense. In parallel, with Dr. DeRisi and a graduate student in the DeRisi lab (C. Runckel) and Brett Adee (Adee Honey Farms), this team produced one of the first published longitudinal studies of commercial bee colony pathogen prevalence and abundance.

Michelle has been focused on honey bee research ever since. She started her own laboratory at MSU in June 2012 and received support from PAm to support her research on the impact of honey bee viruses on bee health (in general) and to examine potential synergistic effects of viral infections and agrochemical exposure. Shortly thereafter Laura Brutscher, a graduate student in the Flenniken Lab, received the PAm-Costco PhD Fellowship in Honey Bee Biology. Both of these grants from PAm were critical in forming and shaping her successful bee lab and projects. **Michelle is a great example of how Project Apis m. leverages donated resources to increase the problem-solving assets for the beekeeping industry, not just with specific projects but also by engaging and supporting developing or ‘non-bee’ scientists who can bring their focus and expertise to our issues.** By providing the initial ‘start-up’ funding required for research projects to gain momentum in order to compete for higher dollar federally funded grants, which are needed to address complex biological questions and develop real solutions for beekeepers down the road. In addition to support from Project Apis m., the Flenniken Lab is supported by the National Science Foundation (both NSF Career Award from the Division of Integrative Organismal Systems and EPSCoR funds), the United States Department of Agriculture National Institute of Food and Agriculture, Agriculture and Food Research Initiative (USDA-NIFA-AFRI) Program, Montana Department of Agriculture Specialty Crop Block Grant Program, Hatch Multistate Funding (NC-1173), and received some initial lab ‘start up’ support from the National Institutes of Health IDEA Program COBRE grant GM110732, the Montana State Beekeepers Association, Montana State University, and the Montana State University Agricultural Experiment Station.

With an expertise in microbiology, genetics, and virology, Michelle is an excellent addition to our cadre of Science Advisors. We couldn’t be more excited to have her on board and are thankful already that her passion for research drives her to volunteer service to PAm!

Danielle Downey, Executive Director

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The BIP Box

Bee Bold, Bee Informed

Each year, Burt’s Bees holds a Culture Day and this year, for their 11th annual event, they chose the Bee Informed Partnership to team with in their recommitment to their brand values and to reinforce the goals of working towards economically and environmentally sustainable products. This year’s event found over 400 Burt’s Bees and Clorox (Clorox purchased Burt’s Bees in 2007) employees building sampling kits and MiteCheck kits for BIP’s use over the next year. Although it took months of planning, the amount of work that 400 enthusiastic and energized folks can do in 1 day was remarkable. It usually takes our team about 4 months to sporadically build the sampling kits and these intensely choreographed (efficiency engineers were involved) groups were able to do it all in 1 day.
The event was held at the North Carolina Museum of Art, a beautiful venue with incredibly patient and cooperative staff. Because weather did not cooperate, much of the kit building took place inside but there was an enormous tent to hold all 400+ employees plus or BIP lab team to listen to the kickoff speakers (Jim Geikie, Burt’s Bees VP and General Manager, Dennis vanEngelsdorp, and Peter Nelson, a beekeeper and documentary filmmaker) and to construct the MiteCheck kits. We supplied a live colony (thanks to James Wilkes our IT lead at Appalachian State University and his Faith Mountain Farm). It was an exhausting but fulfilling day and everyone left with a greater appreciation of the commercial beekeeping industry and the challenges that lie ahead as we work towards BIP’s goal of reducing colony losses. We cannot thank everyone at Burt’s Bees enough. Their generosity and hospitality was extraordinary.

Karen Rennich, Executive Director
The Bee Informed Partnership

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Billy’s Blog

Nitrogen Management Plans and Cover Crops for Almond Growers

California agriculture is extremely diverse. Over 400 commodities are produced in a wide variety of growing conditions. Irrigation and fertilization are critical to an efficient and productive crop yield. Water discharges from agricultural operations in California include runoffs which can affect water quality by transporting pollutants, including pesticides, sediment, nutrients, salts, pathogens, and heavy metals, from cultivated fields into surface waters. While groundwater quality can be impaired by nitrogen and salts when they leach below the rootzone. Cover crops can play a role in protecting surface water quality by slowing down run off during rain events and by supplementing nitrogen without
All the land used to grow almonds in California is regulated by The Central Valley Regional Water Quality Control Board (CVWB). It is one of nine Regional Water Boards in California. Stretching from the Oregon border to Los Angeles County, the Central Valley is about 60,000 square miles or nearly 40 percent of the state. It includes about 75 percent of the State’s irrigated agricultural land. In 2003, the CVWB created a specific program designed to address water quality activities associated with irrigated lands. This program is referred to as the Irrigated Lands Regulatory Program. Growers must join and pay into regional water quality coalitions who do the monitoring and outreach necessary to ensure water quality standards are met. Please refer to the Irrigated Lands Regulatory Program for more details.

As part of the Irrigated Regulatory Program, starting in 2015, all growers are required to have a nitrogen management plan. This plan will indicate how much nitrogen is needed and identify the sources where it is coming from. Accurately determining the amount of nitrogen being applied to an agricultural system can be challenging. Fertilizers, manures, composts, cover crops, and sometimes irrigation water all add nitrogen to soil, and figuring out how much is needed can be complicated. Fortunately, Almond Board of California and SureHarvest have created an online assessment tool to make this process easier and more streamlined. The online assessment tools needed to create a nitrogen management plan are available at the California Almond Sustainability Program (CASP) website. Here almond growers can create a private account, and information entered is kept confidential.

One very useful tool provided is a Nitrogen Calculator. Based on the nitrogen budget model developed by Dr. Patrick Brown of UC Davis, this calculator simplifies the process of budgeting nitrogen for almond growers. The calculator takes into consideration yield estimates, leaf sampling results and nitrogen that comes from other sources, like bee forage cover crops. It stores data by orchard block, making updates easy as information changes. Budget components can be cloned and applied to other orchards or used in subsequent years. All almond growers can use the online model to create budgets, but must be participants in CASP for the data storage aspect, which eliminates the need to re-enter all the data when revising budgets during the growing season. Data can be printed or displayed as a PDF file, or exported into a database.

Almond growers who plant cover crops are helping bees while simultaneously amending their soil with a free source of nitrogen. However, without knowing how much nitrogen is being fixed into the soil by legume cover crops like PAm Clover Mix, growers won’t know how much to reduce their fertilizer application rate. Using the Nitrogen Calculator will give growers clarity about how to manage their operation. Depending on the strength of the stand (poor, good, or great) and the incorporation method (mow only or discing in), almond growers are getting 15-84 lbs. N/acre from the cover crop alone. Once the nitrogen from the cover crop is factored in, the calculator will then give detailed recommendations about how much additional fertilizer is needed and when to apply it.

Almond trees need nitrogen every year for two reasons: 1) to assist perennial growth, and 2) to replace the nitrogen lost by the annual harvesting of almonds. The nitrogen in the roots, trunk and branches increases annually by 25-30 lbs./acre. The hulls, shells, leaves, debris, and kernels collected each year during harvest are responsible for depleting nitrogen from the tree. The average amount of nitrogen lost each year from harvested crop pruning, and leaf fall is 68 lbs./acre of nitrogen for every 1000 kernel lbs./acre harvested. Higher kernel yields are positively correlated with higher nitrogen demand. Growers can use a previous year’s yield data to estimate how much nitrogen
After the amount of required nitrogen is determined, growers can make a choice about what source(s) the nitrogen will come from. For example, if an orchard yielded 1000 lbs./acre of kernels the nitrogen required for a successful crop the next year will be 95 lbs. nitrogen/acre. Take note that the required nitrogen is greater than the nitrogen demand because nitrogen use is not 100% efficient. Applying only 68 pounds of nitrogen for every 1000 kernel pounds will not meet the tree’s need because the application efficiency of nitrogen is not 100%. If a cover crops is providing 84 lbs. nitrogen/acre, then the amount of additional nitrogen that needs to be applied with fertilizer is only 11 lbs./acre. If this orchard didn’t have a cover crop, the grower would have to apply all the recommended 95 lbs. nitrogen/acre with fertilizer alone.

In summary, cover crops can add a significant amount of nitrogen to orchards. Having accurate data about the necessary amount is the key to wise fertilizer use. Please refer to the following links for more information:

- California State Water Resources Control Board

**Irrigated Lands Regulatory Program**
- Almond Board of California / SureHarvest

**Nitrogen Calculator**
- California Department of Food and Agriculture

**Almond Nitrogen Fertilizer Guidelines**

References:

http://thealmonddoctor.com/2012/05/19/estimating-nitrogen-needs-estimating-your-crop/

Billy Synk  
Director of Pollination Programs

Please contact Billy Synk at Billy@ProjectApism.org for questions or comments.

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As a beekeeper, you are likely well aware of a growing list of challenges your bees face. Varroa, Pesticides, Nutrition, etc. You are looking out for their interests so that they might provide you with some form of return, whether that means an income or perhaps just a little home-grown honey and the satisfaction of having stewarded a hive through a season. In either case, it’s clear that it is much more difficult than it used to be. The challenges of making a good honey crop today are often overshadowed by the greater challenge of just keeping them alive! Domestic honey production has fallen 35% over the last 2 decades. Winter losses now averaging near 40% are 4 times higher than 20 years ago. Input costs in commercial operations are as much as 5 times higher than they were in the 90s. These are sobering facts for beekeepers to digest. Are these facts related? If they are, then what are the common denominators?

In my opinion, one of the most important factors is habitat, or “forage” as many beekeepers say. Habitat availability, in the form of clean, safe, diverse natural forage is the most basic and important component in maintaining healthy, productive colonies. A hive that has proper natural nutrition will tolerate much more stress than hives that are nutritionally deficient.

Large scale beekeepers around the country are aware of the sobering reality that their bees are finding less and less nutritional opportunity on our landscapes. This problem is not new. In fact, commercial beekeepers have adapted to changing landscapes quite well over the years, which has led to the mechanization and mobilization of the industry. As consummate opportunist, beekeepers are amazingly resourceful. At the micro level: When farms change their practices, beekeepers scout for a better opportunity and move their bees. At the macro level: When honey production opportunities are scarce, beekeepers seek more opportunities in pollination services.

Unfortunately, this resourceful and innovative strategy will only succeed until there are no more safe, productive alternatives. That situation is becoming a reality in many parts of the country as more and more of the landscape is changing. Honey crops nationwide are on a declining trend. Hives are malnourished and too dependent on supplemental feeding. In major honey production states like California and Florida, beekeepers now have to avoid some of the very best citrus areas completely, because of pesticides used to control citrus greening. In the Dakotas and Minnesota, the Honey basket of the country, the expansion of GMO row crops and the subsequent prolific use of herbicide has been devastating to
honey production. North Dakota is still the number one honey producer, but only because the number of hives in the state have doubled recently, as beekeepers fleeing other states, where opportunities are even more scarce, flock into the “last best place.”

Compounding these changes is the loss of tens of millions of acres of conservation acres in federal programs nationwide. These lost acres once served as safe, supplemental habitat, where beekeepers could expect their bees to thrive.

As hive losses have garnered national media attention over the last decade, there has been a swell of new interest in finding solutions to the bee health crisis. Beekeepers, scientists, and politicians have worked to solve the problem from every angle. As more and more stakeholders recognize habitat loss as a major problem, the interest and opportunities to improve habitat are broadening. To date there are over 40 programs aimed at improving habitat for pollinators. They range from ad campaigns that send out packets of seeds to new federal programs. As you might have guessed, while all are probably well intended, most have little impact on bee health on a wide scale.

PAm has been a pioneer in developing habitat for honey bees. In 2013 PAm launched the Seeds for Bees program, which provides free honey bee forage seeds to Almond growers who are willing to plant it around their orchards. The goal is to improve available forage before and after the almonds bloom to give the bees a needed boost and also to raise awareness of the importance of habitat for the bees.

In 2014 PAm upped the ante by partnering with Pheasants Forever and Browning Honey to form the Honey Bee and Monarch Butterfly Partnership, which later became known as the Bee and Butterfly Habitat Fund. The BBHF has two primary goals. First, to establish high quality habitat in key areas. Secondly, the program aims to influence other pollinator habitat initiatives by serving as a model of the best practices in terms of cost, weed competition, and overall benefits to pollinators. The program solicits funding and pays participating landowners, who are close to beekeepers’ apiaries an annual fee to plant and maintain project acres for pollinators. The seed mixtures are engineered to provide diverse, high density, season long bloom for pollinators and utilize both native and introduced plant species.

To be fair, this is a new concept. Never before have beekeepers needed to invest in habitat. For many beekeepers, it seems impossible to invest in forage on a scale large enough to make a difference. And it would be, if we as beekeepers were alone in this fight. The good news is...we’re not.

As a beekeeper, are you also a conservationist? According to Webster, a conservationist is someone who works to protect animals, plants, and natural resources or to prevent the loss or waste of natural resources: a person who is involved in conservation. If beekeepers are conservationists, which we are, then we join a host of others who are seeking the same things, albeit for different reasons, but, nevertheless, all vying for their own little scraps on the landscape. Our bees utilize the same kinds of habitat that meet the critical needs of hosts of other critters. Deer, upland birds, waterfowl, grassland song birds, native pollinators, monarch butterflies, and countless other creatures all need places to call home on our landscape. That means that those people interested in those animals, whether to protect and conserve them, or to hunt them are also promoting the same kind of habitat that bees need. The list doesn’t end there either. People who are interested in soil health, sustainability, clean water, and even carbon sequestration to offset climate change...all want things that can be consistent with great pollinator habitat!

PAm pollinator habitat programs have been funded by many stakeholders, from beekeepers and honey packers to big ag and from hunting groups to the federal government. Beekeepers who contribute dollars to PAm habitat programs are joining a broad list of other stakeholders who share common interests, making each dollar go further and further.

These programs are still in their infancy but are growing fast. As I talk to beekeepers and growers alike who are participating, it is clear there are more than just dollars changing hands here. There is a growing level of awareness and appreciation for what bees both need and contribute. The relationships formed by working with landowners who are planting habitat for bees is priceless. They become partners, invested in the health of the bees that occupy a spot on their farm. I personally worked with a land owner in my area where I had kept bees for many years. As the farming changed around him I saw less and less honey and eventually quit bringing the bees back. He called and inquired why, and I explained that there was not enough forage around for the bees. Saddened and concerned, he asked what could be done. I mentioned that he could establish habitat for the bees. That fall he planted 8 acres between two rows of trees where it was difficult to combine with a mixture
of clovers. The next year I brought the bees back. They did amazingly well. The next fall, he enrolled an additional 1.5 acres into the Bee and Butterfly Habitat Fund. Now the yard is as good as any in the outfit. The land owner calls to inquire how the bees are doing and remarks about all the birds, deer, and butterflies that have returned to his farm. One more thing...last year the farmer who rents most of his land complained about the bees when he wanted to spray soy beans. This year he has a new renter.

As beekeepers, we are remarkably well adept at overcoming challenges, like the bees! The issue of declining habitat is a real challenge, but it is not one we can’t make progress on if we work together. hope you will consider joining the many stake holders investing in habitat by donating to PAm forage programs.

Zac Browning,
Project Apis m. Board Member

Research Highlight of the Month

*Establishing Deformed Wing Viral Diversity in the US*
Principal Investigator: Stephen Martin, Salford University

The honey bee viral landscape is changing. The Varroa mite is providing a new viral transmission route for a previously rare and largely benign virus called Deformed Wing Virus (DWV). The mite’s main role in causing the death of honey bee colonies is by acting as a transmitter of this virus. DWV is now one of the most wide-spread insect viruses in the world with most colonies in the U.S. infected – healthy-looking bees are also potentially infected, not just the deformed ones, as people often think. DWV is made up of several distinct viral strains, and each viral strain may have a different effect on the honey bees. The project is seeking to determine if non-virulent strains can be linked to increased colony survival to develop a long term solution to the problem of Varroa-transmitted viruses.

![Varroa on Pupa](image.jpg)

On June 19 2017, as part of the Healthy Hives 2020 Pollinator Week Webinar Series, Professor Stephen Martin gave an educational webinar about his research regarding Deformed Wing Virus and the Varroa Mite.

This informative webinar can be viewed here: [Tracking the Changing Deformed Wing](#)
As a beekeeper, are you also a conservationist? According to Webster, a conservationist is someone who works to protect and promote the natural environment. This is important because...