

Technology Tips For Beekeepers

Malcolm T. Sanford

DIAGNOSIS AND MAPPING OF EMERGENT HONEY BEE HEALTH ISSUES VIA AN AI-POWERED SMARTPHONE APP

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The Bee Health Guru app provides a way to improve honey bee colony health by letting bees communicate their health status to their keeper. The bees become the guru, indicating colony health via their sounds. Our app: (1) Allows beekeepers to record colonies with a smartphone; and (2) Uses Artificial intelligence (AI) algorithms to diagnose each colony's health. These algorithms are not static but can learn based on new training data. Currently, we are tuning the app for accuracy. Our first step consisted of years of audio recordings from research projects. These provided the proof-of-concept, demonstrating accuracies ranging from 86-98% for eight critical colony health variables. Starting in August 2019, our second step recruited beekeepers worldwide to download the application, inspect colonies, and upload the app's diagnoses along with their recordings. Within two weeks of the app's release, we had 653 participants and 400 data uploads, which yielded geo-referenced data maps. These maps showed locations reporting healthy colonies and those reporting colonies with pest or disease problems. Our smartphone application automatically creates a copy of all recordings, beekeeper observations and combines them into a comprehensive, transformative AI colony health diagnosis system featuring real-time monitoring and mapping. All electronic records are stored in a secure, cloud-based destination with safeguards to protect data privacy, confidentiality, and security. We recently added a report-back to the beekeeper feature based on user feedback, automated the mapping, and began producing training videos to use the app effectively. 13 minutes: <https://tinyurl.com/jpm995wy>

TOOLS FOR TRANSFORMING DATA INTO KNOWLEDGE

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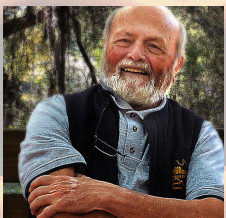


Regardless of the size of a beekeeping operation, there are times when it is useful to visualize spatial data. Suppose that I have two hives in my backyard; I suddenly discover an infestation of mites, and I would like to reference regional or national maps of varroa outbreaks? If I had 10,000 colonies across multiple states, I might ask whether there are tools to chart where my hives are at, how they are doing, and where, if any, are there problem spots. Also, I might want to overlay my apiary locations over vegetation and habitat maps, or maybe pollen maps. Routinely used in industry, business, university settings, geo-spatial analytic tools are available to anyone to run on home computers. The best programs are intuitive to use and powerful.

In this video presentation, I interview Andrew Dudley, Product Manager, and Training Lead for Golden Software. I have been using their 2-D and 3-D modeling and visualization software for nearly 40 years ago. One of the founder partners has ties to the University of Montana. Think of them as a geo-spatial counterpart to the MS Office Suite of Programs, such as MS Word, Excel, Powerpoint, One Note, Outlook, Teams, and OneDrive, where Golden has Surfer, Grapher, Strater, Voxler, MapViewer, and Digger. They offer powerful analytic tools and publication-quality, high-resolution plots. They are not the only company offering visualization tools, but their pricing is comparable to others' annual costs and I have always found their technical support to be readily available and helpful. 13 minutes <https://tinyurl.com/jwhbh4uu>

BEEXML: STANDARDIZING THE WORLD'S BEE DATA

Joseph Cazier; Appalachian State University; Dick Rogers; Bayer Crop Science; Ed Hassler; Appalachian State University; Agnes Gambill; Appalachian State University; USA; cazierja@appstate.edu



https://beekeep.info/vita_details



This presentation explores the role that data science and machine learning can play in helping bees and illustrates the need for data sharing. We then summarize efforts by Apimondia Working Group #15 to enable data sharing through data standardization, data policy recommendations, and data harmonization efforts. A new journal, BeeXML: Journal for Bee Data Standardization, is introduced as a vehicle for data standardization. We conclude with ways you can help these efforts. 13 minutes: <https://tinyurl.com/dm3dwcuj>