SAINT LOUIS BEEKEEPERS SUSTAINABLE STOCK APIARY (SSA)

USDA-SARE Grants -

FNC18-1145
ONC22-114

Our Mission –

Focusing on beekeeping practices, our goal is to facilitate a broad spectrum of education and promote healthy natural systems where people, honey bees and other pollinators can adapt and thrive.

In The Headlines

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U.S. DEPARTMENT OF AGRICULTURE

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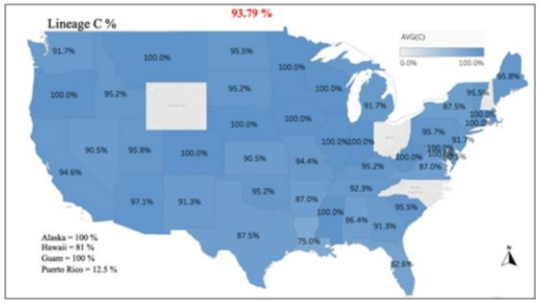
DNA Research Finds Low Genetic Diversity Among U.S. Honey Bees

February 15, 2023



93.79 percent of U.S. honey bees belonged to the North Mediterranean C lineage. The percentage of this lineage is displayed for each state.

The lack of genetic diversity creates a vulnerability for U.S. honey bees to survive in shifting climates that are now wetter or drier than usual. There is also concern that a honey bee's inability to fight off disease or parasitic infection could negatively impact beekeeping sustainability. The challenge of U.S. honey bees' weakened immunity has become an economic burden to bee producers and beekeepers. In the past, U.S. beekeepers suffered less honey bee colony losses and treated against varroa mite (a ferocious honey bee parasite) once per year. In 2023, colony losses and winter mortality are at a high peak and varroa mite requires multiple treatments per year to keep it under control.

More Research Headlines

Original article | Published: 19 March 2020

Effect of shipping boxes, attendant bees, and temperature on honey bee queen sperm quality (*Apis mellifera*)

Andrée Rousseau ✉, Émile Houle & Pierre Giovenazzo

Apidologie **51**, 724–735 (2020) | Cite this article

2001 Accesses | **5** Citations | Metrics

WHY RAISE LOCAL QUEENS?

- Queen quality / drone fertility in commercial breeding operations is declining, often resulfting in disappointing or quickly superseded queen
- Local, survivor stocks are not currently available to serve the area's growing beekeeping community
- Late season local queens are good candidates for requeening "spent" or failing queens
- Queen availability for off-season emergency replacement is challenging to find, often expensive to ship and stressful on the queens

Queen Rearing Basics

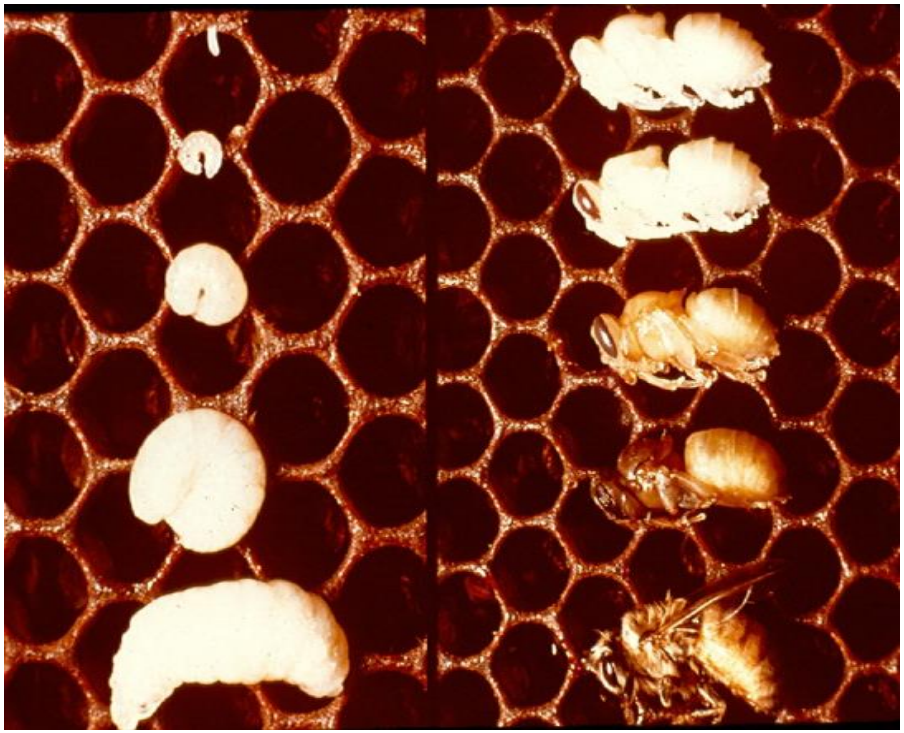
- Honey bee colonies raise their own queens to divide (swarm) for propagation
  - Prime, cast, afterswarm
- They raise queens to replace (supersede) aging or failing queens
- The colony will raise emergency queen cells when the queen is damaged or removed

Bee Development

QUEEN	WORKER	DRONE
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8
9	9	9
10	10	10
11	11	11
12	12	12
13	13	13
14	14	14
15	15	15
16	16	16
	17	17
	18	18
	19	19
	20	20
	21	21
		22
		23
		24

DAYS

- Period as Egg
- Period as Larvae Feeding
- Larvae Spins Cocoon and Transforms to Pupae Under a Closed Cap
- Bee Emerges



Queen Cell Development

- From the day an egg is laid, a queen emerges in ~16 days
- A colony can successfully raise a queen from a larvae up to 3 days old (day 6)
- The shortest time a queen can be raised to emergence is 10 days...

(6 plus 10 = 16)

Queen Maturation

From emergence to egg-laying -

- Up to 5 days to "harden off"
- 1-3 days for mating flight (s), as short as 18 minutes each, usually in the afternoon
- 2-5 more days to ripen and produce fertilized eggs

Queen Fertility

- Queens mate with 12 drones, on average
- Within 14-21 days from emergence, eggs and larvae should be plentiful
- New research demonstrates the longer queens are allowed to lay in their mating box, the better accepted they will be when introduced to another colony
- Temperature in transport can dramatically impact queen fertility, and thus acceptance when introduced to another colony

Inspiration for our Sustainable Stock Apiary

Randy Oliver
Scientific Beekeeping

Dr. Gerardo Camilo
Saint Louis University

Billiken Bee Lab's Research

BioOne RESEARCH EVOLVED

A Checklist of the Bees (Hymenoptera: Apoidea) of St. Louis, Missouri, USA

Author(s): Gerardo R. Camilo, Paige A. Muñiz, Michael S. Arduser, and Edward M. Spevak
Source: Journal of the Kansas Entomological Society, 90(3):175-188.
Published By: Kansas Entomological Society
https://doi.org/10.2317/0022-8567-90.3.175
URL: http://www.bioone.org/doi/full/10.2317/0022-8567-90.3.175

Discussion

We identified 198 bee species in the city of St. Louis. In the state of Missouri, there are six families and 452 reported bee species (M. Arduser, in preparation). Almot 45% of the bee fauna of the state of Missouri has been recorded in the city of St. Louis (198/452). In terms of raw species richness, St. Louis bee diversity is higher than that of restored prairie systems in the Midwest United States (Geroff *et al.,* 2014), and is comparable to the natural environment that is the Indiana Dunes (Grundel *et al.,* 2011).

Non-natives Bees

A total of nine non-native bees were identified as occurring in the city (Table 1). The most common non-native across the entire city was the honeybee, *Apis mellifera*, with as much as ten times higher abundance than any other species. Even when hives were not observed in the vicinity, honeybees were prevalent. Over half of the sites surveyed had hives present, or hives were observed nearby.

Proposal –

In 2017, the club will create a Sustainable Stock Apiary, with a proposed location at Classic Carpentry Unlimited, 1259 Stephen Jones Ave, Wellston, St. Louis County, Missouri.

This location is being considered for the following reasons -

- Very few if any managed hive in the area
- Recent research indicates these is a marked absence in the use of chemical ground, plant or insect treatment used in the general area
- Access from street
- Distance from club meeting location – 4.4 miles
- Will provide an opportunity for hands-on field work

The purpose of this apiary - to raise honey bee queens during the active season (April through September) to have locally raised, healthy, acclimated and sustainable queens available for access by beekeepers in the Saint Louis Beekeepers club (first priority) and to other local beekpers.

Queen rearing stock to be supplied by club participants in the form of spring splits from overwintered, disease-free, treatment-free colonies.

- Overwintered is defined as queenright with healthy population in mid-March
- Disease-free is defined as non-symptomatic, testing below treatment threshold
- Treatment-free is defined as no chemical treatment, but mechanical manipulation and supplemental feeding is employed

Original Outline -

5-10 STLBEE participants will supply 1 or 2 five-frame splits based on above , agreed criteria, delivered to the SSA location. These 10 or so colonies will be sampled and tested to verify disease-free, pathogen-free, treatment-free, per above agreed criteria.

A number of STLBEES volunteers will manage these colonies for swarm control, drone stock and queen breeding with the goal to have queens mature, mate and reproduce from May through September, 2017.

Queens will be assessed and maintained in queen-rearing boxes and harvested to fill requests from within the STLBEES participating community.

Original Outline -

Beekeepers requesting queens from this SSA will pay the market rate at the time of purchases, with revenues going to STLBEES.

Equipment needs will be identified and communicated within the club. Any contributions from beekeepers within the club, specifically for this SSA, will be honored and segregated for this purpose only.

Original colonies remaining at the end of September, 2017 will go back to the supplier, any expansion colonies and/or queens remaining will be offered for sale.

The SSA will not be maintained as such from October through March of the following year.

Queen Rearing Methods Employed

- Swarm cell transfer
- Grafting
- Nicot/Jenter
- Cell punch
- OTS (On The Spot)

Original Grafting Timeline

- April 15 — Splits delivered and samples taken for disease panel test
  - May 2 — Test results received
  - May 6 — Queen rearing begins
  - May 13 — More queen rearing, transfer cells to mating boxes
  - ~May 20 — More queen rearing, transfer May 6th work to mating boxes
  - ~ May 27 — More queen rearing, transfer May 6th work to mating boxes
  - ~ June 3 — More queen rearing, transfer May 20 work to mating boxes

Original Grafting Timeline

June

Proof queens for productivity, laying pattern, gentleness, color and grade

July – September

Manage queen castles for population and resources. Small hive beetles with need to be managed.

Make queens available for sale to STL Bees members and local beekeepers.

Equipment Assembly

Queen Mating Boxes


102
ASK
ME


Grooved Top & Bottom

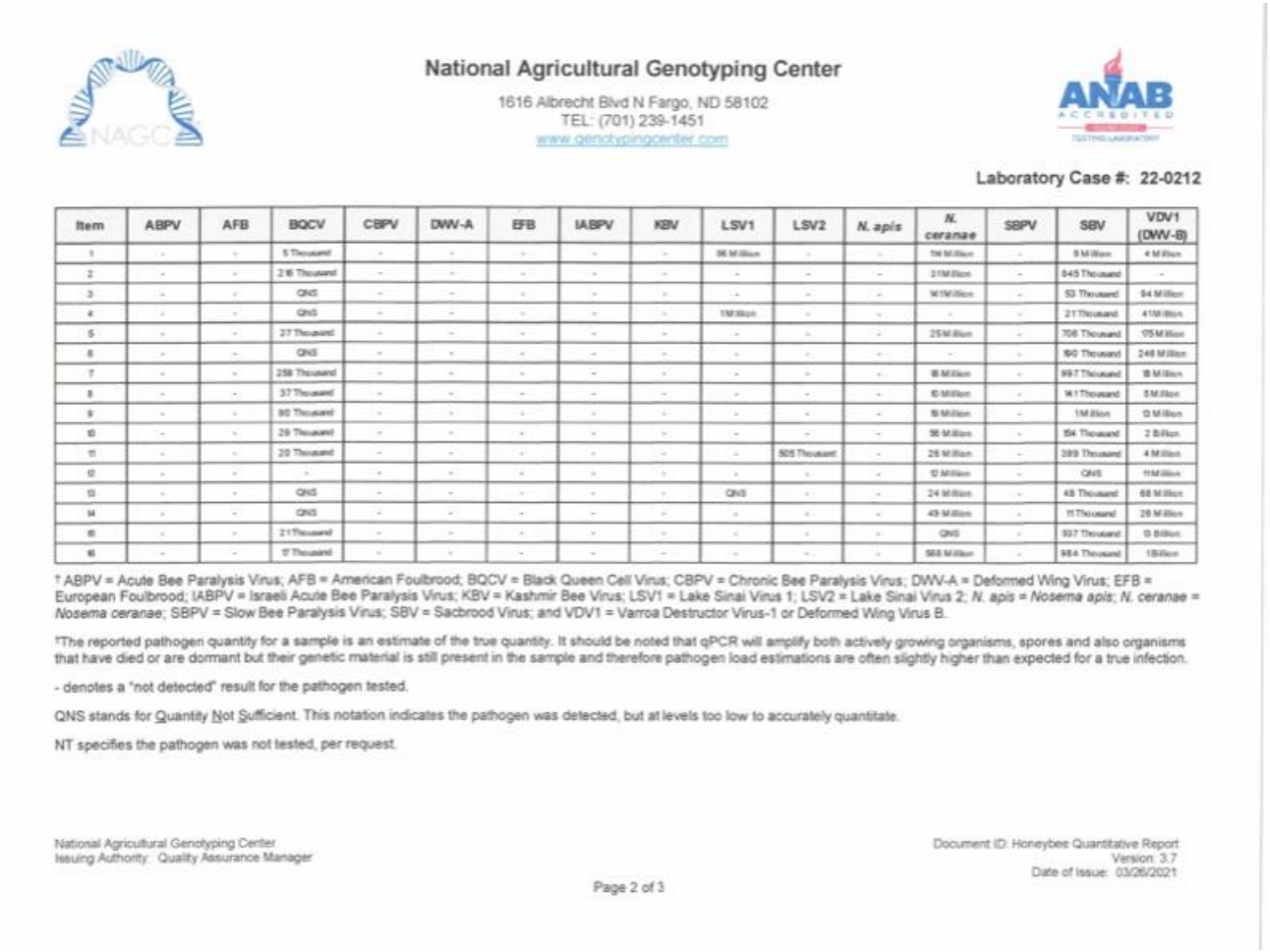

Longlac Wood
Industries Inc.
Hardwood

On-site Equipment Storage


WERNER

Queen Rearing Apiary
SSA Grant Year 2017

Grant dollars for pathogen testing



National Agricultural Genotyping Center

1616 Albrecht Blvd N Fargo, ND 58102
TEL: (701) 239-1451
www.genotypingcenter.com

Laboratory Case #: 22-0212

Item	ABPV	AFB	BQCV	CBPV	DWV-A	EFB	IABPV	KBV	LSV1	LSV2	*N. apis*	*N. ceranae*	SBPV	SBV	VDV1 (DWV-B)
1	-	-	5 Thousand	-	-	-	-	-	96 Million	-	-	1M Million	-	5 Million	4 Million
2	-	-	216 Thousand	-	-	-	-	-	-	-	-	21Million	-	845 Thousand	-
3	-	-	QNS	-	-	-	-	-	-	-	-	141Million	-	53 Thousand	84 Million
4	-	-	QNS	-	-	-	-	-	1M Million	-	-	-	-	21 Thousand	41M Million
5	-	-	27 Thousand	-	-	-	-	-	-	-	-	25 Million	-	706 Thousand	175M Million
6	-	-	QNS	-	-	-	-	-	-	-	-	-	-	190 Thousand	248 Million
7	-	-	258 Thousand	-	-	-	-	-	-	-	-	16 Million	-	997 Thousand	18 Million
8	-	-	37 Thousand	-	-	-	-	-	-	-	-	10 Million	-	141 Thousand	5 Million
9	-	-	90 Thousand	-	-	-	-	-	-	-	-	19 Million	-	1M Million	13 Million
10	-	-	29 Thousand	-	-	-	-	-	-	-	-	56 Million	-	154 Thousand	2 Billion
11	-	-	20 Thousand	-	-	-	-	-	-	505 Thousand	-	26 Million	-	289 Thousand	4 Million
12	-	-	-	-	-	-	-	-	-	-	-	12 Million	-	QNS	11Million
13	-	-	QNS	-	-	-	-	-	QNS	-	-	24 Million	-	48 Thousand	68 Million
14	-	-	QNS	-	-	-	-	-	-	-	-	49 Million	-	11Thousand	28 Million
15	-	-	21Thousand	-	-	-	-	-	-	-	-	QNS	-	537 Thousand	13 Billion
16	-	-	17 Thousand	-	-	-	-	-	-	-	-	568 Million	-	984 Thousand	1Billion

† ABPV = Acute Bee Paralysis Virus; AFB = American Foulbrood; BQCV = Black Queen Cell Virus; CBPV = Chronic Bee Paralysis Virus; DWV-A = Deformed Wing Virus; EFB = European Foulbrood; IABPV = Israeli Acute Bee Paralysis Virus; KBV = Kashmir Bee Virus; LSV1 = Lake Sinai Virus 1; LSV2 = Lake Sinai Virus 2; *N. apis* = *Nosema apis*; *N. ceranae* = *Nosema ceranae*; SBPV = Slow Bee Paralysis Virus; SBV = Sacbrood Virus; and VDV1 = Varroa Destructor Virus-1 or Deformed Wing Virus B.

‡The reported pathogen quantity for a sample is an estimate of the true quantity. It should be noted that qPCR will amplify both actively growing organisms, spores and also organisms that have died or are dormant but their genetic material is still present in the sample and therefore pathogen load estimations are often slightly higher than expected for a true infection.

- denotes a "not detected" result for the pathogen tested.

QNS stands for Quantity Not Sufficient. This notation indicates the pathogen was detected, but at levels too low to accurately quantitate.

NT specifies the pathogen was not tested, per request.

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Relative Pathogen Density

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Laboratory Case #: 22-0212

Relative Pathogen Density**			
Pathogen	Low	Average	High
ABPV	< 2.5 million	2.6 million - 1.2 billion	> 1.3 billion
AFB	< 1,200	1,201 - 590,000	> 590,000
BQCV	< 391,000	391,001 - 33 million	> 34 million
CBPV	< 47 million	48 million - 821 million	> 822 million
DWV-A	< 21 million	22 million - 2.5 billion	> 2.6 billion
EFB	< 7.5 million	7.6 million - 234 million	> 235 million
IABPV	< 610 million	611 million - 74 billion	> 75 billion
KBV	-	-	-
LSV1	< 124 million	125 million - 15 billion	> 16 billion
LSV2	< 4.4 million	4.5 million - 76 million	> 77 million
N. apis	-	-	-
N. ceranae	< 2.8 billion	2.9 billion - 21 billion	> 22 billion
SBPV	-	-	-
SBV	< 91 million	92 million - 36 billion	> 37 billion
VDV1 (DWV-B)	< 58 million	59 million - 2.4 billion	> 2.5 billion

**Densities are based on the range of pathogen loads of positive samples submitted to NAGC over the last year. These categories do not designate a risk of colony loss, but can be used to compare results from personalized reports to other beekeepers' colonies tested by NAGC.

Disposition of Samples:

Items 1 through 16 will be retained and stored by the laboratory for thirty days before final disposition according to NAGC policy.

Report Disposition:

Saint Louis Beekeepers

I hereby certify that the above report is true and accurate and represents my opinions and interpretations.

Lindsey Fransen
Laboratory Technician

Saint Louis Beekeepers Sustainable Stock Apiary: Local survivor Honey Bee Queen Rearing Project

2022 – 2023

SARE
Sustainable Agriculture
Research & Education
www.sare.org

SSA Fenton Volunteers

Harvesting resources

Nice brood pattern

Building the Cell Builder

Grafting Session

Grafting Team

Eggs and Young Larvae

Nurse Bees from Fenton


Primed to
Raise
Queens

Fresh Pollen & Feed

Go to work, girls!


Queen Cell
Take

Queen Mating Boxes

Over-Wintering Local Nucs

SSA Participants & Supporters

- Chris Bates
- Connie Bachman
- Cindy Fulton
- Dane Gerdes
- Jane Sueme
- Jeanne Koebbe
- Jeff Weaver
- Jim McGerry
- Jim Patterson
- John Appelbaum
- Karen Giovannoni
- Kate Smith
- Ken Heitkamp
- Linda Stilwell
- Michael Kelrick
- May Properties
- Miranda Deuschek
- Scott Klein
- Tammy McGarry
- Tim McHale
- Tom Foeller
- Tom Cairns

Thank you!