

Natural Beekeeping and CNG



honey bee health is threatened by...

- pesticides
- monoculture crops
- in-hive chemical treatments
- pests and diseases
- colony collapse disorder

solution...

- Organic Beekeeping

USDA National Organic Program

- No standards for beekeepers
- NOSB Final Organic Apiculture Standards
 - issued as recommendations in 2001
 - were never adopted
- Any agricultural product labeled ‘organic’ that has not been certified by the USDA to meet all NOP requirements can be fined \$10,000 per violation
 - this includes honey!

NOSB Task Force

Recommendation Example

- A plan and map of the forage zone including organic, wild, and non-organic land, nectar sources, bloom periods, competing species densities, climate conditions, water sources, landfills, incinerators, sewage treatment and power plants, golf courses, towns and cities, and measures to prevent drift and robbing is required



dead in the water (for bees)

enter... Certified Naturally Grown



- Independent non-profit organization 2002
- Grassroots organization of small-scale direct market farmers
- Standards based on NOP
- 2011: over 800 farmers from 48 states
- Neighboring farmer inspectors
- Certification documents for each farm are made available to the public on-line
- Attractive labels for produce
- Marketing guides

CNG is beekeeper-driven

- CNG Apiary Standards written by me beginning in 2009
 - EAS Master Beekeeper, NCSBA Master Beekeeper, began keeping bees 2003
 - Advice: Jennifer Berry, Ross Conrad, Rick Fell, Kim Flottum, Chris Harp, Bill Owens, Dianna Sammataro, David Tarpy
 - Apiary Advisory Council reviews standards, appeals, etc. yearly
- Introduced in 2010 with workshops in NC and VA
 - 78 certified beekeepers in 2013 (28 in GA, 6 in NC, 6 in NY)
 - 1,000 – 1,500 Handbooks in circulation
- 23 page document include best practice natural methods that adhere to chemical-free agriculture principles and the rationale behind them
 - FAQs too
- Beekeeper-to-Beekeeper inspections, encouraging local connections and shared information
 - USDA inspectors are forbidden from giving advice

CNG Apiary Standard Principles

- Honey bee health and welfare
- Organic principles
- Economic impact / Product marketing
- Bee responsible with what's under your control!

CNG Honey Bee Certification Standards

- Criteria are clearly established within each subheading such that beekeeping practices are categorized as:
 - Required
 - Recommended
 - Permitted
 - Prohibited
- Rationale is given as subject headings
- Standards are strict, but doable
- Transitions from previous chemical exposure are built in

Standards Cover:

- Apiary location
- Hive position
- Hive construction
- Frames, foundation and brood comb removal
- Frames and foundation in honey supers
- Queen and bee sources
- Supplemental feeding
- Honey removal, processing and labeling
- Wax processing
- Hive and frame storage and transfer between colonies
- Moving colonies
- Colonies engaged in pollination services
- Hive transition
- Record keeping

Treatment of Specific Pests and Diseases

- Varroa mite
- Tracheal mite
- American foulbrood
- European foulbrood
- Nosema
- Chalkbrood
- Viral diseases
- Wax moth
- Small hive beetle
- Other insects
- Mice
- Skunks, possums, raccoons
- Bears

List of Beekeeping-Specific Prohibited Substances

- 24 substances, including:
 - Amitraz (Miticur, TakTic, Mitac)
 - Copper Naphthalate (wood preservative)
 - Coumaphos (CheckMite+)
 - Fenpyroximate (Hivastan)
 - Fipronil (Max Force Gel roach bait)
 - Fluvalinate (Apistan, Mavrik)
 - Fumagillin (Fumidil-B)
 - Hydramethylnon (Max Force Gel roach bait)
 - Oxytetracycline (Terramycin)
 - Paradichlorobenzene (PDB, Para-Moth)
 - Permethrin (GuardStar)
 - Tylosin Tartrate (Tylan)
 - High fructose corn syrup (HFCS)
 - Pollen substitutes

List of Beekeeping-Specific Allowed Substances

- 20 substances, including:
 - Formic acid OR thymol-based wafers / gels (ApiLife VAR, Apiguard)
 - for hives that meet treatment threshold once per year
 - Essential oils (clove, white thyme, wintergreen, lemon grass, etc) in sugar syrup
 - Powdered sugar
 - Sucroside
 - Apple cider vinegar (organic)
 - Boric acid for in-hive trapping of small hive beetles
 - Sugar syrup
 - Pollen (fresh, or irradiated, frozen and recently thawed) with no additives

Hive Transition Table

- Based on:
 - Previous exposure
 - Type of exposure
 - Number of exposures
- Which Transition Schedule to follow
- Transition Schedules

Hive Transition Schedules

1. Permanent suspension of exposure (immediate compliance) with no transition required.
2. Mark purchased frames and remove their used comb within two years.
3. Previous treatments to be recorded and considered in the allowed exposure of each bee hive in the operation (once per calendar year for either Allowed treatment).
4. Prior brood comb replacement or operation expansion schedule that achieves the removal (or 'dilution') of at least 60% of the exposed comb prior to being CNG Certified. Removal and replacement of the remaining (< 40% of) exposed comb within the first two years after certification. Each frame will require marking at the beginning of the transition period, to ensure that all of the previously exposed comb is replaced within two years after CNG Certification. Permanent suspension of exposure (immediate compliance).

Hive Transition Example

- Required- clear records of removal of comb exposed to prohibited substances and frame marking
- Recommended- immediate cessation of prohibited substance use and brood comb removal and replacement to 60% immediately
- Permitted- any previous exposure to PDB (Para-Moth), oxytetracycline (Terramycin), tylosin (Tylan), fumagillin (Fumidil-B), formic acid, thymol (ApiLife VAR, Apiguard), or prohibited pollen substitutes. Up to 6 uses of coumaphos (Checkmite+) inside a SHB trap. 2 to 6 treatments of fluvalinate and/or amitraz provided brood comb replacement schedule achieves 60% removal, with the remaining 40% comb replaced within the first two years.
- Prohibited- any wax or comb that has EVER been exposed to open coumaphos (CheckMite+) or > 6 uses of coumaphos inside a SHB trap. Any wax that has been exposed to > 6 in-hive treatments with fluvalinate or amitraz. The commingling of hives / components, or products between hives that have not yet met the CNG certification requirements and CNG Certified beekeeping operations.

natural beekeeping principles

- Minimize colony chemical exposure
 - Place hives on land that is organic or naturally managed
 - Be a natural ambassador with neighbors
 - Limit chemicals used for diseases and pests to natural or organic substances and use them only when absolutely necessary
 - Almost all chemicals used inside bee hives and pesticides used on crops are lipophilic (they like fats – not water), so they are primarily incorporated into beeswax – not honey
 - These substances have deleterious effects on brood that is reared in beeswax cells
- Use sunlight and hive ventilation

natural beekeeping principles

- Minimize beeswax chemical exposure
 - Minimize commercial beeswax foundation exposure
 - Let the bees make their own wax – all of it
 - Incorporate local processing of your own cappings wax into your operation
 - Regularly remove brood comb on a schedule
 - Old brood comb harbors chemicals AND disease (spores)
- Minimize colony stress
 - Minimize moves
 - Make regular careful inspections
 - Be judicious in how used equipment is incorporated
 - Be careful in the storage and transferring of frames

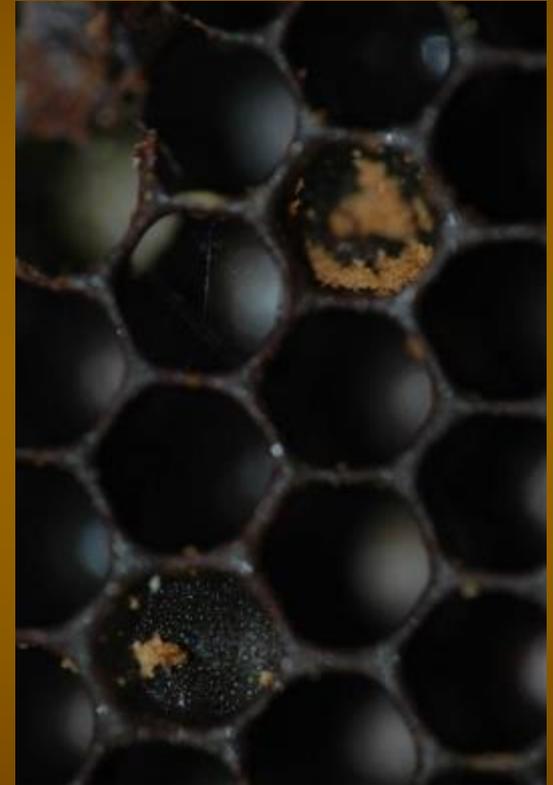
natural beekeeping principles

- Maximize cultural and biological methods of disease management
 - Select for disease tolerant bees
 - Select for less virulent mites
- Maintain the biological integrity of the hive
 - Avoid overharvesting of pollen, propolis, and honey
 - Avoid antibiotics that change the milieu of the bacteria and fungi in the bee bread within the hive
 - Maintain strong queenright colonies with adequate nectar / honey and pollen stores

pesticide prevalence

- 350 pollen samples from colonies contained 98 different pesticides
 - 88 % pollen samples had Fluvalinate
 - 75 % had Coumaphos
 - 61 % had a fungicide
- 98 % of 259 comb and foundation wax samples contained
 - Fluvalinate (up to 204 ppm)
 - Coumaphos (up to 94 ppm)

- Mullin CA, Frazier M, Frazier JL, Ashcraft S, Simonds R, et al. (2010) High levels of Miticides ... in North American Apiaries. PLoS ONE 5(3): e9754



entombed pollen



TOXIC



TOXIC



com



TOXIC



TOXIC

the perils of foundation

- Queen acceptance and weight decrease at a queen cell wax concentration between 10 - 100 ppm of coumaphos
 - J Pettis, *Apidologie*, 2004
- Frame 1 coumaphos concentration 256 ppm after a single treatment on frame 5!
 - J Berry, *Bee Culture*, 2009
- Fluvalinate has sublethal (weight and sperm number) and coumaphos has lethal effects on queen rearing
 - Haarmann, *J Econ Entomol*, 2002
- Plastic foundation alters vibrational signaling (and heat transfer), comb building AND honey production
 - Seeley, *Apidologie*, 2005; *ABJ*, 2006
- No drone sized cells (17% feral)
- Bees pull it 'wrong'



how bees draw comb without our 'help'



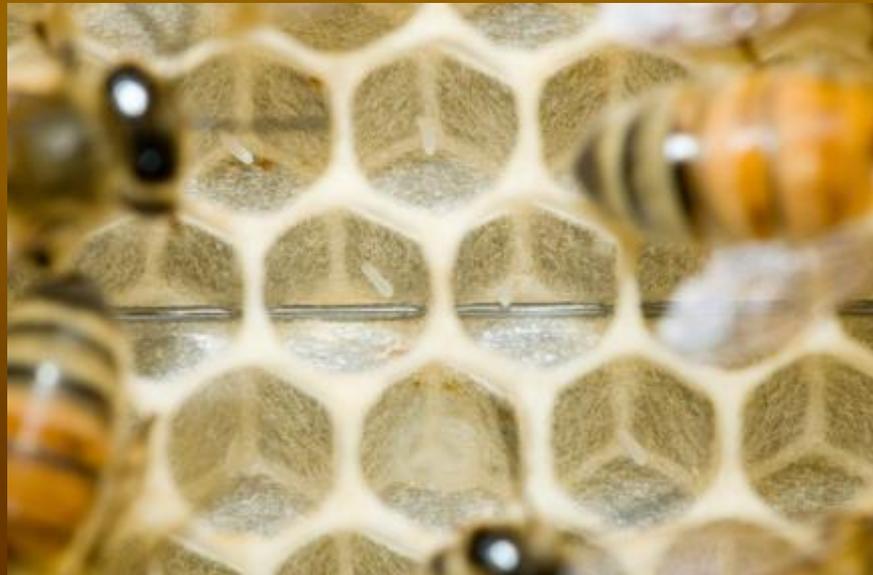
foundation just gets in the way (of festooning)

no foundation frames

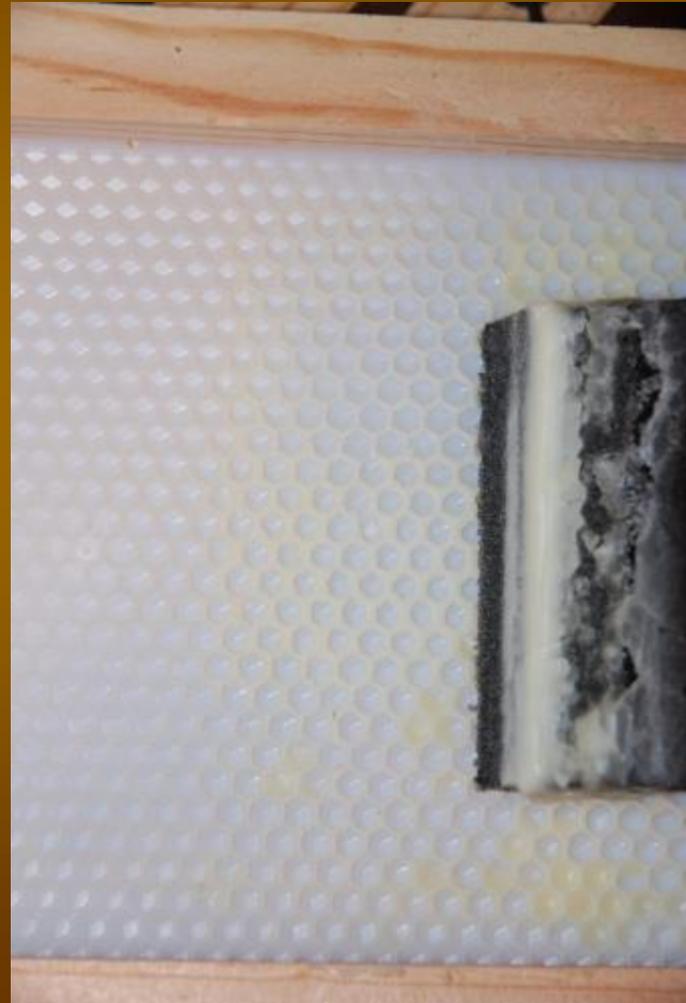
- 3/4" strip of thin surplus foundation or a similar guide (bead of wax, remove wedge, paint stick, pointed top bar) under the top bar
- Reinforcement wires
- Intersperse 1 or 2 maximum between already drawn comb frames
- Ensure the hive is absolutely level (side-to-side)



8 days later...



coating bare plastic foundation with pure cappings wax for honey supers



brood comb removal

- Pesticide residues transfer from previously treated comb to untreated comb
 - Wu, Anelli, and Sheppard (2011). Sublethal effects of pesticide residues in brood comb on worker honey bee development and longevity. PLoS ONE 6(2):e14720
- Mark all frames in brood chambers according to year they are placed into service
- Remove at least 20% of the wax per year so that no brood wax is > 5 years old



american foulbrood management

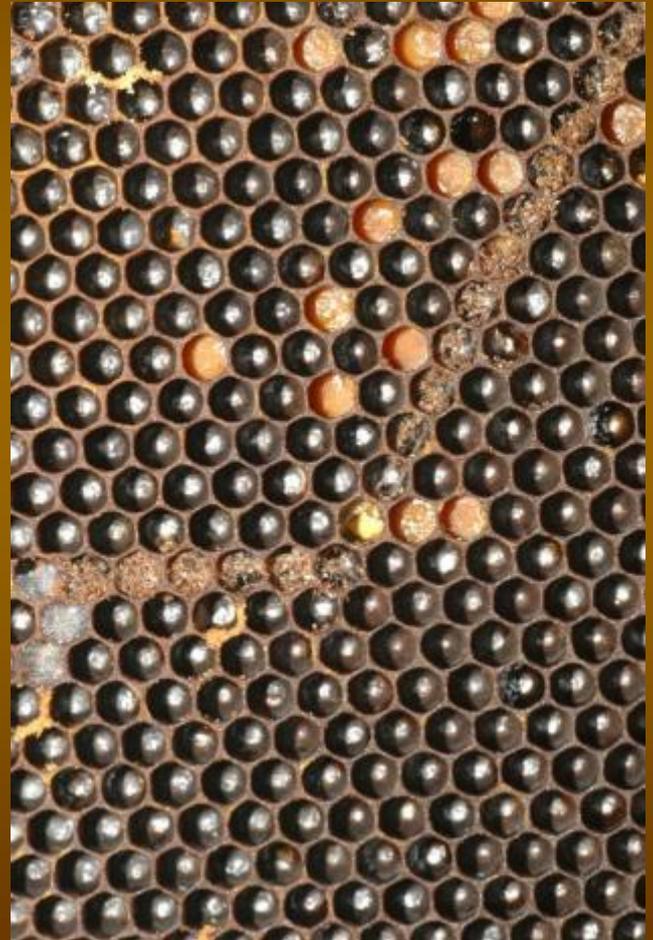
- Call your Apiary Inspector!
- Kill all the bees (spray with soapy water)
- Scrub hive tool, wash hands, gloves and bee suit with bleach
- Burn old hive components and ALL brood frames
- Clean and fumigate good hive components with ethylene oxide if available
- Avoid Oxytetracycline – OTC (Terramycin)
 - DOES NOT treat the spore phase!
 - 80 % larval mortality
 - 1/3 AFB strains are resistant to Terramycin
 - Antibiotics change the bacteria proportions in bee bread!
- Avoid shaking adult bees onto plain foundation + feeding
 - This only selects for bees that aren't tolerant!

managing nosema

- Keep bees well nourished with adequate pollen and honey stores
- Be gentle – NO squished bees
- Clean out drowned bees in feeders
- Limit colony stress (moves)
- Keep hives warm and in the sun
- Supplement pollen or substitutes in the fall
 - Well nourished honey bees are less susceptible to Nosema than poorly nourished bees
 - Eischen and Graham, Proc Am Bee Research Conf, 2008
- Avoid Fumagillin-B
 - Fumagillin-B has a long 1/2 life in honey
 - Fumagillin alters the fungi inside the colony (bee bread)

wax moth prevention

- Only leave enough empty comb on the hive that worker bees can 'patrol'
- Store empty super combs in cold or light
- Don't store combs containing pollen
- Avoid Paradichlorobenzene (PDB) and naphthalene because they poison wax!
- Consider *Bacillus thuringiensis* var. *aizawai* (Bta)
 - B401, Certan, XenTari



managing wax moths

■ Trapping

- 2 liter drink bottle- cut 1 1/4" hole below the neck shoulder.
- Fill w/ 1 cup white vinegar, 1 cup sugar, 1 banana peel
- Add water up to 3/4 full and hang near stored supers



■ Treatment

- Cut out the tunnel, expose the larva, and destroy it
- Freeze comb for 24 hours if necessary, and return to hive to be rebuilt



SHB prevention / treatment



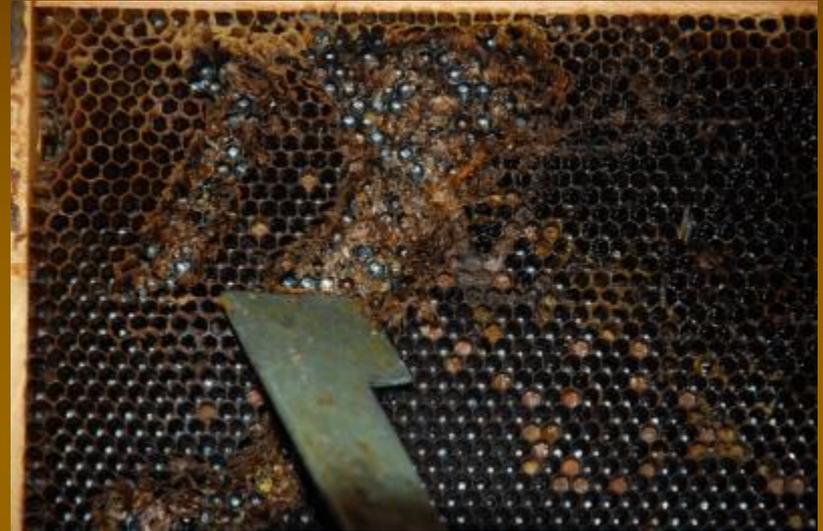
- Maintain strong, healthy queen-right colonies in the sun
 - No more comb than the bees can patrol!!!
 - NO DEAD OUTS!
- Only feed as much pollen as can be consumed within 5 days
 - Dry pollen substitutes don't attract SHBs to lay eggs like moist patties do
- Freeman, Hood, West, Beetle Jail, AJ's beetle eater, Cutt's better beetle blaster, etc
 - Vegetable or Mineral oil or Apple Cider Vinegar-laden
 - Diatomaceous earth (in Freeman trap)
- Ground up crickets mixed with boric acid in in-hive trap
 - Bees are prevented exposure to the trap
- Consider *Heterohabditis indica* nematode soil treatment
 - Doesn't kill foliage like GuardStar does

SHB and the honey house

- Don't remove more honey than can be extracted in a few days
- Don't bring brood in with the honey
- Keep settling tanks *solidly* covered and skim frequently
- Don't openly store slum-gum
- Don't store wet honey comb
- Remove dead bees, pollen and debris
- Don't store dead outs containing ANY pollen or brood
- Don't store wet supers
- Fill a pan of water with sand around the outside edge of the pan, and hang a light near the floor above the pan

comb with SHB damage

- Freeze infested frames to kill larvae and eggs
- Scrape out small SHB nests
- Wash the frame vigorously with sprayed water
- Return to a strong colony to repair
- Discard moderate and heavily damaged frames
- Remember that bees don't like the odor caused by the yeast and may abscond!



do you have to certify with CNG to be a natural beekeeper?

■ No

- You can apply if you wish and you can meet the standards
- You can work towards certification in the future if you don't currently meet the requirements
- You can adopt these principles with no intention of ever applying to CNG, and
- Utilize the standards as a resource

CNG Application Process

- Read and understand the Apiary Standards
- Identify two members in your local network
- Apply on line at www.naturallygrown.org
- Send CNG your signed beekeeper declaration and Annual Contribution (\geq \$50 suggested)
- Make arrangements for your apiary inspections (two natural beekeepers per season)
- Agree to inspect other CNG beekeeping operations
- Once certified - purchase attractive honey labels, establish your profile on the CNG website, etc

