

Beginning Beekeeping  
Module 2  
Hive Structure and Beekeeping  
Hardware

Northwest Arkansas  
Beekeepers Association  
[www.nwabeekeepers.com](http://www.nwabeekeepers.com)

## Beekeeping

- Bees are currently in high demand and short supply
- Most producers are selling out of early spring bees and they will sell out completely around April
- Order bees NOW to start this year
- Order your hives and other equipment NOW so you can have it ready when your bees arrive

## Beekeeping

- Where can you get bees and supplies?
- [www. Beesource.com](http://www.Beesource.com)
- Large Mail order suppliers have equipment and bees for sale
- Some local suppliers may have equipment and bees
- If you are good at woodworking, you can build your own hive equipment

## Beekeeping

- In nature, honey bees always maintain a certain amount of space between honeycombs
- Bee space =  $\frac{1}{4}$  in. to  $\frac{3}{8}$  in.
  - This is the space that allows two bees to be back to back on separate combs and pass by each other unimpeded

## Beekeeping

- Bee space is the basis of the moveable frame hive
  - Allows individual combs to be removed and inspected
  - Allows the combs to be rearranged
  - Allows beekeeper to work the colony with a minimum of disturbance

## Bee Hives

- Langstroth hive
  - Encouraged straight combs while preserving bee space
  - Became the world-wide standard
  - Has precise internal dimensions preserves bee space
  - Interchangeable components
    - Standardized sizes
    - Widely available

## Bee Hives

- Hive stand
  - Keeps the hive off the ground
    - Avoids termites and wood rot
    - Improves ventilation
  - Makes it easier to work on the hives
  - Can be wooden stands or concrete block
  - 12 in. to 14 in. high works well

## Bee Hives

- Bottom board
  - Serves as the floor of the hive
  - The space between the front of the bottom board and the first hive box is the entrance to the hive
  - Allows use of an entrance reducer between the bottom board and the first hive box
  - May be solid or be screened
  - Screen bottom board
    - Improves ventilation
    - Pest management tool



## Bee Hives

- Hive boxes come in three sizes:
  - Deep body
    - 10 frame – 19  $\frac{13}{16}$  in. X 16  $\frac{1}{4}$  in. X 9  $\frac{9}{16}$  in.
    - Will weigh up to 90 lbs. when fully loaded
  - Medium supers
    - 10 frame – 19  $\frac{13}{16}$  in. X 16  $\frac{1}{4}$  in. X 6  $\frac{5}{8}$  in.
    - Will weigh up to 50 lbs. when fully loaded
  - Shallow supers
    - 10 frame – 19  $\frac{13}{16}$  in. X 16  $\frac{1}{4}$  in. X 5  $\frac{3}{4}$  in.
    - Will weigh up to 35 lbs. when fully loaded

## Bee Hives

- **Brood Chambers**

- Where the queen bee stays

- Lays eggs
- Brood develops
- Pollen is stored

- Usually deep boxes are used

- You will start out with one brood chamber

- When 80% full or 8 out of 10 frames in use, add a second box on top

## Bee Hives

- Supers
  - Where the surplus honey is stored
  - Add boxes as needed
  - These are removed at the time of honey harvest
  - Left off during the winter
    - This so bees do not have to warm the excess space and reduces having to deal with small hive beetles

## Bee Hives

- Frames

- There are 10 frames for each 10 frame box

- Can get spacers to put 9 frames in a 10 frame box

- 9 frame spacing can make it easier to get frames in and out of the hive without damage to combs and to the bees

- Bees will often make thicker combs with 9 frames, making cutting the caps off of the comb easier for honey extraction

- Can also get 8 frame boxes

- Bees build honeycomb on both sides of the frame

- Removable from the hive box

- There are specifically sized frames for each size of box

## Bee Hives

- Frames
  - There is a bewildering variety of tops and bases for frames
  - Frames may have foundation for the workers to build honeycomb on
    - Beeswax
    - Plastic
  - Frames are available with no foundation so the workers build their honeycomb naturally

## Bee Hives

- **Frames**

- The foundation may be wired or unwired

- Vertical wires and horizontal wires

- Wired foundation comes with the vertical wires in place

- You have to place the horizontal wires on the frame

- Foundation should be wired for reinforcement if a honey extractor is used

- Otherwise, you may blow the foundation out of the frame

## Bee Hives

- Queen excluder
  - Used to exclude the queen from the honey supers
  - Comes in plastic or metal
  - Never leave a metal queen excluder on during winter, it can act as a heat sink
  - May cause workers not to move up into the supers to deposit nectar

## Bee Hives

- Inner Cover
  - Provides an insulating airspace
  - Makes it easier to pry off the outer cover when sealed with propolis



## Bee Hives

- Outer cover
  - Telescoping cover
    - Keeps out the weather
    - Metal clad last longest
    - Can also be obtained in plastic or styrofoam
  - Migratory cover
    - Has front, top, and back, no sides
    - Allows hives to be stacked side by side for transport

## Bee Hives

- Good idea to place a rock or part of a concrete block on top of the outer cover
- Prevents the outer cover and possibly the inner cover from blowing off in high winds

## Bee Hives

- Entrance reducers
  - Reversible
  - Used to reduce the hive entrance to make it easier for the hive to defend

## Bee Hives

- Where do you get a bee hive?
  - Order the hive pre-assembled
    - May come with frames
    - Easiest with minimal assembly
    - Most expensive
  - Order a kit
    - Pre-cut lumber
    - Nails and glues together quickly
    - Moderate cost
    - You will need to paint the boxes

## Bee Hives

- Where do you get a bee hive?
  - Build your own woodenware
  - Use precise plans
  - May not be less expensive than buying a kit
    - Figure your time
    - Economies of scale in cost of wood may come into play
- Make your own frames?
  - Very time consuming
  - Cheap to purchase

## Bee Hives

- **Box assembly**
  - Make strong, tight corners
    - Use dovetail or rabbet joints
    - Hives are exposed to the weather for years
      - Wood will try to swell and warp
      - Simple box corners will pull apart, causing gaps

## Bee Hives

- **Box assembly**
  - Use glue in addition to nails
    - Use a strong waterproof glue, e.g., Titebond
    - Use at every joint
    - The glue is what provides the strength
    - The nails are there to hold it together while the glue cures

## Bee Hives

- **Box assembly**
  - Paint your hive boxes
    - Protects the wood
    - Either latex or oil based paints are fine
    - Don't paint the inside of the hives or the top and bottom surfaces where the boxes meet when stacked (tends to stick together)
    - Use a primer
    - Bees don't care about color
    - Many people use white for heat reflectivity



## Bee Hives

- **Box assembly**
  - Other wood sealants
    - Linseed oil
    - Varnish
    - ECO Wood Treatment
      - mixed with water
      - new product
    - Copper naphthenate

## Bee Hives

- Frame assembly
  - Glue all joints
  - Two nails on each end through the top bar into the side bars
  - Two nails on each end through the bottom bar into the side bars
  - One nail through each side bar into the top bar (very important when you pick up a fully loaded frame)

## Bee Hives

- Frame assembly
  - If you buy frames with a cleat on the top bar, 3 or 4 short nails through the cleat into the top bar is sufficient to hold the foundation in place
  - A Jig can be purchased allowing you to assemble 10 frames at a time. If you are doing a lot of frames, the jig is convenient
  - Another jig can be purchased for mounting foundation in a frame and wiring it

## Bee Hives

- Frame assembly
  - Wiring frames – do this **BEFORE** you put in foundation
    - Most frames come with 4 holes in each sidebar
    - Use tinned wire (this stuff tends to splay off the spool)
    - You can also obtain rivets to put in the holes to protect the wood from cutting
    - This allows you to have 4 horizontal wires, 2 horizontal wires, or an X pattern

## Bee Hives

- Frame assembly
  - Feed your wire in the desired pattern through the holes in the frame
  - At the end, tap in a nail in the side bar and wrap the wire around the nail, and drive the nail flush
  - Pull the wire tight and tap in a nail in the other sidebar, wrap the wire around the nail, and drive the nail flush
  - The wire needs to be banjo string tight

## Bee Hives

- Frame assembly

- Good luck getting the wire tight enough by pulling on it.
- Use a wire crimper to put a wave pattern in the wire. This shortens the wire and tightens it
- You are now ready to mount the foundation in the frame and embed the wire
- Rolling wire embedder is an inexpensive option
- Electric wire embedders also are available, either purchased or homemade

## Bee Hives

- Support pins can be obtained which hold foundation in place.
- Pushed through the sidebar holes in the frame
- May not give adequate support for centrifugal honey extractors

## Bee Hives

- **Foundation**

- Pressed beeswax sheets

- Has a honeycomb pattern embossed on it

- Plastic foundation

- Can be obtained in waxed or unwaxed
    - Never comes with enough wax on it



## Bee Hives

- Foundationless frames
  - Essentially the top bar only
  - Bees build the honeycomb below the top bar
  - Often has a strip along the bottom of the bar
  - Commercial top bars have a V shape on the bottom
  - Can be made by using popsicle sticks in the bottom groove of the top bar (should stick out about  $\frac{3}{16}$  in.) Beeswax can be added to this.

## Bee Hives

- You may observe that the workers have chewed holes in the foundation on each corner
- This seems to be a short cut for the workers to move between sides of the frames

## Bee Hives

- Feeders
  - Division board feeders
    - Sits inside hive in deep body box
    - Should have wire frame for bees to cling to so they don't drown
    - Have to enter hive to refill

## Bee Hives

- Feeders
  - Boardman feeders
    - Slips inside the entrance of hive
    - Uses quart jar of syrup
    - Can be observed and replaced from outside of hive

## Bee Hives

- Feeders
  - A hive can consume one quart or more of syrup during the summer when nectar is not available

## Bee Hives – other tools

- Smoker

- Honey bees communicate using a complex language of scents called pheromones
- Smoke interferes with that language
  - Especially interferes with alarm pheromone
  - Isopentyl acetate – smells like bananas
  - Given off when threat detected to alert other bees
  - Released with the sting to mark the intruder
  - Makes the colony defensive and prone to sting

## Bee Hives – other tools

- Smoker
  - Also causes workers to ingest honey, making them more docile
- Recommend obtaining smoker which has a wire guard to protect from burns – they get very hot
- Various items can be used for smoker fuel; i.e., untreated burlap, pine needles, dried grasses

- Smoker

- Correctly lighting the smoker is important for fire safety
- Do NOT place a lit smoker in your car or your house
- Be sure to extinguish the smoker and let it cool before transporting and storing



## Bee Hives – other tools

- **Hive tool**
  - Used for prying and scraping
  - Hives are stuck together from the inside
    - Burr comb needs to be scraped
    - Frames and hive boxes are stuck together with propolis
  - Critical piece of kit – looks like small pry bar

## Bee Hives – other tools

- Protective clothing
  - A relaxed beekeeper makes for relaxed bees
  - Hat with veil to protect face, head, and neck
  - Jacket for upper body protection

## Bee Hives – other tools

- Protective clothing
  - Full coveralls – protects entire body
    - Fitted coveralls for the ladies are now available
    - These get a little uncomfortable in July and August
  - Gloves
    - Long gloves with sleeves halfway up forearm are available
    - Many like to work barehanded as being easier than wearing gloves

## Bee Hives – other tools

- Protective clothing
  - As you gain experience and confidence, you will shed some gear
  - The more gear you wear, the less you may be stung
  - Bees are clever and can get past your protective gear if they are motivated

## Bee Hives – other tools

- Bee brush
  - Used to gently brush bees from frames and other surfaces

## Bee Hives – other tools

- **Frame grips**
  - Used to pick frames out of the hive box
  - You will need to pry the frames loose if they are propolised

## Bee Hives – other tools

- Frame perch
  - Used to hang frames while inspecting the boxes
  - Avoids laying frames on ground or setting them upright on something and having the wind blow them over

## Bee Hives – cost

- So how much does all this stuff cost?
- Recommended that you start with two hives so if one hive dies, you still are in the bee business
- Cost of the bees will be talked about in the next section



## Bee Hives – cost for two hives, basic outfit, new, sample cost

Item	Unit Cost	Total Cost
2 Screened Bottom Boards	\$30.00	\$60.00
4 Deep Body boxes (unassembled)	23.00	92.00
4 Medium Supers (unassembled)	17.00	68.00
2 Queen excluders (metal)	18.00	36.00
2 Inner Covers	13.00	26.00
2 Telescoping covers	23.00	46.00
2 Entrance reducers	2.00	4.00
2 Boardman feeders	4.00	8.00
4 Deep frames (10 pack unassembled)	14.00	56.00
4 Medium frames (10 pack unassembled)	14.00	56.00
4 Deep body wired foundation (10 pack)	16.00	32.00
2 Medium wired foundation (20 pack)	21.00	42.00
Full coveralls with veil	72.00	72.00
Helmet	17.00	17.00
Gloves	16.00	16.00
Smoker	24.00	24.00
Smoker fuel (untreated burlap)	5.00	5.00
Hive tool	7.00	7.00
Bee brush	6.00	6.00
Total Cost of equipment		673.00

## Bee Hives – cost

- Cost items purchased separately - \$683
- Vendors also sell hive kits
  - Unassembled hive with protective gear - \$433
  - Additional unassembled hive - \$226
  - Total cost - \$659
- Price difference is in the quality of the protective gear

## Bee Hives – other types

- Top Bar Hives
  - Uses only top bars, no frames
  - Critical dimension is the width of the top bar –
    - 1 3/8 inches (3.5 cm)
  - Designed to be easily and cheaply built
  - Requires different management than Langstroth hives

## Bee Hives – other types

- **Warre Hives**

- Square bodies with smaller dimensions (11 13/16")
- Uses 8 top bars per box – no frames
- Sawdust box on top as a quilt
- Sloped and vented roof
- Small hive entrance
- New boxes go on bottom

## Bee Hives – other types

- Horizontal Long Hives
  - Uses frame for deep boxes
  - Must be home built
  - Requires different management from Langstroth hives, similar to Top Bar Hives
  - Has advantage of being easily insulated