

**Beekeeping Procedures and Safety Manual
for the
Apiary at the GVSU Sustainable Agriculture Project**



*For any additional information about this manual, procedures, safety or general information, please contact: Anne Marie Fauvel (fauvela@gvsu.edu)

Welcome to the Beekeeping Procedures and Safety Manual for the Apiary at the GVSU Sustainable Agriculture Project

It's surprising how important something as small as a honey bee is to our society. We depend on bees for an indispensable amount of our food. According to the U.S. Department of Agriculture, about one-third of the human diet comes from insect-pollinated plants, and the honey bee is responsible for 80 percent of that pollination. In the last decade, bee populations have dwindled. The Apiary at the GVSU Sustainable Agriculture Project offers the Grand Valley community the ability to develop opportunities for bee research, awareness, education and to practice applied sustainability through the use of a living lab.

Honey hunting evidence date back more than 6500 BCE. And more purposeful beekeeping practices have been around since 900 BCE. Here in North America, bees came from the Old World after the introduction of the apple trees, which did not fair so well away from their original habitat and pollinators. Beehives were introduced in Virginia in 1622. The practice of keeping bees is a traditional and well-established industry as well as a resurging hobby. Beekeeping does present some inherent risks. The following procedures and safety manual offers education and precautions, which aim at minimizing those risks.

Preparation prior to working with Honey bees

Prior to working directly with the GVSU bees, Beekeeper's club member, student beekeepers and community member are required to:

- Familiarize themselves with the following procedures and safety manual to ensure a positive experience working with bees.
- Sign an Informed Consent Form (see attached)
- Review the Emergency Action Plan and know individual roles (see attached)
- Feel comfortable participating in activities in the Apiary. **Note that students are NOT required to participate in any activities involving direct contact with bees. Students may remove themselves from participation in the fieldwork involving direct contact with bees at any time, and this without any penalty.**

General and Important rules of Beekeeping!

- Always wear protective equipment when working in the Apiary.
- Do everything carefully and quickly.
- Don't leave the hive open and exposed for extended periods of time.
- Always aim smoke from the smoker at the bees as the smoke minimizes the defensive behavior of the colony.
- Never stand in front of the hive entrance.

- Always work the hive from the side or back.
- Avoid using hair spray, aftershave, perfume or deodorants, especially those that are perfumed as the smell upset bees and make them more defensive.

Beehive components and associated vocabulary

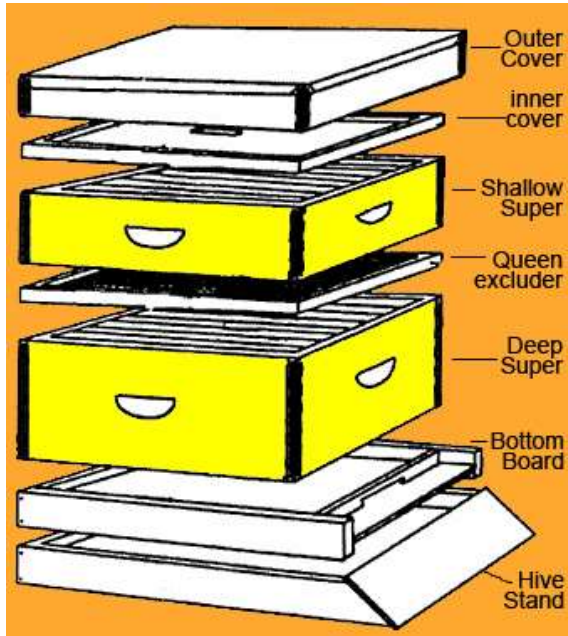


Photo source: blissbubblely.blogspot.com

Equipment

Protective Clothing (to be worn at all times within the apiary area, which is from within 20feet from the hives)

- Combination Bee Suit
- Gloves
- Boots (Muck boots work well).
- heavy shirt (long sleeved)
- heavy long leg pants
- Suggested ball cap

Putting on Protective Equipment

The Apiary will provide student beekeepers and beekeeping participants with a full combination bee suit and full-length gloves. Students will be responsible to bring boots and suggested ball cap. To suit up:

- Unzip the combination suit and suit up starting from the bottom up, i.e. placing one foot at a time in the pant legs followed by one arm at a time in each sleeve.
- Place veil on the top of the head (the use of a ball cap will help keep the veil in place and not move or cover eyes) and zip each sides completely and secure with the Velcro flap.
- Remember to zip pant leg all the way down.
- Place elastic finger hook around one finger.
- Put gloves on over hand, forearm and above elbow.

Only once protective equipment in on are student beekeepers ready to approach the apiary.

Tools

- A smoker. (As indicated this produces smoke to 'subdue' the bees, see Use of the Smoker section below)
- Hive tool. (Tool to pry open the hive and remove frames. It is also good for scraping.)
- Frame grips
- Bee Brush
- A roll of duct tape
- Electric Hand uncapping knife
- Capping scratcher
- An extractor
- Wax and capping collection bucket
- A storage tank for honey
- Honey jars and labels*.
- Woodworking tools – Hammer, nails, glue, duck tape, etc...

Use of the Smoker

The bee smoker is used to 'control' the bees. The smoke from the smoker minimizes the defensive behavior of the colony allowing to minimize the risk of being stung. It is a very important safety piece of equipment when you work the bees. A bee smoker can be dangerous; you can burn yourself or start a fire. It is very important to light the smoker correctly and extinguish it safely after use. The goal is to have a good cool flow of smoke when you press the bellows on the smoker.

Lighting the Smoker

- Select a safe area to light the smoker so as not to set fire to the surroundings.
- Open the lid of the smoker with your hive tool.
- Tear up a sheet of newspaper into shreds and make a loose ball.
- Light the newspaper
- Drop the burning paper into the bottom of the smoker barrel.
- Gently puff the smoker using enough pressure on the bellows to maintain a flame
- Then add your smoker fuel in small quantities to the top of the burning paper while gently puffing the smoker bellows.
- When the smoker fuel begins to burn add more fuel.
- Continue the process until the smoker barrel is half full of fuel.
- Close the lid of the smoker.
- When the smoker is warm, add more fuel while puffing the bellows. Fill the barrel full of fuel, packing it down with the hive tool.
- From time to time, you will need to add fuel. If the smoker gets low on fuel, flames can occur. This is dangerous to the bees and could start a fire.

Using the Smoker

- Blow smoke into the entrance of the hive. Allow 10 to 20 seconds for the smoke to 'calm' the bees before opening the hive. Always aim the smoke at the bees.
- After opening the hive apply additional smoke by puffing it under the lid, between the supers and over the frames. Be careful not to 'over smoke'; if you over smoke, the bees will run to excess.
- Regularly check the fuel supply - keep the smoker full of fuel to ensure a cool smoke supply
- Always keep the lighted smoker standing upright.

Extinguishing the Smoker

- Block the nozzle.
- If in doubt, put the smoker into an airtight fire proof box

Approaching the Apiary and Inspection of the hives

How to open and examine a hive:

- Always wear protective equipment when working in the hive. This protective equipment should be put on before entering the Apiary area, (20 feet from the hives).
- Gather all of the necessary equipment, hive tool, frame gripper, bee brush, smoker, notebook.
- Use the mowed path and always approach the beehive from the side and work from the side or back of the beehive when possible. Do not stand in the front of the beehive and leave the entrance free.
- Use a hive tool to remove the top cover. Lay the top cover on the ground next to the hive with the bottom side up or stand on the side leaning against the hive.
- Blow a little smoke toward the entrance and the top of the hive. Use smoke sparingly.
- Next remove the inner cover. Bees have a tendency to glue this down to the inner side of the hive with propolis, so you may have to pry the inner cover off with the hive tool.
- Always keep the smoker handy.
- Once the inner cover is off the top bars of the frames in the top box (super) are exposed. Bees will start to migrate toward the disturbance and you will notice them coming up between the top bars. You can apply a little smoke to 'calm' them down. A few may become air borne and fly about you. Ignore them. **Do not swat at the bees.**
- Move slowly -- avoid quick sudden movement.
- Don't spend a lot of time with the hive open.
- Inspect hive (use checklist below).
- Place the inner cover back on, followed by the outer cover. Place the bricks back on the top of the hive and slowly walk away from the beehive.
- Once back into the parking lot, pair up for a 'bee check'. While holding arms up, twirl around in a circle while partner gently brushes bees off of protective gear. Only once everyone has been checked and cleared can we walk back toward the campus building and remove protective gear.
- Record observations in Bee Log, which is kept on the back porch of the Wesley house with the other SAP documents.

Hive inspections:

A beekeeper should know what his bees are doing. The hive should be examined every two weeks to make sure they have plenty of room, that the queen is laying eggs, that they are storing honey, and that the bees are free of disease.

Checklist: In a new or existing hive, you could or should be looking for:

- ✓ Are the bees building new comb on the foundation you put into the hive? New comb is nice and white or slightly yellow.
- ✓ Are all frames drawn out? This depends on how long the bees have been in the hive. If the comb is drawn out (the bees have made new comb over the foundation), do you have a new super to add to the colony? A new super can be added when 3/4 of the comb is drawn out. The last frames to be drawn out are the ones on the outside of the hive body. The bees will instinctively store honey in these outside frames. Do not take it away from them.
- ✓ Can you recognize brood? It will be located in the center of the frame of comb. It is tan to dark brown in color. It may be hard to see eggs but you should learn how to spot them. They look like little spots of sugar at the bottom of cells. Larva is easier to spot -- they look like pearly white worms coiled within a cell. The capped brood is brownish in color. Older comb turns dark in color. This is because of travel stain and also brood raised in comb turns the comb dark-- sometimes almost brown/ black. If you can see eggs you do not need to find the queen to know that you have one. One exception is with a laying worker.
- ✓ Can you recognize capped honey? Capped honey will be found in an arch across the top of the comb. If it is unsealed, it will be a shiny liquid. When sealed, the cappings are a distinct whitish color. You will also see cells that have a yellow or brownish substance in them. These cells contain pollen. A normal hive will have most of the frame filled with brood, a small arch of honey at the top of the frame and some pollen stored between the two. It is not unusual to find a frame, which is almost all brood in a strong hive.

- ✓ Get ready to close the hive if you are satisfied that all is well. If you have a feeling that all is not right with the hive, you may want to look for signs of diseases, for examples: varroa mites, hive beetles, wax moths, etc...
- ✓ Use all your senses, look for sluggish bee behavior, smell for foul odors, listen to the bee buzzes, etc...

Record (Bee Log)

Keeping a notebook of beehive observations is very important. As years come and go, the notebook will provide some means of comparison.

Honey Extraction

Removal of honey frames (Mid-summer or Fall harvest)

Bees collect nectar and pollen from the surrounding flowering plants. They will store the pollen in a variety of patterns through out the brood frames. You will easily spot pollen combs as they are bright yellow/orange in color. They will store the nectar and use different ventilation methods to concentrate it in the form of honey in the upper boxes (usually 3rd box and above). Ideally, the beekeepers want to remove as much honey as possible while leaving enough stored in for the bees to survive through the winter. Depending on the timing of the removal, and to be on the safe side, it is good precaution to leave an entire super (shallow) box of capped honey by the end of September. The task will consist of removing each frame of capped honey efficiently and safely. One way to proceed would be:

- Always wear protective equipment when working in the hive. This protective equipment should be put on before entering the Apiary area, (20 feet from the hives).
- Gather necessary equipment; hive tool, brush, empty super box with closed bottom board and top board.
- Use the mowed path and always approach the beehive from the side and work from the sides or back of the beehive when possible. Do not stand in the front of the beehive and leave the entrance free.
- Use a hive tool to remove the top cover. Lay the top cover on the ground next to the hive with the bottom side up or stand on the side leaning against the hive.
- Blow a little smoke toward the entrance and the top of the hive. Use smoke sparingly.
- Next remove the inner cover. Bees have a tendency to glue this down to the inner side of the hive with propolis, so you may have to pry the inner cover off with the hive tool.
- Always keep the smoker handy.
- Using a hive tool, loosen up a honey frame, lift, inspect, tap the corner on the hive or in front of the entrance to remove as many bees as possible, then use the brush to remove all remaining bees. When the frame is clear of all bees, lift the top board from the extra empty box, place honey frame in it and quickly close the top board back onto it to prevent any bees from returning onto the removed honey frame. Repeat this operation for all honey frames to be removed.
- When all the honey frames have been removed, place the inner cover back on, followed by the outer cover. Place the bricks back on the top of the hive and slowly walk away from the beehive with the 'sealed' removed honey frames.
- Once back into the parking lot, pair up for a 'bee check'. While holding arms up, twirl around in a circle while partner gently brushes bees off of protective gear. Only once everyone has been checked and cleared can we walk back toward the campus building and remove protective gear.
- The boxes of collected 'bee free' honey frames will be brought into the campus for honey extraction.

Honey extraction procedures

- Gather all necessary equipment for extraction in the tool shed: electric heated knife, capping scratcher, fastened extractor, uncapping bucket, honey collecting bucket, filter and sieve, and a few moist and clean rags.
- First, remove one frame from the super.
- Holding it vertically over a large bucket (to catch the wax and overflow honey as you work), use the electric heated knife to slowly cut the wax using a light sawing motion, working from the top to the bottom. The heat will do the work, so use a light touch.
- Follow up by using the capping scratcher to remove any wax that was not cut off by the knife. There is no need to dig with the scratcher — a light scratching will do.
- Immediately place the uncapped frame into the extractor and move onto the next frame.
- Place a bucket fitted with first a cloth filter, then a double sieve strainer under the release valve. This valve will remain closed during the extraction process to prevent any honey from flowing out into the bucket.
- Once six frames are uncapped and fitted into the extractor, close the lid and turn fasten extractor on.
- After a few minutes, stop the extractor and check the frames.
- Turn extractor back on, at a higher speed (if necessary), for another few minutes. Repeat this a few times with fresh, uncapped frames until a quantity of honey is built up inside the extractor.
- When ready, open the release valve and allow the honey to pour into the sieve and filter below into a honey collecting container.

Bottling and Labeling procedures

- Gather all necessary equipment for bottling and labeling; empty clean jars and caps, honey collecting bucket with valve, a few moist and clean rags, labels*.
- Holding jar under the honey collecting bucket fitted with a valve, open the valve and fill jar to about an inch from the top.
- Cap the jar
- With a clean moist rag, wipe the jar clean and pat dry.
- Apply label* to jar
- Store at room temperature

*Labels: By Michigan Law, under the Cottage Food Law and the Michigan Food Law, honey labels must have the following information:

- Name and address of the Cottage Food operation.
- Name of the Cottage Food product (All capital letters or upper/lower case are both acceptable).
- The ingredients of the Cottage Food product, in descending order of predominance by weight. In the case of honey, it is the sole ingredient.
- The net weight or net volume of the Cottage Food product (must also include the metric equivalent – note that this can be added by hand on each label afterwards).
- Allergen labeling as specified in federal labeling requirements.
- The following statement: "Made in a home kitchen that has not been inspected by the Michigan Department of Agriculture & Rural Development" in at least the equivalent of 11 point font (about 1/8" tall) and in a color that provides a clear contrast to the background (All capital letters or upper/lower case are both acceptable).
- Hand-printed labels are acceptable if they are clearly legible, written with durable, permanent ink, and printed large enough to equal the font size requirements listed above.

**MADE IN A FACILITY NOT INSPECTED BY THE
MICHIGAN DEPARTMENT OF AGRICULTURE
& RURAL DEVELOPMENT**

Pure Michigan Honey
GVSU
4539 Luce Street
Allendale, MI 49401

Ingredients: Honey
Net Wt. 12 oz (355 ml)

Wintering procedures

Wintering of the beehives is a simple process. Beekeepers should perform one last hive inspection (see hive inspections section above) and assess the health of the colony, size, evidence of diseases (see disease treatments section below), amount of brood and adequate honey storage for the winter. When the hive is determined to be ready for the upcoming winter, student beekeepers will:

- Install the wedges on the inner cover for winter ventilation, this involves nailing four wood pieces to create an angle at which the inner cover will sit on the boxes and create a 2 inches entrance at the top of the hive complete with 2 screws to prevent the outer cover from closing the entrance.
- Wrap the remaining boxes with tar paper. The wrapping involves using a hand stapler to cover the hives on four sides with tar paper.
- Record observations in Bee Log

Spring Inspections

Review Approaching Apiary and Inspection of the Hive sections. In addition:

- Assess the size and health of the colony, the amount of honey and pollen left
- Look for diseases (varroa mites, hive beetles, wax moth, etc...)
- Search for evidence of queen activities (eggs, larvae, etc...) or queen cells
- Clean bottom board of dead bees
- Reorder brood boxes (main activity at the bottom)
- Feed bees if necessary (use wooden feeders and a solution of sugar water 2:1)
- Record observations in Bee Log

Diseases and Treatments

Honey Bees are sensitive to many different diseases and parasites. The Sustainable Agriculture Project pledges to run a “treatment free” apiculture whenever possible. It is not to say that we will not be treating severe infestations in specific special circumstances. We will however use natural (chemical free) methods whenever possible. Student beekeepers will not be exposed to potentially hazardous chemical substances while working with bees.

Apiary at the GVSU Sustainable Agriculture Project Informed Consent/Assumption of Risk and Release for participation in Apiary-related activities

Welcome to the Apiary at the GVSU Sustainable Agriculture Project. The Apiary is a living colony of honey bees that are being studied and being used as a teaching tool for understanding ecosystem- insect interactions. Interaction with the Apiary range from simple observation and wireless data acquisition, to hands on honey extraction. This form is designed to explain what you may be doing while visiting the apiary, and all of the potential risks and benefits of your participation.

Potential Apiary related Activities.

- Observation from a distance (bee activity).
- Removal of bee covers and examining bees
- Removal of honey and or brood frames (using a hooking tool)
- Addition and removal of bee hive boxes
- Observation of brood frames close up (examining life cycles)
- Equipment maintenance (scale hardware and software)
- Addition and/or removal of entrance reducers, adjustments to seasonal ventilation/covers
- Removal of honey frames for honey extraction. The frames can be heavy (up to 50lbs)
- Use of a bee smoker, which is a device that uses a small bit of grass or brush to burn and create smoke in a container. This is then manually blown onto the bees to sedate them.
- Honey extraction – use of an electric heated knife (260-270F) that is not sharp, electric honey extractor, filtering equipment, bottling and labeling equipment.
- Equipment wintering of beehives- tar paper wrapping of hives, unwrapping in the spring

The most common risk of involvement with the Apiary is bee sting, which has the potential of eliciting an allergic reaction. In those who are severely allergic, this can be a potential life threatening situation. Since the Apiary is on a grassland area, injury due to uneven terrain is possible. Injury during bee extraction may include heated knife burn, smoke irritation from smoker, muscular injury while lifting honey frames and bee sting while removing the frames. Operating within the bee suit (protective gear) during hot summer months can create conditions for a heat-related injury. Panic or fear from being around bees is possible for some individuals.

All reasonable efforts are being made to reduce the possibility of any adverse event while working with the Apiary. All individuals approaching the beehive for any apiary related activities will be required to wear a full combination bee suit with veil designed to prevent bee stings. In addition, leather gloves and muck boots will be worn. Any lifting of frames will be done with assistance to minimize the risk to the individual and the bees. Prior to removal of the suit the individual will be removed from the bee hive location and

the suit brushed clean of any bees or debris following a bee removal/check routine. The bee smoker is designed to prevent touching the heated portion. A faculty member and first aid kit will be available on site. All participants are required to complete a health questionnaire and are asked to provide any allergy history. For individuals who do not wish to approach the Apiary and still want to gain the experience, a secondary option (videos and wireless data observation) is provided.

There are many benefits to working with the Apiary. These include knowledge and first hand understanding of the inner workings of a bee colony and the honeybee cast system. Participants will gain an understanding of the science of honey production, the relationship between the local flora and honeybees as pollinators. Skills will be gained in raising honeybees, beekeeping (maintenance) and honey harvesting. Participants will gain an understanding and appreciation of honeybees within the greater context of agriculture and food production systems. They will also gain an understanding and appreciation for the true nature of honeybees, their social system, and docile nature.

Consent and Release Statement

By your signature below you are acknowledging that in addition to this document, you have been provided with a copy of general and important rules of Beekeeping included in the document titled Welcome to the Apiary at the GVSU Sustainable Agriculture Project, and that you have read and understood and agree to abide by the terms therein. You further agree to the following:

I RELEASE, WAIVE, AND DISCHARGE Grand Valley State University, their faculty, agents and employees from all liability to me, my personal representatives, assigned heirs, and next of kin, for all loss or damage and any claims or demands.

I INDEMNIFY AND HOLD HARMLESS Grand Valley State University, their faculty, agents, and employees and all persons, including but not limited to participants and spectators, from any and all claims and costs arising directly or indirectly out of any Beekeeping Experience activities, acts, and/or omissions.

I HAVE CAREFULLY READ AND UNDERSTAND COMPLETELY AND CLEARLY THE ABOVE PROVISIONS AND VOLUNTARILY SIGN THIS INFORMED CONSENT/ASSUMPTION OF RISK AND RELEASE FORM. I AM GUARENTEED THE RIGHT TO STEP BACK AND OBSERVE AT ANY AND ALL TIMES WITH ABSOLUTELY NO PENALTY , AND UNDERSTAND THAT ALTERNATE EXPERIENCE IS AVAILABLE.

Printed Name of Participant

Signature of Participant

Printed Name of Minor Participant

Signature of Minor's Parent or
Legal Guardian

Apiary at the GVSU Sustainable Agriculture Project
Apiary-Beekeeping- Pre Participation Health History

(Individuals are not obliged to fill out this Health History form, if you choose to do so, this information will be helpful to the Instructor and will be kept confidential.)

Name _____ Date _____

Home Phone _____ Work Phone _____

Emergency Contact (name) _____ Phone _____

Age ____yrs. Height ____ft. ____in. Weight ____lbs. Gender Male Female

Past History: Check if you previously or currently have any of the following conditions:

- | | |
|---|--|
| <input type="checkbox"/> High Blood Pressure | <input type="checkbox"/> Lung Disease or dysfunction |
| <input type="checkbox"/> Asthma | <input type="checkbox"/> Blood Clots |
| <input type="checkbox"/> Irregular heart rhythms
abnormality | <input type="checkbox"/> Diabetes or blood sugar |
| <input type="checkbox"/> Edema | <input type="checkbox"/> Hepatitis |

Others you feel we should know about _____

If you checked any of the above, please explain _____

Allergy History

- Grasses Foods Stings/bites Other

Please explain your level of reaction

History of Bee sting or other insect bite/sting

Have you ever been stung by a bee? _____yes _____no

Have you ever had an insect bite ? _____yes _____no

Please explain your level of reaction (itching, inflammation, more severe?)_____

Medications

1. List any prescription or non-prescription medications that you are presently taking or have taken in the last 3 months.

Allergy Medicine

Do you take any medication for Asthma or Allergies? _____yes _____no

If yes please explain dosage and use

Do you carry an epi pen? _____yes _____no

Signature of Participant

Date