

Morat

Mulberries Mead

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General Information and History of the Honey Bee

There are 4 species of bees that produce honey. The western honeybee *Apis mellifera* is the most important and widely used. It is native to Europe, Asia Minor and Africa. The Asiatic hive bee *Apis cerana* is native to Asia. The giant *Apis dorsata* and dwarf *Apis florea* bees are also Asian species, but they nest in the open and cannot be kept in hives. Most other wild bees like the bumblebees feed on nectar but do not store it in great excess and so are not useful for honey production. We will look at the *Apis mellifera* or the common name is the honeybee.

The Honey Bee has 5 eyes, fly approx. 20 mph, has 6 legs and 2 pairs of Wings. Honey Bees are in the insect family. There are about 20,000 to 30,000 bees in the hive in the winter and over 60,000 to 80,000 bees in the summer. The Honey Bee is a colony which has 3 caste (type of bees). Most of them are Female Worker Bees, only a few hundred are Drone Bees and only one Queen. The Queen Bee lifespan is 1 to 5 years. The Female Worker Bees lifespan is mere 42 days in the summer and 4 to 6 months in the winter and the Male Drone Bees lifespan is 35 days and only in the summer months.

The Worker bees carry pollen in her mouth and hind legs. The foragers will collect the pollen and the lifetime of honey production equal to about $\frac{1}{12}$ to 1 of a teaspoon. It will take about 2 million flowers that the Worker Bees collect the nectar to equal 1 pound of honey.

The oldest form of animal life in existence is the Honey Bee from the Neolithic Age. In the bible, they mention cave painting from prehistoric time and refer to heaven as “Land of Milk and Honey”. Beekeeping is the one of the oldest form of animal husbandry still practiced. Humans gathered the honey and the honeycomb from wild honey bees as far back at 7,000 B.C. In 2,400 B.C. near Cairo, the first recorded information on bees keeping and the hives was found. In Egypt, they have bees featured frequently on hieroglyphs favoured by the pharaohs. In the 15 B.C. Greeks viewed honey not only for the food but it was used as medicine as well. The Romans had Beekeeper all over the Roman Empire and honey was used as a gift to the Gods. When Christianity took over, they used the beewax production increased for the Churches as candles and the Monks and Clergy use Beekeeping in order to ensure an adequate supply of the raw materials.

Peasants used honey and wax which was found valued highly as currency to pay their feudal lords in the 11th century in Germany. When the Spaniards travelled to the new world, the native from Mexica and Central America already developed beekeeping and method to produced honey and wax.

Honey is comprised of 17-20% water, 76-80% glucose, and fructose, pollen, wax, and mineral salts. The word Mellifera translate into “Honey bees” and in 1758, the scientific name, *Apis Mellifera*, was given for the Honey Bee by Carolus Linnaeus. ^(5,6,8,9,10,11,15,16,18)

Life Cycle

The Egg and Larva

It starts when the Queen lays the egg in the cell in the honeycomb. Only the worker eggs are fertilised with the drones' sperm and develop into females. It will hatch in 72 hours into Larva known as grubs. All grubs are fed royal jelly for 2 days but only the Queen will continue to get royal jelly. Then the grubs transform into pupae. The pupae metamorphosis into a fully grown worker bee which emerges in 21 days, the drone bees will emerge several days after the worker bees and the Queens emerge within 16 days. As there is only one queen for the hive, the old queen and about half the worker bees and drone bees will leave the hive about a week before the new queen emerges.⁽⁹⁾



Figure 1: The Process of the Egg to a Bee

Early Life

Once the grown bee emerges from the cell, the bee will groom herself, have a meal of pollen and honey and clean out her own cell. Then for a few weeks, they clean cells, removing dead bees from the hive, tending the brood (eggs and larva) and tending the queen. They also take nectar and pollen from the returning forage bees, adding the enzyme and depositing into the cells. They reduce the water by fanning it and converting into honey. Fanning also helps to control the temperature and humidity levels inside the hive. Near the end of the early life, they feed royal jelly to the younger larva and to the queen larva. The royal-jelly which is nutrient-rich is secreted from the nurse glands on the workers' head.⁽⁵⁾

Mid-Life

The worker bees, which are about 12 days old and has the pharyngeal glands, begin to regress while the wax glands mature, will build and cap the honeycomb. The Bee's sting glands contain enough venom to start to guard the hive in about 18 days and she will take off on a short flight out side of the hive for orientation.⁽⁵⁾

Later Life

The last few weeks the worker bees will be spent foraging for nectar, pollen, propolis and water. Each trip, a bee visits 50 to 100 flowers and carrying half her weight on the way back to the hive. Her lifetime of work will only product 1/12 to 1 teaspoon of honey.

The Forage Honey bee have a dangerous time because of prey from bird and insects. They will work till the end and die while out foraging either from getting chilled and die because they cannot get back to the hive before nightfall and the list goes on. The

Worker bees that develop in the later season will live through the winter to tend the new spring brood.⁽⁵⁾

Honey Bee Caste

The colony has 3 caste. A caste is a type of individual. There is a Queen Bee, a Female Worker Bee and the Male Drone Bees. The Honey Bees have a highly evolved form of socialization called eusocial (Truly Social Behaviour). Below is the different caste.⁽⁵⁾

Queen Bee

The Queen Bee regulates the behaviour of the worker bees. She is the only one that can lay fertilized eggs. Once in a while the worker bees will raise a new queen because she is injured, ineffective and/or replace the old queen. It starts by laid eggs by the original queen out of it cells and put it into a larger peanut shaped cell. The egg will hatch in 3 days and then they fed the new queen Royal Jelly. Royal jelly contains chemicals that cause the larva to develop the characteristics of a queen, including smaller eyes and proboscis, a longer abdomen, fully developed ovaries, mandibles (jaws) with teeth, and the abilities to sting repeatedly and to produce 'queen substance' pheromone. Also the Queen has a longer lifespan of 1 to 5 years. After 9 Days, the worker will cap the cell and on the 12th day, it becomes a pupa. On the 16th day, the new queen emerges from her cell. The queen has at least 53 known characteristics that differentiate a queen from her sister workers. Her first order is to find and dispose of the still developing queen with her stinger. If the mother exist, the new queen will disposes of her as well. If there is another queen out of the cell, they will fight until only one queen survives.

The new virgin queen then will take her first flight where she will mate with several drone. As a result, a queen may mate with 6 to 18 or more drones and store 5 to 12 million quiescent sperm in a special sac in her abdomen called a spermatheca to last her lifetime. Once this initial period of copulation is passed, the queen no longer attempts to mate. Once she gets back to the hive, she will start laying the eggs. She can lay up to 2,000 eggs a day from February to November. The highest number of lay is in the summer months. The queen is capable of laying 2 to 3 times her body weight in eggs in a single day. The queen can lay two types of eggs: fertilized eggs that will develop into female worker bees and unfertilized eggs that will develop into male drone bees. The queen's job is simple—laying the eggs that will spawn the hive's next generation of bees. The queen is cared for by a group of attendants made up of worker bees. They will coax the queen to lay eggs, feed and groom her. The queen emits a pheromone called queen substance that regulates the behaviour of the colony. All members of the colony know the state of the queen and if the queen dies, within hours, all members know. 60 Percents of the queen will be replaced or die in the first year.^(5,6,9,10,12,13)

Worker Bees

A Worker Bees makes up most of the members of the colony. The bee is a female but not sexually developed so the bee cannot lay the eggs. The Queen lays a fertilized egg and 21 days the Worker Bee is mature. The lifespan is 28 to 35 days in the spring and

summer and 4 to 6 months in the winter. Most honeybees that the people see are female worker bees. The Worker bees are the labour force of the colony. They perform specialized duties based primarily on the age. Early in their life, they brood rearing, comb construction, colony defense. Other worker bees will ingest the honey, adding more enzymes and ripen the honey. When the honey is fully ripened, it is deposited into a honeycomb cell and capped with a thin layer of beeswax. When the honey is fully ripened, it is deposited into a honeycomb cell one last time and capped with a thin layer of beeswax. After then they started build and protect the hive, clean, circulate air by beating their wings, and perform other functions. When the worker bee age is around 18 to 21 days, they start to forage for food (pollen, water and nectar from flowers). A bee collecting nectar normally makes 7 to 13 trips per day (the average is 10, the maximum recorded is 24), spending 27 to 45 min per trip. They forage between about 16°C (61°F) and 43°C (100°F). The Worker bee has eye adapted to rapid movement which they can see complex shapes and broken patterns of objects below like a colorful flower on a green background. In the eye of the bee, there are three visual pigments which can see ultraviolet spectrum as well as the color spectrum except red.

Bees have excellent sense of direction, time and memory. They can remember for 6 days and after three trips to the same location, they remember for 2 weeks. Even though the Queen maintains the integrity of the hive, the worker bees control the fate of the colony by their activities. They govern where and when the queen lays her eggs, replacing the failing queen and/or ensuring the production of drones. If the worker bee has to sting, she normally loses her stinger when she impales an enemy self-defense or in defense of the hive. Shortly after that, she dies of loss of internal organ and tissue. If she does not lose her stinger but empties the venom sac, she will survive but the venom does not replenish. ^(6, 9, 10, 12, 13, 15)

Drone Bees

The Drone Bee is a Male Bee that one purpose is to mate. They find the new virgin queen and they copulate in flight in mid-air approximately 200 feet above the ground. After the mating, the drone dies because some of the organs were torn out when separated from the queen. There are only a few hundred drones in the colony. They are larger than the worker bees with barrel shaped bodies and huge eyes so they can find the new queen. They have larger cells than the worker bees. The queen lays unfertilized eggs in the designated drone cells. The normal set of chromosomes of a worker bee has 32 but the drone only has 16. When the new drone is ready, the worker bees have to chew out the capping because the drone cannot. They do not forage, produce wax and defend the hive and the worker bees have to feed the drone. When later in life they feed themselves on honey stored in the hive. The drone doesn't have pollen baskets, wax glands or stinger. A drone's reproductive parts are barbed like a stinger.

At the end of the summer season, when cooler weather comes, the drone bees are unnecessary and the worker bees sting the drone bees to death or put him out of the hive. Their services won't be needed until spring when the new queens are looking for a mate. ^(5, 6, 9, 10, 12, 13)

Royal Jelly

Royal Jelly is a milky substance that all the larva eat for two days. Only the Queen Bee at larvae stage will continue the Royal Jelly. The Queen grows up 1 ½ times larger than the regular Bees and she is capable of laying up to 2,000 eggs a day. The Queen Bee will live 40x longer than a worker bee. The Jelly is pollen that the bees chewed up and mixed with the chemical secreted from the gland in the bee's head.

The Queen Bee and a worker bee in the larvae is the same until the Queen Bee continue to get the Royal Jelly. They analyzed the Royal Jelly and found that it is rich in protein, vitamin B, pantothenic acid and potent bactericide. However there is some components that fail to analyze so it cannot be synthesized. Royal Jelly has been known to speed up healing of wound in people, reduce the scarring with no side effects. ⁽¹⁰⁾

Communication

The honey bees communicate with a dance, vibrations and body chemical signal. They cannot communicate with talking. The two patterns of movement to convey the message is the circle dance and the waggle dance. If the food source is close, around 50 m to the hive, the circle dance is performed. If it is more than 100 m from the hive, the waggle dance is performed. This dance is performed inside the beehive which is dark. Other worker bees gather while the dancer performs. The dancer will find new pollen, nectar and/or water and then uses an audible code of buzzes on a 200 cycle per second note with the pulse rate of 35 to a second. The round circle dance is for around 50 m and the waggle tail dance is for over 100 m. The waggle dance of 2 circles with a straight run in the middle. When the bee goes in the straight run, she's producing a high pitched sound. The dance, wing vibrates, and the odour the bee associated with the food and location tells the worker bees to get the information and a foraging trip will start as soon as possible. The direction dance is linked to the sun. This movement is related to the map of the food source both direction and distance as Von Frisch discovered.

“The number of waggles, the duration of the waggle run and the duration of sound pulses also correlate with distance, all three features increasing with it...Bees fly at a very constant speed in still air and they interpret distance information in terms of flight time and effort. Von Frisch found that dancers indicated a greater distance for food sources upwind than for those downwind.”⁽⁵⁾

The Circle and Waggle Dance is performed while the sun moves in the sky. Which means if they do the dance in the morning and one at the same location in the afternoon, the dance direction (angle of the bee's movement compared to the sun indicates the direction of the food source relative to the sun.) will be different. ^(5, 9, 13)

Bee's Scientific Name ⁽⁵⁾

Kingdom:	Animalia - Honey bees are multicellular animals, as opposed to plants, fungi, bacteria and protozoa.
Phylum:	Arthropoda - Having jointed legs.
Class:	Insecta - True insects.
Order:	Hymenoptera - Insects with 4 wings, long legs and compound eyes. Their mouthparts may be sponging, sucking or biting.
Family:	Apidae - Bee family.
Genus:	Apis - Latin for bee.
Species:	Mellifera - Latin for honey-producing.

How Honey Bees Defend Their Hive

The honey bees back end with the black and yellow pattern is well known for their ability to sting the victim. The Queen can sting you repeatedly, the Worker Bees can sting you one and the drone can't sting you at all.

When foraging, the worker bee is a little threat if you do not bother them, they won't bother you. If the worker bee is near you, do not swat them or they will be threatened and sting you.

Approximately 0.1 mg of venom is injected into the victim, which includes histamine, pheromones, enzymes, peptides, amino acids and other acids. The effect of the victim can be localized itching, swelling, redness and pain to systemic symptoms such as hives. In the rare case the victim can have difficulty breathing, vomiting, loss of consciousness and death may occur. The stinger is barbed which when stung, will stay in the victim and torn away the bee body along with the venom sack and it is internal anatomy which results in death. ⁽⁵⁾

Pollination

The pollination of plant is the pollen (equivalent to sperm) which must find its way to the stigma (equivalent to the vagina). The most effective way to transfer the pollen within and between flowers is the bees. The aromas and the floral nectar attracts bees and the reproductive success of the plant. The fruit, vegetable, nut, and seed crops are partially or entirely dependent on bees for pollination, as are numerous ornamental plants and wild flowers. One-third of the human diet in many country use this crop. In the United States, the value of the bee-pollinated of crops is worth 100 times the value of the honey produced. The Beekeeper will go to a farmer with the hive, and at the time of pollination is needed, provide pollination service. Once the crops are pollinate, the Beekeeper return back home and prepare for the winter. 80% of all insect for pollination is the honeybees. Without such pollination, we would see a significant decrease in the yield of fruits and vegetables. ^(6, 10)

Bee Identification Chart(8)



European style
honeybee
5/8 "



Africanized
honeybee
5/8 "



Bumblebee
1-1/16 "



Carpenter bee (13/16 ")



Mud dauber (7/8 ")

The Hive

Around the middle of the 1800's most bee hives were simple shelters. The common type of hives in the period were Skeps, log gums, box hives, clat pots, cylinders, hollow logs, and wicker baskets. They will make the wax comb to the hive's roof and walls, just like they do in the wild. However most would be destroyed when you remove the honeycomb. Two of the hives, the hollow log and the skep, can take the comb out without destroying the comb which the bee can reuse.

In the mid nineteenth century there were two inventors. First was Moses Quimby who improved upon the beekeeping system by layering a number of boxes over the main chamber. And the second and the basis for the method that is currently used today is Reverend Langstroth moveable frame hive. It is easy to remove and re-insert the combs in the hive. The hive consisted of a base a hive body fitted with frames that contained the brood chamber, one or more removable sections (called supers) that were also fitted with frames for honey storage. The hive system is protected with a waterproof cover. With this invention from Langstroth, it increased the honey production up to today. ^(13, 15, 18)

Comb

The worker bees will construct the combs using the secreted wax that the bees have in the abdomens. They construct the comb from Top downward in the hive. The comb is a hexagonally shape cell which honey is stored in the top, followed by a layer of pollen-storage then the brood cells for the worker bees. The drones bees will be off to one side and the bottom has a peanut-shaped cell for the infant queens.

A Natural Nest has 100,000 cell which the surface area is about 27 square feet. For the structure, it takes about 2 ½ lbs of beeswax and about 15 lbs of honey to make the beeswax. For survival in the winter the colony needs about 100,000 cells to store 40 lbs of honey and 20,000 immature bees that will last the winter months and into spring. ^(13, 15)

The Flowers

Honey has different taste and colour because of the different flowers. When a large area of one kind of flower, the bees will produce the taste and colour of that particular flower. If there many different flowers, then the bees blend the nectar and produce a natural blend honey.

There are alfalfa, clover, heather, lavender, acacia, sainfoin, basswood, goldenrod, buckwheat, sunflower and the list goes on. The alfalfa and clover will have a white honey, the heather will have a reddish-brown, lavender will have an amber hue, and the acacia and sainfoin will have a straw color. ^(14,15,16,18)

Process the honeycomb

The average bee colony produces 60 – 100 lb of honey per year. It will take 4 lb of nectar and 2 million flowers to produce 1 lb of honey. Honey with more than 21% water content with the exception of heather or clover honey is not fit for sale, except for industrial use. The honey and wax in your room will be covered and your hands and feet will be sticky. Keep a handy bucket of soapy water to clean after. For the wax, remove the wax with a sharp stick in a cool room.

Once your remove the honeycomb. There are many different ways to remove the honey from the honeycomb. First, clean all equipments before use. Then, you will remove the wax capping with a knife. Put the honeycomb in the extractor, a large drum that employs centrifugal force to draw out the honey. The extractor spins the honeycomb slowly and starts speeding up. The honey will hit the walls of the extractor and fall into a container. Then you have to filter the honey with strainer because there are bee parts, left over beeswax, etc. What you are left with is pure honey. ^(14, 15, 16, 17)

By Products

There are four other by Products besides honey that the bees product. They are beeswax, pollen, royal jelly and propolis.

The wax that the bees expel through the glands in its abdomen that they use to cap the full honeycomb cells. The beekeeper scrapped the wax off the honeycomb and can be sold to commercial manufacturers for use in the production such as candles, furniture polish, drugs, cosmetics and art materials.

Pollen sticks on the worker bee will she collect the nectar. The Pollen contains large amount of vitamin B12 and vitamin E as well as a higher percentage of protein then beef. To collect the Pollen, the beekeeper will use a pollen trap which the bees go thru either a single or double screened. When they return to the hive, they have to go thru the barriers and the pollen pellets on their hind legs dislodge and drop into a tray which the Beekeeper collect. The pollen immediately dried and stored and sold to a health food stores and/or pharmacies which the public can buy.

Royal Jelly is rich in Nutrient including proteins, amino acids, fatty acids, sugars, vitamins and minerals. It is a creamy liquid product by the nurse bees to feed the queen. Some of the benefits includes a skin product, dietary supplement and prolongs youthfulness by improving the skin, increases energy, and helps to reduce anxiety, sleeplessness, and memory loss.

Propolis is a plant resin collected by the bees from the buds of plants. It is mixed with enzymes, wax and pollen and used it as a disinfectant, to cover cracks in the hive, and to decrease the hive opening during the winter months. To the public, it is used as a disinfectant, to treat corns, receding gums, and upper respiratory disease, and to varnish violins. ^(15, 18)

History of Mead

Mead has its origin in Africa back 20,000 to 40,000 years ago. It is mentioned in the Bible, Beowulf, Aeneid and the Rig-Veda and was sacred to Bacchus, the Roman god of wine. In Spain from 7,000 B.C. there is cave painting of earliest records of beekeeping and in 2,100 B.C. Sumerian and Babylonian writing about the honey. Mead making which is a pleasant alcohol from honey, water and fermented by yeast had a rich history from Norse, Anglo-Saxon, Celts, Roman, Greek and Egyptian. ^(1,2,3,4)

Over 1 million years ago, the honeybee separated from its parent species from the DNA sequence. Millennia, the honeybee battle against indigenous yeast while it gathers pollen and nectar. Nectar, which is low sugar content, can experience spontaneous fermentation with the action of wild yeast. That would not be good for the honeybee since the need the nectar for the life cycle. The honeybee converts the 12-carbon sugar, Sucrose, into two 6-carbon sugars, Fructose and Glucose in the stomach. By drying the honey the bees learned that it is less suitable for fermentation by native yeast. ⁽¹⁾

In the beginning, the only way to extract the honey and the beeswax was to crush the honeycombs. That would destroy the honeycomb and any bees. Then the crushed honey/beeswax was easily processed by rinsing the honey out of the beeswax with warm water. The beeswax was used for candles, and the list goes on. The honey water is leftover. So what can we do with that? Mead of course. That process continued until the first mechanized extraction meant less left over combs which meant less honey water. The general decline of mead making and the craft was the result of that process. ⁽¹⁾

Nomadic people first indication of the knowledge of mead was about 20,000 years ago in Africa. That yeast that first bees bio-engineered almost a million years ago to make honey. It is common for the extreme conditions of drought during the dry season and very heavy rain in the wet season. The elephants roamed the area and weather patterns were seasonal as it is today in Africa. When elephants break the branches of the Baobab and Miombo trees, the weather pattern would cause some trees to rot out the crown. Bees would nest in the hollows tree in the dry season and would fill up with water in the wet season. With the water, the honey from the bee hive, osmotolerant yeast and time, Mead is born. The African Bushman and tribes gathered the liquid which we now know as Mead. When the people left Africa and went into the Mediterranean they took the bees, honey and unknowingly, the osmotolerant yeasts, they took the knowledge of mead and mead making with them. They continue making mead and the fermentation was a hit and miss result in good, bad and/or undrinkable mead. Also, the process to convert water into mead has a benefit because some water was unsafe but when you process into wine, beer and/or mead, it became safe. The use of heavy spice mead was the fact that the water did not purify and in the fermentation, it will create an off flavour and after taste. The process continued until Louis Pasteur in the 1840s helped understand the process of the yeast as a life form and the fermentation. ^(1,2,4)

Europe, India and China knew how to make mead but the mead almost died out because of urbanization. That happened in India about 1,700 years ago, China in 1,500 years ago and Europe in the 500 years ago. In Europe, it was around 1300 A.D. with Marco Polo (1254-1324) return with an inexperienced source of sugar cane in the Spice Islands. The mead process almost died out but the monasteries of Europe still use the honey and beeswax for ceremonial candles and the honey surplus was used to make mead which the monks enjoyed. Today, with over 400 years of traditions, the monasteries in Great Britain still make mead.

History of Mulberry

The mulberry tree may have originated from the Middle East. The white mulberry (*Morus alba*) is native to eastern and central China which has been cultivated white mulberry since very early times. The red mulberry (*Morus rubra*) is native to eastern United States from Massachusetts to Kansas, Southernmost Ontario to Vermont South to Florida and down to the Gulf coast. The black mulberry (*Morus nigra*) is native to western Asia and has been grown for its fruits in Europe since before Greek and Roman

times. In Greek legend the berries of the white mulberry turned red when its roots were bathed by the blood of the lovers Pyramis and Thisbe, who killed themselves (see below).

Mulberry is a genus of 3 species of deciduous tree native to warm temperature and subtropical regions and are deciduous trees of varying sizes. White mulberries can grow to 80 ft. and are the most variable in form, including drooping and pyramidal shapes and are short-lived, fast-growing tree. The red mulberry can reach 70 ft. in height in some location and the trunk up to 20-25 inches diameter and rarely live more than 75 years. The black mulberry is the smallest of the three, sometimes growing to 30 ft. in height, but it tends to be a bush if not trained when it is young and have been known to bear fruit for hundreds of years.

The white mulberry, and to a lesser extent the red mulberry, are quite tolerant of drought, pollution and poor soil and the black mulberry is more fastidious, faring less well in cold climates or areas with humid summers.

The mulberry leaves are oval and have pointed edges and they are rough on their upper surfaces and pubescent underneath. The leaves of the red mulberry are larger and thicker, blunt toothed and often lobed and are 3-6.5 inches long and 3-6 cm broad. The smaller black mulberry leaves are similar to those of the red mulberry, but with sturdier twigs and fatter buds. White mulberries generally come out in early spring, almost two months before black mulberries. The species vary in the time of year they begin to leaf-out.

Mulberry trees are either dioecious or monoecious, and sometimes will change from one sex to another. The flowers are held on short, green, pendulous, nondescript catkins that appear in the axils of the current season's growth and on spurs on older wood. They are wind pollinated and some cultivars will set fruit without any pollination.

The fruit of the mulberry is not a berry but a collective fruit, in appearance like a swollen loganberry and is about 1 inch. Ultimately they become completely altered in texture and color, becoming succulent, fat and full of juice. In appearance, each tiny swollen flower roughly resembles the individual drupe of a blackberry. The color of the fruit does not identify the mulberry species. White mulberries, for example, can produce white, lavender or black fruit and are generally very sweet but often lacking in needed tartness. Red mulberry fruits are usually deep red, almost black, and in the best clones have a flavor that almost equals that of the black mulberry. Black mulberry fruits are large and juicy, with a good balance of sweetness and tartness that makes them the best flavored species of mulberry. Its fruit is used as a natural insect repellent

Mulberries like a warm, well-drained soil, preferably a deep loam. Shallow soils such as those frequently found on chalk or gravel are not recommended.

Although somewhat drought-resistant, mulberries need to be watered in dry seasons. If the roots become too dry during drought, the fruit is likely to drop before it has fully ripened.

Mulberries can be grown from seed, although the plants can take 10 years or more to bear. Seed should be sown as soon as extracted from the fruit although white mulberry seeds germinate better after stratifying one to three months before planting. Sprig budding is the most common method for grafting mulberries

Mulberries are generally free of pests and diseases although cankers and dieback can occur. The "popcorn disease" is an occasional problem, in which fruits swell to resemble popped corn. White and red mulberry hybrids are particularly prone to this condition. The disease carries on from one season to the next, so collecting and burning infected fruits help control it. The ripe fruit is very attractive to birds, but there is usually enough fruit left over for harvesting.

White and red mulberry fruits (and hybrid fruits) are ready for harvest in late spring, the fruit of black mulberries ripen in summer to late summer. The fruits of white mulberries are often harvested by spreading a sheet on the ground and shaking the limbs. A surprising quantity can be gathered from a comparatively small and young tree. Black mulberry fruits are more difficult to pick. As the berries are squeezed to pull them loose, they tend to collapse, staining the hands (and clothing) with blood red juice. Unwashed the berries will keep several days in a refrigerator in a covered container. The ripe fruits of the black mulberry contain about 9-11% sugar, 1.5% protein, 1% organic acid with malic and citric acid. The berries can be eaten out of hand or used in any way that other berries are used, such as in pies, tarts, puddings or sweetened and pureed as a sauce. Slightly unripe fruits are best for making pies and tarts. Mulberries blend well with other fruits, especially pears and apples. They can also be made into wine and make an excellent dried fruit, especially the black varieties.

Scientific classification

Mulberry



Ripe mulberry on tree

Scientific classification

Kingdom: Plantae
Phylum: Magnoliophyta
Class: Magnoliopsida
Order: Rosales
Family: Moraceae
Genus: MorusL.

Ingredients

Ingredients	Latin Name	Quantities	
Clover Honey	Trifolium	11 lbs	
Mulberries	MorusL	2 ½ lbs	
Raisins	rac̄emus	¼ cups	(Nutrient)
Strong Tea			(Tannin)
Wine Yeast		1 pkg	

Brief Information:

I am using modern methods for the mead including the yeast, carboy and airlock so the mead process will not have wild yeast introduced and ruin the mead.

Procedure:

Simmer approx. 1 gal water at 160° F. Add honey and simmer, stirring to dissolve honey. Remove scum at the top of liquid, looks like white film. Then cool liquid until room temperature. Put liquid into carboy, add Mulberries, Raisins – for nutrient, cut and juice orange – Acid and Tannin - and put that in the carboy and strong tea – for tannin. Add more water to get about 3 gallons of liquid. Pitch yeast to liquid and put the airlock on the carboy. Rack about 9 days after before the mulberries starts to bleach. Rack every month until mead to ferment out. Rack mead, and age in carboy for 3 months or more. Transfer some mead and mix with bentonite and then put that mixture back in to the carboy (looks like clay) and wait for 2 weeks more, rack. Then Bottle the mead. They were deep purple to red. The mead tasted good at bottling. Quite fruity, but has a wine-like quality. It is fairly sweet, but does have a berry-sweetness I find very enjoyable. It cleared beautifully, and has a deep red color, but easy to see through.

End Notes

- 1) The Past, Present and Future of Mead by Mark Beran
- 2) The History and Magic of Mead by Richard B. Webb
- 3) Mead Made Easy: History of Mead by Dave Polaschek
- 4) The History Of Honey by Bizzy Bee Apiary
- 5) The Bee Company by Stephanie Harper
- 6) A Scanning Electron Microscope Atlas of the Honey Bee by Carlson, Stanley D., Ericson, Eric H. Jr and Garment, Martin B
- 7) A Taste of American Beekeeping History – Bees by John Caldeira
- 8) About Honey Bees by Texas A&M University Department of Entomology
- 9) About the Honey Bee by Capilano
- 10) Facts About Honeybees by Back Yards BeeKeepers Association
- 11) The History Of Honey by Bizzy Bee Apiary
- 12) Honeybee. By National Geographic Society
- 13) Tales of the Hive by NOVA
- 14) How to Process Honey by Articlesbase
- 15) Honey by Advameg Inc.
- 16) Honey by Apiaries, Inc
- 17) How to Process Honey by Howtopedia
- 18) BeeKeeping by The Canadian Encyclopedia Historica

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