A Sunny Disposition

James Fischer

How do you place your hives? Many of us are restricted by limited open space, designated areas on land that belongs to others, access roads, and other non-negotiable issues. Though your choices may be limited, you can still optimize your hive placement by considering factors like the sun.

In the January issue of *Bee Culture*, the article "*Whither Weather*" explained wind roses as a useful tool for finding the direction of the prevailing winds. Once one has given thought to the prevailing winds, the next item for your consideration would be hive orientation to take advantage of the sun.

"Big deal" you may be thinking – "aim the hive entrance South or Southeast* – everyone does that." True, but have you considered the shading of the local terrain, trees, and buildings throughout the year?

The sun can have a significant impact on a beehive. Recall the last time you parked your car in the sun, and found the seats too hot to sit upon. While hives do not have windshields, the ability of the sun to overheat a hive should be clear to anyone who has seen a large number of bees on the outside of the hive in mid-Summer. The sun can have a positive impact in late Winter and early Spring, warming the hive enough to allow the bees to break cluster, and get the queen laying earlier.

An Overview

On the last page of this issue, page 56, is a full-page chart that you can use to track the apparent motion of the sun in the sky throughout the year. This article will explain how to use the chart to position your hives, taking advantage of the local terrain, or at least minimizing the impact of any negative aspects of your apiary site. You can use the chart to evaluate at what times of day and at what times of year your hives will be in sun or shade, and find positions that meet your needs.

Sun Versus Shade

The choice of "shade" versus "full sun" has been the subject of extensive discussion among beekeepers for longer than I have been breathing, let alone keeping bees. I'm not going to take sides. I'll just provide the tools and techniques that will allow you to provide for your hives as you wish. In general, the warmer your climate, the more you may want to consider placing your hives to take advantage of afternoon shade. The cooler your climate, the more you may favor "full sun".

Why The Sun Is Higher In Summer

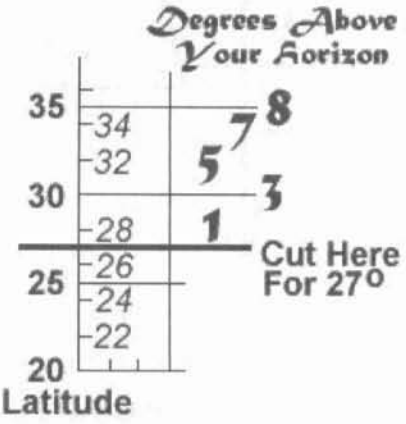
The chart shows a higher and wider sun path during Summer months. For those of you who have forgotten your science classes, I should explain. The further away you are from the equator, the lower the sun will appear above the horizon. The Earth's axis is tilted at an angle of about 23 degrees. As the Earth orbits the Sun, the North Pole alternates between pointing "away from" or "towards" the Sun. When the pole closest to you points towards the sun, you have Summer. When it points away, you have Winter. This why in Winter, the sun appears to be lower in the sky than in Summer.

Changes In Latitudes, Changes In Attitudes

To start, you need to know the latitude of your apiary. Latitude is simply how far you are away from the equator, expressed in degrees. The equator is at 0°, and the poles are at 90°. Any decent map should list latitude along its edges. A round number within one degree is close enough for your purposes.

If you keep bees closer to the equator than 20 degrees, or further from the equator than 55 degrees, the chart provided will not be accurate. You can make an accurate chart for your location at a website provided by U. Oregon. http://solardat.uoregon.edu/SunChartProgram.html (Instructions specific to beekeepers who are South of the equator are given in the box at the end of this article.)

Make a photocopy or remove the page with the chart, and find your latitude along the left edge of the chart. Each line that crosses the chart represents 5 degrees, and each tic mark represents an even-numbered 2 degree interval. For example, lets assume that you are 27 degrees away from the equator (near Jupiter Inlet in Florida). As shown in the figure below, find 27 degrees along the left edge, and cut off the bottom of the chart along that line. Label the vertical scale of the chart, starting with zero at the bottom, and counting up by 2 degree increments for each tick line and line that crosses the chart. These labels you are making will indicate the angle above your horizon.



Adjusting For Your Declination

The chart shows "True South" at the center. This is not the magnetic south shown by a compass. The difference is the magnetic declination for your area, which is listed on hiking maps. Find the symbol on a map of your area like the one shown below. If no maps are handy,

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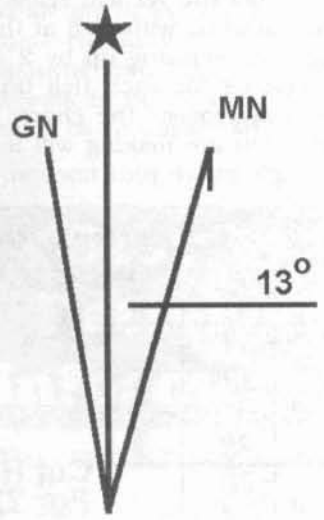
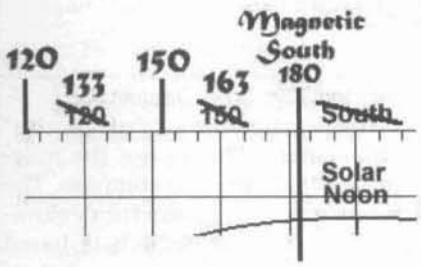
there is a worldwide declination chart at http://www.thecompassstore.com/decvar.html

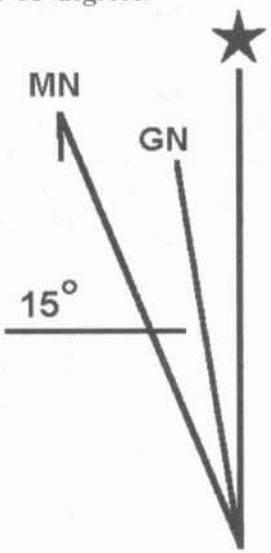
The first example shown below is typical for locations west of the US Great Lakes in the 48 states of the USA.

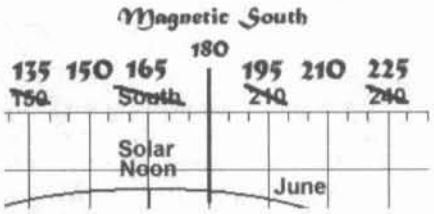
You are interested in the difference between the "MN" (magnetic north) and the "★" ("True North", represented by the North Star), which in the example below is 13 degrees. Since the star on the map's diagram is to the left of the magnetic north line, you would mark magnetic south 13 degrees to the left of the center line on the chart. You would also add 13 degrees to each label for the vertical lines, or better still, mark the map to match the numbers on your compass. (Note that your actual declination will likely not be 13 degrees. Use the number you find on your map.) Each tic mark along the top of the chart represents 5 degrees, and each line that crosses the chart represents 15 degrees.





If you are East of the U.S. Great Lakes, your map will show the "★" to the right of the "MN", like the example below. In this case, you would mark magnetic south to the right of the center line of the chart, and subtract whatever number of degrees indicated on the map's declination diagram. In the example below, it is 15 degrees.





Once you have adjusted the chart for your local declination, you can then photocopy your modified chart onto clear overhead gels. All copy shops have overhead gels. The cost is about the same as a paper photocopy. The idea is that you can face South, hold the chart in front of your eyes, and use a compass to sight the location of objects that block the sun.

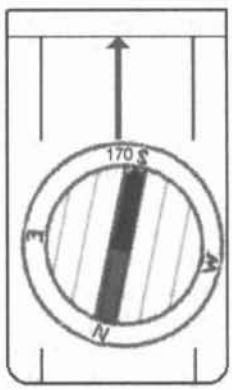
Since 90 degrees is East, and 270 degrees is West, the chart should be held as a cylinder, with your nose at the center. The elliptical lines on the chart then match the sun's path as it moves across the sky during each month of the year.

Lost Horizons

If you are surrounded by hills, trees, or other objects that block your view of the horizon, do not make the mistake of thinking that the horizon is where the sky appears to start. Hold the chart before you and estimate where the horizon would be if you were on perfectly flat land, which should be at eye level in the distance. If your apiary is on a hillside and you have a panoramic view of a valley below, the horizon will be below you, so adjust accordingly.

North By Northwest

If you are unfamiliar with using a compass, simply turn the compass in your hand until the pointer (often red) points at the zero degree mark (or points to "N"). While keeping the needled pointed at "N", rotate the plastic base until the sighting arrow on the base points at the object of interest. When the arrow points at the object, and the compass needle points at "N", you can then read the number on the compass ring to find the sighting to the object. In the example below, the compass is pointing at an object at 170 degrees. If this explanation is confusing, find a Boy Scout or Army Veteran to show you.



Mapping The Terrain

You can use your compass to find the position and width of terrain objects in terms of degrees on the compass. If you wish, you can draw the objects on your chart with a felt-tip marker or crayon, but many people can see at glance if they have a "problem" or not, and move about the apiary site, looking at options from the hive's point of view.

You can also estimate how high above the horizon each feature is. This is easier than it sounds. You do not need a surveyor's transit. If you point straight up, that is 90 degrees above the horizon. Halfway down to the horizon from straight up is 45 degrees. Half again is 22.5 degrees. The horizon is 0 degrees. You get the idea.

Month Of Year

Each curve on the chart shows the Sun's path on the 21st of the indicated months. The sun's height above the horizon changes at a fairly constant rate, so if there is a specific date of interest, you can guesstimate it as a line between any two of the lines shown.

Hour Of Day

The lines labeled with negative numbers on the left side of the chart and with positive numbers on the right side of the chart are hours before and after "Solar Noon", which is when the sun reaches its highest point in the sky. You can estimate at what time of day that the hive will be shaded, and when the hive will be in full sun. (The hour lines shown are less accurate as one gets further away than 40 degrees from the equator.)

Terrain Objects

While buildings, hills, and coniferous trees will block the sun year-round, deciduous trees will only block the sun in the Summer, not in the Winter or Spring. Those who favor shaded hives will want to exploit the deciduous trees to maximum advantage.

Optimizing Hive Positions

If you don't like a position, you can move around, holding up the chart from time to time to find a better place for a hive or group of hives. In the diagram shown below, a single tree is shown, and has been scribbled onto the chart in the correct position. Depending upon how close the tree is to you, a move to the right of only a few feet r
enough to get it "out of the

Morning Sun

There is at least one general consensus among beekeepers on "sun versus shade". Bees tend to start foraging earlier if the hive entrance is exposed to the early morning sun. The apparent location of the sunrise moves Northeastward in Spring, and moves towards Southeast in Fall. Give careful attention to the eastern side of any prospective hive location.

Early Spring Sun

Early Spring is when you want the queen to start laying. The sun is fairly low in the sky during that time, so you may find buildings and trees that will shade their hives, and reduce the sun's ability to help warm the hive for brood-rearing benefits.

Moving Hives

If you find that you wish to move existing hives, you face the problem of bees returning from foraging trips to the old hive location. The best approach would be moving the hive less than 5 feet at a time over a period of a few weeks. Hives should only be moved when temperatures are high enough that there is no chance of the bees being clustered. A common suggestion is to move hives only at night, but one can more easily make these short moves during the day.

Most of James Fischer's hives are near 37°26'03"N, 79°35'30"W.

For readers south of the Equator

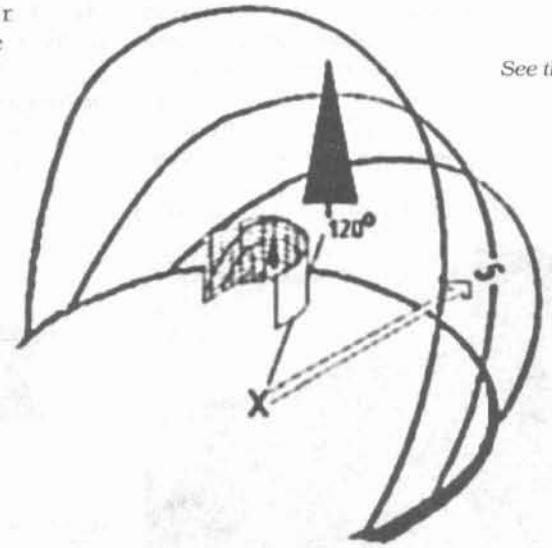
Since you are south of the Equator, replace all references to "South" in this article with "North".

The sun still rises in the east no matter where you are, so you don't need to change references to East and West.

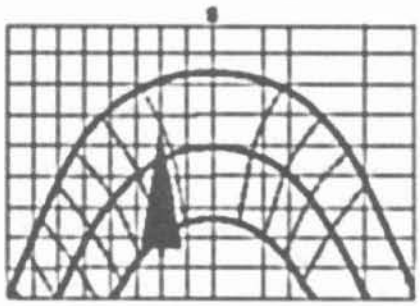
When adjusting for declination, you will also need to reverse "left" with "right", add when the article says "subtract", and subtract when it says "add".

Readers south of the equator will also need to re-label the compass headings at the top of the chart, changing "South" to "North", and changing the numeric compass headings for every 30-degree interval across the top of the chart. You also need to swap all the month labels on the chart, except the "Mar/Sep" label as follows:

Label	Swap With
Dec	June
Jan/Nov	May/Jul
Feb/Oct	Apr/Aug



See the full page chart on Page 56



Tracking The Sun

This chart can be used to track the apparent motion of the sun in the sky throughout the year. Look at the article on **Page 27, *A Sunny Disposition***, for an explanation.