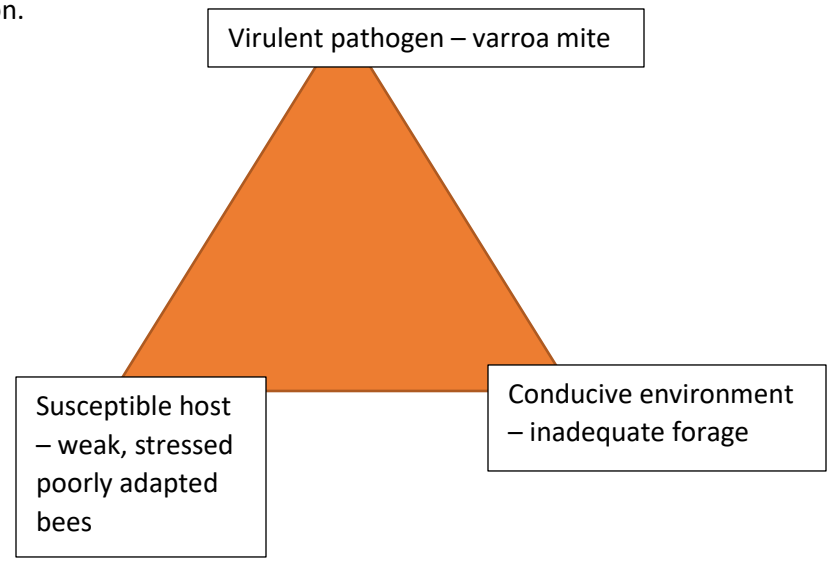
The three legged stool and how it affects beekeeping

The three legged stool represents a balanced equation. In order for the stool to remain standing, all three legs must be present and balanced. If one leg is taken away, the stool will fall. If two are taken away it can't possibly stand at all. There is a paradigm in disease pathology that corresponds to this idea. It is called the disease triangle. The three points of the triangle are: 1. A susceptible host, 2. A virulent pathogen and 3. A conducive environment. All three must be present for disease to occur. For this example, let's make the virulent pathogen the varroa mite, the susceptible host weak, stressed, poorly adapted bees with weak genetics and the conducive environment inadequate forage, in other words, malnutrition.



If an impartial observer were to look at this paradigm and decide how best to take out one of the three legs, he or she would identify which is the easiest to control and would work on that leg first. Let's determine which leg that logically would be. First, let's look at the susceptible host. We have honeybees that are weak, stressed, poorly adapted to the environments they find themselves in and have experienced genetic bottle-necks making shallow gene pools. The scientific community is addressing these issues. Also bee breeders are working on the genetic issues. This is fairly complex and takes quite a bit of time to see results. It is doable to take out that leg, but not easy by any means. Now let's look at the virulent pathogen. For 30 years or more beekeepers have been fighting the varroa mite. The mite has shown its ability to adapt to new controls faster than scientists can come up with new modes of action. After 30 years I think we need to recognize this is not the easiest leg to take out. This leaves the conducive environment. I believe this is the easiest leg to take out. We simply have to make sure our bees get adequate nutrition from their natural environment. This requires that we locate our hives where the bees can get the best natural forage, without too much competition for resources. This takes some work on the part of the beekeeper to find proper locations. It also means the beekeeper needs to constantly monitor changes in the environment where the bees are kept because that can change. We also must pay attention to hive density. Too many hives crowded together create that susceptible host and the conducive environment.

Let's assume the virulent pathogen is always present and always will be just for argument sake. Let's put up the white flag and surrender to the reality that the varroa mite isn't going away, basically ever. This does not make beekeeping doomed. It just means we need to work more diligently on the other two legs of the stool. The well-fed bee addresses the conducive environment and how to make it not

conducive to virulent pathogens of any kind, but in this case the varroa mite. To illustrate how forage availability and hive density can affect hive mortality and honey production I want to share a quote from the February 2018 *American Bee Journal* page 148-149 as part of its "U.S. Honey Crops and Markets" report.

> Reports from Michigan attest that the honey harvest is down substantially comparted to last year, though colony numbers are up 5%-10%, while Indiana reports a 10% increase in harvest. The majority of the bees have been moved out of the state to southern climates for the winter…Indiana reports that bees are entering the winter in good condition with adequate honey stores. Flows were good with colonies averaging 110-130 lbs over the season…About 30%-50% of beekeepers moved their colonies south or to California for the winter.

There was more of interest in that report, but I wanted to highlight the difference between Michigan and Indiana because we are so close regionally we should have similar environmental issues, weather, etc. to deal with in a given season. Michigan reported a "substantial" decrease in honey harvest from last year and Indiana reported an *average* of 110-130 pounds per hive. Michigan also made note that the decreased harvest was in spite of a 5-10% increase in number of hives. The clues come in the next statistics – in Michigan the majority of the bees had been moved out of the state by the time of the report, in Indiana 30 – 50% of the bees had been moved. This indicates the number of large scale commercial beekeepers operating in both states. In Michigan and Indiana only large scale producers move their hives out of state for the winter. It is these producers who also crowd their hives and place large numbers in single locations which overload the area with bees, creating inadequate forage situations.

In my early years of beekeeping, I had the opportunity to benefit from some long-time beekeepers who had a lot of wisdom to share. Unfortunately those people are gone now, they were aging out as I was coming on. One of the "old sayings" that they liked to repeat was, "Bottom boards don't make honey". What they meant was that indiscriminate increase may make more bees, but you won't get more honey from more hives if you are increasing just for increase sake. If you are raising bees to sell, you have to accept you won't make a lot of honey. If you place too many hives in a given area, there is a limit to how much honey a piece of land can produce. Too many hives spreads the forage too thin and no one gets enough. When any organism is malnourished that susceptible host created by the conducive environment is ready and waiting to be overcome by the virulent pathogen.

As responsible beekeepers we need to address the three legged stool and make changes where we can most easily make changes. Let's be part of the solution, not part of the problem. The first leg to tackle is the conducive environment. Let's spread our hives out, keep our operations as small as possible to keep healthy bees and advocate for keeping wild spaces wild. Let's be sensitive to the environment around us and try to work with nature, not against it. Let's not overload our area with more bees than it can feed. Try to be a good steward of any property you own to let nature restore its own balance. If you have influence in your community, try to encourage leaders to be environmentally responsible when planning new developments and businesses. There are many ways to redevelop blighted areas rather than destroying wild areas to place new businesses. Many times municipalities just never thought about it. A little education goes a long way.