Varroa and Winter Losses

By Jean-Pierre Chapleau

January 2005

Since varroa has spread in Canada it is common to see higher winter losses and weaker colonies in the spring. Is this fatality or is there something we can do? In my opinion, as commercial beekeepers, we can keep full control of the situation.

It is important to understand how varroa affects our colonies at that important period of the year.

Winter Threshold

The most obvious damage caused by varroa occurs when the wintering bees are too heavily infested. The parasites suck their blood all winter, reducing their vitality and shortening their lifespan. Under these circumstances secondary viral infections will often develop and emphasize the problem. We can prevent this situation by applying efficient treatments in order to reduce the mites' level before winter. But what is a safe threshold for colonies entering into the winter? According to my experience and according to European experience, the infestation must be reduced to an very low level. The Swiss recommendations suggest a level of ½ varroa per day (natural mites fall[1]). This means that the total number of varroas in the colony will probably be of one hundred or less. I tend to agree with this recommendation. Besides protecting the colony for the winter period, such a low level will often exempt the beekeeper from the spring treatment.

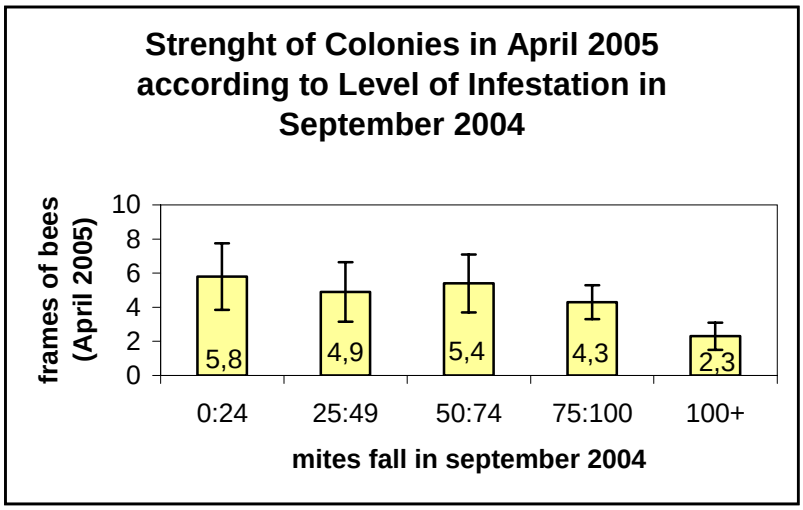
Suggested Natural Mortality Winter Threshold
½ varroa per day

September Threshold

Sometimes higher than usual losses still occur despite efficient fall treatments. The reason is that another important threshold has probably been exceeded. This threshold is the maximum infestation level that should be tolerated just before the fall treatment is initiated. The September brood contains most of the future wintering bees. If this brood is too highly infested the wintering population will be weakened before hatching. In such a situation, no matter how good our fall treatment, our colonies will suffer winter damage. T**reating the colonies adequately in the fall is important but is not enough. All successful control strategy will also be aimed at not exceeding this crucial September threshold.**

Several recommendations exist for the September threshold. They vary from 25 to 60 mites per day. Roughly this threshold seems to be equivalent to what is sometimes referred to as the damage threshold. In April 2004 I could make some interesting observations from a large sample of colonies exposed to varied mites' levels in September of 2003 (just before the fall treatment). For the requirements of a selection project these colonies had not received a spring treatment and were voluntary left exposed to sometimes quite high mites level at the end of the summer. The incidence of these varied mites' level could then be observed the next spring.

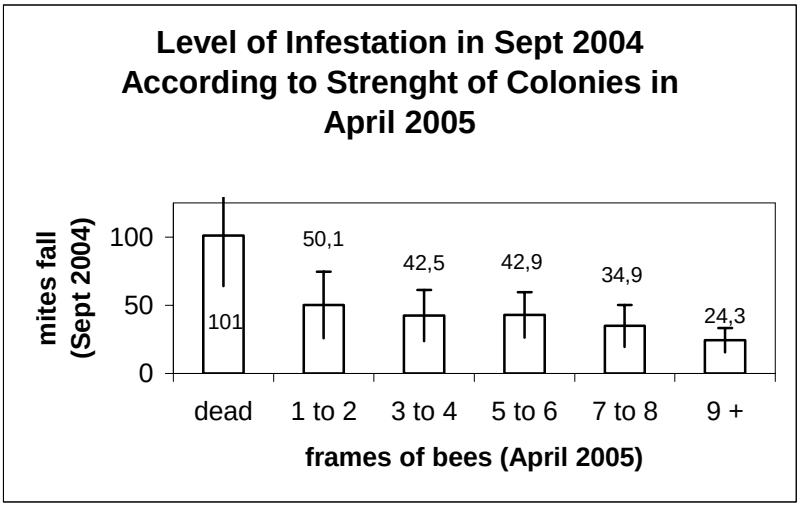
Table and graph 1 show that colonies with high September infestation levels are weaker the following spring. Colonies exceeding 75 mites per day seem to be hit particularly hard. The majority of the colonies with a daily natural mortality of 100 or more died (62%).



mites fall early Sept. 04	number of colonies	frames of bees April 05	standard deviation	mites fall May 05
0:24	59	**5,8**	3,9	1,1
25:49	40	**4,9**	3,5	1
50:74	22	**5,4**	3,4	0,8
75:100	18	**4,3**	2	1,5
100+	10	**2,3**	1,6	1,4

Table and graph no 1^2

Of course other factors influence wintering and colonies with low September mites fall will not all winter well. If we change our view point and if we rank the colonies by their strength (table and graph 2) we see that the group of colonies with 9 frames of bees or more had an average September mites' fall of 25 only. No colony in this group exceeded 75 mites per day. If we consider only the colonies with 12 frames or more we realize that these still had a lower average (18 mites per day). We deduct that the level of infestation before the fall treatment seems to be an important limiting factor for the strength of the colony the next spring.



frames of bees April 05	number of colonies	mites fall early Sept. 04	standard deviation	mites fall May 05
dead	41	**101**	73,8	na
1 to 2	41	**50,1**	48,8	0,6
3 to 4	35	**42,5**	37,6	1
5 to 6	35	**42,9**	33,2	1,6
7 to 8	22	**34,9**	30,7	1,3
9 +	20	**24,3**	17,8	1,5
12 +	12	**18,4**	14,5	

Table and graph no 2

As there are important variations between the infestation levels of individual colonies it would be useful for commercial beekeepers to have at their disposal a double threshold: a threshold expressed both as an average for all the colonies and also as a maximum for individual colonies. Until further research states differently, we are tempted to adopt the following September thresholds:

September Natural Mortality Threshold	
Average for all colonies	**25**
Maximum for individual colonies	**75**

[1] Natural mortality is the most accurate sampling method. This is the only method that we can use when mites' levels are low. With an adapted screened bottom board, natural mites fall sampling can extend over periods reaching 4-7 days, providing high accuracy. **It is important to use full dimension sampling cartons.**

[2] The average natural mites' fall in the spring has been included in this table to show that the spring condition of the colonies cannot be explained by different levels of exposition to varroa during the winter. A significant correlation was found between spring 2005 strength and September 2004 mites' fall (r = -0, 25). The correlation between spring strength and October Mites' fall was only r = 0, 1.