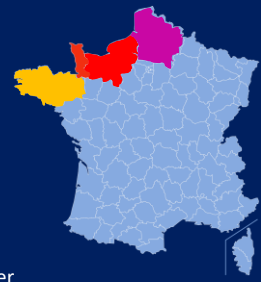




Asian Hornet

The Beekeepers' Guide

The Hornet & The Honeybee



Wikipedia - Mairfield / CC BY-SA
(<https://creativecommons.org/licenses/by-sa/2.5/>)

Presented by Andrew Durham – Cambridgeshire Beekeeper



December 2022

Photograph © Gilles San Martin via Flickr (CC BY-SA 2.0)

This special pdf is an extract from the briefing “Asian Hornet – The Beekeepers Guide” which is available to member associations of the British Beekeeping Association through the BBKA Speakers List.

The Asian hornet was accidentally introduced into France in 2004, it quickly spread and in many parts it is a significant problem especially for beekeepers. Few people in this country are aware of the scale of the problem being faced just across the Channel

The Normandy dept of Manche highlighted here in red has the same area as Devon. // It normally destroys around 4,000 Asian hornet nests a year and if that sounds a lot, they are just the ones that are reported.

In the Normandy region as a whole, they destroy around 11,000 nests a year but that’s only about half of the 20,000 nests that are destroyed each year in the Region of Brittany, shown here in orange, which is just that bit further south.

The other region opposite us across the Channel, the Hauts de France, shown here in purple, has suffered less but nonetheless the hundreds of nests reported in each department every year can become thousands in the surge years that happen from time to time.

All along that coast from Brest to Ostend and even as far as Rotterdam, the Asian hornet nest numbers are steadily increasing.

Last year (2022) saw a significant surge in nest numbers right across France. Manche with a well established and organised nest destruction scheme went from 4,000 nests

in 2021 to 9,176 nests by the end of November 2022, it was a new record. These surge years are happening more often.

Further up the coast in Belgium, predicted to be marginal for the hornet and where it was barely present in 2017, last year they were looking at several hundred nests and the hornet is now established beyond eradication.

So far we have been lucky, our weather indicated that we too, were a marginal environment for the hornet, but that weather is now changing, in the hornet's favour and the hornet is adapting.

Situation in France & Belgium

The Hornet & the Honeybee

The Hornet & Beekeeping

Control in the Area around the Apiary

Integrated Control in the Apiary

The briefing is divided into a number of sections but in this section

We'll look at the hornet, / and the effects of its predation on the honeybee. As beekeepers we need to understand what is happening with the bees

Asian Hornet – The Beekeepers' Guide

Copyright

Images in this presentation are subject to
copyright.

This briefing is a non-commercial, educational
service to beekeeping for members of the
British Beekeepers Association.

No fee is charged.

Just to be clear and for third party copyright reasons, I don't charge for this talk – this is my contribution to beekeeping.

This pdf may not be distributed outside of the BBKA, it's associations and members. It may not be dissembled or published in any other form and it is important that photograph and graphic attributions are retained.

The Hornet & The Honeybee

(Understanding the hornet & its effect on the honeybee)




© Q. Rome

Copyright © Museum National de la Histoire Naturelle: Rome, Q. (<http://frelonascaine.mnhn.fr>
consulted on 16 April 2020)


5

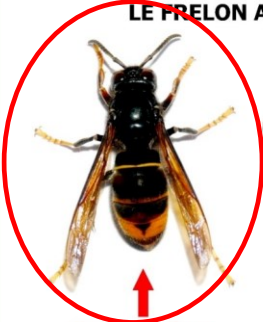
We are now going to look at the hornet, its lifecycle and its nests then we'll look at the interaction between the hornet and the honeybee. We need to understand what is happening.


 Fédération Départementale de lutte
 contre les Organismes Nuisibles d'Ille et Vilaine


**UNE NOUVELLE ESPECE INVASIVE
EN ILLE ET VILAINE
LE FRELON ASIATIQUE**

V. Soror






Frelon asiatique
(taille réelle 3 cm)



Frelon commun
(jusqu'à 4 cm)


V. Mandarinia



ATTENTION CET INSECTE EST DANGEREUX

Vous suspectez fortement sa présence?
Contactez nous
02.23.48.26.23

FEVILDEC. ZAC Atalante Champeaux
 Rue Maurice Le Lannou - CS N° 74241 - 35042 RENNES Cedex

avec le soutien du Conseil Général


On the far right at the top is the Giant Asian hornet *Vespa Mandarinia* now making an appearance in America and recently renamed as the northern giant hornet.

On the far left is another giant hornet called *V Soror*. These two giant hornets are frequently confused in the press with the much smaller Asian hornet that we are interested in, called

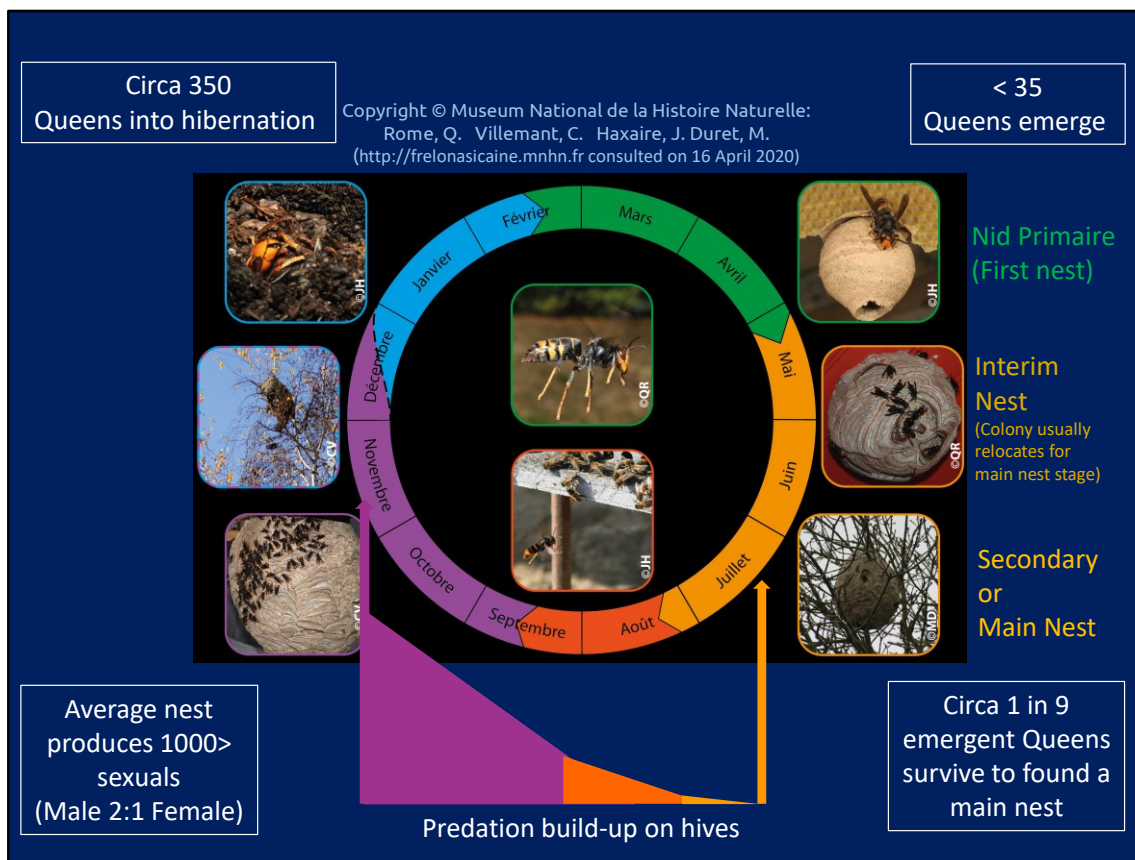
(CLICK) - *Vespa Velutina* – the yellow legged hornet, known in France as the Frelon Asiatique and circled above.

The giant hornets, With their huge size, powerful jaws and thick exoskeletons make direct attacks on the honeybee hive and that is their main method of attack

But the smaller yellow legged hornet has to rely on another method of attack, one that gives us beekeepers some rather different problems// It uses its aerial agility to hawk bees in preference to the direct attack on the hive. Which is why they are called solitary hawkers.

Vespa velutina may make a direct attack on a hive. But if this happens, it will be very late in their season and on weakened hives.

CLICK – Just to compare ***Vespa Velutina*** to our European Hornet / it is smaller but VV nests are 3 -4 more populous and there are far more of them and VV's season is much longer



If we are to understand what is happening in the apiary and most importantly // when it will happen then we beekeepers need to know the hornet's lifecycle:

We'll start in the autumn..... The purple sector..... this is when the hornet's nest is at its peak and over the autumn it progressively switches from producing workers to producing sexuals – a process that is at its height in October and is complete by early November.

Over a thousand sexuals are produced by an average nest. *Those sexuals fly off to mate and the mated queens spread out to find new territory before going into **Hibernation for the winter*** where they hibernate under leaf litter, under tree bark, under caravan awnings, in vegetable crates, lorry canvases – that is how they get here / **although** researchers tell us that *less than 10% make it through winter - probably less than 5%.*

The nest is destroyed by the winds and the weather over winter – it is only used for one season.

The foundress queens as they are now called, emerge at different times throughout the spring. During the first 10-12 weeks of their life the foundress queens are on their own and vulnerable, to being caught as prey for birds, to being trapped and also to being killed by later emerging queens that try to take over their first nest

The first nest, the Nid Primaire, is always under cover and hanging down from something like a shed roof or a veranda or in an electricity meter box and if you are looking for nid primaires you will usually find them where last year's nests were located – so if you do find one remember where it was for next year.

The nid primaire grows in size //but the hornets usually relocate at around the interim stage when the bulk of the workers move to build

a secondary or main nest and be joined by the queen and other workers. So if you find a nest with no eggs or queen, the real nest will be nearby

Scientists estimate / that of those that survive winter / only about one in 9 emergent foundress queens actually founds a full-size colony.

Over the summer the numbers of worker hornets increases and the nest grows in size until we come again to the autumn.

Predation on hives slowly builds up from July when you might see the first Asian hornet workers in your apiary but note that from September there is a marked increase in predation in the apiary **and do not** overlook the fact that the hornet can be active in October and November – those can be particularly dangerous months for our bees.



Average Nest population in late summer = c1200 workers - Largest nests 2000> workers

Circa 6,000 (average) to 10,000> hornets in total are produced over the season

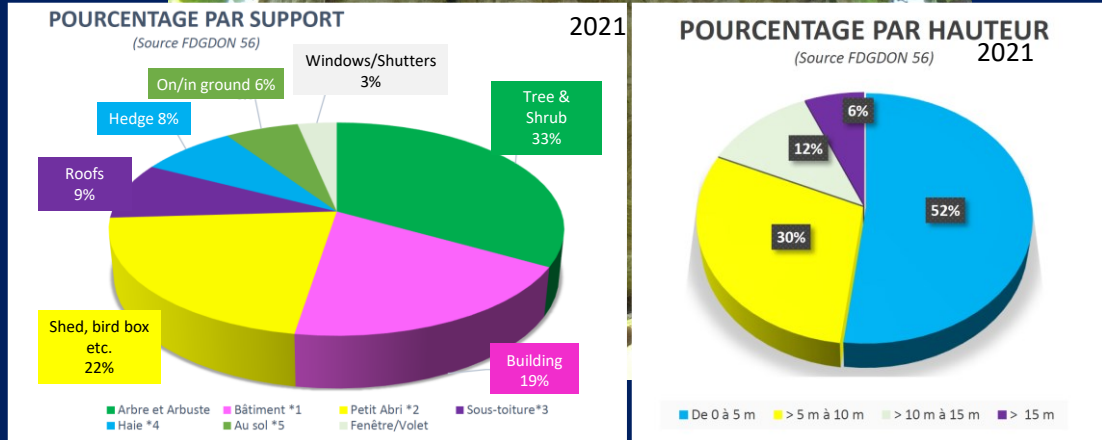
Let's have a closer look at these nests. By the way that nest in the middle is the one from Rayleigh in Essex – if some nests in this country have been stunted there is nothing wrong with that nest. Did it release its sexuals? By mid September the nest will have been producing female sexuals but they usually spend the first fortnight in the nest – so we might be lucky – another week and I'd have said differently. So I fully expect Defra to find that it has produced sexuals but the big question is had any actually left the nest to mate.

In a year when conditions are poor for the hornet there will be fewer nests, which develop later and so will be smaller, but of course the reverse applies in a good year, especially if you get a good autumn when the hornet's season can become extended;

and that is when you can get huge nests such as this one on the right.

Remember that extension of the hornet's season because many beekeepers forget that can happen, and get caught out.

Within 5m of the Asian hornet nest there is a serious risk of a mass attack



Nests are often hidden by foliage and are not found until the leaves drop in Autumn. This nest is typical, those things that look like entrances are just anchor points for further expansion.

Early on in the invasion the nests were very high up in trees and unless you happened to be a tree surgeon, people were not coming into conflict with the hornet, but now the nests are not just in trees they are amongst people – and they are much lower, 52% in Brittany in 2021 were below 5m and that is important because....

Whilst the hornet is not aggressive away from its nest / ***within 5M of a nest it can be very aggressive indeed and will quickly make a mass attack.*** By the end of November Manche was reporting 356 attacks on humans.

Additional commentary:

Thanks to a Korean researcher, Moon Bu Choi, and his brave team of fellow researchers, we know that people looking for nests would be well advised to wear white or bright primary colour clothing and avoid black and brown. Rapid movement attracts more attention so if you find yourself too close to a hornet nests, move carefully away without rapid movement. However, if you have attracted attention and the hornets are attacking, run away as fast and as far as you can. That definitely results in fewer hornets attacking the further away you get. Walking or standing still does not work.

Be aware that there are reports from Spain that stings from Asian hornets are now the leading cause of anaphylactic reaction from Hymenoptera stings. There is an additional risk to internal organs from a toxic reaction when more than 10 stings are received. Seek early medical help in the case of such multiple stings.

Predation of the Honeybee

Olfactory Attraction of the Hornet *Vespa Velutina* to Honeybee Colony Odours and Pheromones – PLOS DOI :101371 – Dec 2014

- Pollen
- Honey
- Honeybees' Nasonov gland pheromone

Once an apiary is found, learns waymarks to find it again

Photograph by Karine Monceau
"Searching for nests of the invasive Asian hornet (*Vespa velutina*) using radio-telemetry"
[Peter J. Kennedy](#), [Scott M. Ford](#), [Juliette Poidatz](#), [Denis Thiéry](#) & [Juliet L. Osborne](#)
Communications Biology volume 1, Article number: 88 (2018)
Reproduced under Creative Commons Attribution 4.0 International Licence
<http://creativecommons.org/licenses/by/4.0/>

What we beekeepers need to pay particular attention to is that the hornet is not in your apiary by chance / it is actively searching for concentrations of its prey.

It is attracted by the smell of Pollen, Honey, and the bees own Nasonov gland pheromone, with which the bee marks the entrance to its hive

Once an apiary is found, the hornet learns waymarks to find it again so a high number of hornets in front of the hive are return visitors

It is very important that you do all you can to maintain a low olfactory signature in the apiary – we'll look more at that in Integrated Defences in the Apiary

Asian Hornet Predation – The Hidden Effects

Predation of the invasive Asian hornet affects foraging activity and survival probability of honey bees in Western Europe – 2018

Journal of Pest Science doi.org/10.1007/s10340-018-1063-0

A beekeeper's rule of thumb.....

4 hornets outside the hive - 40% reduction in foraging

6 hornets outside the hive - 60% reduction in foraging

12 hornets outside the hive - NO foraging

Stress is a major factor in colony loss



Copyright © Museum National de la Histoire Naturelle:
P. Viand (<http://frelonasicaïne.mnhn.fr> consulted on 16 April 2020)

What I would like you to focus on now is the effects of hornet predation on the honeybee because some of those effects are hidden, and it is these that cause the majority of colony losses

As predation builds over the summer the response of the honeybee colony is to reinforce the guard bees – the colony starts to get stressed.

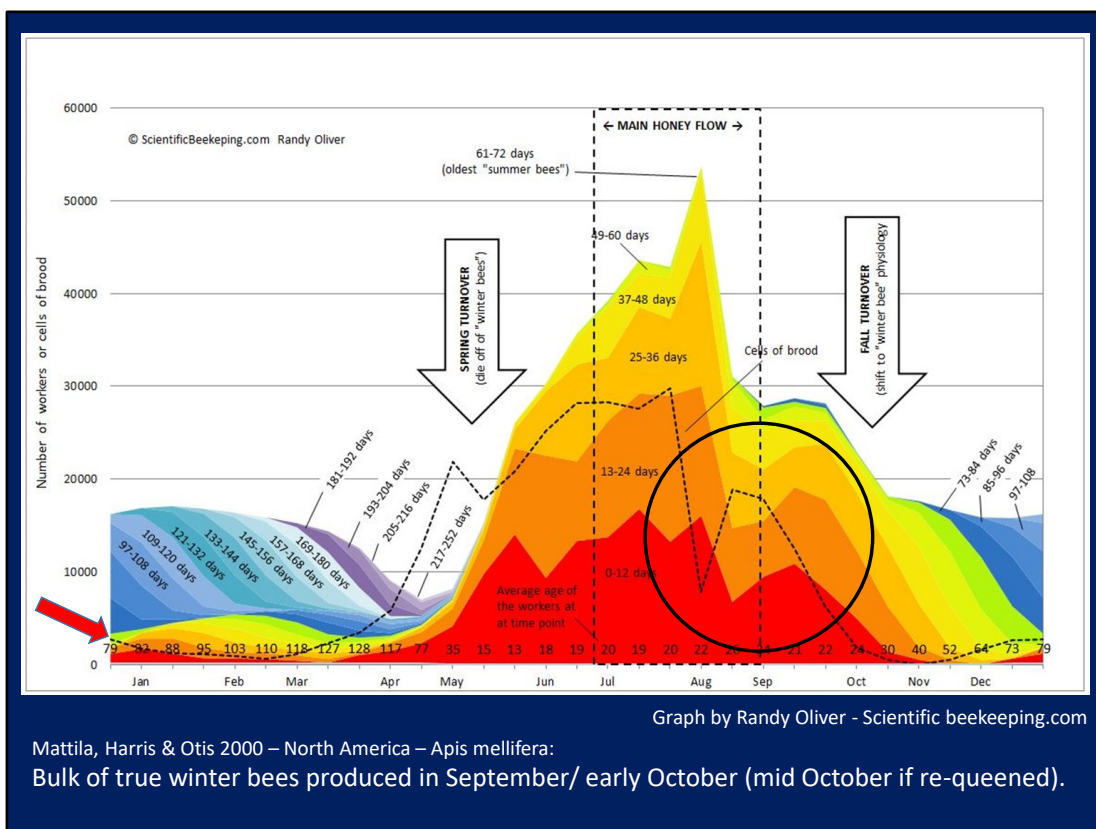
What a 4 year study found was that in addition to the obvious losses caused by hawking: there was a reduction in foraging corresponding with the number of hornets in front of the hive,

What the study found was- 4 hornets, 6 hornets etc

More than 12 hornets in front of a hive and the bees stayed in hive consuming stores and getting even more stressed.

I have to say that this piece of research was not particularly good, it was under-funded, under-resourced and in some respects over-ambitious in its scope but it is all we have. The general feeling is that these foraging problems come in at lower levels of predation than the study concluded.

I cannot over-emphasise just how important the stress factor is, /// in the absence of food coming in the colony will take the queen off-lay but they may also kill her, the organisation and cohesion of the colony starts to collapse, and September absconding is not unusual in heavily predated areas



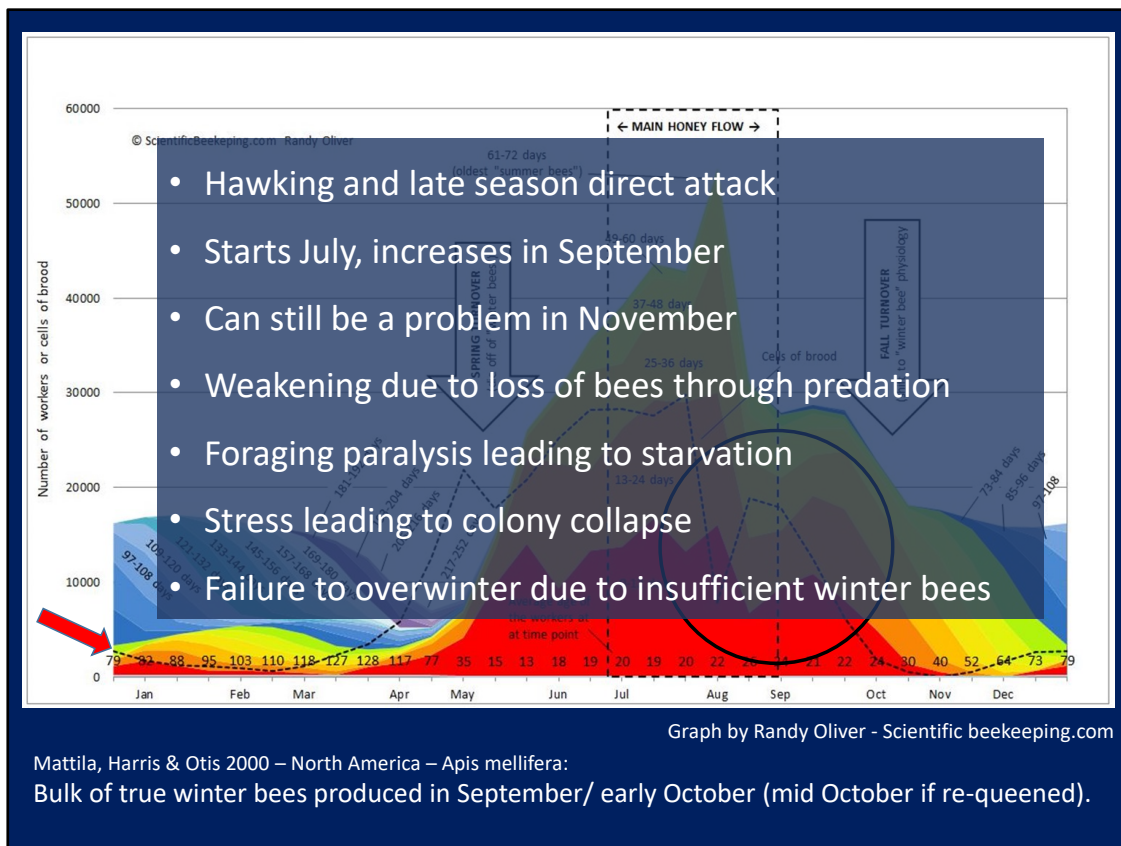
The graphic is from Randy Oliver over in the states, so the flow calendar is not quite right for us but it still serves the purpose very well

Reds and yellows are summer bees and blues and purples are winter bees. The bees with longer lifespans with hypertrophied pharyngeal glands and enlarged fat bodies, that are essential for the survival of the colony over winter

The dotted line running across left to right, highlighted by the red arrow,

shows the brood development over the course of the year // You will recognize the spring peak and then the build-up for the main flow. We will also recognize the post-flow drop in brood production and then ***there's that last peak*** which is what Professor Heather Mattila's research identified

That is when the production of the bulk of the winter bees happens or is supposed to happen and it coincides with the period of maximum predation by the hornet with its paralysis of the hive, and that is why it is in winter that colony losses from the hornet are highest.

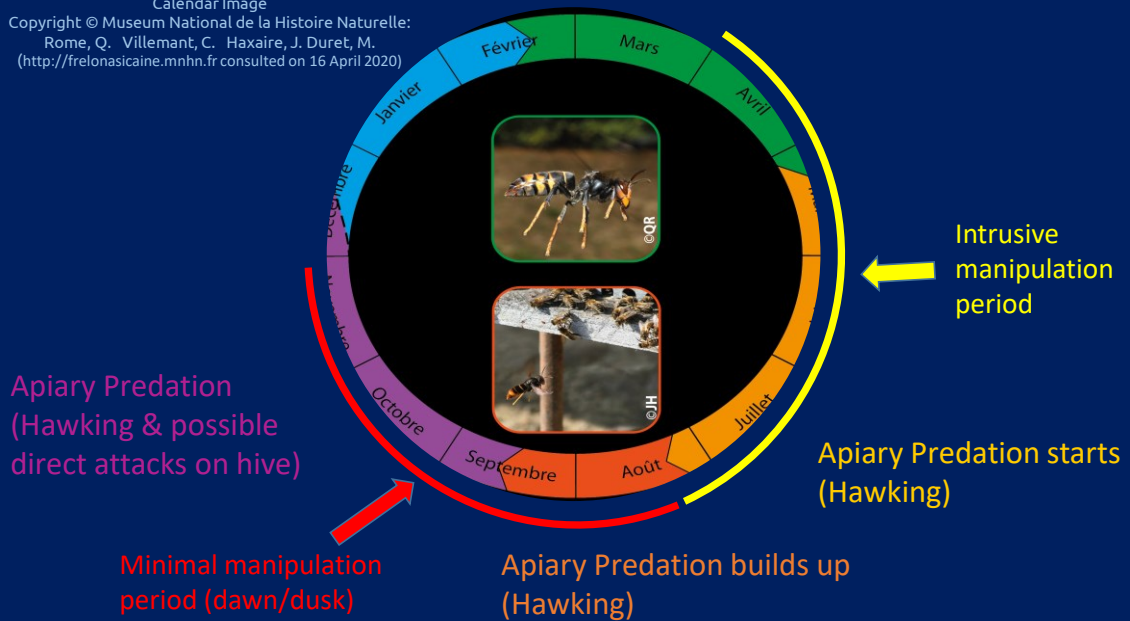


To summarise the Asian hornet's predation:

- two methods of attack, hawking and the possibility of direct attack
- predation starts from a low level in July but a significant increase in late August/September and
- it can continue into November
- predation weakens the colony but it is not that which usually kills the colony
- starvation, but you, the beekeeper can do something about that
- but don't underestimate the effect of stress on the bees which can lead to colony collapse, bees to abscond or kill the queen.
- it's stress and not enough winter bees that kills colonies – those are the two hidden effects that you the beekeeper have to address

Beekeeping Activity – FNOSAD National Association of GDSA's (Departmental Bee Health Groups) Recommendations

Calendar Image
 Copyright © Museum National de la Histoire Naturelle:
 Rome, Q. Villemant, C. Haxaire, J. Duret, M.
 (<http://frelonasicaine.mnhn.fr> consulted on 16 April 2020)



It is because of the stress factor that the French national bee health association urges beekeepers to be very cautious about opening the hive during the period of foraging paralysis,

Beekeepers need to get intensive hive manipulations out of the way before the hornet's predation in the apiary builds up to become a problem. Typically, that's by the beginning of August, last year it was at the beginning of July – you can see how that made life a lot more difficult for the beekeeper

In the period of predation, hive manipulations need to be minimised and / if required / done very early in the morning or just before dusk.



The Hornet & Beekeeping

Pathogens

Pesticides

Loss of forage

Pests e.g. Asian Hornet, **Varroa**

Poor Apicultural Practices

Climate change

“all these factors are cumulative, 1+1=10” – INRA

What has been the effect of the asian hornet on beekeeping?

These factors in honeybee colony decline were identified by a senate committee in 2017 but although the Asian hornet is obviously on the list

Beekeepers are far more worried about pathogens, pesticides and varroa.

Climate change too has had a drastic affect on the summer nectar flow that in many southern and SW areas now stops in July whereas previously it could be relied upon to go through to the autumn.

Many beekeepers are still adjusting to these changes and that’s what the “poor apicultural practices” was referring to, it is just more difficult to keep bees.

The National Institute for Agricultural Research pointed out to the senate committee that



So what should the beekeeper do to manage the situation? I am using traffic light colours, red is bad, green is good and amber can go either way depending on circumstances

First let's recognise that Inaction and lack of knowledge on the part of the beekeeper are two of the Asian Hornet's greatest allies.

Certain factors are going to determine the scale of the problem you face

- What climatic zone you live in will determine the degree of infestation you are likely to get.
- By far the biggest factor affecting nest numbers each year is the weather. Remember if it's a good year for your bees it will be a good year for the hornet.
- If you are an urban or suburban beekeeper you are going to get more hornets than if you are rural
- by a river, more than in a wood

I do not have time today to cover honeybee colony losses in detail but all these following factors are cumulative, so we have to look at this holistically;

- sick bees are in no shape to fight off the Asian hornet so it is suggested that you practice good apiary hygiene

- bees with high varroa loads are compromised but avoid fast vapour treatments like MAQs that stress the colony
- Make sure that **your beekeeping practices** are not making things worse and above all avoid stressing the bees
- One size doesn't fit all. It is important that the beekeeper monitors what is going on with each colony and adapts what they are doing to best support it.

Integrated defence is all about putting the right measures in place at the right time.

- Emergence of foundress queens should prompt the start of selective around the apiary but only until the end of May
- Make sure your apiary environment is in favour of the bee and not the hornet and
- avoid single hives
- consider uniting weak colonies while there is a flow on
- before predation starts get larger mesh muselieres or basic Stop-Its on the hive. I urge caution about getting small mesh museliers on the hive too early in case you interfere with swarming/drones

The start of predation in the apiary should see

- the commencement of apiary trapping. // and / or
- deploy the harpe électrique
- your bees should never be short of food and remember to feed just before dusk

Don't overlook the danger from direct attack

- make sure you have an entrance restrictor in place before September
- if predation is severe perhaps you could move them

As you will never remember all of this, I have put this section of the brief into a separate pdf file that you can get from your association's website and I have included a load of extra detail on apiary defences.



Acknowledgements



Museum National de la Histoire Naturelle
Institute National de la Recherché Agronomique
Fédération Départementale des Groupements de Défense contre les Organismes
Nuisibles
Fédération Nationale des Organisations Sanitaires Apicoles Départementales
Union Nationale de l'Apiculture Français
Syndicat National D'Apiculture
La Ville de Lorient
University of Vigo
(and many other French Beekeeping and Research Organisations/Associations)

Frederique Ripet, Dennis Jaffre, Kouroush, Eric Le Bervet,
Randy Oliver (USA), Eugenio Pichel (España)

Les Apiculteurs Français

It just remains for me to thank the French institutes and associations that made the information in this briefing available.

I am particularly grateful not only to the beekeepers named here but also to those other beekeepers who gave their time to talk at markets and whose apiaries I called in on.

Whatever you do, don't start reinventing the wheel, the French beekeepers have done that for you.