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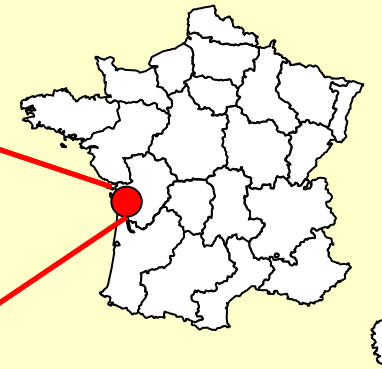
Territorial biodiversity in cropping system and consequences on physico-chemical characteristics of collected pollen

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EURBEE, September 2010

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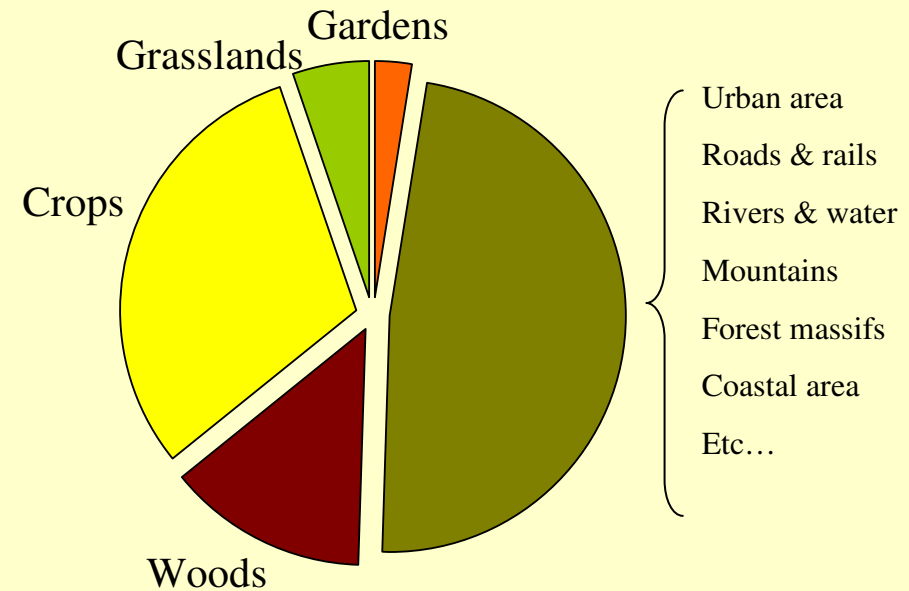
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Introduction

Agrosystems represent the major land use

42% in Europe and 52% in France

- Agrosystems: natural, semi-natural, artificial elements
- Cereal cropping systems considerably intensified under the CAP: intensive cropping system



Background

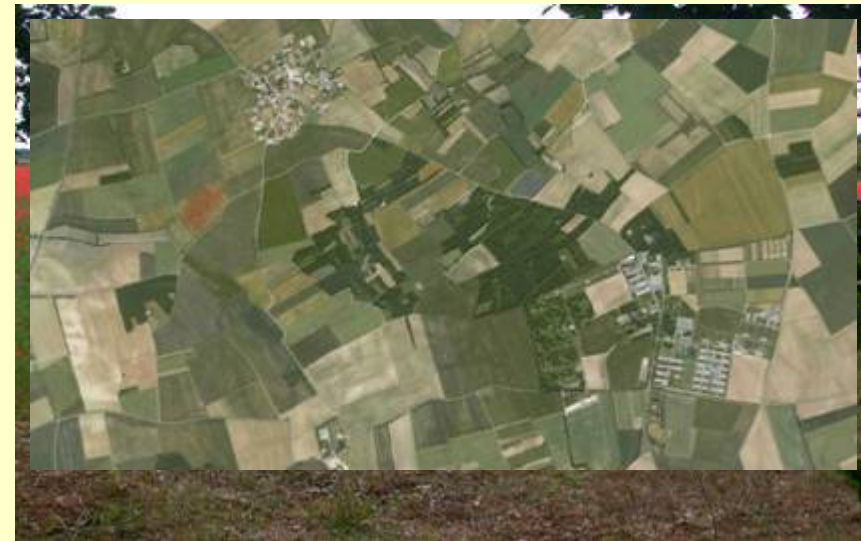
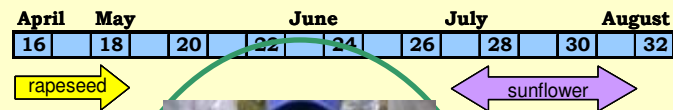
Decline threat on diversity by farming intensification (Fried 2009)

Diet diversity impact on bee health (Alaux, 2010)

→ could impact on honeybee colonies ?

A food shortage period can be observed between crops flowers (i.g. rapeseed and sunflower)

Do Alternative resources play a survival role for bee colonies ???
(i.g. woods and weeds)



Honey bees are spatial collectors and forage over long distances



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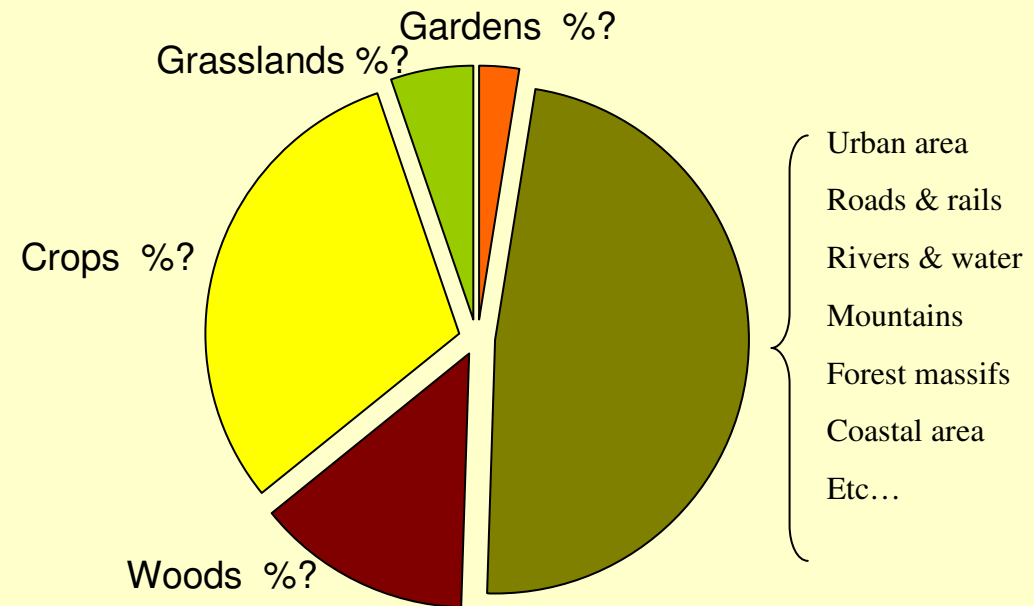
Le Magneraud

Our aim

To assess available resources to bees within the flight range in quantity and quality

To check the flower range exploited

in an intensive cropping environment



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Materials and methods

Samples supply

Based on the collect of pollen trap
all along 1 year

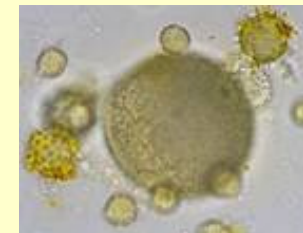
- 10 bee colonies at Le Magneraud
apiary
- Samples collected from January to
December 2006
- Harvested twice a week



1. Palynological analyses



<http://guenievre.magneraud.inra.fr/entomologie>



Method standardisation
adapted from Louveaux to
pellets analysis

Replicates in 2 slides

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2. Physico-chemical analyses



- Sugars

- Elser method, colorimetric

- Proteins

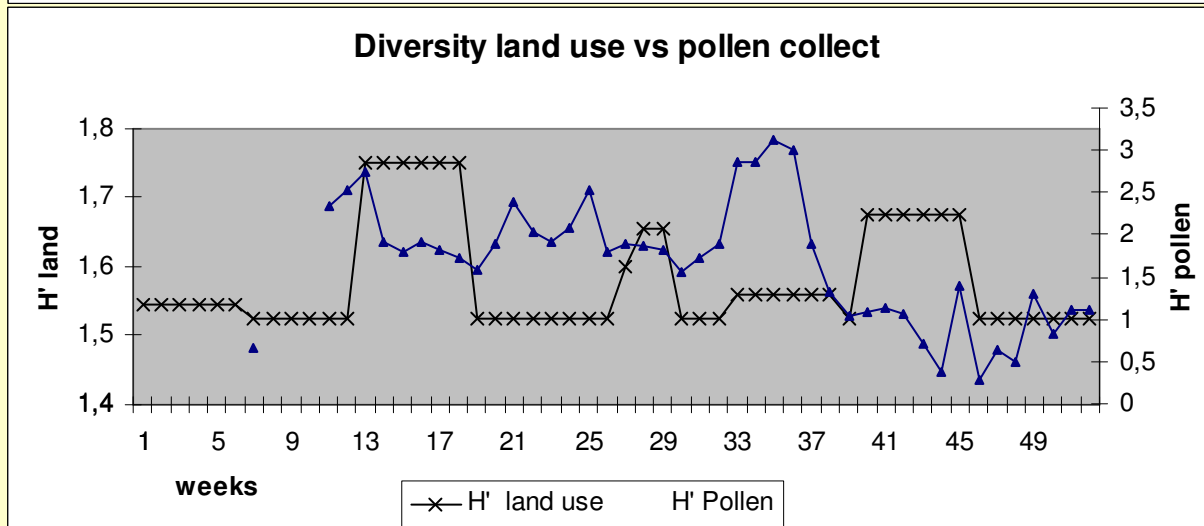
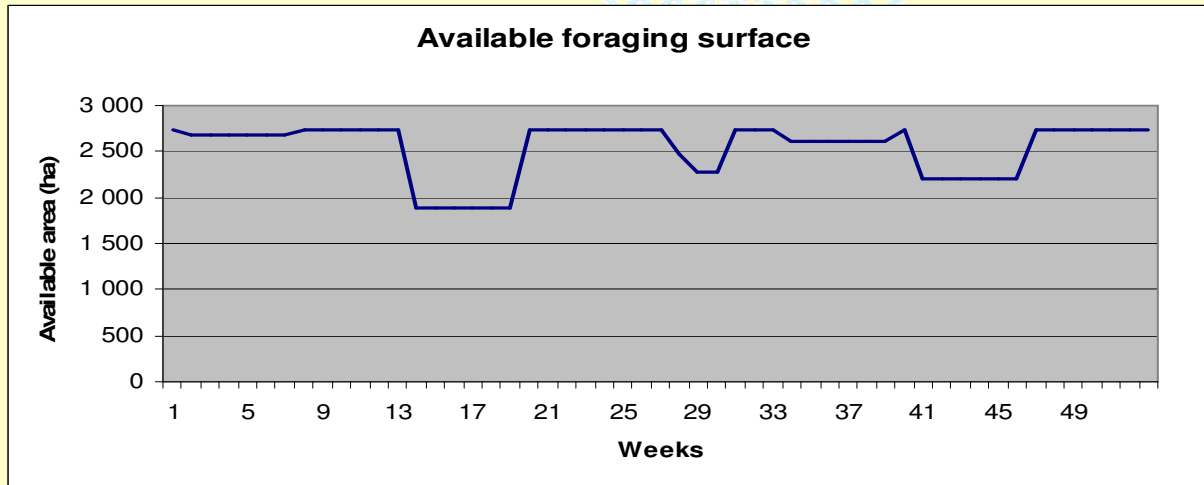
- Kjeldahl method

- Lipids

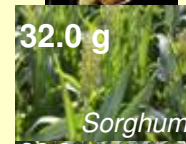
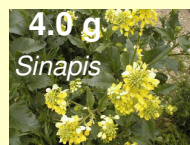
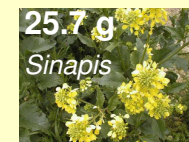
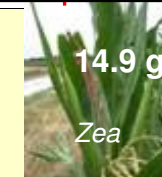
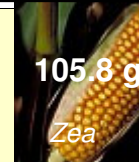
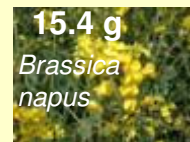
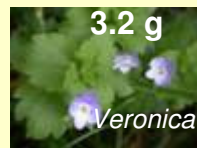
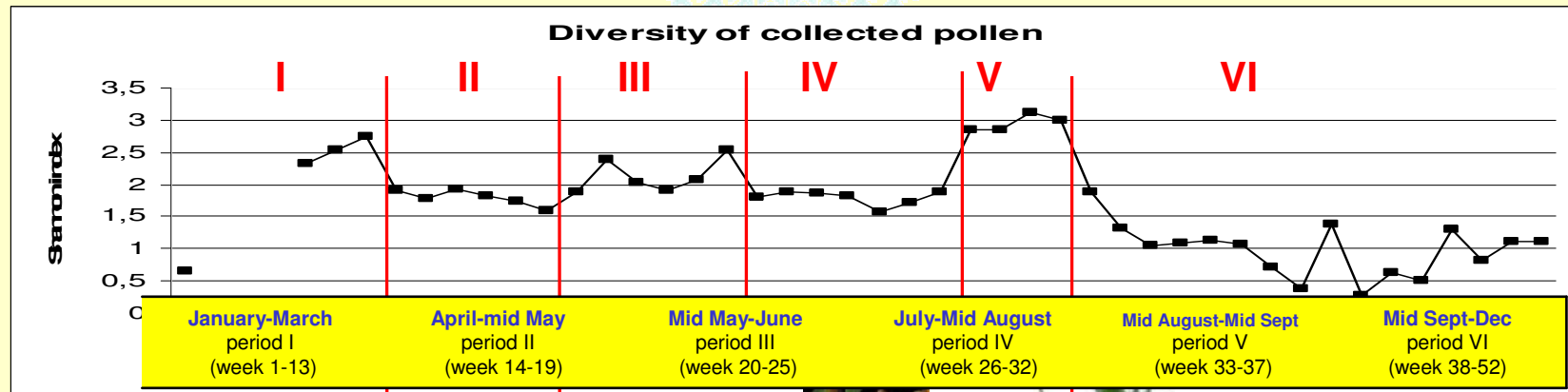
- acid hydrolysis
- Folch method extraction (1957)



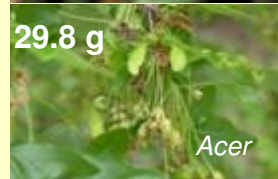
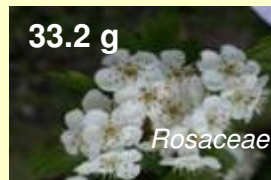
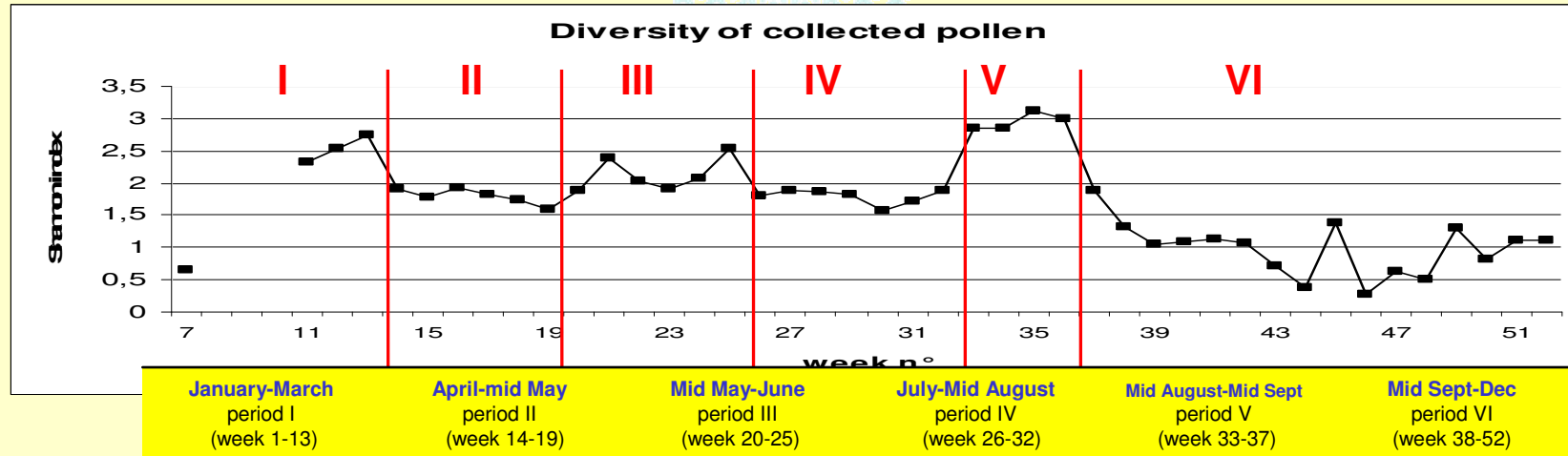
Results : diversity of landscape and harvest



Results: main taxa (Cropped area)



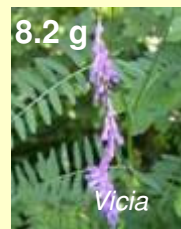
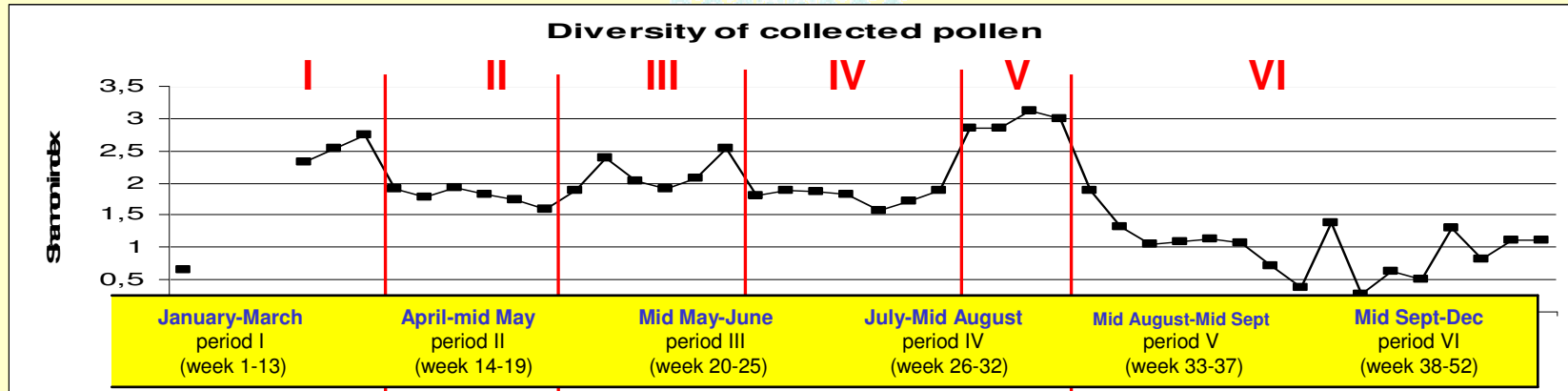
Results: main taxa (Woods)



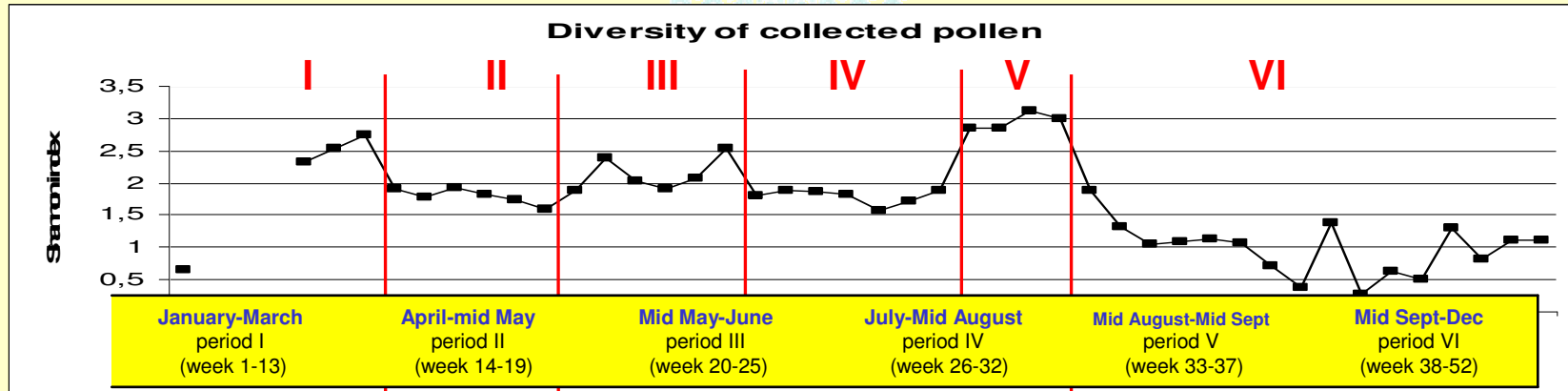
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Results: main taxa (Grasslands)



Results: main taxa (Gardens)



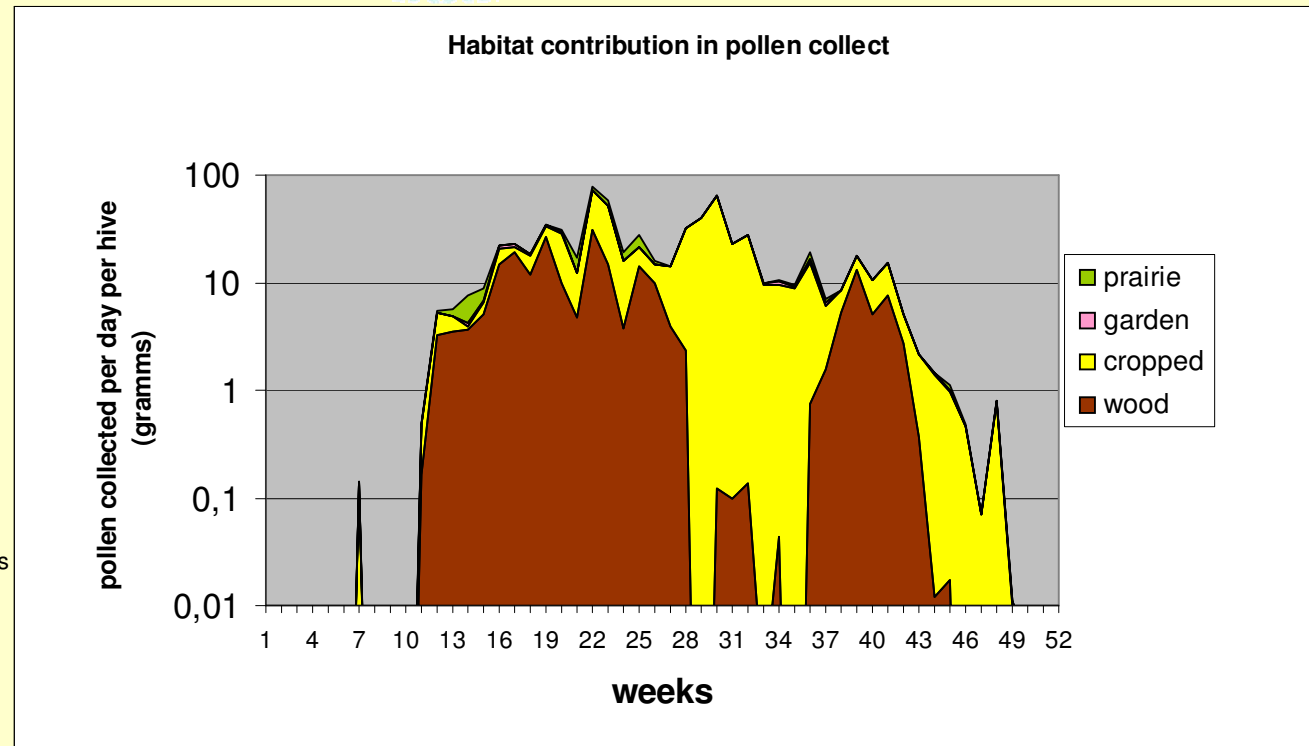
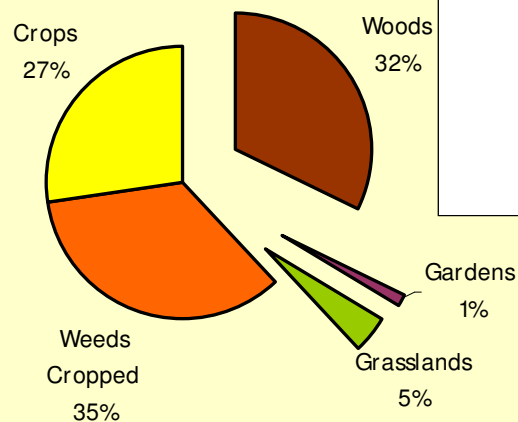
Vicia

6.9 g



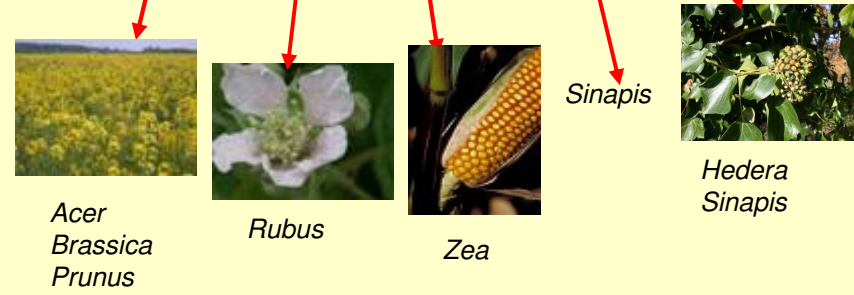
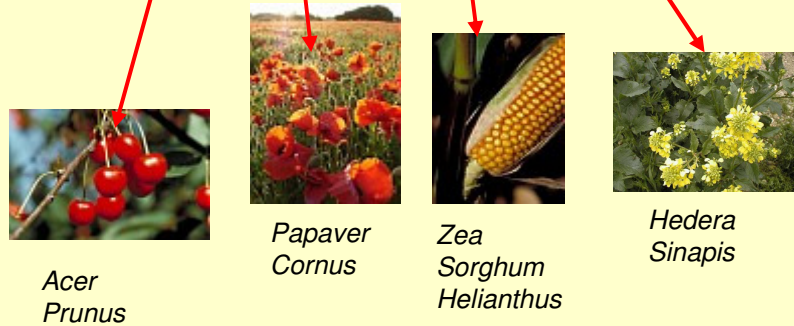
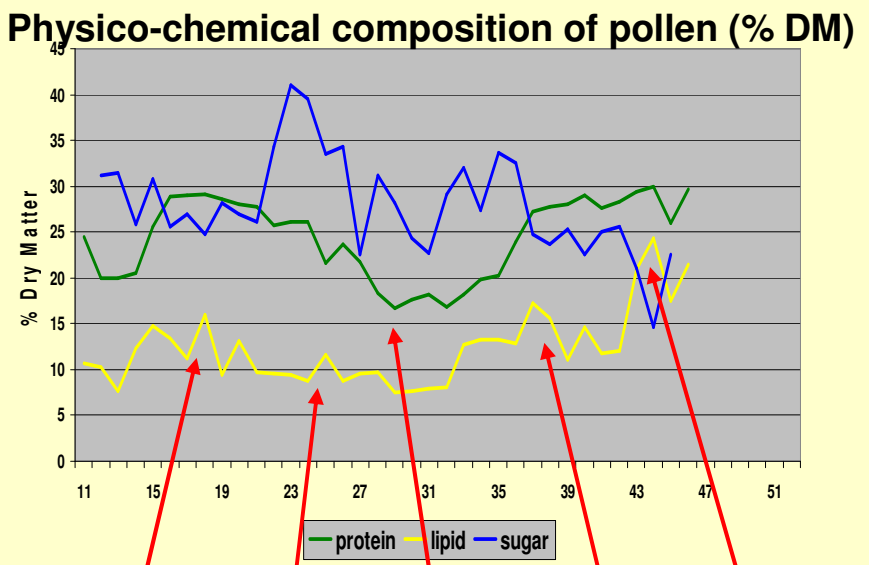
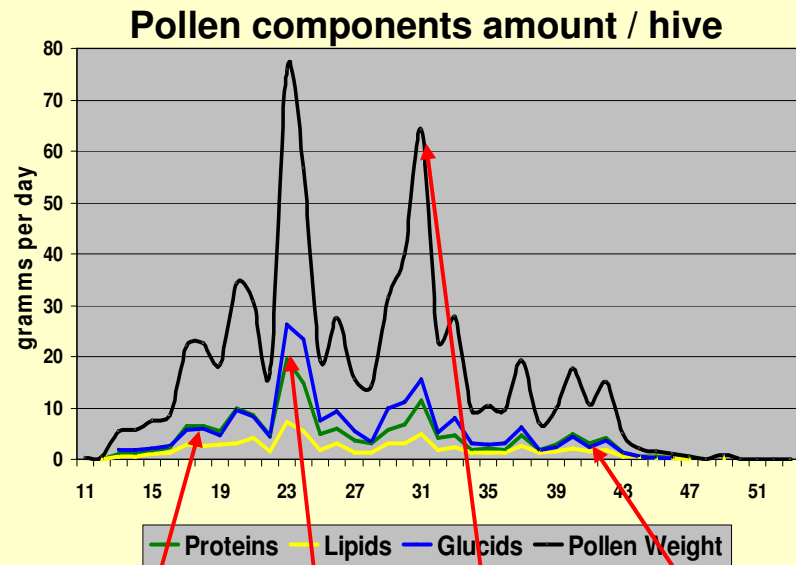
Lotus

Habitat contribution in pollen collect



Year 2006

Physico-chemical characterisation of pollen supply

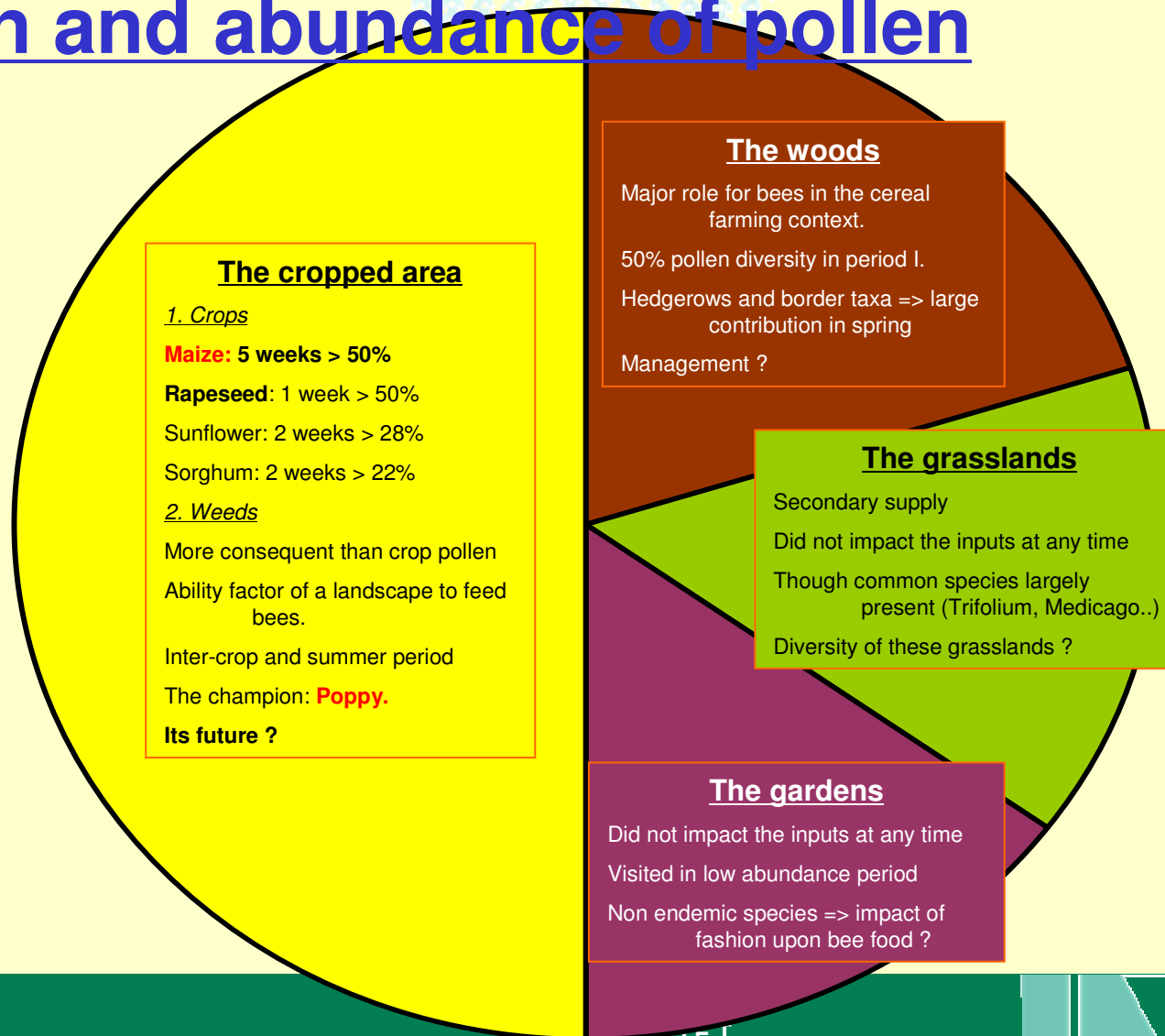


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Conclusion

origin and abundance of pollen



Conclusion

About the biodiversity

- Wood elements insured the hives survival during the sowing periods
- The pollen diversity did not seem to follow that of the landscape
- The high diversity period was encountered in the end of summer and was provided by weeds, whereas the low one in autumn
- Some very productive species occurred in low diversified times



Conclusion

About the nutritional components

Sugar

14 to ...41% !

High sugar values:

simultaneous with the
dry weather

concerned all habitats

Proteins

16 to 30 %!

High protein pollen diet
occurred in spring during the
brood nursing

Low protein time before
large crop blooming

Medium protein content of
maize balanced by huge
quantities

High protein rate of diet in
autumn

Lipids

7 to 24% !

High lipid pollen amount in
spring, *Papaver/Cornus*

Low lipid period in summer
could have consequences
on autumn worker ?

Very high rate of lipid in
pollen collected in autumn
but in too poor quantities

Thanks to

Laurent Roucher

Huguette Lamy

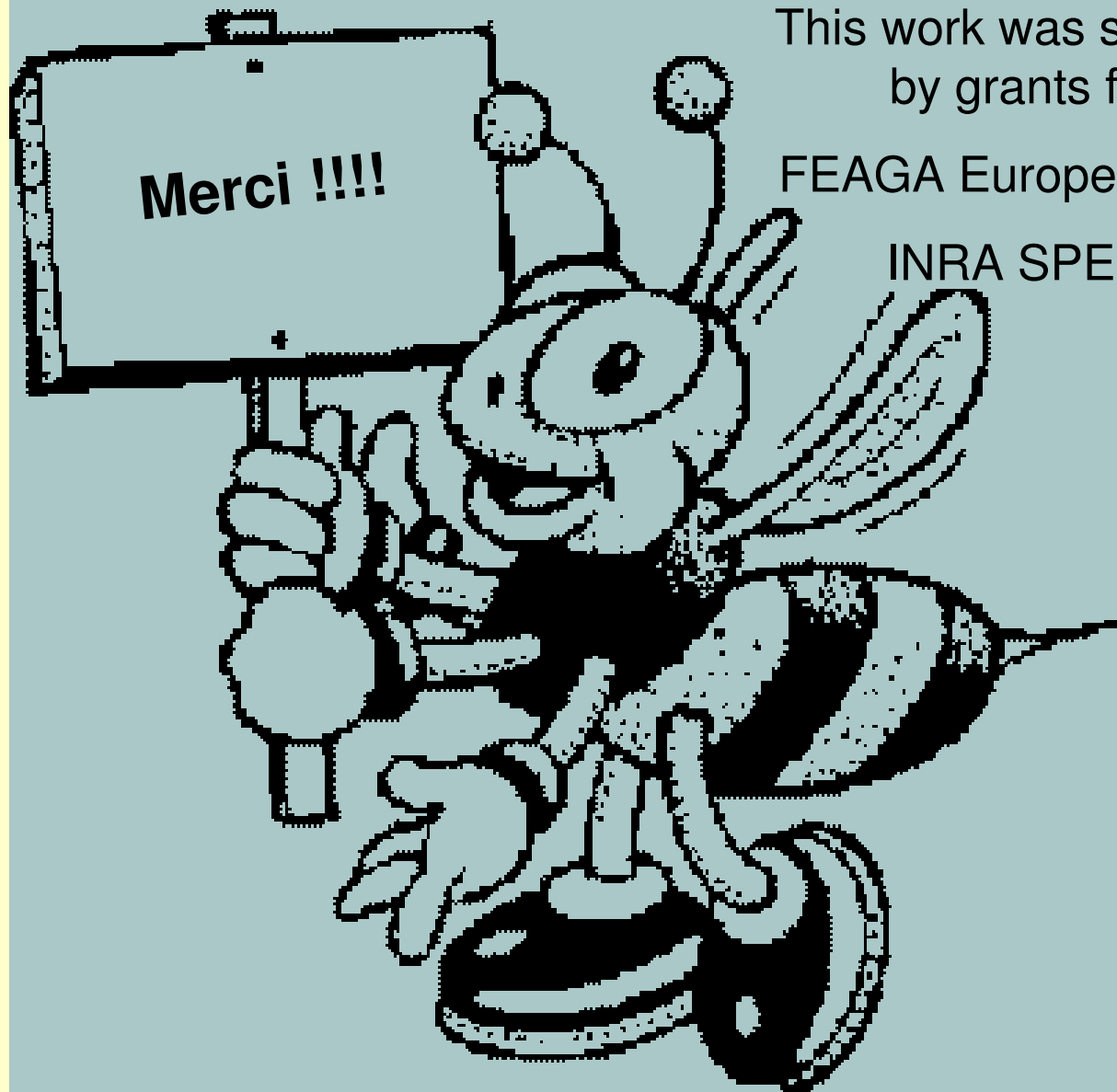
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INRA SPE Dpt

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