

**Working Group on Biochemical and Molecular Techniques  
and DNA-Profiling in Particular****BMT/16/29****Sixteenth Session  
La Rochelle, France, November 7 to 10, 2017****Original:** English  
**Date:** November 10, 2017

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**REPORT**

*adopted by the Working Group on Biochemical and Molecular Techniques and DNA-Profiling in Particular*

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Opening of the session

1. The Working Group on Biochemical and Molecular Techniques and DNA-Profiling in Particular (BMT) held its sixteenth session in La Rochelle, France, from November 7 to 10, 2017. The list of participants is reproduced in Annex I to this report.
2. The BMT was opened by Mr. Kees van Ettehoven (Netherlands), Chairperson of the BMT, who welcomed the participants. The BMT was welcomed by Mr. Frédéric Malterre, *Direction générale de l'alimentation, Ministère de l'agriculture et de l'alimentation*, Mr. Christian Huyghe, *Directeur Scientifique Agriculture, Institut national de recherche agronomique (INRA)*, Mr. Arnaud Deltour, *Directeur général, Groupe d'étude et de contrôle des variétés et des semences (GEVES)*, and Ms. Anne-Lise Corbel, Responsible for DUS, GEVES - Variety sector. Copies of the opening remarks are reproduced in Annexes II to V to this document, respectively.

Adoption of the agenda

3. The BMT adopted the agenda as reproduced in document BMT/16/1 Rev.

Reports on developments in UPOV concerning biochemical and molecular techniques

4. The BMT received a presentation from the Office of the Union on developments in UPOV concerning biochemical and molecular techniques, a copy of which is provided in document BMT/16/2.

Short presentations on new developments in biochemical and molecular techniques by DUS experts, biochemical and molecular specialists, plant breeders and relevant international organizations (oral reports by participants)

5. No presentations were made under this item. However, the participants agreed to share experiences and explore opportunities for future cooperation during an interactive session, which is reported under "Cooperation session"

Report of work on molecular techniques in relation to DUS examination*Genetic Distance-based selection of similar varieties for wheat distinctness test*

6. The BMT considered document BMT/16/6 and received a presentation by Mr. Ruy Li (China).

*Test of the potential use of SNPs markers on oilseed rape varieties*

7. The BMT considered document BMT/16/7 and received a presentation by Mr. Arnaud Remay (France).

*The use of molecular markers (SNP) for maize DUS testing in France (2013 to 2016)*

8. The BMT considered documents BMT/16/8 and BMT/16/8 Add. and received a presentation by Mr. Jehan-Baptiste Mauroux (France).

9. The BMT agreed that France should propose a revision to document TGP/15 “Guidance on the Use of Biochemical and Molecular Markers in the Examination of Distinctness, Uniformity and Stability (DUS)”, Annex II, “Example: Parent Lines in Maize”, to reflect the refinements that had been made in France on the basis of its experience in the application of the Model “Combining Phenotypic and Molecular Distances in the Management of Variety Collections”, for consideration by the Technical Committee at its fifty-fourth session.

10. The BMT agreed that it would be advantageous if the draft revision of document TGP/15, to be considered by the TC at its fifty-fourth session, could be published sufficiently before the forty-seventh session of the Technical Working Party for Agricultural Crops (TWA), to be held in Naivasha, Kenya, from May 21 to 25, 2018, and before the seventeenth session of the BMT, in order that any comments of the TWA and BMT on the draft revision could be reported to the TC at its fifty-fourth session.

*The use of genetic distances as characteristics? Assessment of this approach based on GEVES SNP maize data*

11. The BMT considered document BMT/16/9 Rev. and received a presentation by Mr. René Mathis (France).

*The use of molecular markers (SNP) for maize DUS testing: Development and official applications to assess distinctness of hybrids varieties (France)*

12. The BMT considered document BMT/16/10 and received a presentation by Ms. Valérie Uyttewaal (France).

*An attempt to use molecular markers for winter wheat reference collection management*

13. The BMT considered document BMT/16/11 and received a presentation by Ms. Anne-Lise Corbel (France).

*Update on the American Seed Trade Association and United States PVP Office Molecular Marker Working Group*

14. The BMT considered documents BMT/16/12 and BMT/16/12 Add. and received a presentation by Mr. Paul T. Nelson (Seed Association of the Americas (SAA))

*The use of Reference Variety Similarities in Varietal Distinctness II: Reference Variety Selection*

15. The BMT considered documents BMT/16/14 and BMT/16/14 Add. and received a presentation by Mr. Paul T. Nelson (SAA).

*Imoddis proposal: Developing a toolbox to distinguish apple mutants for DUS testing*

16. The BMT considered document BMT/16/15 Rev. and received a presentation by Mr. Jean Maison (European Union).

*Use of GBS for Lucerne Variety Distinction*

17. The BMT considered document BMT/16/17 and received a presentation by Ms. Bernadette Julier (France).

*Genetic selection of similar varieties for the first growing cycle: example French bean*

18. The BMT considered documents BMT/16/19 and BMT/16/19 Add., and received a presentation by Ms. Amanda van Dijk-Veldhuizen (Netherlands).

19. The BMT agreed that the approach presented in document BMT/16/19 and BMT/16/19 Add. was a suitable use of molecular techniques in the examination of DUS and should be proposed for inclusion in document TGP/15. Therefore, it was agreed that the Netherlands should prepare an explanation of the method as a basis for a revision of document TGP/15 to be considered by the Technical Committee at its fifty-fourth session.

20. The BMT agreed that it would be advantageous if the draft revision of document TGP/15, to be considered by the TC at its fifty-fourth session, could be published sufficiently before the fifty-second session of the Technical Working Party for Vegetables (TWV), to be held in Beijing, China, from September 17 to 21, 2018, and before the seventeenth session of the BMT, in order that any comments of the TWV and BMT on the draft revision could be reported to the TC at its fifty-fourth session.

*SDN-assisted plant breeding and potential impact on DUS testing*

21. The BMT considered document BMT/16/20 and received a presentation by Ms. Cécile Collonnier (European Union).

*Report on IMODDUS activities in 2017*

22. The BMT considered document BMT/16/22 and received a presentation by Mr. Martin Ekvad (European Union).

*The Tomato project proposal in CPVO IMODDUS program*

23. The BMT considered document BMT/16/27 and received a presentation by Ms. Hedwich Teunissen (Netherlands).

International guidelines on molecular methodologies including cooperation between the OECD, UPOV, ISTA and ISO

24. The BMT considered document BMT/16/3.

25. The BMT noted that a Joint OECD/UPOV/ISTA/AOSA Workshop on Biochemical and Molecular Methods had been held in Paris on June 8, 2016, and that the recommendations of the Joint OECD/UPOV/ISTA/AOSA Workshop as reproduced in document BMT/16/3, paragraph 9, were approved by the Annual Meeting of the OECD Seed Schemes, held in Paris on June 9 and 10, 2016; BMT/16/3 page 4.

26. The BMT noted that the TC, at its fifty-third session, had agreed that possible future collaboration between UPOV, the Organization for Economic Co-operation and Development (OECD) and the International Seed Testing Association (ISTA) might include the harmonization of terms and methodologies used for different crops and the possible development of standards, after agreement by those organizations.

27. The BMT noted that practical workshops on "DNA Techniques and Variety Identification" had been held in Roelofarendsveen, Netherlands, from May 8 to 10, 2017 and from September 20 to 22, 2017.

28. The BMT noted that the TC had agreed that UPOV and OECD should consider making progress in the matters reported in this document if ISTA was unable to participate in the near future.

29. The BMT recalled that the TC, at its fifty-first session, had agreed (see document TC/52/29 Rev. "Revised Report", paragraph 129):

- (a) to develop a joint document explaining the principal features of the systems of the OECD, UPOV and ISTA; and
- (b) to develop an inventory on the use of molecular marker techniques, by crop, with a view to developing a joint OECD/UPOV/ISTA document containing that information, in a similar format to UPOV document UPOV/INF/16 "Exchangeable Software", subject to the approval of the Council and in coordination with OECD and ISTA; and

30. The BMT agreed that the initiatives above, and consideration of possible harmonization of terms and methodologies used for different crops and the possible development of standards, might be advanced through a further international practical workshop, to be jointly coordinated by OECD, UPOV and ISTA and supported by Naktuinbouw and/or another partner with the relevant facilities.

#### *Practical workshops on DNA techniques and variety identification*

31. The BMT considered document BMT/16/13 and received a presentation by Mr. Bert Scholte and Ms. Hedwich Teunissen (Netherlands).

32. The BMT considered document BMT/16/3 Add. and received a presentation by Ms. Chiara Delogu (Italy).

#### *OECD Seed Certification Schemes*

33. The BMT considered document BMT/16/23 and received a presentation by Mr. Gerald Hall (OECD).

#### Variety description databases including databases containing molecular data

##### *Integration of molecular data into DUS testing in Durum Wheat: Use of a standardized method for the efficient management of reference collections*

34. The BMT considered document BMT/16/21 and received a presentation by Ms. Alexandra Ribarits (Austria).

#### Methods for analysis of molecular data

35. No information was presented under this item.

#### The use of molecular techniques in examining essential derivation

36. The BMT considered document BMT/16/2 and received a presentation from the Office of the Union.

#### The use of molecular techniques in variety identification

##### *Assessment of reproducibility of 6K SNP genotyping in soybean across laboratories*

37. The BMT considered document BMT/16/16 and received a presentation by Mr. Frédéric Achard (SAA) and Ms. Jin Xiong (SAA).

#### *Assignment Tests for Genotype Classification*

38. The BMT considered document BMT/16/18 Rev. and received a presentation by Mr. Jan De Riek (Flanders Research Institute for Agriculture, Fisheries and Food (ILVO)).

*Development on Use of Molecular Technique for PVP in Republic of Korea*

39. The BMT considered documents BMT/16/24 and BMT/16/24 Add. and received a presentation by Mr. Seung-in Yi (Republic of Korea).

40. The BMT noted the proposal made in the presentation to organize an international consortium to work on molecular techniques and agreed to discuss that matter during the cooperation session.

*Determination of purity and quantification of varietal components through NGS (Next Generation Sequencing)*

41. The BMT considered document BMT/16/25 and received a presentation by Mr. Carlos Azambuja (SAA).

*Determining the parameters to characterize Soybean varieties using single nucleotide polymorphisms*

42. The BMT considered document BMT/16/26 and received a presentation by Mr. Barry K. Nelson (SAA).

*Confirmation of validation for DNA variety identification technique*

43. The BMT considered document BMT/16/28 and received a presentation by Mr. Hiroshi Goto (Japan).

Review of document UPOV/INF/17 “Guidelines for DNA-Profiling: Molecular Marker Selection and Database Construction (‘BMT Guidelines’)”

44. The BMT considered documents BTM/16/4 and BMT/16/5 and received a presentation by the Office of the Union, on “Standards for databases containing molecular information”, a copy of which is reproduced BMT/16/5 Add.

45. The BMT agreed to invite members and observers to provide comments on document UPOV/INF/17 “Guidelines for DNA-profiling: Molecular Marker Selection and Database Construction (‘BMT Guidelines’)”. The comments would be compiled by the Office of the Union in a document that would form the basis of a review of document UPOV/INF/17 by the BMT at its seventeenth session. The BMT further agreed to propose to introduce a new chapter concerning cooperation in the exchange of data and construction of databases in document UPOV/INF/17 on the basis of document BMT/16/5.

Date and place of next session

46. The BMT welcomed the invitation of Uruguay to hold its seventeenth session in Montevideo, Uruguay, from September 10 to 13, 2018, with the elements of the preparatory workshop included in the session.

Chairperson

47. The BMT thanked Mr. Kees van Ettehoven for his chairmanship and noted that he was awarded a UPOV bronze medal in recognition of his chairmanship of the BMT from 2015 to 2017.

Future program

*Coordination session*

48. Discussion groups were formed for: agricultural crops; fruit crops; ornamental plants and forest trees; and vegetables, for BMT participants to exchange information on their work and explore areas for cooperation.

49. The BMT was informed of the following outcomes of the discussions:

*Agricultural Crops*

50. The United Kingdom will compile a list of crops of interest to members of the Union.

*Fruit Crops*

51. The following interest in cooperation were identified:

- Apple: Australia, Canada, France, Republic of Korea, United Kingdom, CIOPORA
- Stone fruit: France, Republic of Korea, Spain, United Kingdom
- Berries: Austria, Germany, Netherlands, United Kingdom, CIOPORA
- Nuts: China, Spain

*Ornamental Plants and Forest Trees*

52. Opportunities for cooperation on Rose will be explored by Netherlands (coordinator), China, United Kingdom and CIOPORA.

*Vegetables*

53. The following UPOV members will share their criteria for selecting crops for work in relation to the use of molecular techniques: Canada; China; France; Germany; Netherlands (coordinator); Republic of Korea; United Kingdom.

*Program for the seventeenth session*

54. During its seventeenth session, the BMT planned to discuss the following items:

1. Opening of the session
2. Adoption of the agenda
3. Reports on developments in UPOV concerning biochemical and molecular techniques (document to be prepared by the Office of the Union)
4. Short presentations on new developments in biochemical and molecular techniques by DUS experts, biochemical and molecular specialists, plant breeders and relevant international organizations (oral reports by participants)
5. Report of work on molecular techniques in relation to DUS examination (papers invited)
6. Cooperation between international organizations (document to be prepared by the Office of the Union)
7. Variety description databases including databases containing molecular data (papers invited)
8. Methods for analysis of molecular data (papers invited)
9. The use of molecular techniques in examining essential derivation\* (papers invited)
10. The use of molecular techniques in variety identification\* (papers invited)
11. Review of document UPOV/INF/17 "Guidelines for DNA-Profiling: Molecular Marker Selection and Database Construction"
12. Revision of document TGP/15 "Guidance on the Use of Biochemical and Molecular Markers in the Examination of Distinctness, Uniformity and Stability (DUS)"
13. Session to facilitate cooperation

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\* Breeders' Day

14. Date and place of next session
15. Future program
16. Report of the session (if time permits)
17. Closing of the session

Visit

55. On the afternoon of November 9, 2017, the BMT participants visited the facilities of BIOGEVES at Le Magneraud, France, where they were welcomed by Mr. René Mathis, Director, BIOGEVES, and Mr. Bruno Richard, Responsable du service Experimentation, GEVES, Le Magneraud, The BMT visited the variety collection of GEVES at Le Magneraud with capacity for up to 32,000 samples in cold storage. The BMT visited the laboratory of molecular biology and biochemistry, where an overview was provided by Ms. Anne Bernole, Technical Manager Molecular Biology, BIOGEVES, Mr. Arnaud Remay, Head, Genotyping unit, GEVES, and Ms. Muriel Thomasset, Genotyping Bioanalysis, BIOGEVES. The BMT also received presentations on current studies on entomology at GEVES by Mr. Pierrick Aupinel, Directeur d'Unité Entomologie, and Mr. Jean-François Odoux, Ingenieur chercheur, one of which is reproduced in Annex VI to this report.

*56. The BMT adopted this report at the close of its session, on November 10, 2017.*

[Annexes follow]

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## II. OBSERVERS

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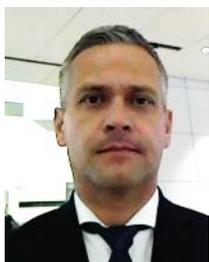
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V. OFFICER



Kees van Ettehoven (Mr.), Chair

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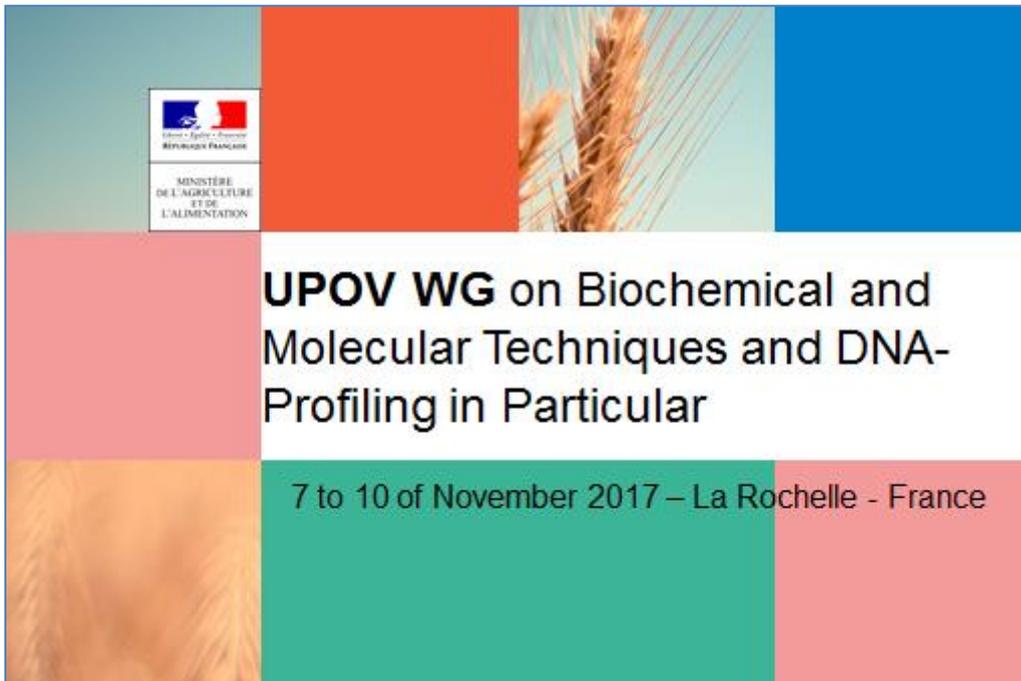
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[Annex II follows]

OPENING REMARK BY MR. FRÉDÉRIC MALTERRE, DIRECTION GÉNÉRALE DE L'ALIMENTATION,  
MINISTÈRE DE L'AGRICULTURE ET DE L'ALIMENTATION, FRANCE



## A short presentation of my office

- Ministry of food and agriculture
- DGAL : General Directorate for Food
- BSPIC : Seeds and Integrated Crop Protection Office
  - Office in charge of :
    - Coordination of « Ecophyto », French plan for reducing the use of pesticides and development integrated crop management
    - Regulatory rules on seed including GMO, Intellectual Property and conservation of phytogenetic resources
    - Coordination of the Seed and Plant plan for a sustainable agriculture

## French Farm key figures

- 474 000 Farms, 922 000 workers
- Agricultural Area : 54 % of France, about 29 millions hectares
- A diversified agriculture
- Animal production with cows, poultry, pigs...
- Crops with cereals, vine, fruit et vegetables et also grassland

 MINISTÈRE DE L'AGRICULTURE ET DE L'ALIMENTATION



## Main Crops in France (Million ha)

- Wheat : 5.5
- Maize : 2.9
- Barley : 1.9
- Oilseed Rape 1.5
- Vineyard : 0.75
- Sunflower : 0.5
- Grassland : 9.2

 MINISTÈRE DE L'AGRICULTURE ET DE L'ALIMENTATION

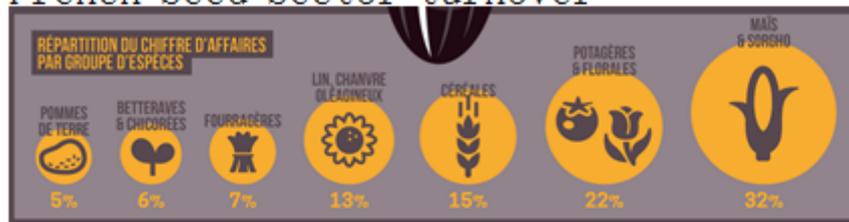
## About French Seed Sector

First producer in Europe  
First exporter in the world with  
1,45 b€ turnover  
18784 farmers seed multiplier  
244 seed companies  
73 breeding companies



MINISTÈRE DE L'AGRICULTURE ET DE L'ALIMENTATION

## French Seed Sector turnover



Total : 3.5 b€

By crops :

- 32 % Maize and Sorghum,
- 22 % Vegetable and floral plants
- 15 % Cereales
- 13 % Flax, Hamp and Oleaginous plants
- 7 % Forage plants, 6 % Beet and Chicoree, 5 % Patatoes

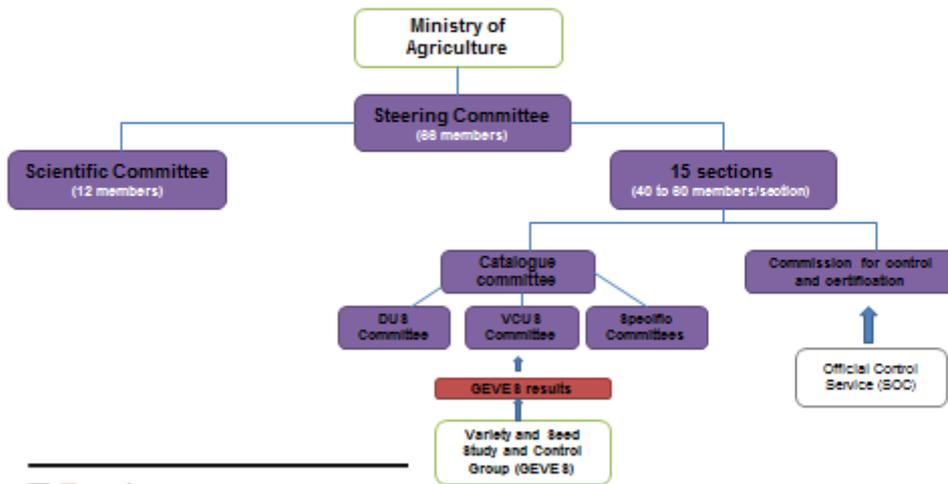
MINISTÈRE DE L'AGRICULTURE ET DE L'ALIMENTATION

## Regulation of plant propagating material in France

European legal basis  
Directives are adopted at the  
european level  
French regulation must be  
written according to those  
directives



## Technical Committee for Plant Breeding (CTPS)



## Key figures for listing varieties

### French listing

**9 285 varieties - 250 different species** (au 12/01/2016)

Agriculture species

> 4 600 varieties

Vegetables

> 2 800 varieties

Fruit plants

1 407 varieties

### UE listing

**44 000 varieties**

## Key figures for annual listing varieties in France

Total about 600

- Maize and Sorghum : about 125
- Cereales : about 70
- Beet and Chicory : about 60
- Oilseed rape and other cruciferous : 30
- Forage and turf plants : about 50
- Vegetable plants : about 165
- Fruit trees : about 45
- Vineyard : about 9

Seeds and plants for a sustainable agriculture

## **SEMENCES ET PLANTS** POUR UNE AGRICULTURE DURABLE



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 MINISTÈRE DE L'AGRICULTURE ET DE L'ALIMENTATION

Seeds and plants for a sustainable agriculture

This new plan was published on December 2016.

Designed after long consultations of relevant stakeholders.

A common roadmap for the seed sector

Seed and plants breeding sector has a key role in the implementation of a sustainable and competitive agriculture as promoted by the Ministry of Agriculture.

Research is fundamental with necessity of promoting quality applied research conducted in partnership with public research and private operators.

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 MINISTÈRE DE L'AGRICULTURE ET DE L'ALIMENTATION

## Seeds and plants for a sustainable agriculture

Innovation is the key to address the capacity of breeders and seed companies to take into account new traits, new features and new targets to meet the expectations of today's and tomorrow's markets.

Agriculture needs plants and seeds adapted to different social, agronomic, environmental contexts, cultural and economic. It is therefore necessary to have a better understanding of the complexity of agro-ecosystems, and to take account diversity, within and between species.

## Seeds and plants for a sustainable agriculture

- 1) Improve and organise the conservation of genetic resources
- 2) Foster innovation to serve « agroecology » in the seeds and plants sector
- 3) Adapt the criteria for listing varieties for a sustainable and competitive agriculture
- 4) Develop innovative processes for producing and analyzing data on plant varieties
- 5) Strengthen the control and certification system for marketed seeds and plants
- 6) Ensure the promotion of French interests abroad and communicate in a transparent way on plant breeding

## To get more informations

<http://agriculture.gouv.fr/stephane-le-foll-presente-le-nouveau-plan-semences-et-plants-pour-une-agriculture-durable>



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 MINISTÈRE DE L'AGRICULTURE ET DE L'ALIMENTATION

## Focus on plant breeders right

France is supporting the UPOV system

- Best way to protect the work of breeders

- Keeps free access to the genetic material as a common good

New element in the French law modified in august 2016 for a better equilibrium between patent and certificate

- Restriction of the possibility to get a patent in France for products obtained by mainly biological process

- Reducing the scope of the patent which will not apply to the material with similar treats obtained by biological process

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 MINISTÈRE DE L'AGRICULTURE ET DE L'ALIMENTATION

Have a productive week in La Rochelle

[Annex III follows]

OPENING REMARK BY MR. CHRISTIAN HUYGHE, DIRECTEUR SCIENTIFIQUE AGRICULTURE,  
INSTITUT NATIONAL DE RECHERCHE AGRONOMIQUE (INRA), FRANCE

**UPOV BMT16**

**Christian Huyghe welcom address**

Opening session of UPOV BMT 16; 7<sup>th</sup> of November 2017, La Rochelle, France

**Welcome:**

Thank you to René Mathis and his team for organizing this meeting and for inviting me to give you this welcome address

My responsibilities are:

- Scientific Director for Agriculture at INRA
- President of the Administrative Board of GEVES
- Chairman of the Scientific Committee of the CTPS

**About INRA:**

- Founding member of GEVES
- First european research organization in Agriculture
- 2<sup>nd</sup> research organization in Agriculture in the world
- 3 pillars: Agriculture (>50%), Food and Environment
- Staff :               8000 permanent members of staff  
                          13000 staff when including PhD, post-doc and associated researchers in UMR

Organisation:

13 scientific divisions

One dedicated to genetics and plant breeding with 1000 staff and many joint research with agronomy and crop protection divisions.

12 experimental units for running trials and short- or long-term experiments

One research unit, in economics department with a special focus on strategy of plant breeding companies and role of intellectual property regime.

Scientific production:

1,4 papers per scientist in BAP (Plant Biology and Breeding), 54% international co-authorship

1,7 papers per scientist in EA (Agronomy and Environment) and SPE (Plant health and environment)

5000 scientific papers per year (5123 in 2016),

50% in international co-authorship

**Plant Breeders right is a key issue for plant breeding**

Regulations are a main component of any innovation ecosystem

Stability of regulations proved to be a determining factor for investment!

Combined with the national catalogue and the registration procedures, it ensures the genetic gains to better meet the expectations of farmers/consumers/supply chain.

Getting back to the founding concept of plant breeders rights:

- It considers the genetic background as a common good  
Nagoya treaty is not fully on line with this view  
This should be better underlined  
Open science!
- It creates the conditions to maximize the genetic gain rate
- It gives the same opportunities to all countries all around the world  
Accessible technologies  
What are going to be the accessible

### And now?

New technologies for describing/ characterizing varieties

- When PBR concept was established in 1961, DNA had just been discovered and phenotyping was the only technology accessible to all.
- Molecular markers
- Sequencing and GBS

New methodologies for creation

- Genomic selection
- NBT
  - Tracing the creation methods?
  - VCUS: Describing the phenotype and the ecosystemic services
  - PBR: what are the patents on the obtention methods?

### I wish you

Fruitful discussions

Sharing the most recent progresses in relevant technologies

Having in mind the possible uses for plant protection with the maximization of the services to all:

- Acknowledging genetic gains while ensuring free access to genetic diversity
- Common views and common possibilities to all countries all around the world
- Long term vision !

[Annex IV follows]

OPENING REMARK BY MR. ARNAUD DELTOUR, DIRECTEUR GÉNÉRAL, GROUPE D'ÉTUDE ET DE CONTRÔLE DES VARIÉTÉS ET DES SEMENCES (GEVES), FRANCE



**GEVES**  
The French Group for the  
study and evaluation  
of Varieties and Seeds

**BMT UPOV – La Rochelle**  
November 7, 2017.

Arnaud DELTOUR - CEO

©2017 - November 2017 - La Rochelle, France

**GEVES**  
Expertise & Performance

## What is GEVES ?

The French Group for the study and evaluation  
of Varieties and Seeds

- A public structure (Public Interest Group created in 1989)
- An official and unique organization in France
- In partnership with :

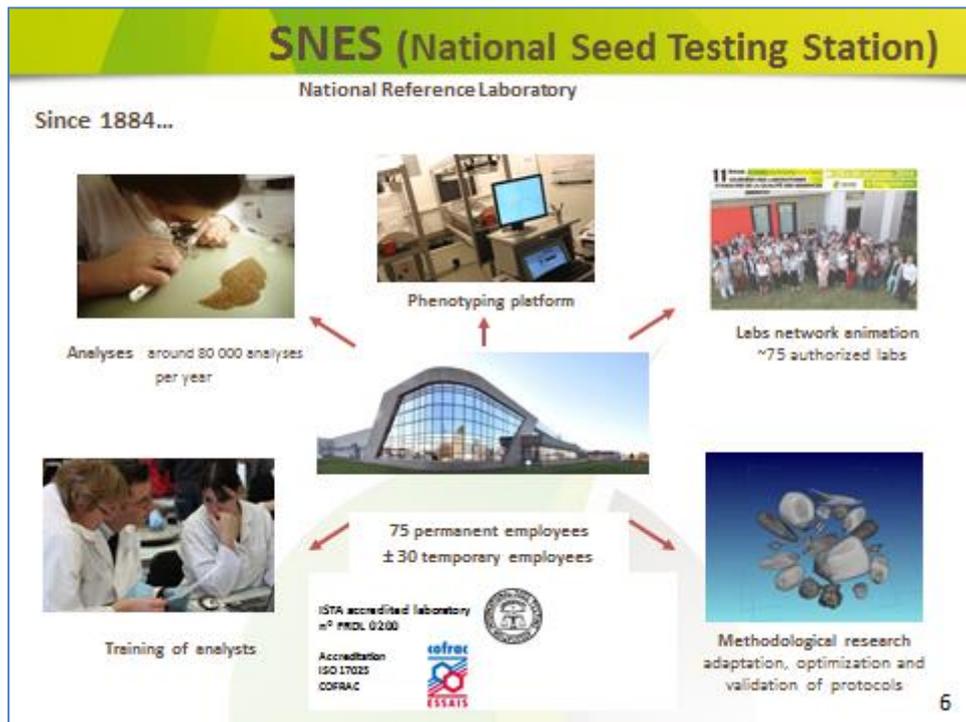
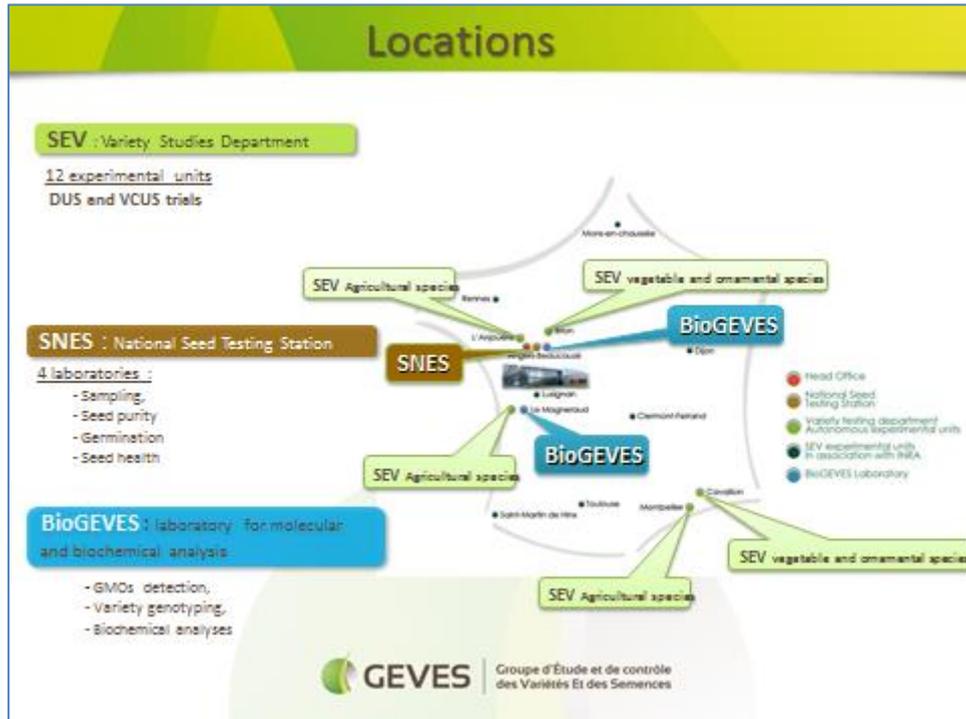
 **INRA** – INRA (the French National Institute for Agricultural Research)  
SCIENCE & IMPACT

 – The Ministry in charge of agriculture

 **gnis** – GNIS (French Inter-professional Group for Seeds and Seedlings)

2





## Analyses of seed lots focuses

on three main areas :

- Physical quality
- Germination capacity
- Seed health

The analyses are carried out using the protocols and international rules of ISTA.

- The pathology laboratory also works on the evaluation of a variety's resistance to viruses, bacteria, fungi and nematodes in DUS or VCUS tests for registration or protection.



**GEVES** | Groupe d'Étude et de contrôle des Variétés Et des Semences

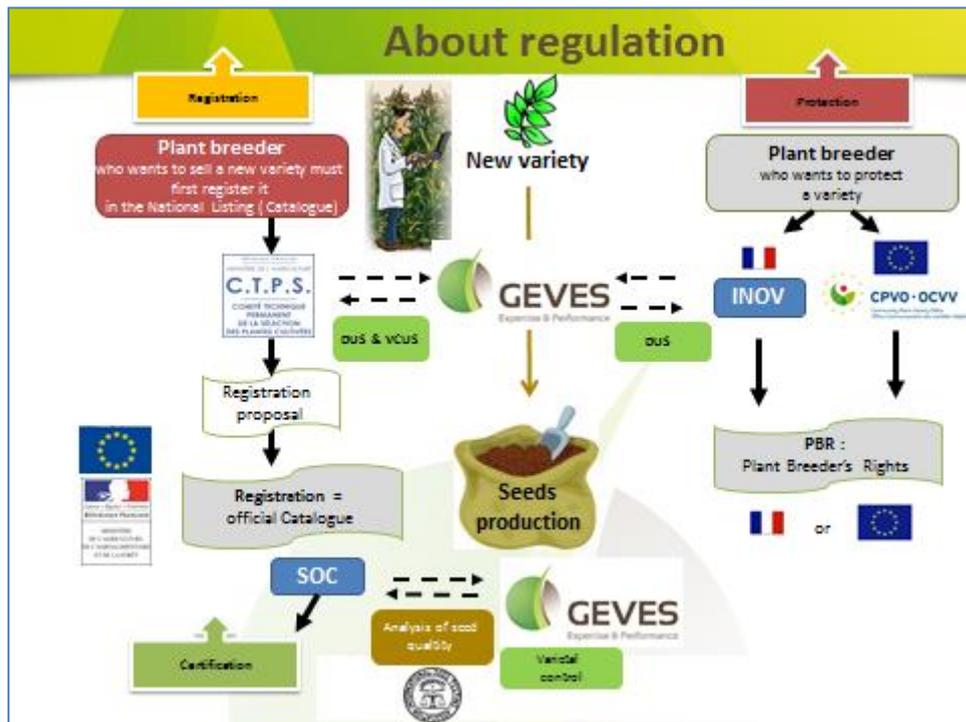
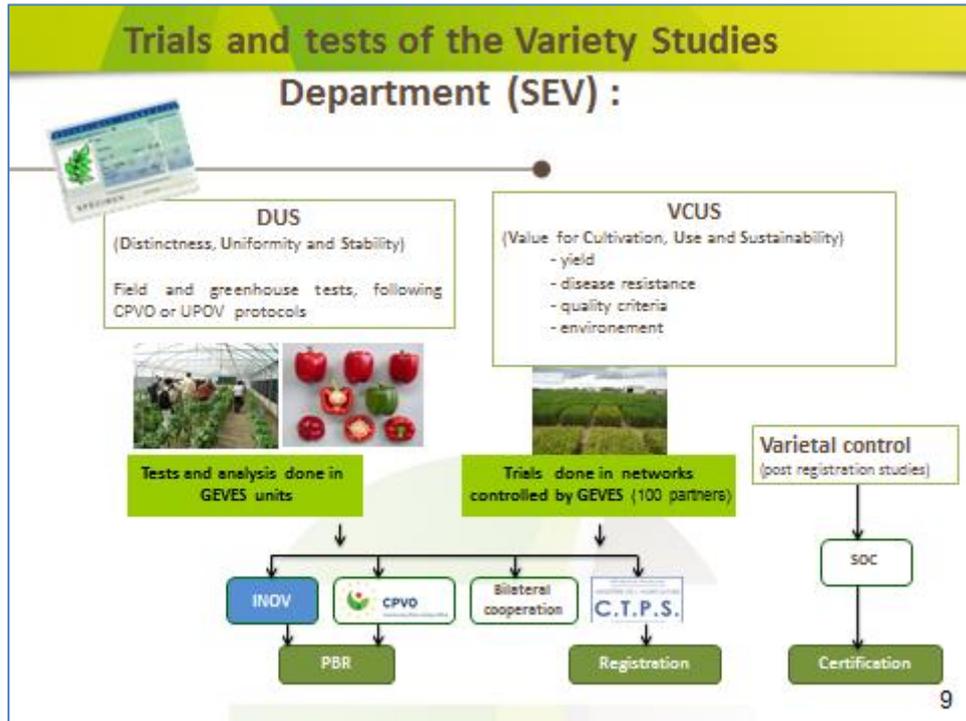
## BioGEVES overview

- **Department in charge of Molecular Biology and Biochemistry :**
  - 20-25 employees (16 permanent staff)
  - 900m<sup>2</sup> of laboratories (2 locations)
  - ISO 9001; ISO 17025
- **Main activities**
  - **Molecular analysis on Seed and Varieties :**
    - Identity and purity of varieties
    - Evaluate technological characters (VCU)
    - Presence of a specific character
    - Presence of GM events (NRL)
    - Seed quality : pathogens detection
  - **Improvement and development of methods**
    - Research Programs
    - Optimization
    - Validation of protocols (national or international level)
  - **Training, expertise, Proficiency tests**



**GEVES** | Groupe d'Étude et de contrôle des Variétés Et des Semences

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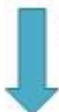
## Key figures : DUS tests

- 1 100 new applications tested for French registration
- 1 100 DUS reports sent to other official bodies
  - =100 to INOV
  - >500 to CPVO
  - >400 to other European offices
  - >200 to non European countries

(33% initial studies, 66% take-over reports)

Each year, in DUS studies = 3600 new cultivars  
+ 12 000 reference collection varieties

## Le GEVES partner of national and international bodies

- 
- 
- 
- French Ministry of Agriculture
  - INRA (National Institute for Agricultural Research)
  - CTPS (Technical Committee for Plant Breeding)
  - INOV (National Office for Plant Breeder's Rights)
  - SOC (Official service of Control and Certification)
  - GNIS (The French Association for Seeds and Seedlings)
  - CPVO (The Community Plant Variety Office)
  - UPOV (The International Union for the Protection of New Varieties of Plants)
  - ISTA (The International Seed Testing Association)
  - ISHI (International Seed Health Initiative)
  - COUNTERPARTS : Bundessortenamt, Naktuinbouw, Niab, Coboru, ...



Végépolys = an international competitiveness plant cluster

## Conclusion

GEVES is a major support service for the evaluation and identification of genetic improvement and seed quality

Thank you for your attention

[WWW.GEVES.FR](http://WWW.GEVES.FR)



[Annex V follows]

OPENING REMARK BY MS. ANNE LISE CORBEL, RESPONSIBLE FOR DUS,  
GEVES - VARIETY SECTOR, FRANCE

Use of molecular markers in the variety testing  
department  
& Perspectives

BMT 16, La Rochelle



## Context

- **Global increase of reference collections**
  - Workload and trial size increases
- **Difficulties encountered to distinguish varieties for some species**
  - Few QL or grouping characteristics
  - Long studies needed to distinguish varieties (up to 6 years) and refusals even if varieties from distant origins



2

## Context

- Important investment of GEVES to develop biomolecular methods
  - ➔ To manage and limit the impacts of reference collection increases
  - ➔ To optimize the D evaluation



- Mainly developments of UPOV model 2: combination of morphological and genetic data

## Overview of the current uses and developments

	Model 2 Combination of morphologic and genetic distances	Control of the conformity of hybrid formula	Control of sterile/fertile lines	Control of samples for collection renewal or for VCU	Model 1 Check the presence of one characteristic
SSR	Spring barley	Sunflower Wheat Barley Triticale		Pea, Strawberry Fruit trees: apple, peach, cherry, pear, apricot, japanese plum	
SNP	Maize Sorghum Rapeseed	Maize Sorghum Rapeseed	Maize Sorghum Rapeseed	Maize Sorghum Rapeseed	
GBS	Lucerne			Lucerne	
Specific gene					Beet (HS1Pro1) Peach tree: sharks, self-fertility

Species in white: utilization in routine  
Species in blue: development phase

⇒Molecular markers are used in the framework of DUS testing for 10 to 15% of species studied in GEVES

## Conclusions from several experiences

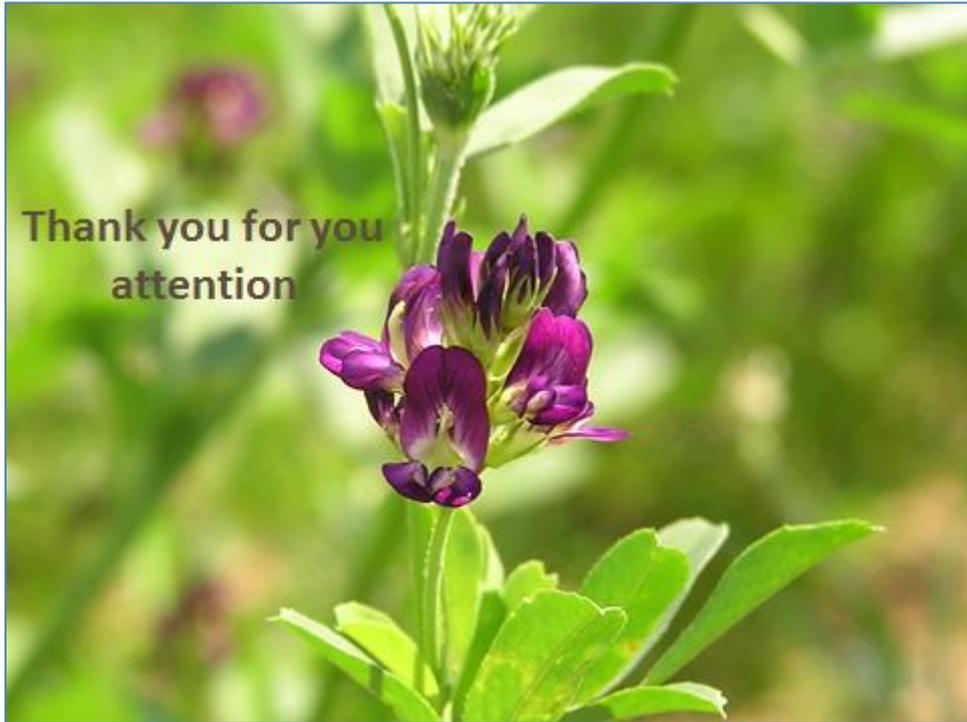
- In some cases very high benefits (example of maize)  
[BMT/16/10](#)  
[BMT/16/8](#)
  - In some cases
    - No urgent need (when strong grouping characteristics for example), current reference collection manageable
    - Low benefits (for example when marker sets not built for that purpose) [BMT/16/11](#)
- For both, ratio cost/benefits too important

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## Perspectives

- Up to now, work and developments mainly on self-pollinated and hybrid species
- New opportunities with new methods to test on cross-pollinated species
  - Collaborative project for lucerne using GBS [BMT/16/17](#)
  - Promising work on oilseed rape [BMT/16/7](#)
- Model 1: Not currently used for routine DUS characteristics in GEVES but ongoing developments for VCU (ex: barley yellow mosaic virus)

6



[Annex VI follows]

PRESENTATION BY MR. JEAN-FRANÇOIS ODOUX AND MR. PIERRICK AUPINEL,  
INSTITUT NATIONAL DE RECHERCHE AGRONOMIQUE (INRA), FRANCE

**BioGevès Le Magneraud**  
*Surgères, 9th November 2017*



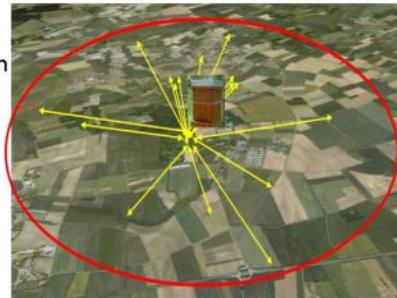
**ECOBEE**  
Dynamics, diet and honeybee  
colonies performances in LTER ZA-PVS

 **INRA** Jean-François ODOUX  
Pierrick AUPINEL  
INRA UE Entomologie, Le Magneraud, SURGERES – France

**cnrs**  
Vincent BRETAGNOLLE  
CNRS Centre d'Etudes Biologiques de Chizé, Villiers en Bois – France

## Honey Bees and Landscape: questioning ?

- We know that landscape has an effect on bee colonies...**difficult to show**
- We know that agricultural practices have an effect on floral...**difficult to show**
- Relationship honeybee/territory  
= food resources
- Intensive farming and bee sustainability?
- ECOBEE/ZAPVS = monitoring tool



=> Support from the public policies (French Government and UE) to assess the impact of cropping systems on pollinators sustainability



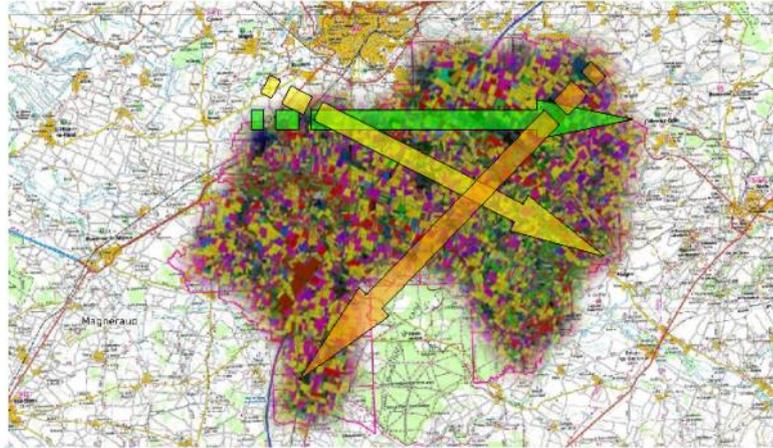
*"no hive has the same development cycle than another. No honey is comparable to another. The beekeeper is a favored observer of nature"*  
G. Lorenz - Editorial - Abeilles & Ruches, 2015



## ECOBEE monitoring

Grid of 50 sectors  
(1 sector = 1 apiary)

ZoLTER  
« Plaine & Val de Sèvre »,  
Deux-Sèvres, France

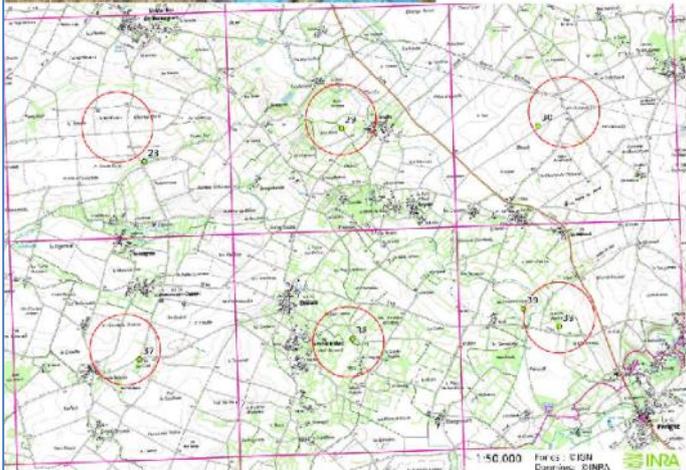
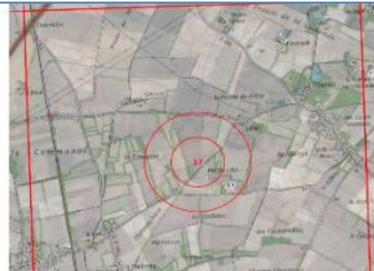


### Parameters recording

- at the landscape level (cultures, flowers, etc.)
- at the apiary level (5 ruches) (honey, pollen, brood, mortality, reserves, etc.)



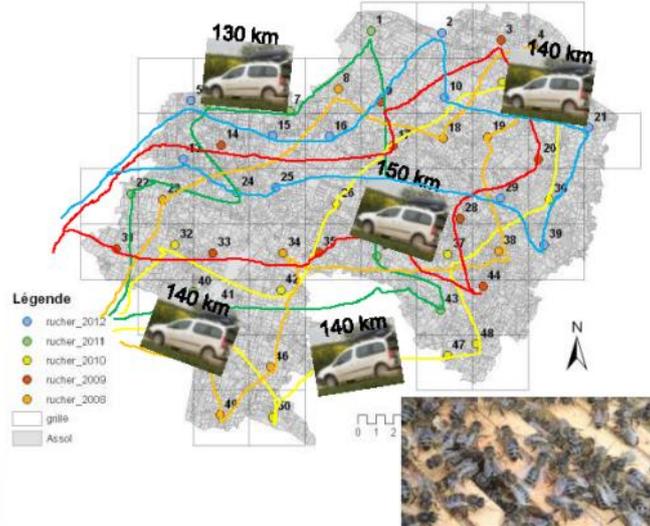
### Hives set up (March-Sept)



## Colony monitoring: organisation and means



Zone atelier "Plaine et Val de Sèvre"



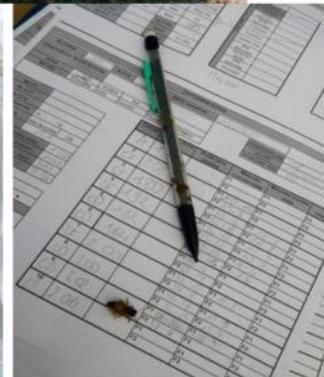
## Observations on colonies



Frames weighing

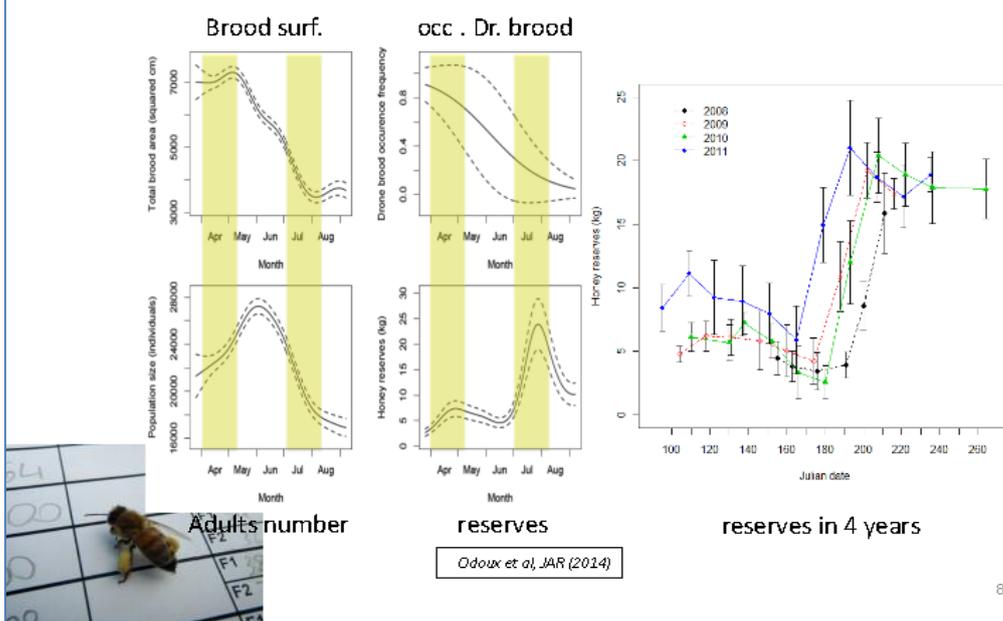


Brood area

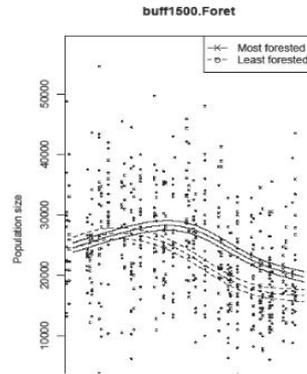
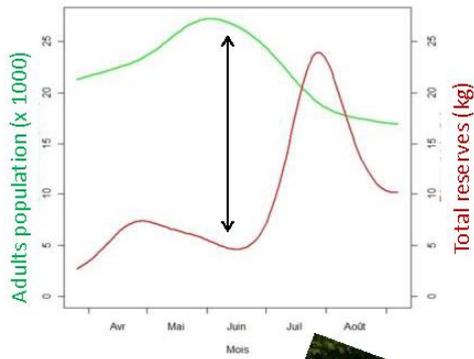


## Apibee database

## Seasonal evolution of the estimators



## Compensating effect of the landscape?



Wood effect on adult population after rapeseed blooming



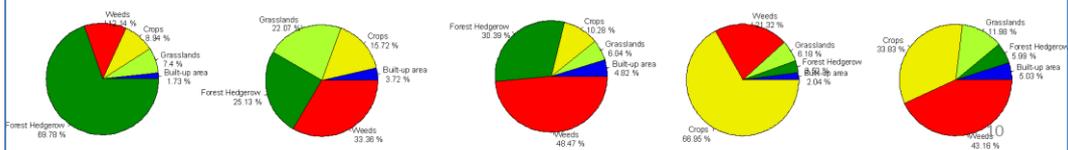
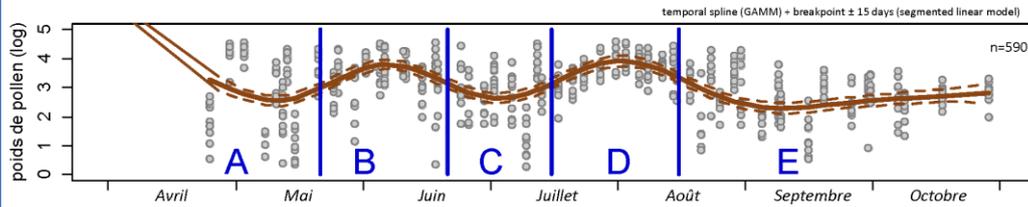
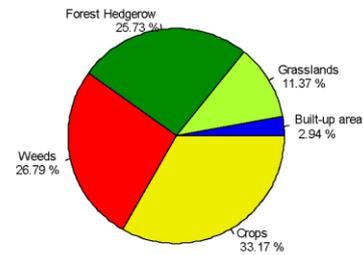
Odoux et al, JAR (2014)

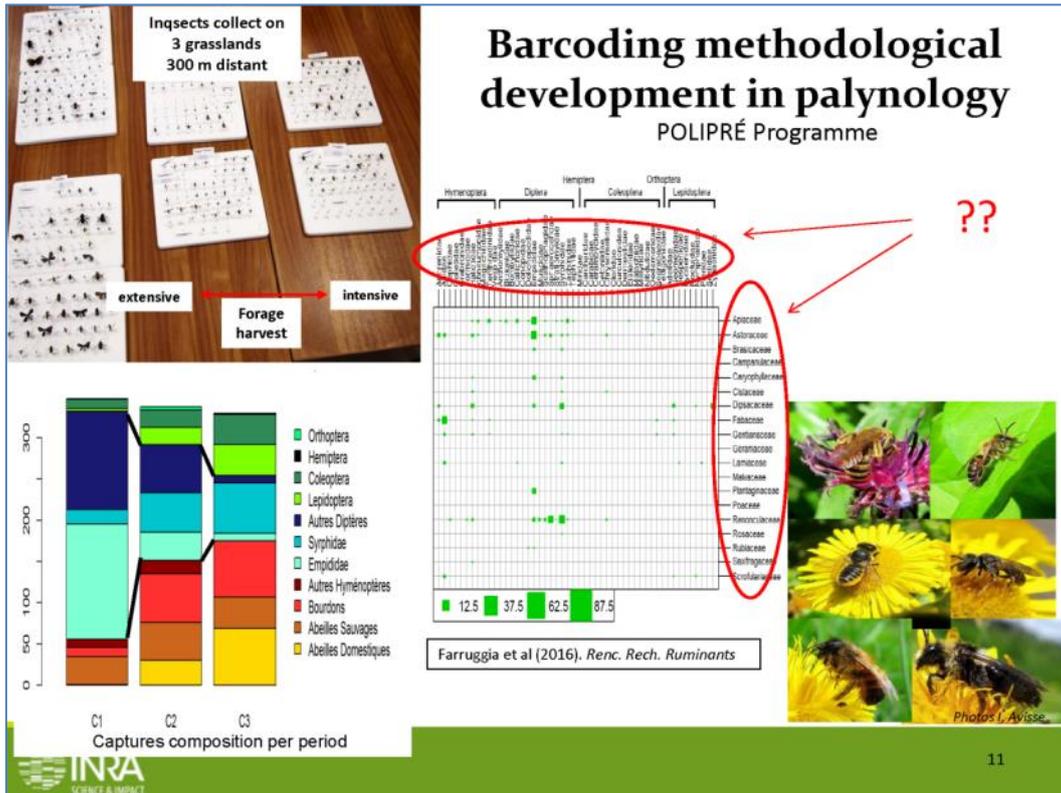


## Pollen diet of the colonies

Groupes	Nombre d'espèces
Ornementales	64
Prairiales	61
Forêt + haie	41
Adventives	32
Cultivées	17
<b>Total</b>	<b>215</b>

F. Requier (2013) Thesis  
Requier et al, Ecol. Appl (2015)



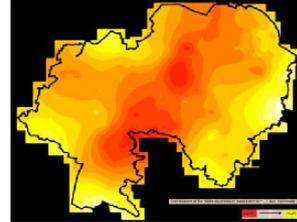


### An example of results for comparison of methods

Sample number	Date collect	Barcoding		Microscopy		correspondance		
		Taxa_barcoding	Nb Read total de l'ech	% read	Taxa microscopy	Nb grains	% nb grains	taxa_correspondance
E10-CHI-366	13/07/2010	<i>Helianthus annuus</i>	11759	77,25%	<i>Helianthus annuus</i>	273	31,89	<i>Helianthus annuus</i>
E10-CHI-366	13/07/2010	<i>Mercurialis annua</i>	2341	15,38%	<i>Mercurialis annua</i>	381	44,51	<i>Mercurialis annua</i>
E10-CHI-366	13/07/2010	<i>Solanum nigrum ou villosum</i>	1003	6,59%	<i>Solanum sp (nigrum)</i>	133	15,54	<i>Solanum spp</i>
E10-CHI-366	13/07/2010	<i>Rubus sp</i>	50	0,33%	<i>Rubus sp</i>	51	5,96	<i>Rubus sp</i>
E10-CHI-366	13/07/2010		0	0	<i>Verbascum sp</i>	7	0,82	<i>Verbascum sp</i>
E10-CHI-366	13/07/2010		0	0	<i>Papaver sp (rhoeas)</i>	5	0,58	<i>Papaver rhoeas</i>
E10-CHI-366	13/07/2010		0	0	<i>Magnolia sp</i>	4	0,47	<i>Magnolia sp</i>
E10-CHI-366	13/07/2010		0	0	<i>Crepis sp</i>	1	0,12	<i>Crepis spp</i>
E10-CHI-366	13/07/2010		0	0	<i>Eremophila sp</i>	1	0,12	<i>Eremophila sp</i>
E11-CHI-483	20/05/2011	<i>Papaver rhoeas</i>	8357	67,35%	<i>Papaver sp (rhoeas)</i>	451	53,88	<i>Papaver rhoeas</i>
E11-CHI-483	20/05/2011	<i>Onobrychis arenaria</i>	1788	14,15%	<i>Onobrychis viciifolia</i>	11	1,31	<i>Onobrychis viciifolia</i>
E11-CHI-483	20/05/2011	<i>Loncomelos pyrenaicum</i>	1050	8,31%	<i>Ornithogalum sp</i>	226	27	<i>Loncomelos pyrenaicum</i>
E11-CHI-483	20/05/2011	<i>Carduus tenuiflorus</i>	878	6,95%	<i>Cirsium sp</i>	8	0,96	<i>Carduoideae1</i>
E11-CHI-483	20/05/2011	<i>Ligustrum sp</i>	140	1,11%	<i>Ligustrum vulgare</i>	50	5,97	<i>Ligustrum spp</i>
E11-CHI-483	20/05/2011	<i>Sambucus nigra</i>	117	0,93%	<i>Sambucus nigra</i>	17	2,03	<i>Sambucus nigra</i>
E11-CHI-483	20/05/2011	<i>Eschscholzia californica</i>	28	0,22%	<i>Eschscholzia californica</i>	57	6,81	<i>Eschscholzia californica</i>
E11-CHI-483	20/05/2011	<i>Lolium multiflorum</i>	27	0,21%	<i>Poaceae</i>	3	0,36	<i>Poaceae5</i>
E11-CHI-483	20/05/2011	<i>Bryonia dioica</i>	16	0,13%		0	0	<i>Bryonia dioica</i>
E11-CHI-483	20/05/2011		0	0	<i>Rosa sp</i>	9	1,08	<i>Rosa spp</i>
E11-CHI-483	20/05/2011		0	0	<i>Rhus sp</i>	2	0,24	<i>Rhus sp</i>
E11-CHI-483	20/05/2011		0	0	<i>Rubus sp</i>	2	0,24	<i>Rubus sp</i>
E11-CHI-483	20/05/2011		0	0	<i>Melilotus sp</i>	1	0,12	<i>Melilotus sp</i>
E11-CHI-483	20/05/2011		0	0	<i>Pisum sativum</i>	0,1	0	<i>Pisum sativum</i>

## Conclusion

**Experimental device**



**Recent projects**

Pesticide exposure effect in the landscape :

*effect of a neonicotinoid on homing flight*

*Pesticide risk assessment is weather and landscape dependent*

Melliferous flora:

*melliferous planting can improve bee health,*

*melliferous potential of wild flowers*

Improvement of bee sustainability in farmland:

### **DEPHY-Abeilles**

*cropping system favourable evolution for bees*

Weeds for bees :

*food shortage compensation and bee health through PAPAVER/ CYANUS*

Biodiversity & Citizen Science:

*Black local bee/Pollen diversity for territorial conservation by citizens*



**Networks** : Coloss / OECD / ITSAP / CNF



[End of Annex VI and of document]