



Productive and Ecological Agriculture

Strategy, organization and needs
of the InVivo network

1. **Who are we**
2. Network organization
3. Productive agriculture: main items
4. Ecological agriculture: main items
5. Conclusion

- 
- A world map with a color gradient from light yellow to dark orange. A black-bordered text box is overlaid on the map, containing a list of key facts about the InVivo Group. The text box is positioned over the Atlantic and European regions of the map.
- National union of cooperatives with **279** members
 - Purchasing, sales and services center
 - 4 activity areas:

| | |
|--------------|-------------------------------|
| THE ALLIANCE | Seeds & Agricultural Supplies |
| OF ANIMAL | Animal Nutrition and Health |
| AND | Storage and Grain Trading |
| PLANT | Distribution |
 - Turnover: **€5,086 billion**
 - Workforce: **6,114**
 - France's No 1 group of agricultural cooperative



InVivo's missions

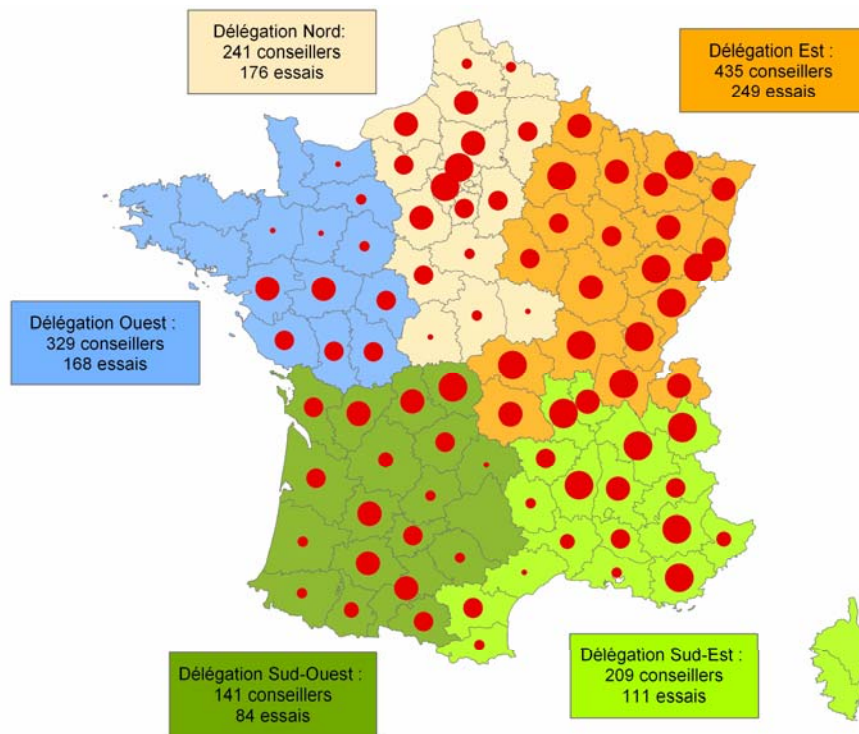
Design, develop and pool techniques, products, tools and services enabling cooperatives and farmers to produce more and better

Generate visible differentiation and a tangible economic return for members



InVivo farm supplying network

- 60 % of the French market on pesticides, fertilizers and seeds
- Advices and products
- 2 073 field advisers agronomists



The 79 cooperatives of the InVivo network for agricultural input

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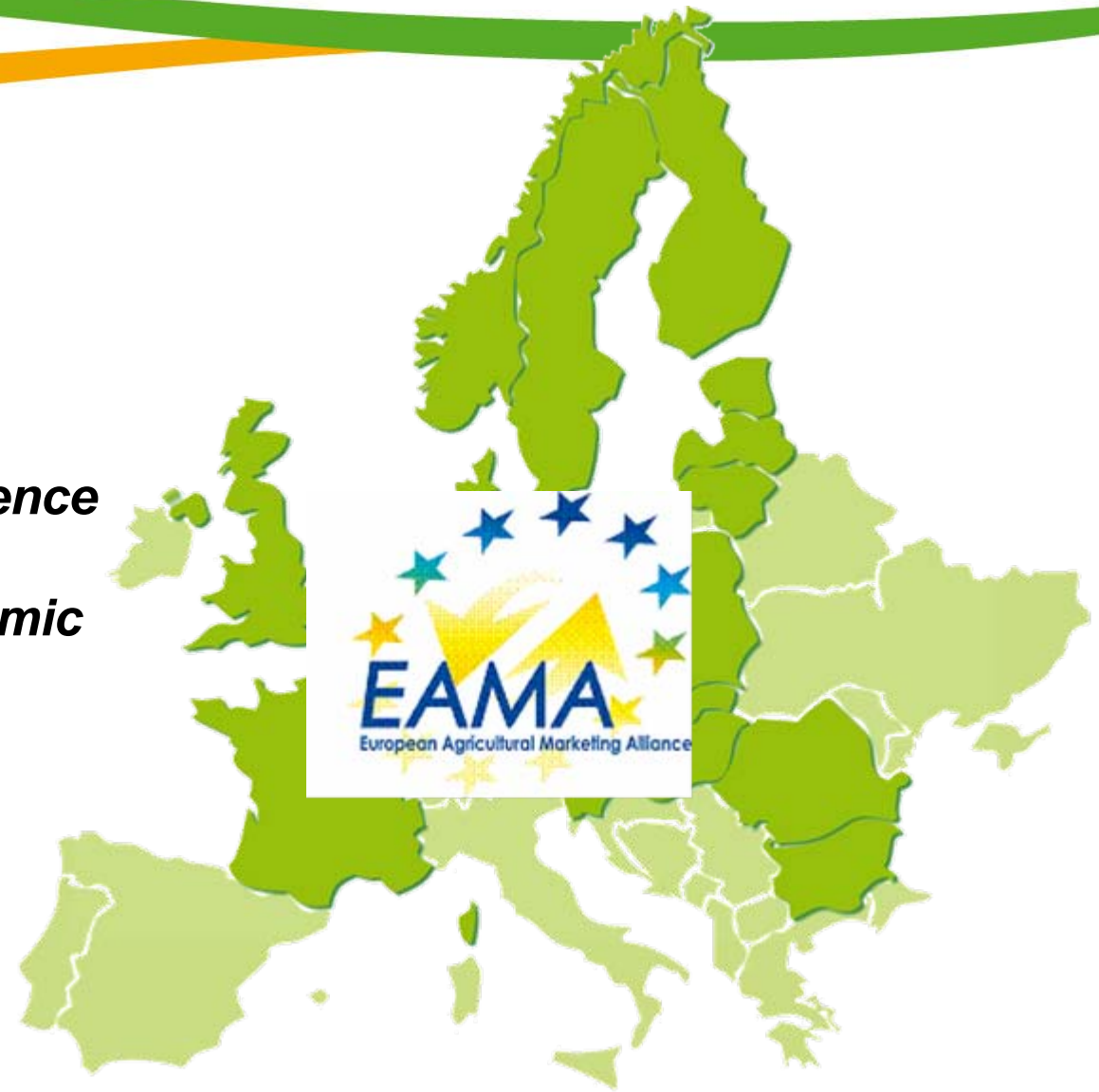
Know how acquiring network

- **Aim: design the most efficient agro-management methods for each type of agronomic situation in France**
- **Field trial network: each year**
 - 554 Field crops trials
 - 60 Vineyards trials
 - 33 Vegetables Production trials
 - 21 Orchards trials
- **Local field agro-economic surveys:**
 - Cropping system coherence
 - Hierarchization of limiting factors and techniques
 - Yield and economic impact of agronomic problems



European Alliance

***Sharing field experience
on: agronomy,
environment, economic
results***



Epiclès,
Phytnès

Ramsès II
Sépale +, ...

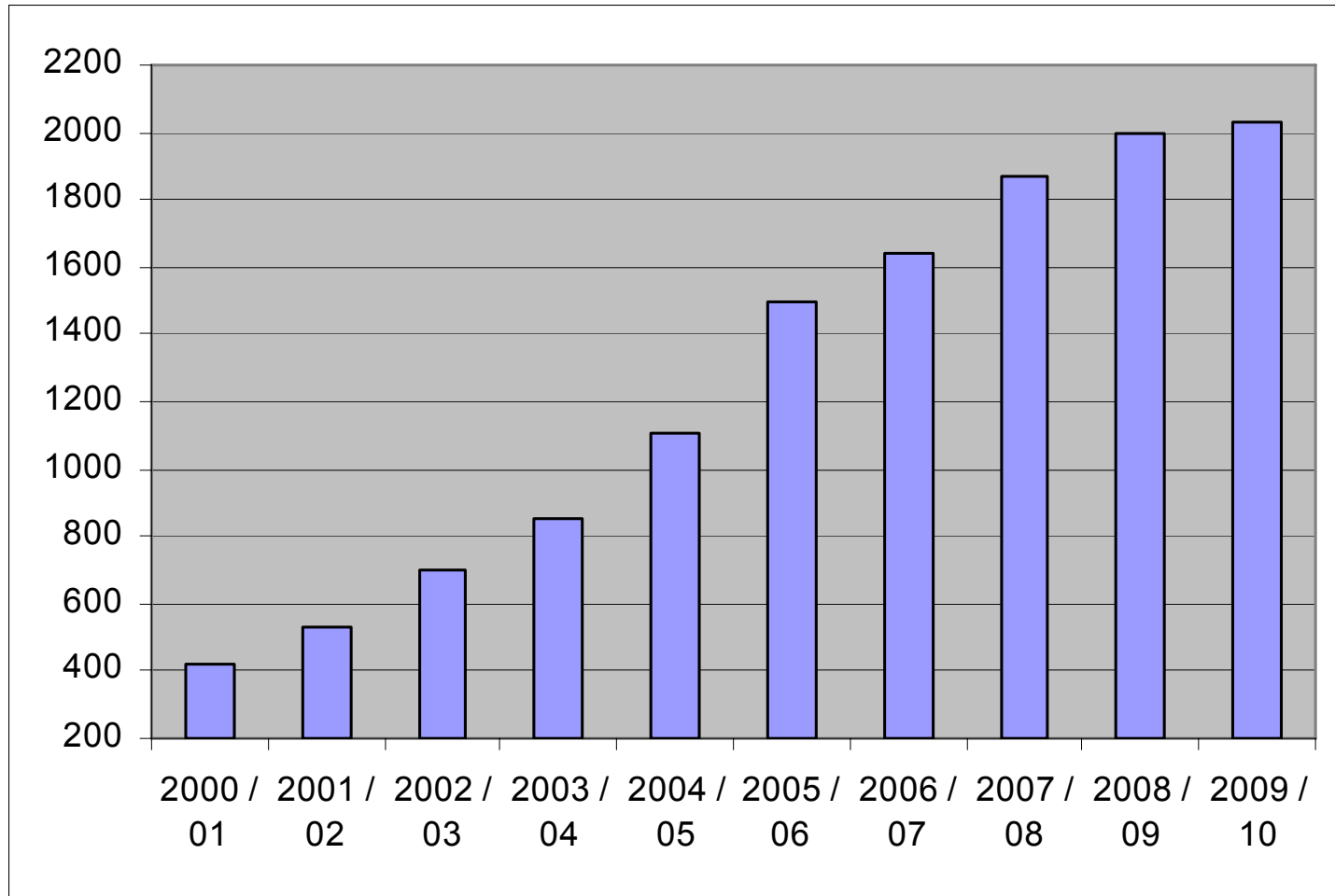
OSMOSE

AgroEDI,

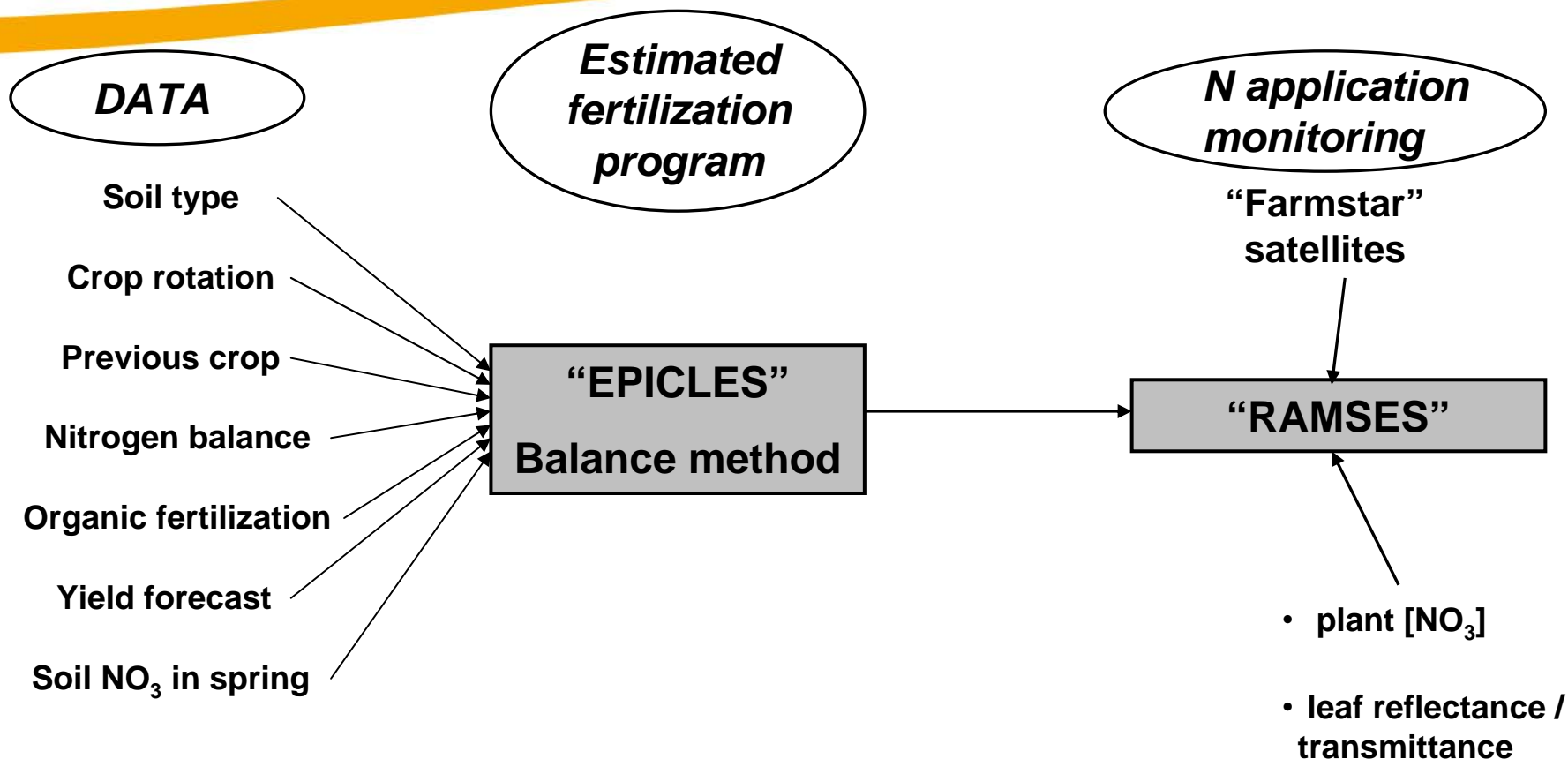
- **Fertilization and protection planning**
 - Plant protection and fertilization designing systems
 - Complying with regulation, budget
 - Economic simulation models: weeds / diseases related losses
- **Piloting the timing of agro-management operations**
 - Epidemiologic / plant development models
 - Optimum date of spraying or suppression
 - Optimum rate and date of nitrogen application
- **Advices and services management**
 - Central and deported data bases;
 - Traceability of advices and actual operations
 - Field advisers for agro-management and quality control system
- **Crops and Field data bases**
 - DAPLOS data
 - Geo referenced datas
 - Direct information transfer with other information systems



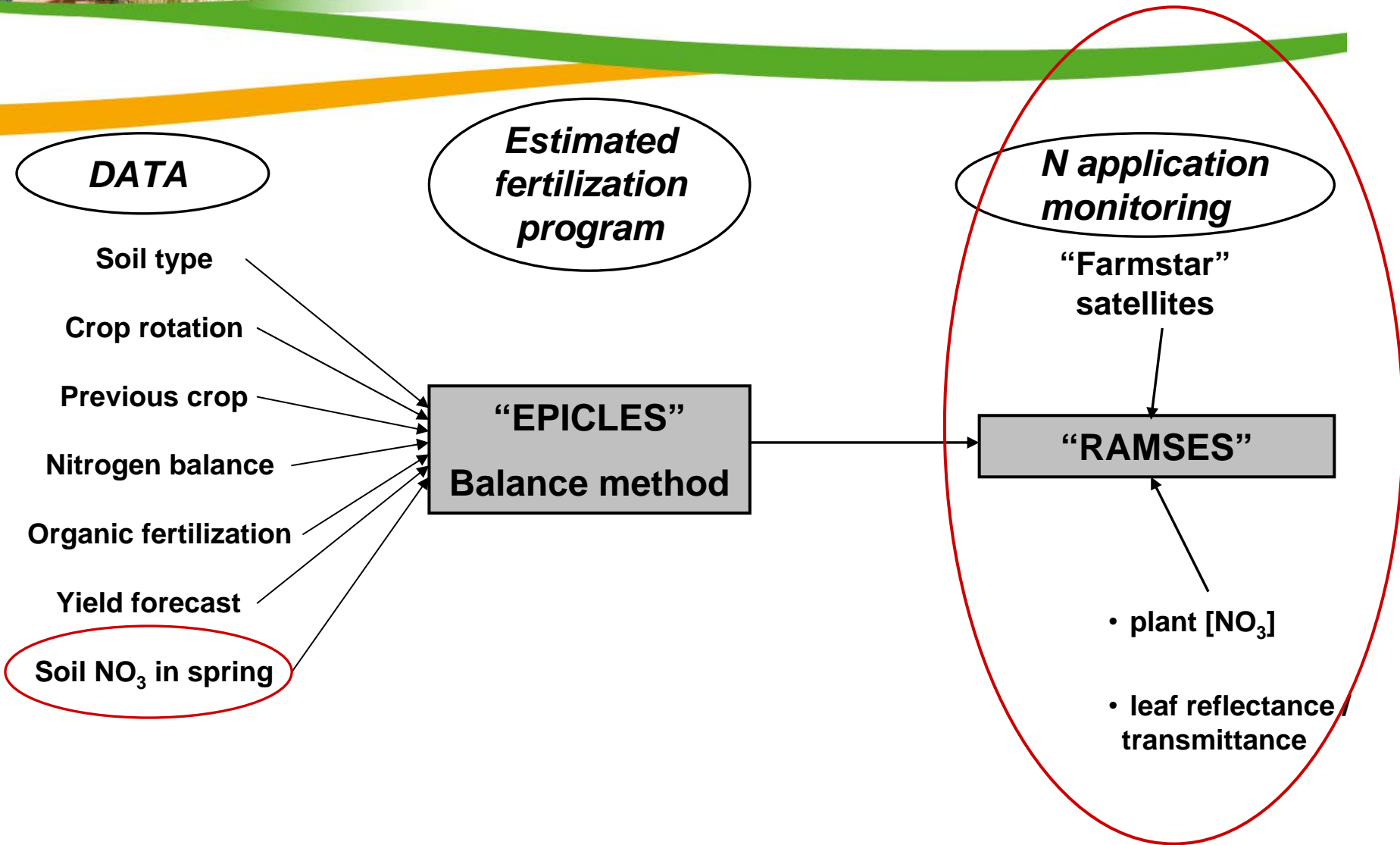
InVivo network advices : area evolution (1000 ha)



Nitrogen fertilization advising

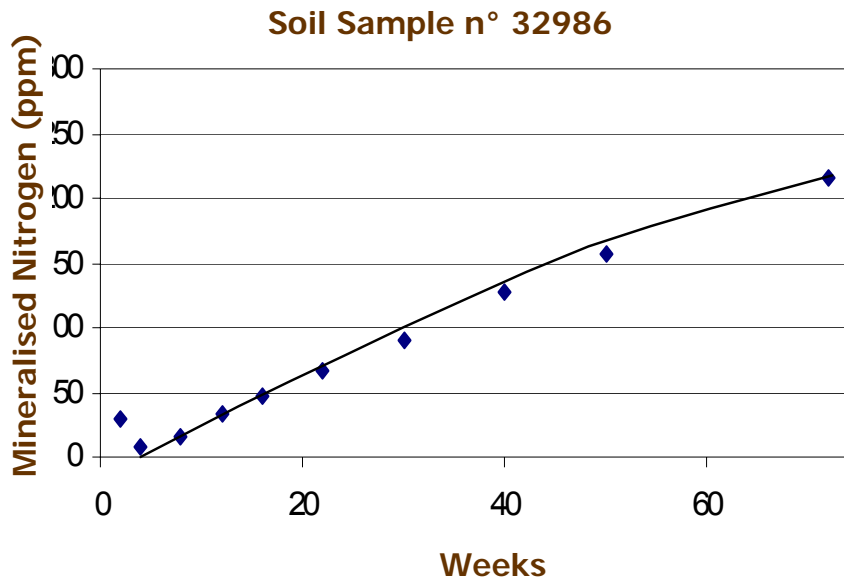


Nitrogen fertilization advising

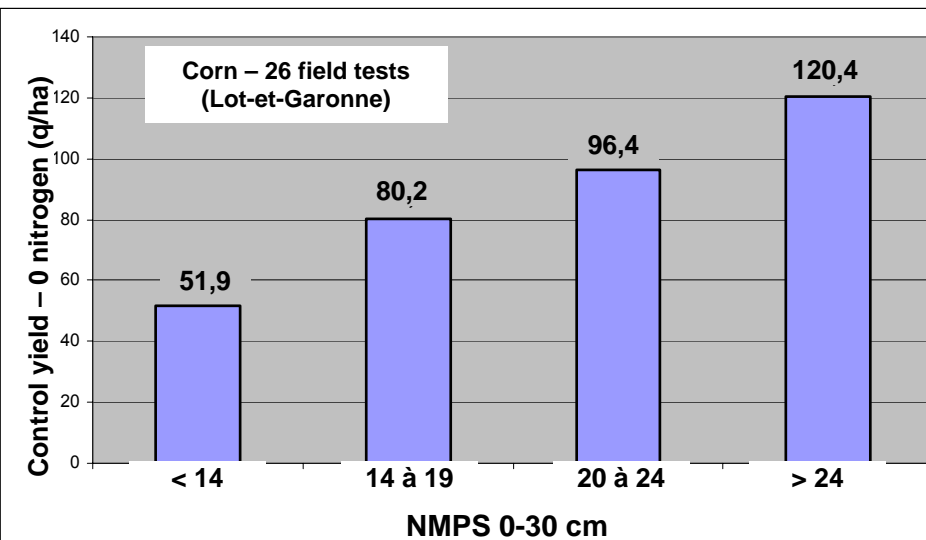
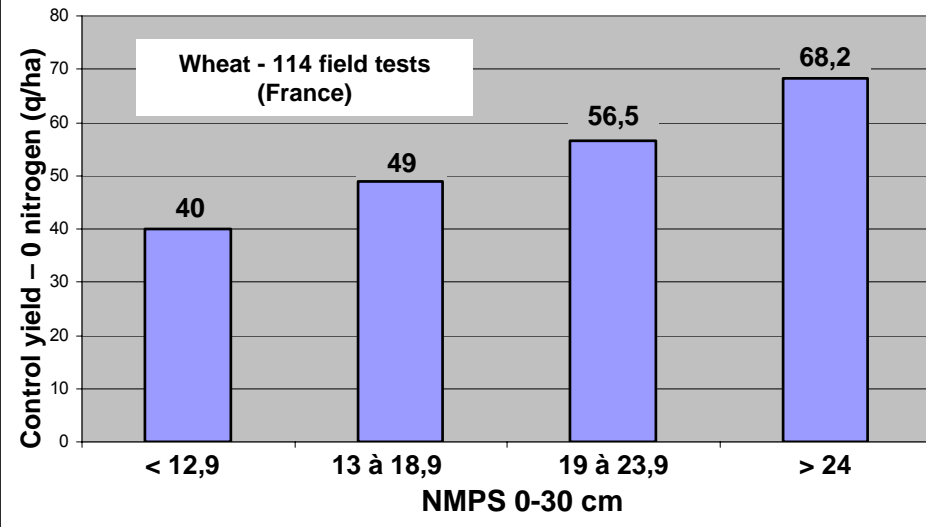


Nitrogen Mineralization of Soils

1. Nitrogen mineralization potential of soils (NMPS)

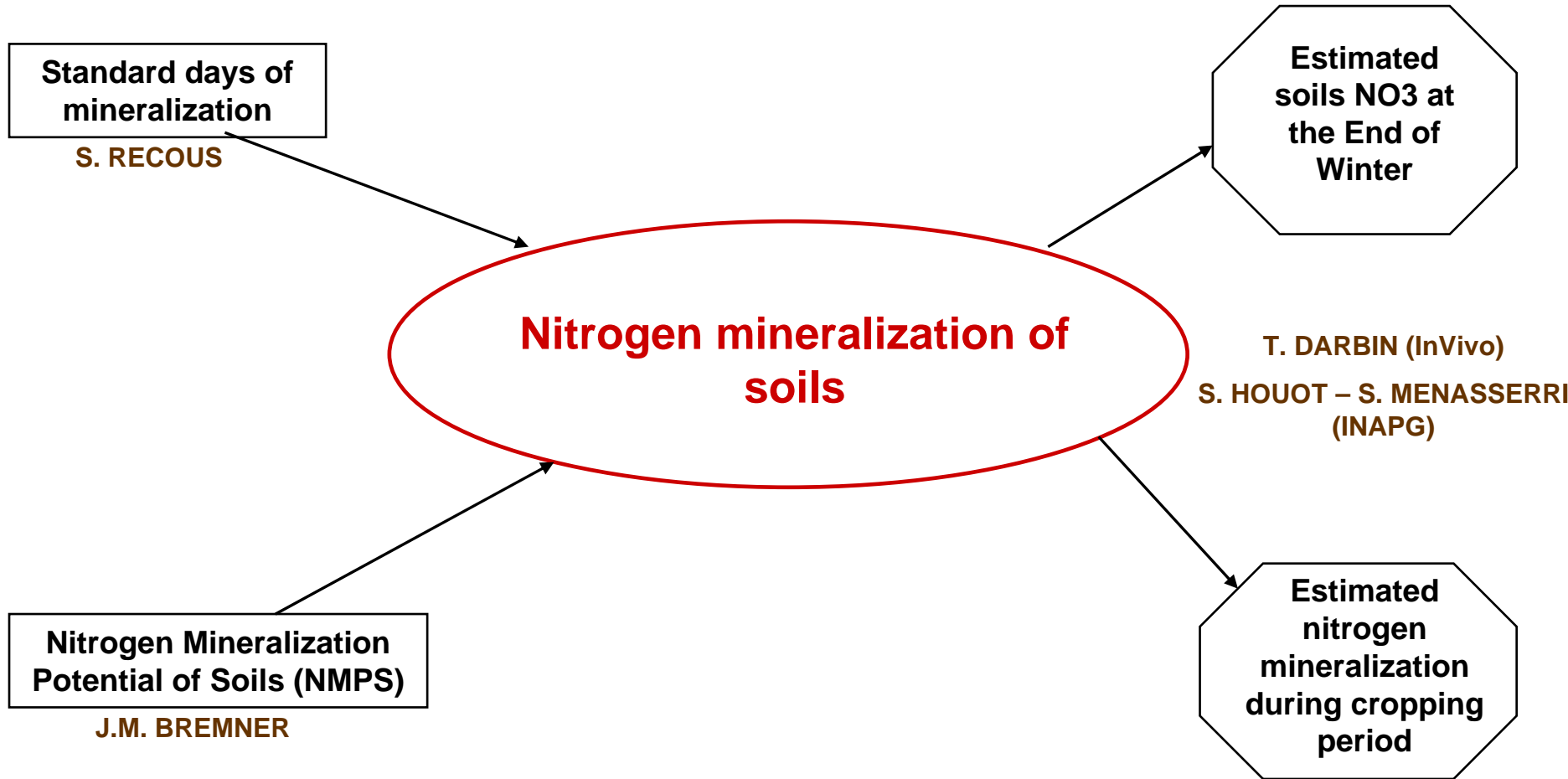


2. NMPS and 0 N fertilization yield





Nitrogen fertilization advising





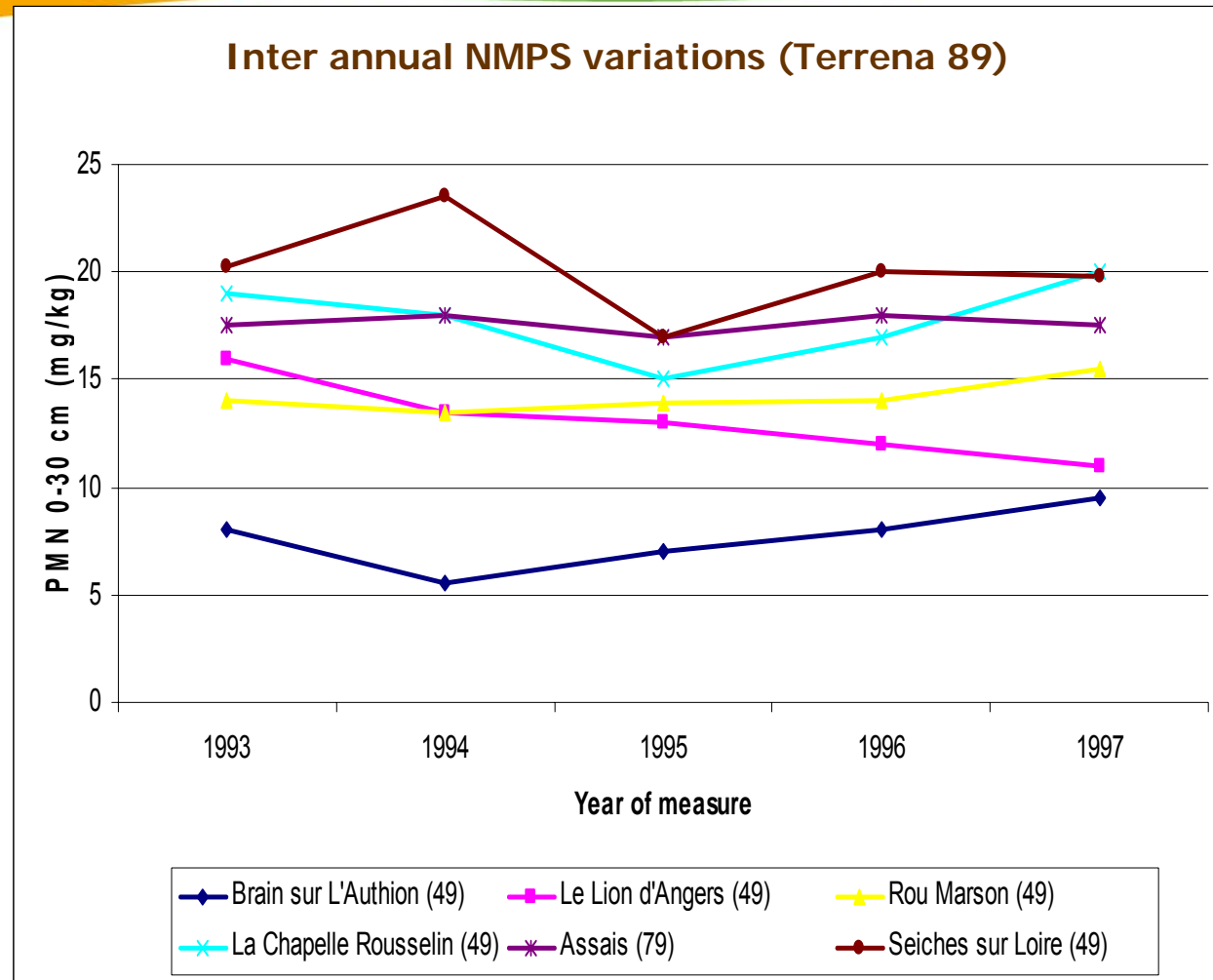
Nitrogen Mineralization of Soils

Easier to develop method (low implementing costs)

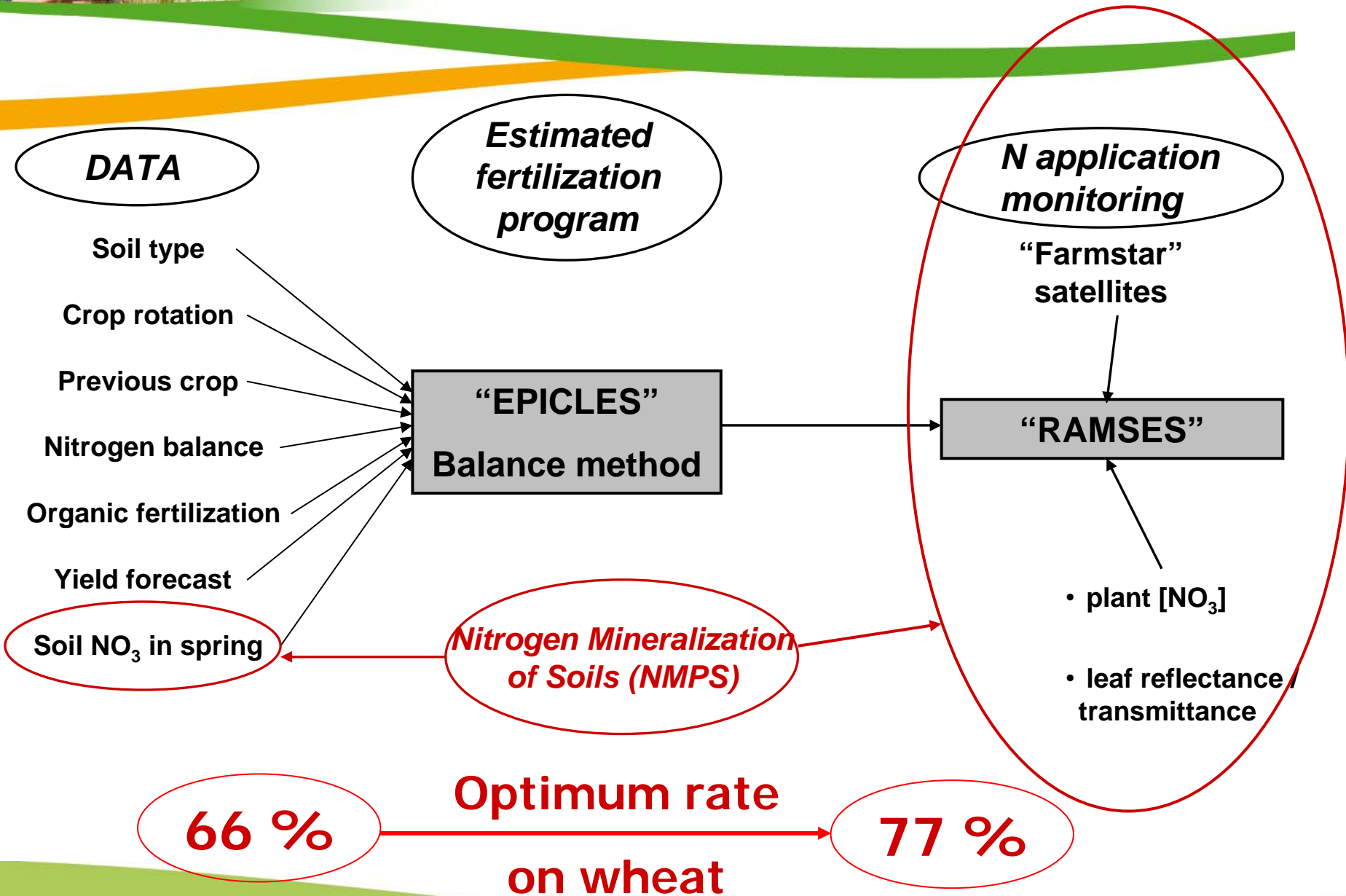
- stable value during 4 years

Easy to manage :

- sample in 0-30 cm layer
- no strict storage conditions of soil samples / direct NO_3 quantification
- sampling : 4 months, august → december



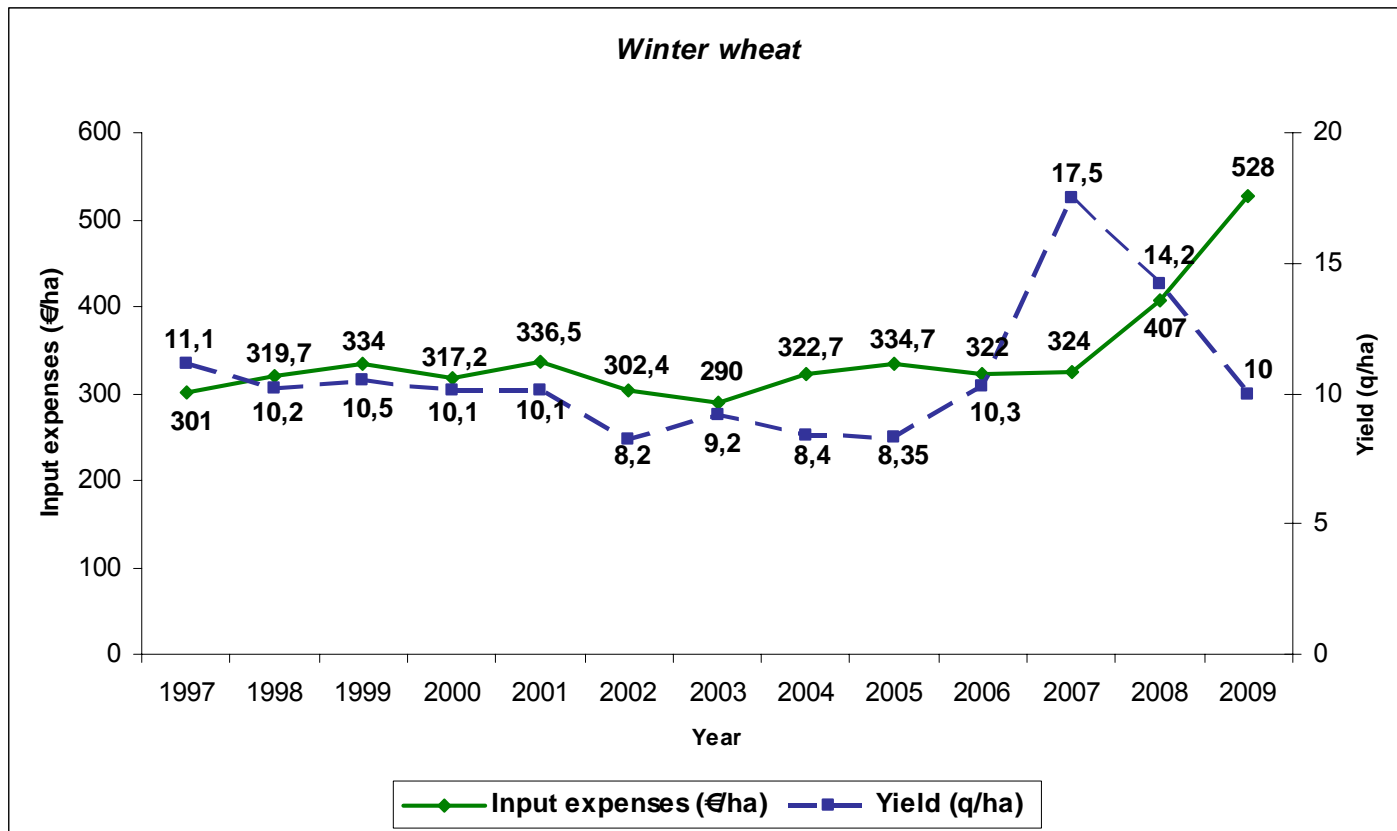
Nitrogen fertilization advising



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Productive agriculture: main results

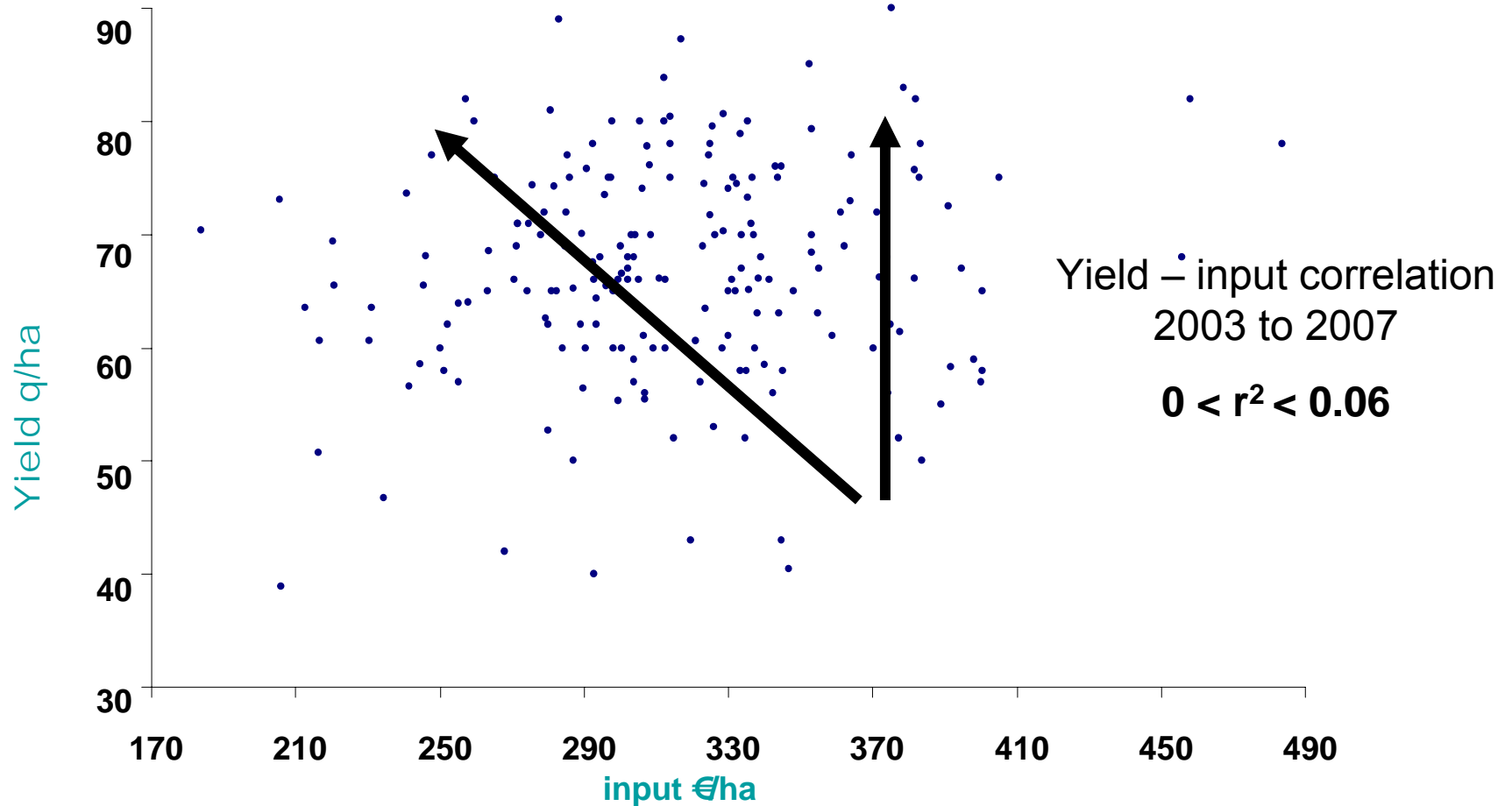
Inputs : 38 % of global costs for field crops





Yield is not explained by the amount of input (Wheat - Cher 2004)

Average input cost : 314 €/ha



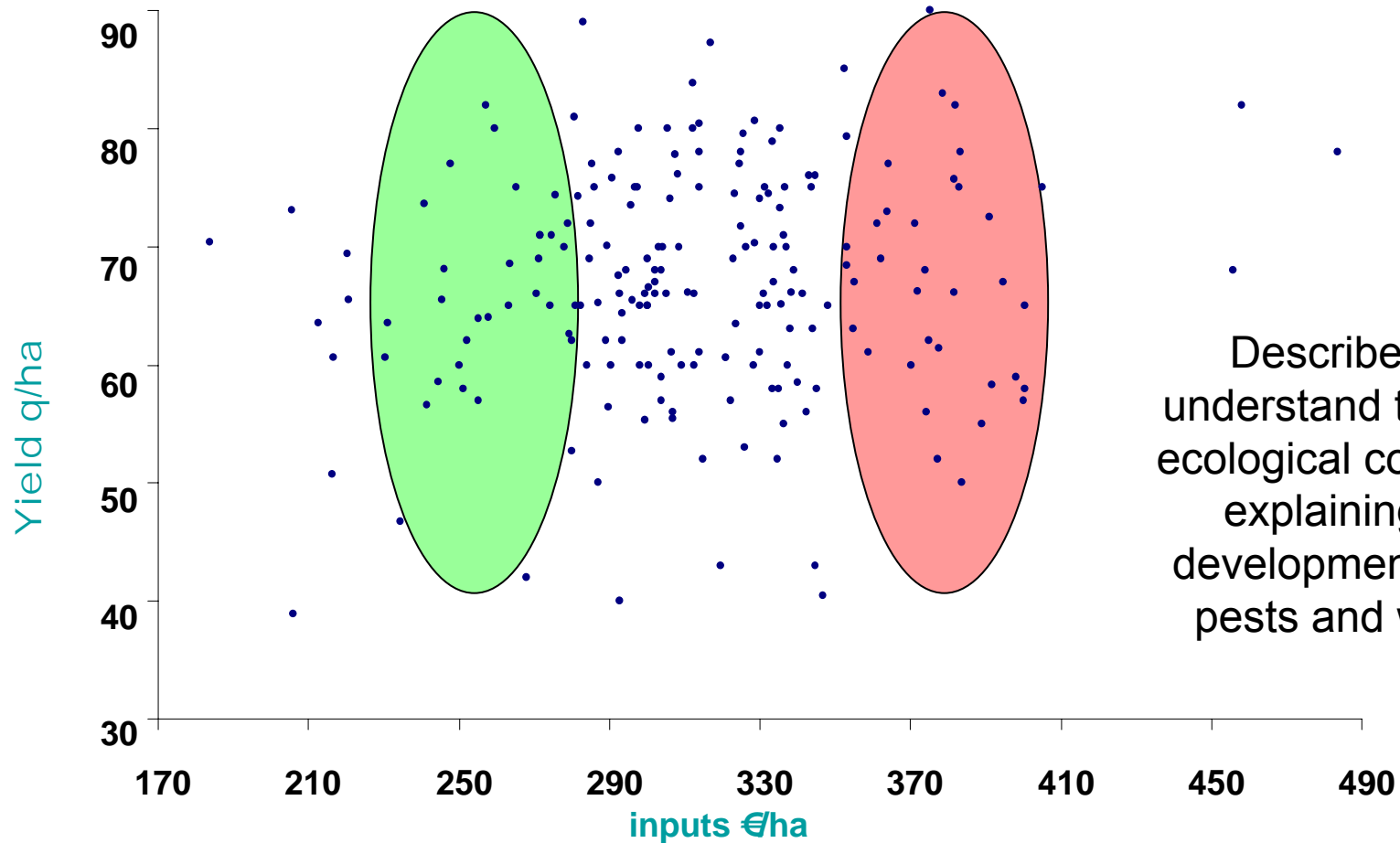
Yield - input correlation
2003 to 2007
 $0 < r^2 < 0.06$

Seeds, protection, fertilization



Agro ecological approach Wheat - Cher 2004

Mean inputs : 314 €/ha

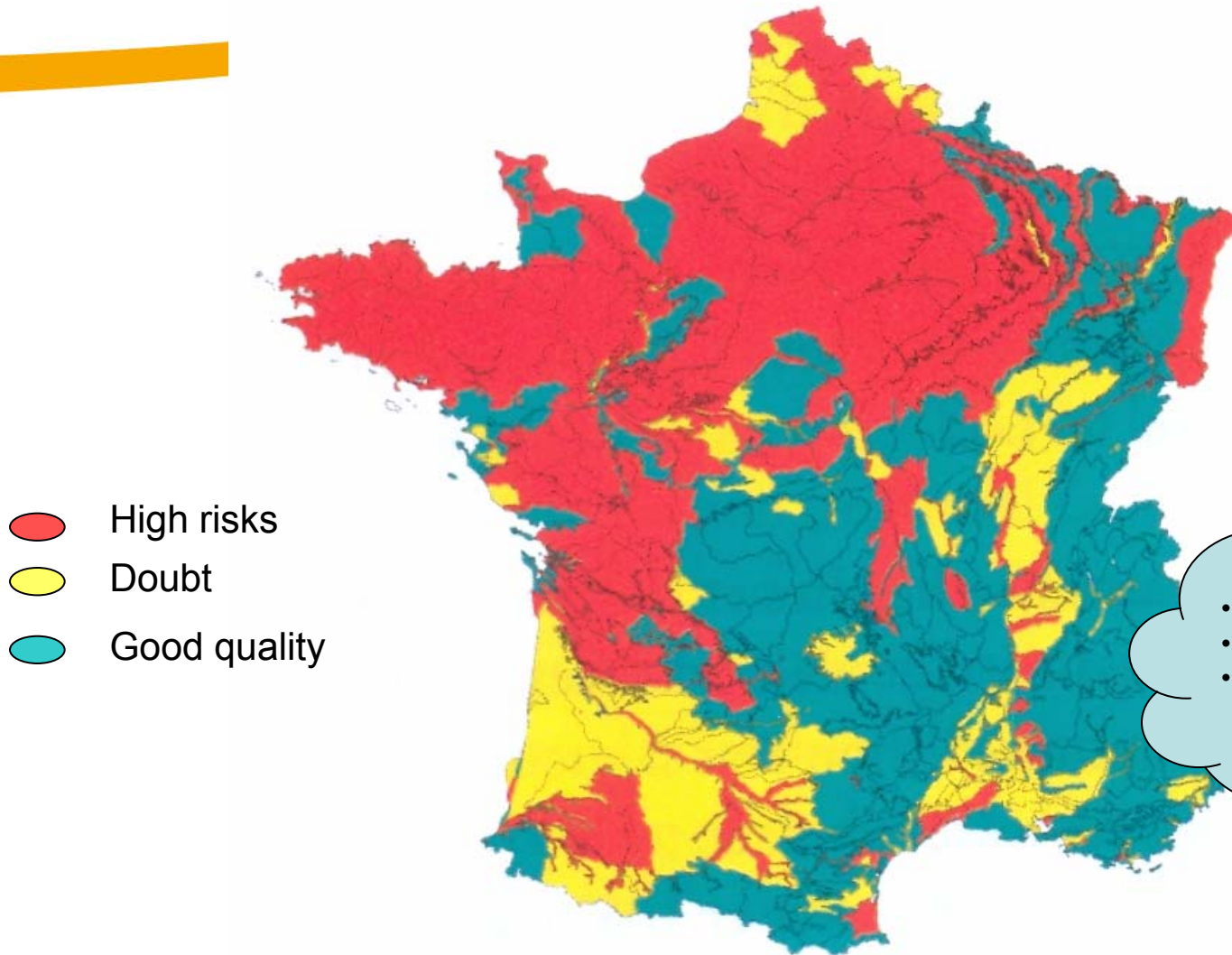


Describe and understand the agro ecological conditions explaining the development of the pests and weeds

Seeds, protection, fertilization

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2015 ground water quality foresight

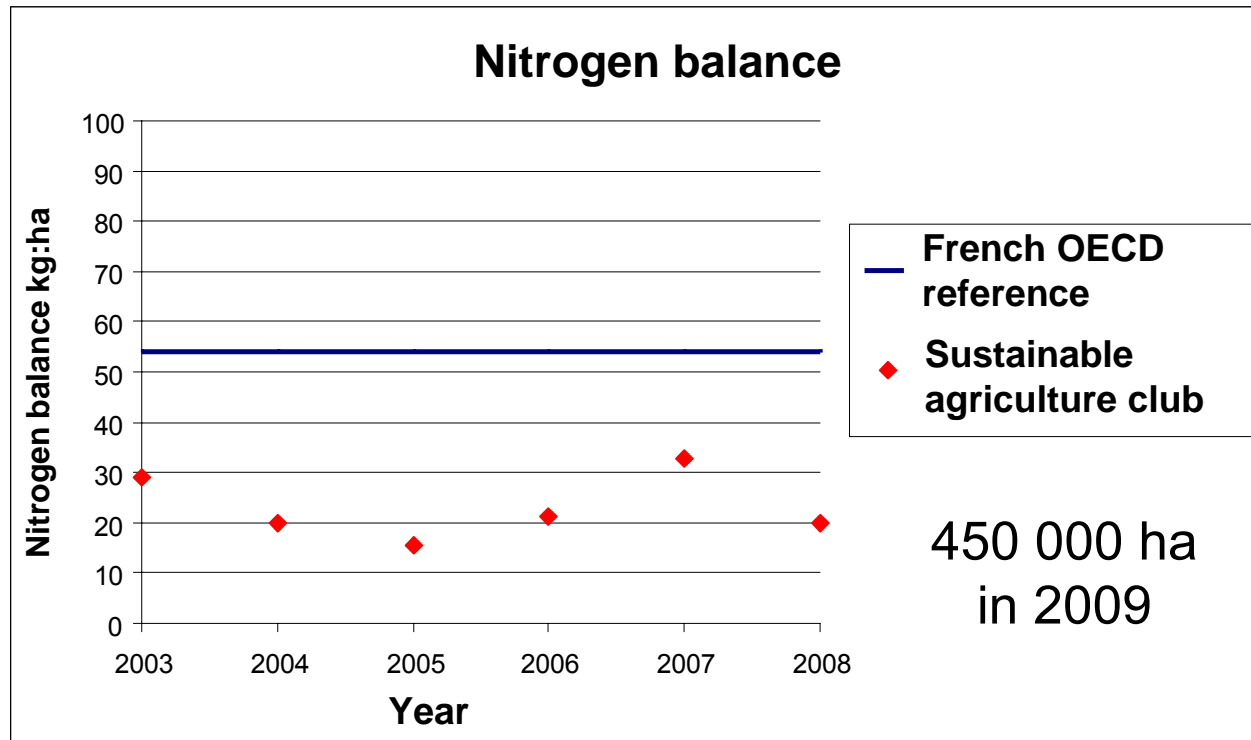


2012
500 action plans on
priority grenelle
catchment areas

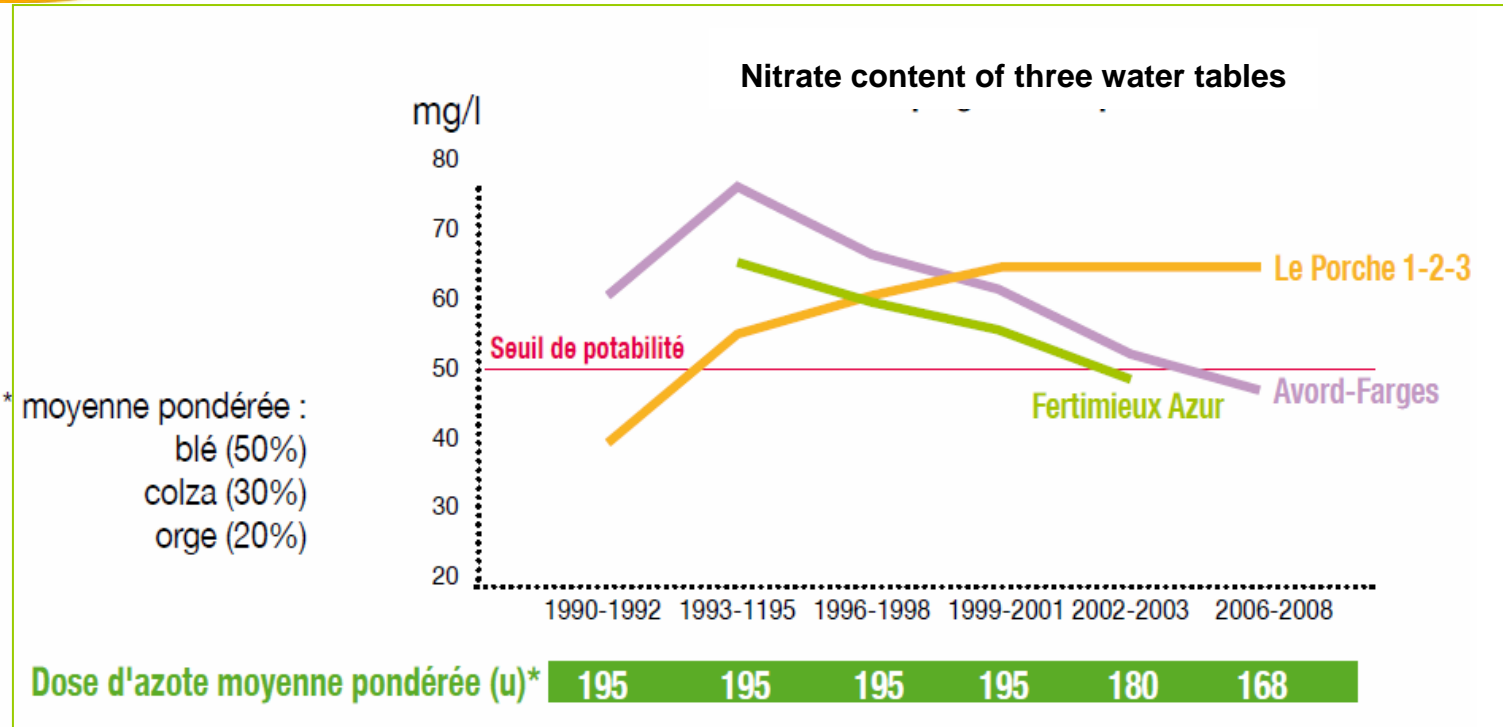
- pressure management:
- pesticides prohibition
 - less fertilisers ...
 - producing rights?

Environment performance strategy

- **Individual performance + collective consolidation**
- **Measure, Manage, Value**



Catchment water quality



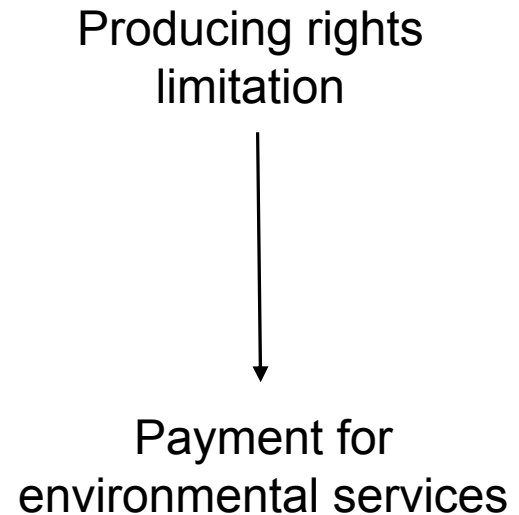
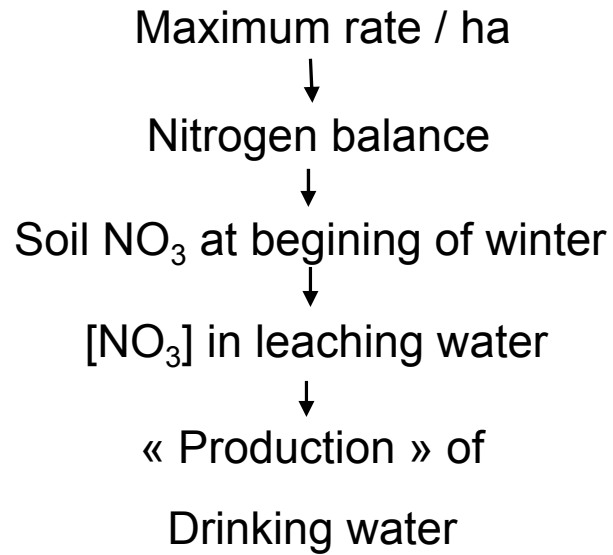
- Similar Fertilization practices (EPICLES)

- Water age at the catchment

— 8 – 12 years

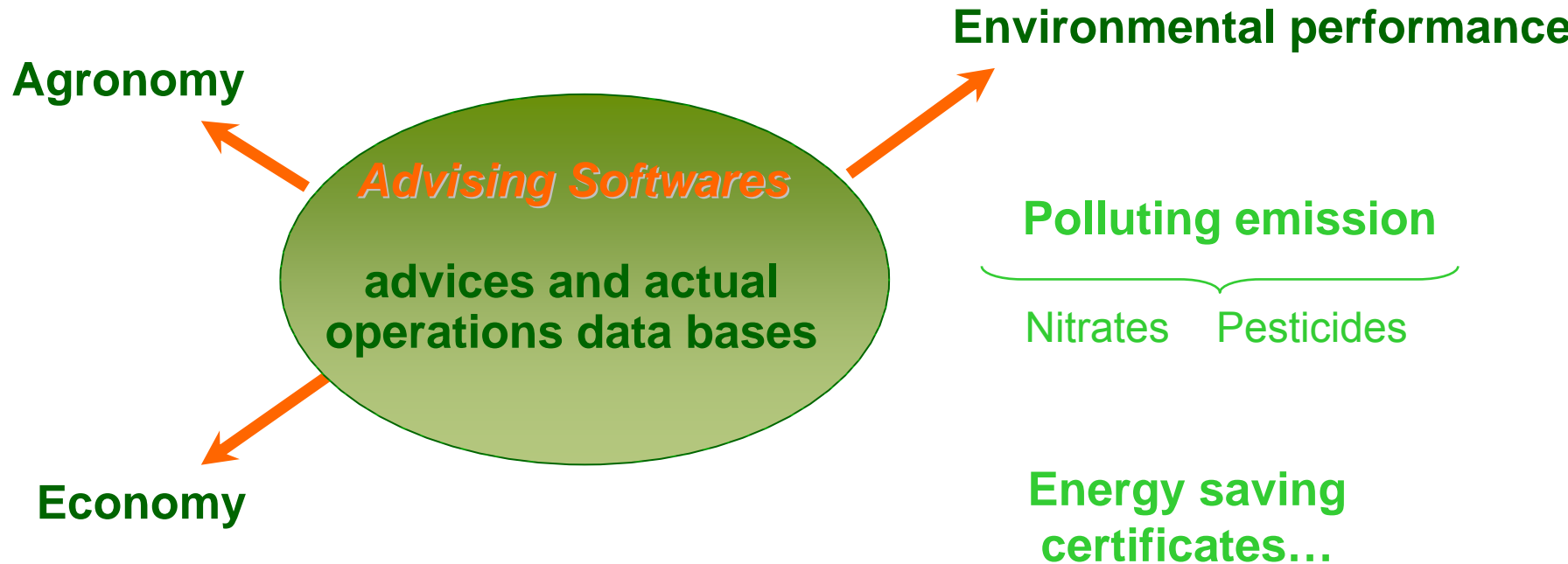
— 8 – 12 months

Nitrogen fertilization :





Measure, Manage, Value

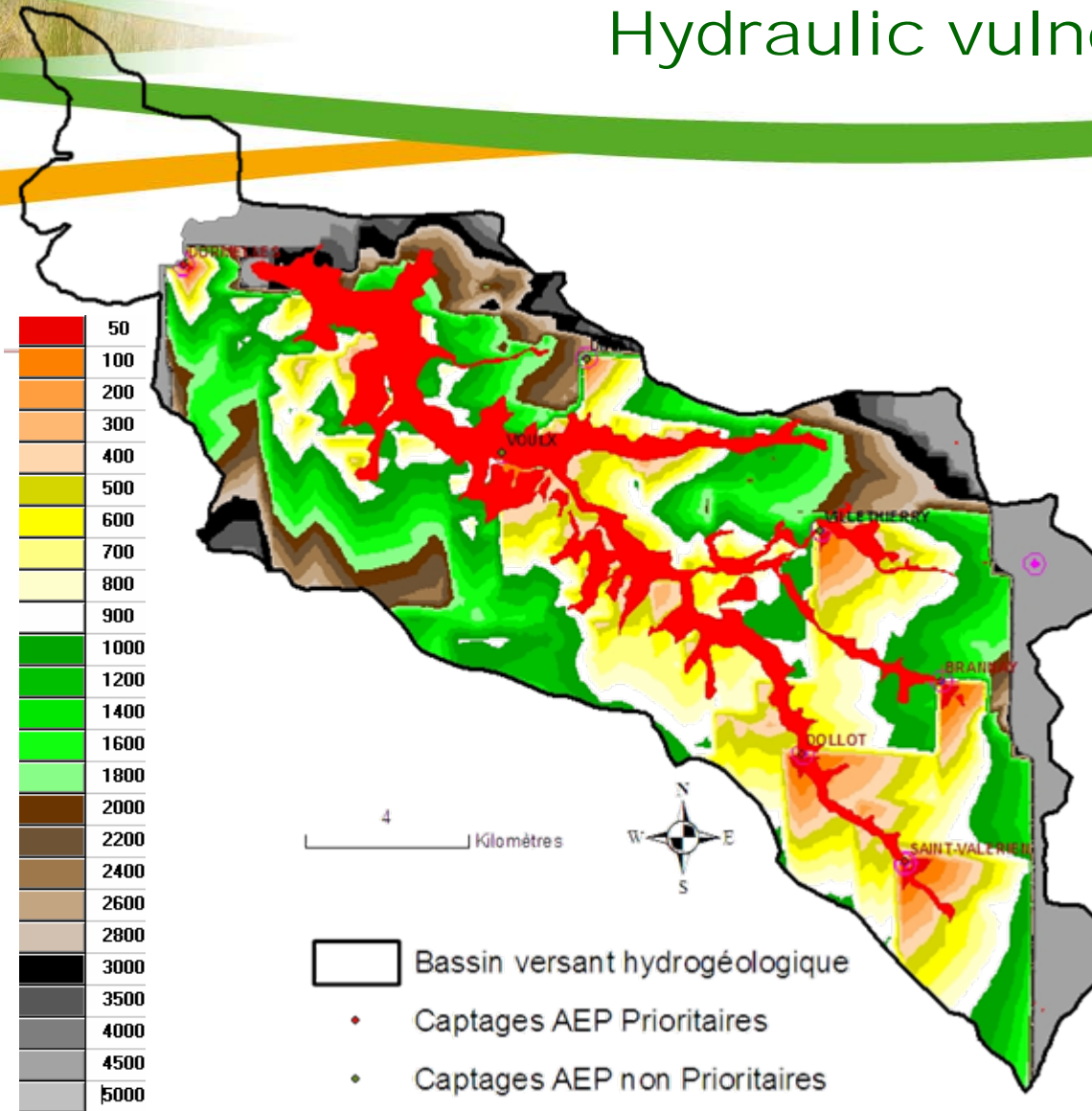


Individual environmental performances

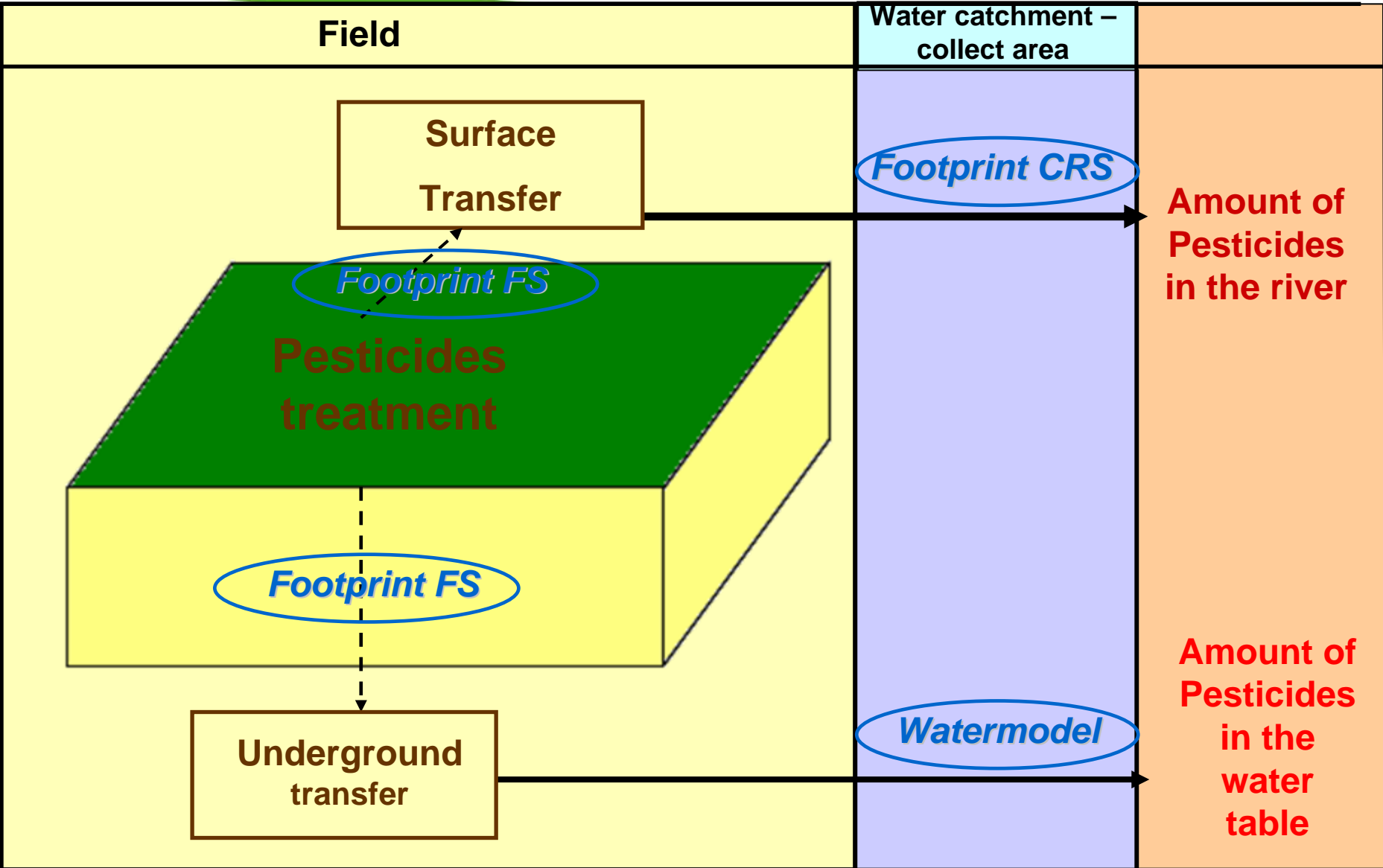
| ADVISING SYSTEM | FERTILIZATION | PLANT PROTECTION | PLANT PROTECTION + FOOTPRINT |
|-----------------|----------------------|---------------------------|------------------------------|
| WATER | Nitrogen balance | Treatment Frequency Index | Surface Water emissions |
| | Phosphorus balance | | Underground water emissions |
| | Soil overlaying | Soil overlaying | |
| | Leaching water [NO3] | | |
| CLIMATE | Green House Gazes | | |
| ENERGY | energy balance | | |
| BIO DIVERSITY | | Treatment Frequency Index | surface water emission |
| | | Crops diversity | |
| | | Soil overlaying | |
| SOILS | Organic % | | |
| | pH | | |
| HEALTH | | | |

| SPECIFIC ACQUISITION | EXTERNAL DATA BASES |
|---|---|
| pinpoint water pollution | <i>water stocks % < [NO3] threshold</i> |
| | <i>water stocks % < [pesticides] threshold</i> |
| | <i>Standard Global Biological Index</i> |
| | |
| <i>Dedicated Biodiversity area</i> | <i>Standard Global Biological Index</i> |
| <i>STOC (birds)</i> | |
| <i>STERF (insects)</i> | |
| | |
| <i>Individual Protection equipments</i> | <i>% food < residues thresholds</i> |
| | <i>water stocks % < [pesticides] t.</i> |

Hydraulic vulnerability



Transfer time between rain on fields and catchment points





Our aims

- **To find the most efficient combinations between natural/ecological processes and artificial/mechanical/chemical means**
- **To improve the input efficiency and to reduce the losses and impacts of farming practices on the ecosystems**
- **To provide farmers with effective, reliable and timely information on their crop requirements, pests dynamics, environmental performance and risks – To challenge the increase of the farms' size**

- 1. Increase yield and quality**
- 2. Improve Agromanagement – modelisation**
- 3. Crops / crop operations innovations**
- 4. Environmental farming**

1. Increase yield and quality

- Which changes in crop management? (i.e. Wheat: toward wheat 13t/ha ; Corn 18-20t/ha?)
- Better understanding on production / accumulation of matter in the grain – when and how is the yield built ? (i.e. oil seed rape)

2. Improve agro management – models

To increase the liability and economic efficiency of our advices,
and reduce their cost

- Scientific knowledge of the pathogens, weeds,... systematic, eco-physiology,
- Resistance understanding and quantification through models, mode of action of the pesticides families
- New concepts on permanent agronomic or environmental characteristics of fields (i.e. NMPS)
- Improve the efficiency ratio (product used by plants / product lost in environment) of inputs (fertilizers N, P, pesticides)
- Quantification (models) of **all** pests (weeds, diseases, insects...) dynamics and agro management conditions, basis for predictive management of crop operation
- Models based on data already registered by farmers

3. Innovations

- new crop operations and agro management consequences (i.e. no soil operation and weeds or fertilization management, new pests)
- Machinery – to make easier changing products or rates between fields...
- How to increase the yield and reduce the nitrogen or phosphorus inputs? Efficient alternatives to chemical fertilizers?
- *New, traits, cultivars, crops adapted to French conditions or to lower agronomic potentials*
- *Improve leguminous efficiency (feed qualities, yield, diseases...)*

4. Environment

- Alternative products and method of plant plant protection
- Improve and quantify (models) the environmental impact of crop operation and agro management
 - Loss in water pollution (pesticides and nitrogen quantities)
 - Biodiversity (quantification and management)

*Toward environmental farming
And
environmental services payments*

**Because of the food and social needs,
high productivity and ecological performances
must be matched at the same time**

This agriculture will be based on

- **Agronomy and ecological know how**
- **Go ahead business capacity and
environmental responsibility of the farmers**

Thank you for your attention