DIAGNOSIS OF N LOSSES IN CROPPING SYSTEMS IN WATER PROTECTION AREAS FROM SPECIFIC STAKEHOLDERS

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Introduction

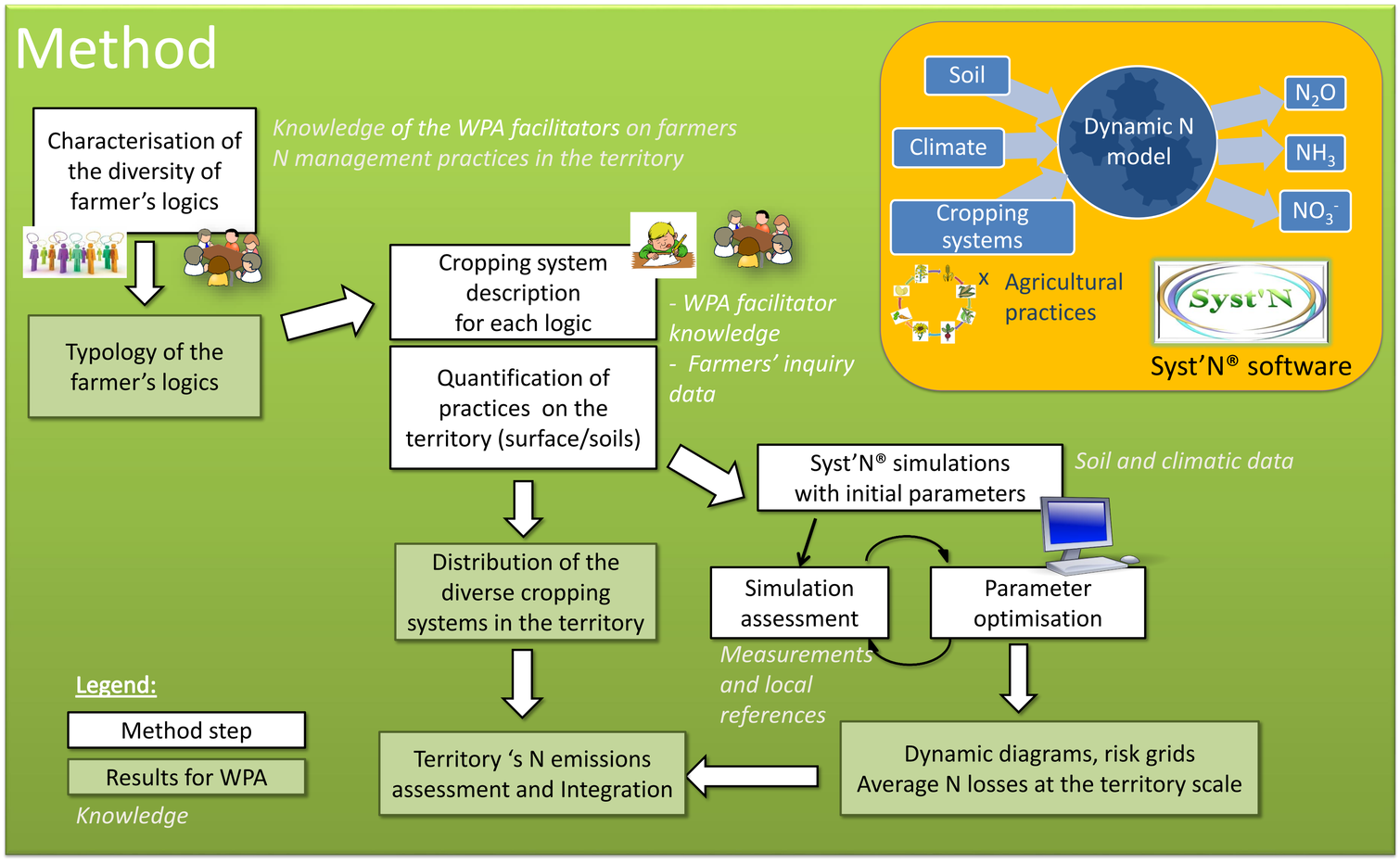
Context: agricultural pollution in French water protection areas (WPA)

Objectives: estimation of nitrogen losses in cropping systems in 7 contrasting water protection areas (WPA), in order to improve water quality and support development of environmental-friendly systems

Stakes: involvement of stakeholders of each WPA, considered as local experts, to avoid results disconnected from the reality of farmers

Issues: developing an efficient and operational diagnosis method involving agricultural stakeholders, to help them identifying cropping systems to foster or to discourage, in order to produce good quality water

Method



Example of 3 Water Protection Areas

Main features

	WPA B	WPA H	WPA L
Size (km²)	20	0.9	12.5
Stakes for water quality(1)	++	+	+++
Agricultural production	Cereals, rapeseed, intensive indoor production	Mixed farming	Mixed farming
Involvement of extention services and farmers in			
- Water quality issues	++	++	++
- This research project	++	+	-
Available knowledge on cropping systems coming from:			
- Knowledge of WPA facilitators (observations, measurements, practices)	++	+	+
- Inquiry data on practices	++	++	-

(1) Related to the number of water comsumers depending from this WPA

Main methodological results

Effectiveness of the "farmer's logics" method to describe the diversity of cropping systems and N management practices

Need of presentation of simulation results adapted to the specific issues of each WPA

The DSS Syst'N requires expert knowledge or further measurements/observations to provide reliable input parameters required for each of situations and accurate results

Interactions between local experts and researchers regular and useful during the whole study, and increasingly strengthened in the WPA where the stakeholders were deeply involved in the process (since a long time if possible)

Results for the different WPAs

WPA B

- Effectiveness of the use of cover crops for short and long periods between two commercial crops

➢ Identification of various cropping systems to foster or to discourage according to the farmer's logics

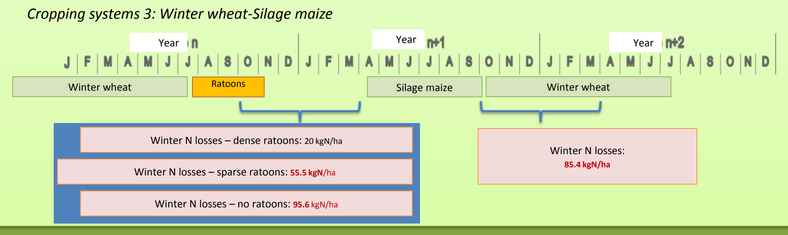
Farmer's « logic »	Soil cover in autumn	Organic manure – Frequence of application	Average N losses (kg N/ha/year)		
			Rendosol x 2014-2015	Rendosol x 2001-2002	Sandy calcosol X 2014-2015
LogicPK_-A_	No soil cover	No organic manure application	33	67	50
Logic PK_-Ap	- Cover crop – late sowing – long fallow period - No rapeseed ratoons	Vinasse every 5 years	30	65	45
Logic PKO-AO	- Cover crops sown at the end of July - long fallow period - rapeseed ratoons ground in the late winter	Poultry manure compost + vinasse 3 years out of 4	18	45	33

WPA H

- N losses are more significant under short crop rotations (cereals-maize) than under grassland
- Soil characteristics and efficiency of cover crops in winter may affect the nitrate losses significantly

➢ Identification of risky periods

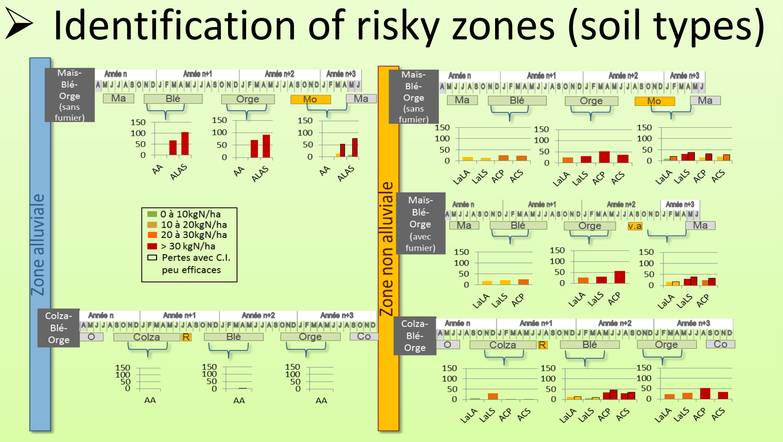
Cropping systems 3: Winter wheat-Silage maize



WPA L

- Effectiveness of the actions tested in the initial program, mainly in allocating permanent grasslands in the alluvial zone

➢ Identification of risky zones (soil types)



Conclusion

This study enabled the development of N loss assessments in contrasting WPA, by working with local experts to build typologies describing the diversity of the practices inside the territory, without exhaustive enquiries inside each farm.

We participated in enlightening the WPA facilitators and farmers about their choices among many various possibilities, aiming to develop cropping systems both consistent with their logics and generating weak N losses

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