

Conservation tillage in Organic Farming in France Results of the TILMAN-org project

J. Peigné, M. Casagrande, F. Celette, C. David, J.F. Vian

European organic farmers' survey

Description: 159 farmers in 10 countries in Europe were interviewed to get information on their conservation agriculture practices (green manure, no-tillage and reduced tillage), their motivations to implement these practices, as well as problems they were facing. Data were statistically analyzed in order to identify profiles of farmers regarding: their motivations and problems, and their practices for managing spring and/or winter crops.

Main results :

	Socio-economics	Soil conservation	Environment	Agronomic conditions & crop management
MOTIVATIONS		<ul style="list-style-type: none"> Improving soil structure Improving biological soil quality Limiting soil erosion Increasing soil OM 	<ul style="list-style-type: none"> Limiting N leaching Improving biodiversity 	<ul style="list-style-type: none"> Limiting weeds, pest and diseases
PROBLEMS	<ul style="list-style-type: none"> Increasing labor requirements Yield stability 		<ul style="list-style-type: none"> Machinery 	<ul style="list-style-type: none"> Weed infestation and management Destroying preceding crop and/or green manure

Reduced tillage and green manure are the 2 main practices used by the farmers. No-tillage is used only by 20% of the interviewed farmers. Reduced tillage is more used in southern Europe whereas green manure is more used in northern Europe.

Main motivations for applying conservation agriculture practices are soil quality conservation and environmental concerns. Main problems are socio-economical, technical and agronomical (including weed control).

Design of organic cropping systems

Description: our aim was to design new arable system in organic farming including conservation agriculture techniques to preserve soil fertility and enhance crop performance. The method was based on a participatory approach, with (1) farmers knowledge collected during the survey, and (2) researchers knowledge. Two workshops were held with TILMAN-Org partners

Main results :

We designed 5 prototypes (Western Europe, Atlantic, Northern Europe, Nordic and Mediterranean conditions). Example of Western Europe prototype is presented in Figure 1. Prototypes were assessed with 2 models (MASC and NDICEA) for investigation of their effects on economical, environmental and agronomical performances.

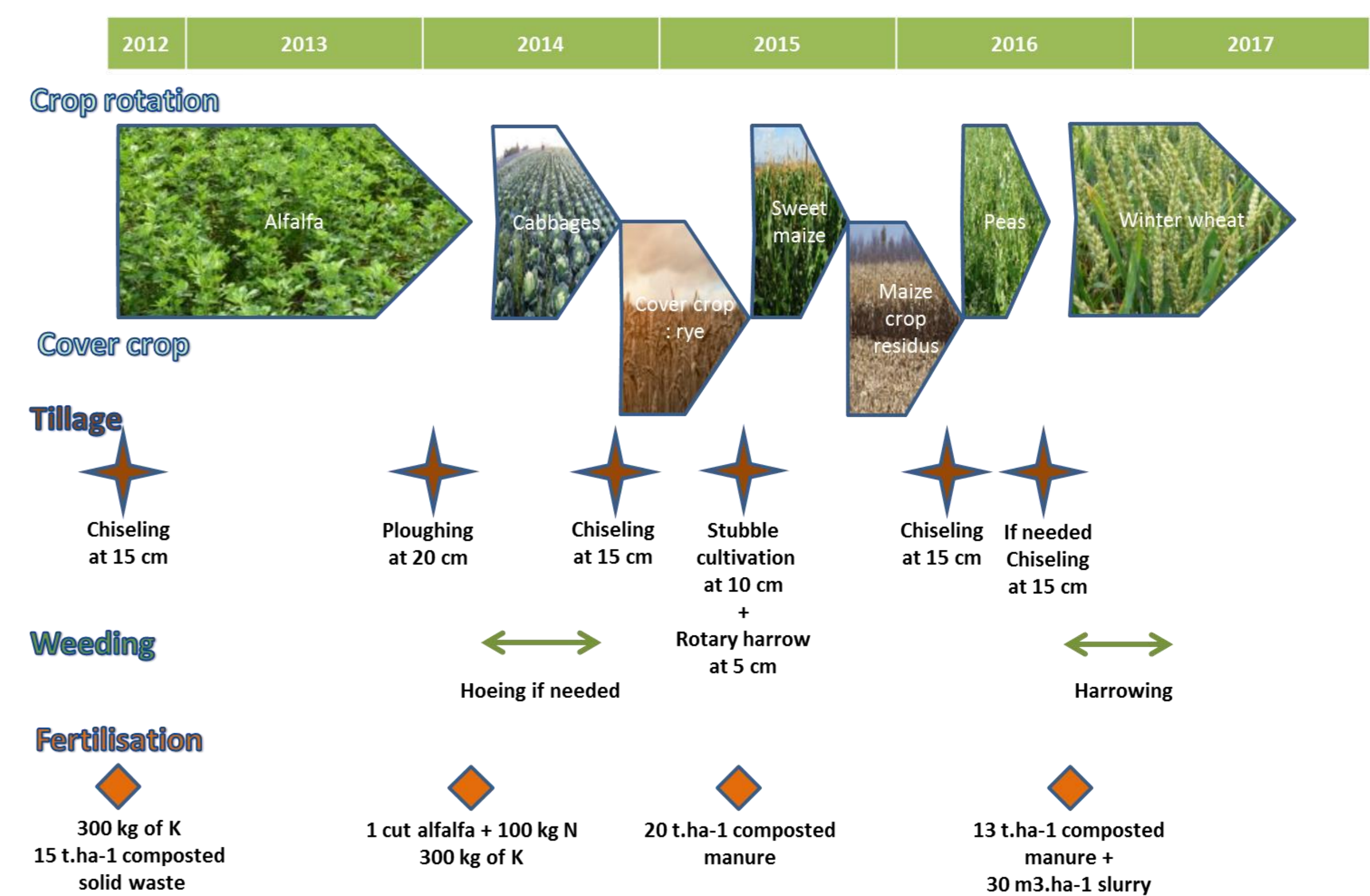


Figure 1 : Western Europe prototype

Main objectives are: Yield stability, Soil quality, Weed control, Minimizing nutrient losses, Efficient use of resources and on farm N (fixation)

Long-term Experiment :Thil

Description: Field experiment to adapt reduced or no tillage to organic grain system on a irrigated sandy soil. Experiment started in 2004. Four tillage are compared : Plough at 30 cm depth (MP), Shallow plough at 18cm depth (SP), Reduced tillage with chisel at 15 cm depth (RT) and Very superficial tillage (5 cm)/direct seeding with crimper roller (ST/NT).

Main results :

Soil :
Risk of soil compaction with RT and ST .
Higher earthworm density and activity with direct seeding under a cover crop.
More carbon, nitrogen and microbial biomass in the surface soil layer (0-15 cm) with RT and ST compared to MP and SP.

Weeds and crops:
More weeds in RT and ST compared to MP and SP.
Shift in weed communities composition between treatments with (MP and SP) and without ploughing (RT and ST) (Figure 2).
No statistical difference in yields after 8 and 9 years of experiment. A tendency for more yield with SP compared to RT.

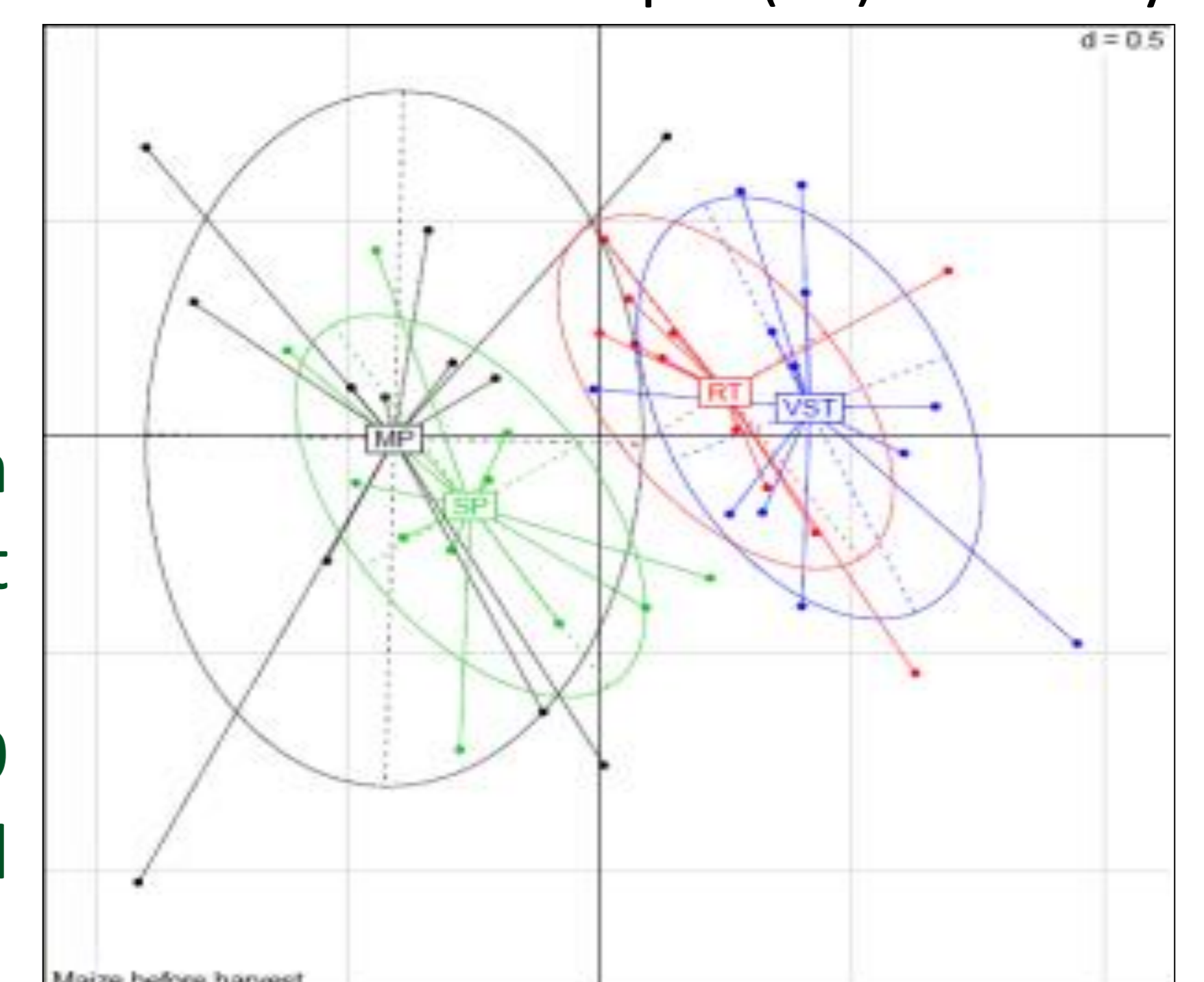


Figure 2 : Shift in weeds communities for the maize before harvest (2013)

Method: non metric multi-dimensional scaling