



## Annex 2

### Sustainable innovative practices in the central region of France: a focus on soil structure assessment in the field

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ANNEXE 2 - FIELD TRIAL ON SOIL STRUCTURE CHARACTERISATION

**Held in May, 19, 2016**

15 farmers of the Berry group, 5 regional advisors and soil scientist.

Testing of a tool to aid decision based on structure and porosity of soil as well as the environmental context (past practices on soils, pests risks). Depth looks at the knowledge of the soil with a soil scientist. A quick, visual & descriptive assessment of the soil structure evaluation guide (simplified spade test).

#### ***Methodology :***

- Assessment of the overall plot in its environment (orientation, slope, landscape features, etc.)
- Evaluation of the general state of the floor surface: presence of stones, etc.
- Implementation of the adapted spade method (see illustrated prototype in Annexe 3)

#### ***Stakeholder comments on the implementation of the method:***

- Soil structure measurements have to be made on a soil with medium relative humidity, avoid dry soil. April/May corresponds to the adapted period for soil tillage decision in intercropping.
- The soil colors depend on the amount and type of organic matter (OM) and of limestone content.

- To characterize the soil depth, specify more than 'deep', 'superficial' as these terms are too subjective.
- View rooting by snatching feet. A cluster of small pieces that adhere to the roots is a good indicator of the very favourable lumpy structure.
- To test organic matter with hydrogen peroxide: this test is informative (except in special cases, the reaction is more intense and longer with higher and more stable OM content) but not to generalise because it is very aggressive to the skin.
- Direct seeding, by concentrating the OM on the superficial layer of soils leads to soil acidification (and increased P availability). It also contributes to a gradual reduction in the effectiveness of herbicides (observations made by network farmers).
- The choice of the tillage depth is difficult to make if soils are not compacted (and not managed with no-till method): tillage of the superficial layer is enough from the standpoint of the clay soil structure, but the problem is more in the management of straws, which penalize emergence and growth of rape if they are not diluted enough in soil. No consensus.
- The selection of the tool to restructure soil in depth: no consensus among tines tools, sub-soiler, plowing etc.

*General comments:*

- Farmers very interested in the process.
- Even for these innovative farmers, observation of soil structure is unfamiliar, so they need to be trained. Some other training days are needed for them to be autonomous on soil structure assessment.
- The contribution of the soil scientist was very beneficial to make them better understand their soils, but his speech is more focused on the long term assessment of soil and its intervention is less adapted to days dedicated to “diagnostic / short-term crop management.

*Farmer's comments on the implementation of the method:*

- They do not know the name of the structural states (gamma, phi, delta): define more familiar qualifiers (lumpy, prismatic, polyhedral)?
- "It's a return to agronomy"

**Partner feedback on the demonstration/trial**

Yes, farmers were very interested in the process. Even for these innovative farmers, observation of soil structure is unfamiliar, so they need to be trained. Some other training days are needed for them to be autonomous on soil structure assessment. The contribution of the soil scientist was very beneficial to make them better understand their soils, but his speech is more focused on the long term assessment of soil and its intervention is less adapted to days dedicated to “diagnostic / short-term crop management '.

### ***Intentions to change following feedback***

Proposals for improvement points (post meeting)

- Clarify some points: how to select the areas for 'spade strokes', how many repetitions are needed, how to position them, etc.
- Propose no 'specialist' terms to describe the structural states, eg delta = packed, phi = packed but cracked, gamma = porous.
- Submit photos of typical structural states and some additional elements in the analysis grid.
- Farmers must all practice the method and decide on the structural state they observe.
- In a parcel, couple the spade method and the "profil cultural" method to allow farmers to better understand the structural states and their location and thus to better use the spade method after?
- Add a brief presentation of knowledge on the dynamics of the structural state of soil, depending on weather conditions, rotation, tillage ... and on the conditions for maintaining a good structural condition.

# Pictures taken during the field trial on soil structure characterisation

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