AGRO ECOLOGUE
CONSULTING
KARIM RIMAN

Global approach in Vineyard "From the soil to the bottle"

ISARA Lyon

6 and 7 of October 2014

www.consultant-agriculture-ecologique.com

Consultant since 1996

I operate with farmers in France and many countries around the world.

I am specialized in:

- Global diagnosis of soil fertility
- Technical follow-up
- Training

Agro Ecologue Consulting

Karim Riman

MISSIONS UNDERTAKEN

- Interventions Areas
- Training

Places of work, since 1996

In several countries : France, Portugal, Italy ; South Africa, Morocco, Togo, Ivory Coast ; Azerbaijan, Lebanon, Jordan, India ; New Zeeland, Australia ; ...

We worked for more than 300 farmers and organisations in France.

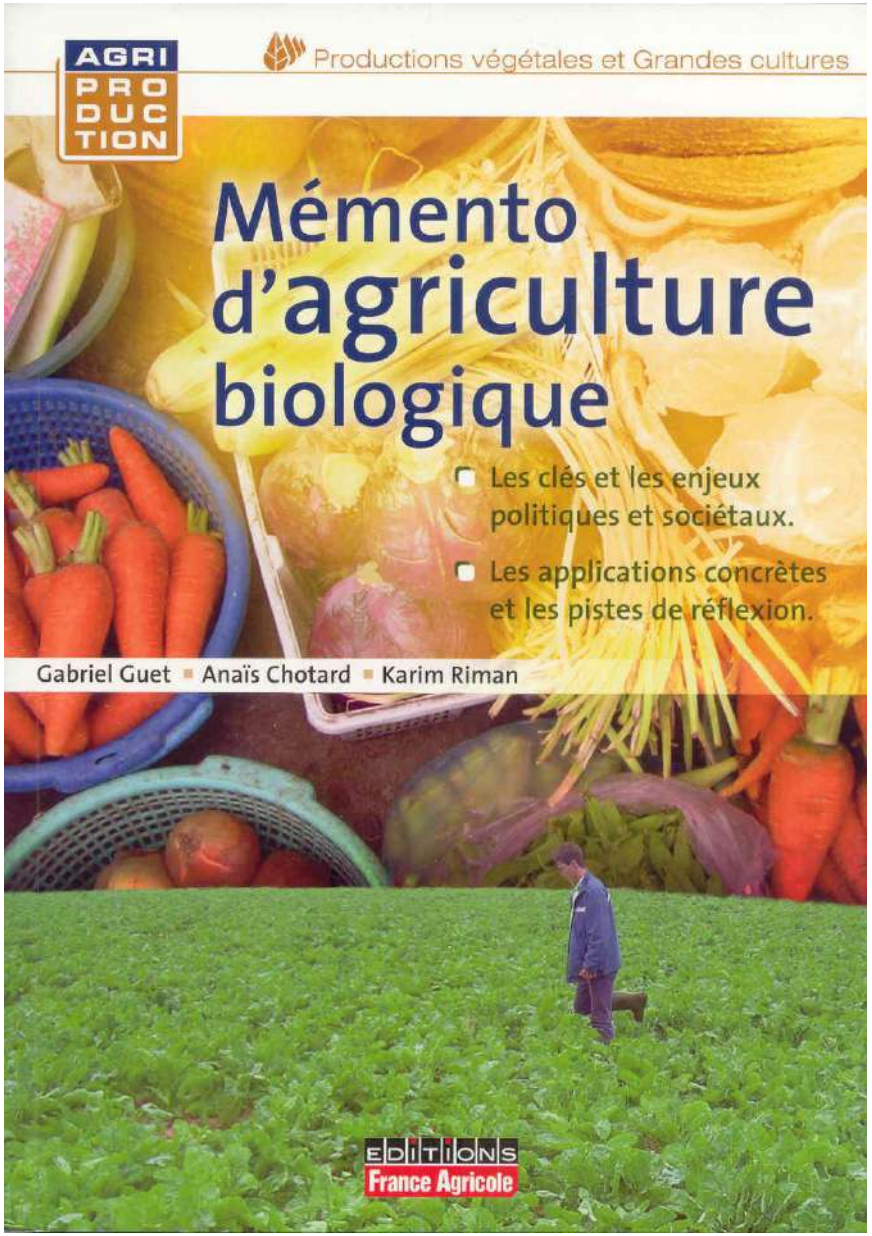
An ecological approach applied to agriculture

Karim Riman
78 Mas de La Cigalière - ZA de la Cigalière
84250 Le THOR - FRANCE
e-mail:karim.riman@free.fr - Tél portable : +33 607963007
Tél: + 33 490214044 Fax : + 33 490214041

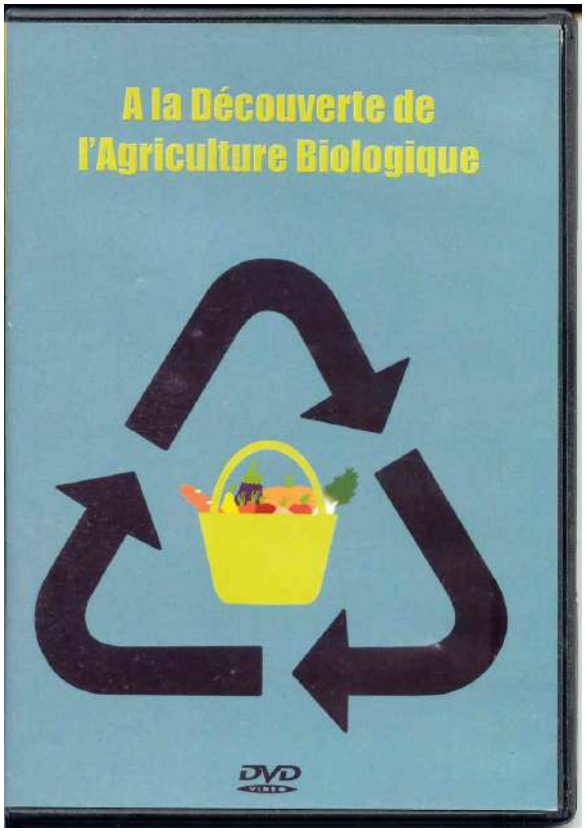
Areas of intervention

- **Vine growing**
- **Fruit growing** : Stone and Top fruit; kiwi; Olive trees
- **Market garden products**
- **Tropical fruits** : citrus, mangoes, bananas, pineapples
- General crops and rice

I participate in « Mémento d'agriculture biologique ».
3rd edition, September 2011



And introduce the soil in



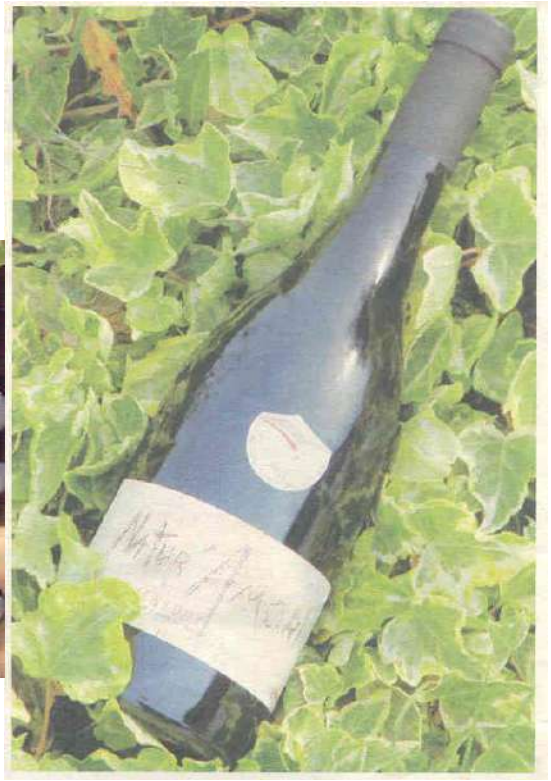
Papers

- Vivre la Vigne en Bio Mars/Avril 2014:
  « Le Sol -Base d'une Viticulture Biodynamique et Durable »
- La revue des œnologues novembre 2006 :
  « connaissance et respect des sols en viticulture »
- Alter Agri juin 2009: « fertilité du sol en viticulture »

Vine

Wine

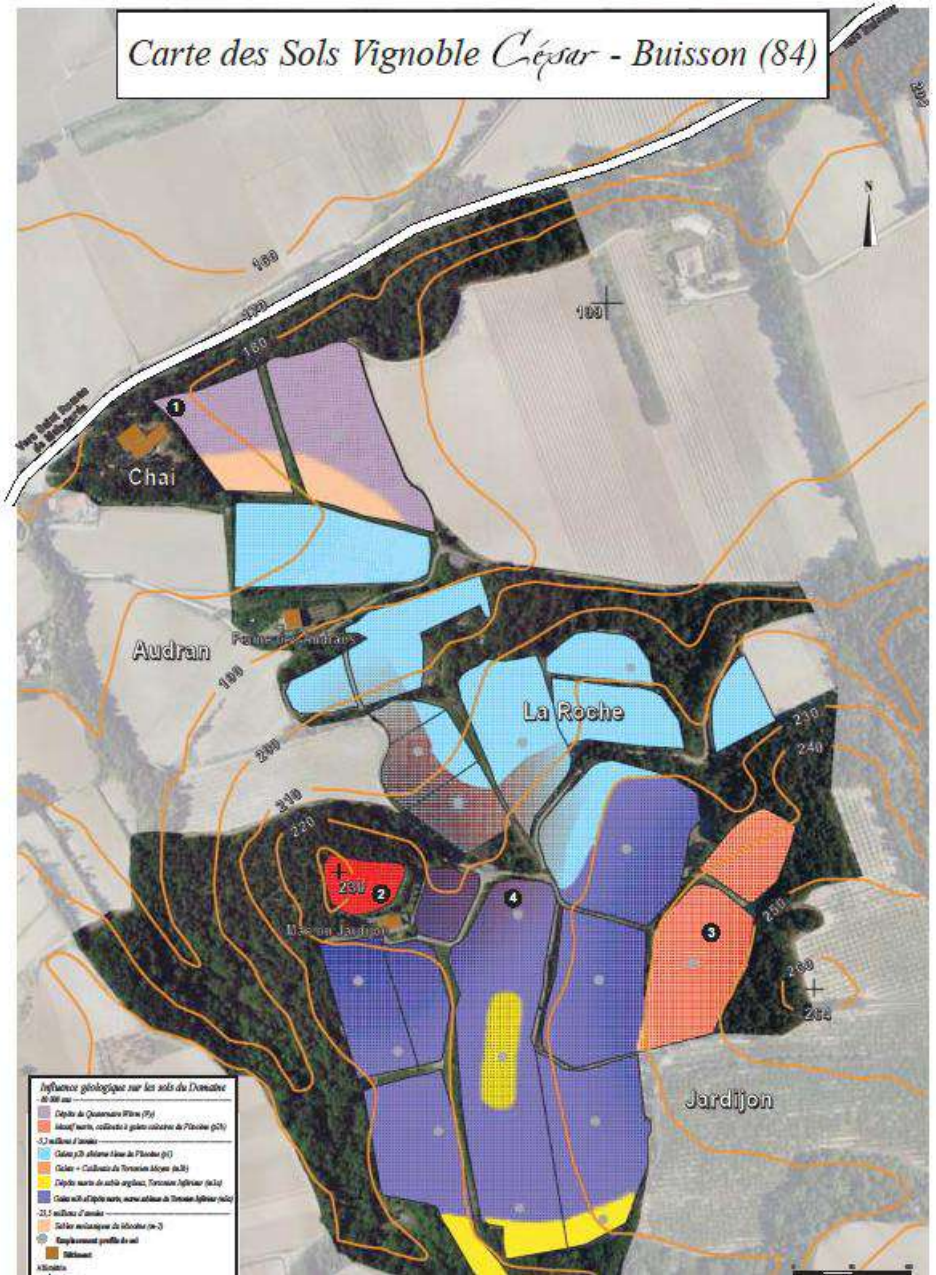
Grappe



Soil

I want to discover my vineyard’s soils

Impossible d'afficher l'image.



The aim of this cartography is to do the wine the best in harmony with soil and vine

Some of wine-growers demands

- Understand the lake of growth of the vine or the big vigor
- Improve maturity of grapes
- Manage irrigation
- Explain deficiency on leaves
- Use of grass or not
- Choose organic matter

How to prepare the future

- Succeed the new plantation
- Choose rootstock, and the variety
- Not fail “complantation”
- Face climate change

Quel choix à la plantation ?

Climate change

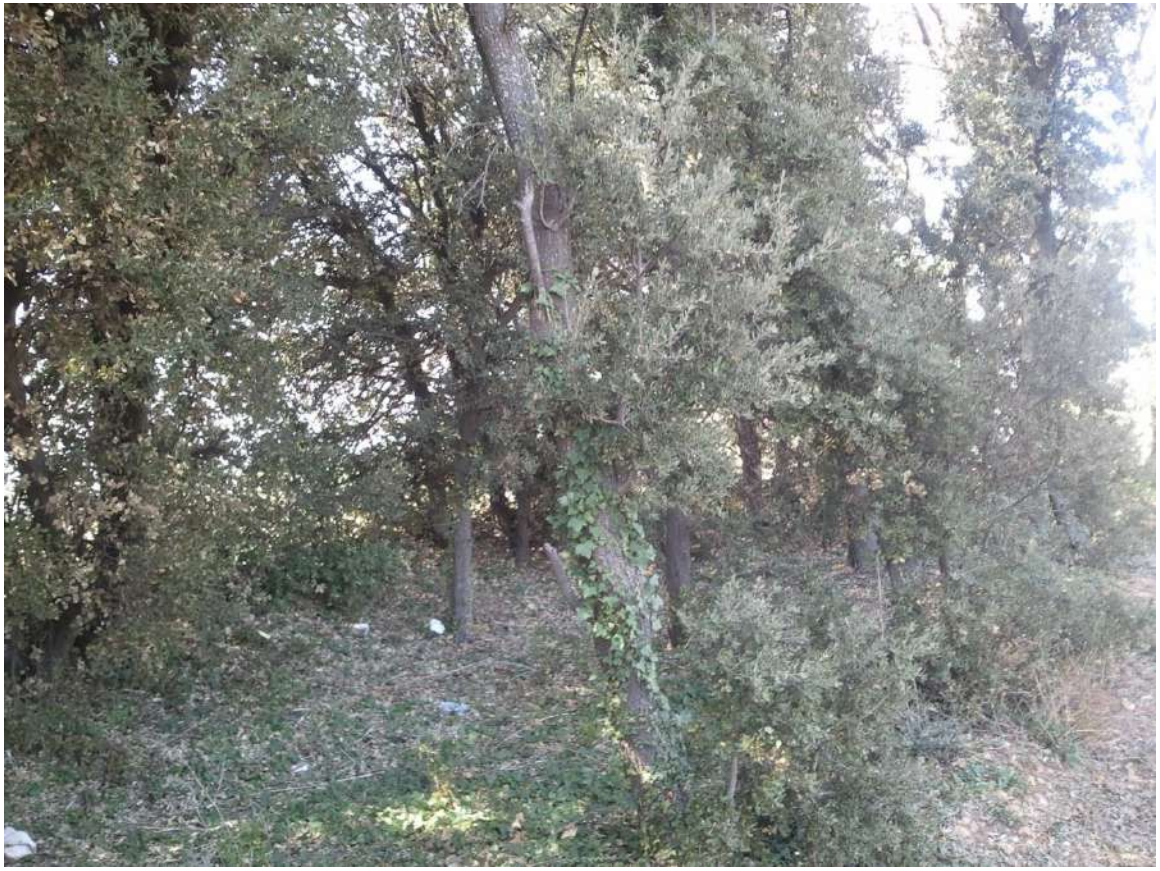
Le vivant fait le sol ici Roche calcaire

-

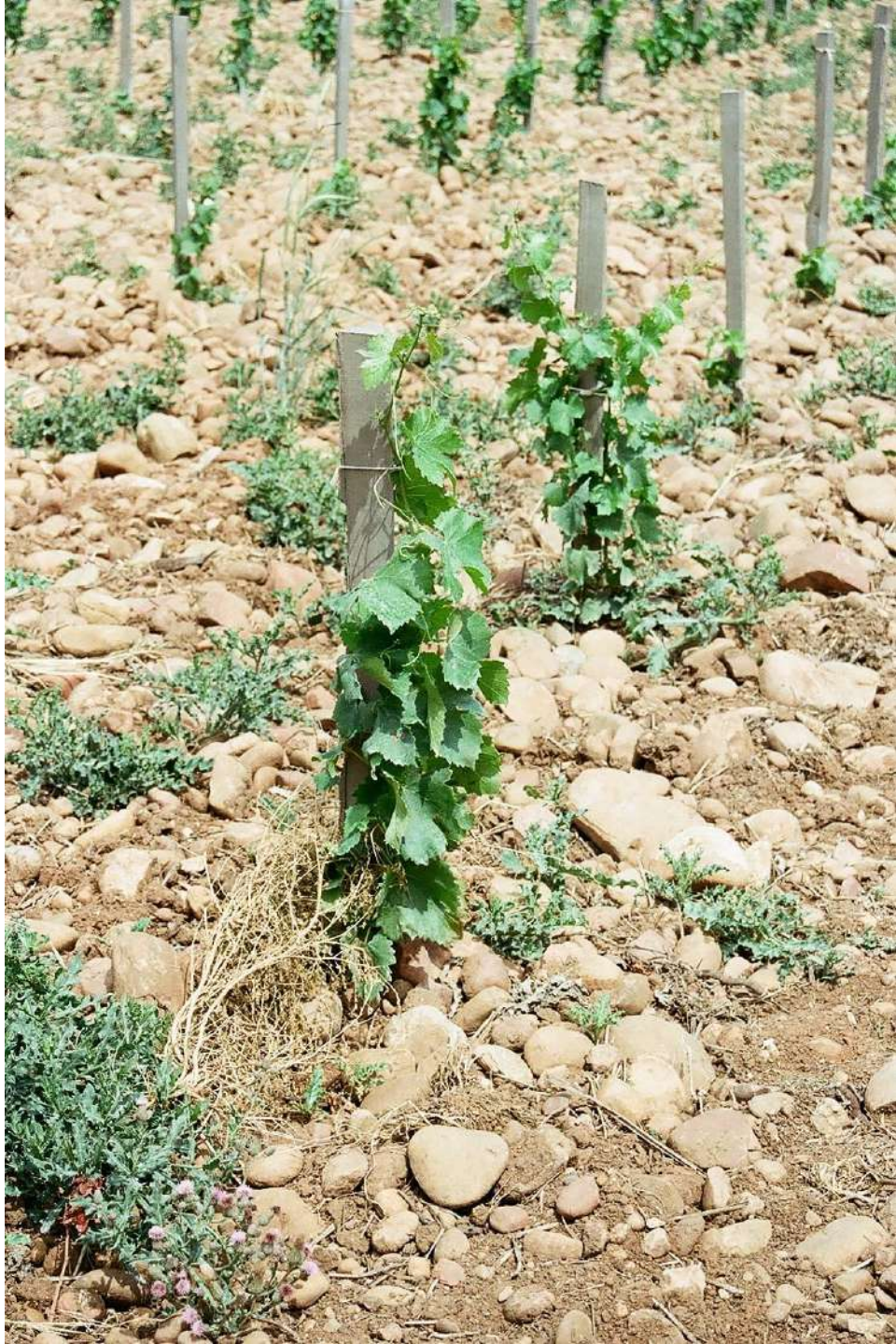
Les Baronnies

Force de la racine et de la rhizosphère

New plantation after the wood



Plantation printemps 2008



Été 2009

Printemps 2012

Vine observations

- Leaves color
- Shoots length and diameter
- Leaves analysis
- Grapes shape, weight,
- Grapes analysis
- Shoots analysis

Soil diagnosis

- Physical quality
- Organic and biological fertility
- mineral contents
- Evolution status

Aims to maintain or improve its fertility

Soil fertility
definition that I choose

its “capacity to produce all food chain, going from micro-organisms to man, passing through plant and animal, and this during generations “ (H.P. Rusch).

Soil diagnosis

- **Soil profile ;**
- **Agro-pedagogical and organo-biological analysis;**
- **Bio-indicators plants**

Observations of soil profile

- horizons, depth, stone content, geological subsoil.

- soil structure, pedological phenomenon going on
- rooting of vine and cover crop : density, depth, state
- biological activity (earthworms, ants…)
- presence of raw crop residues

General comments on soil and limiting factors

Etat interne des mottes

(Manichon 1982, Gautronneau 2000)

Γ (gamma)

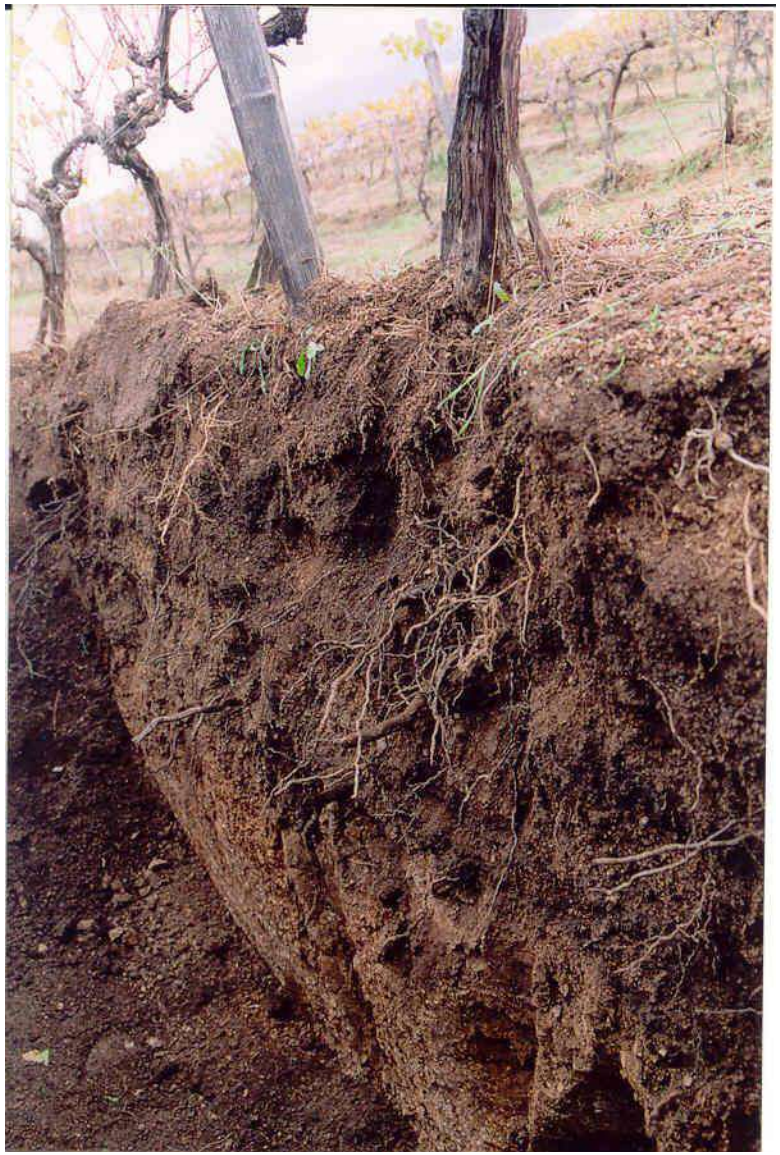
Φ (phi)

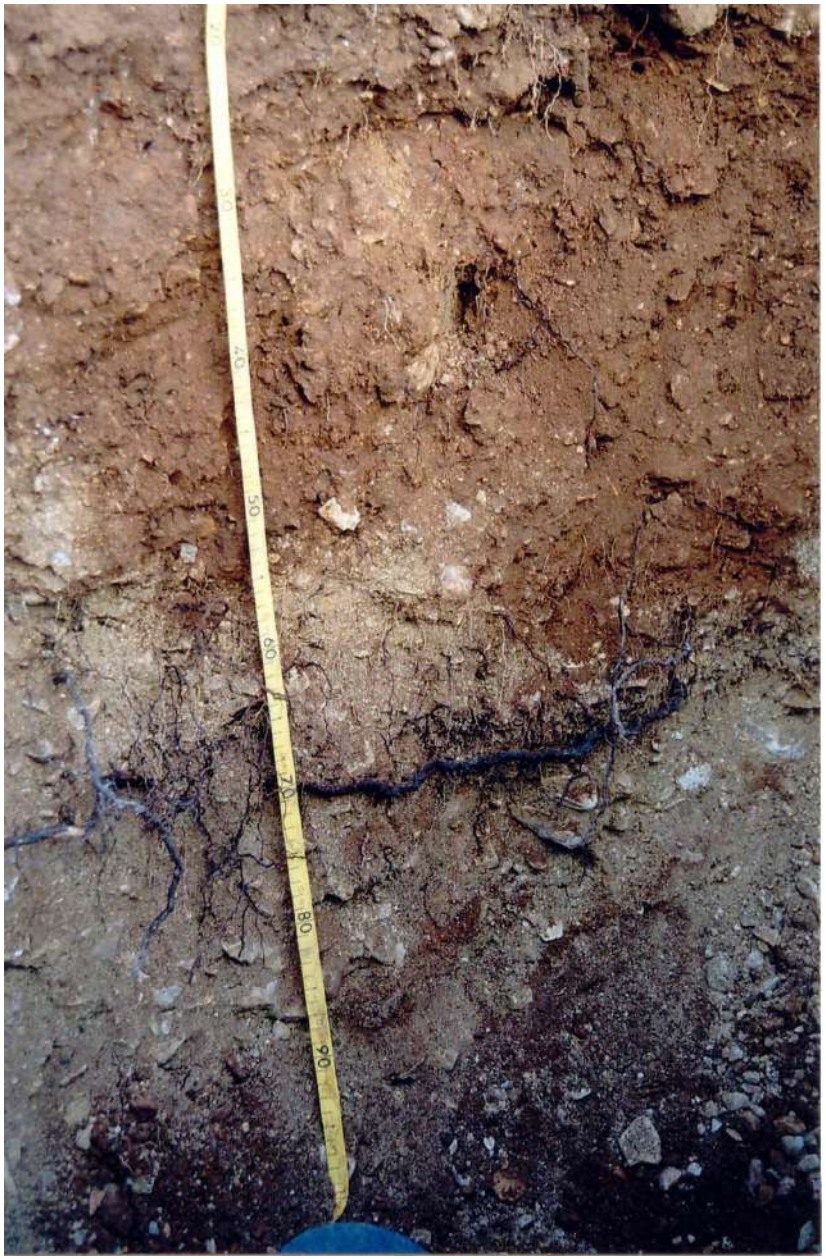
Δ_0 (delta zéro)

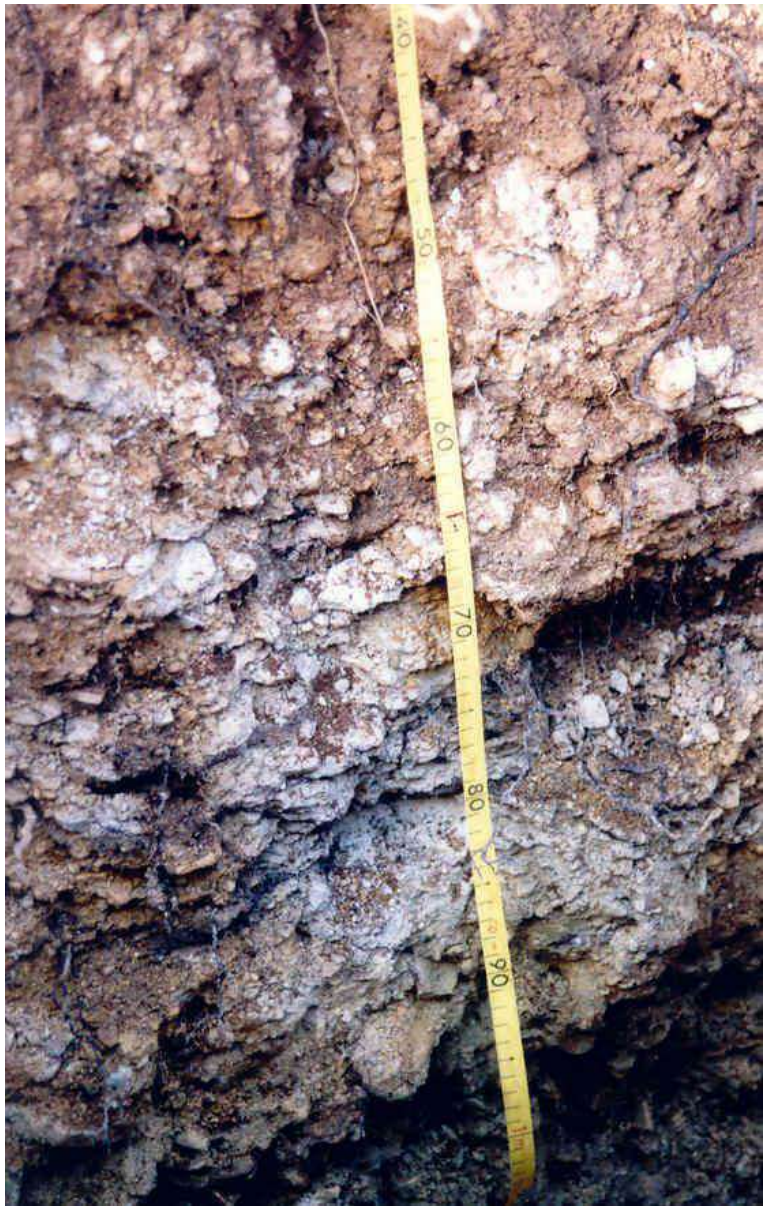
Δ (delta)


400
600
200
800
0
1000
N

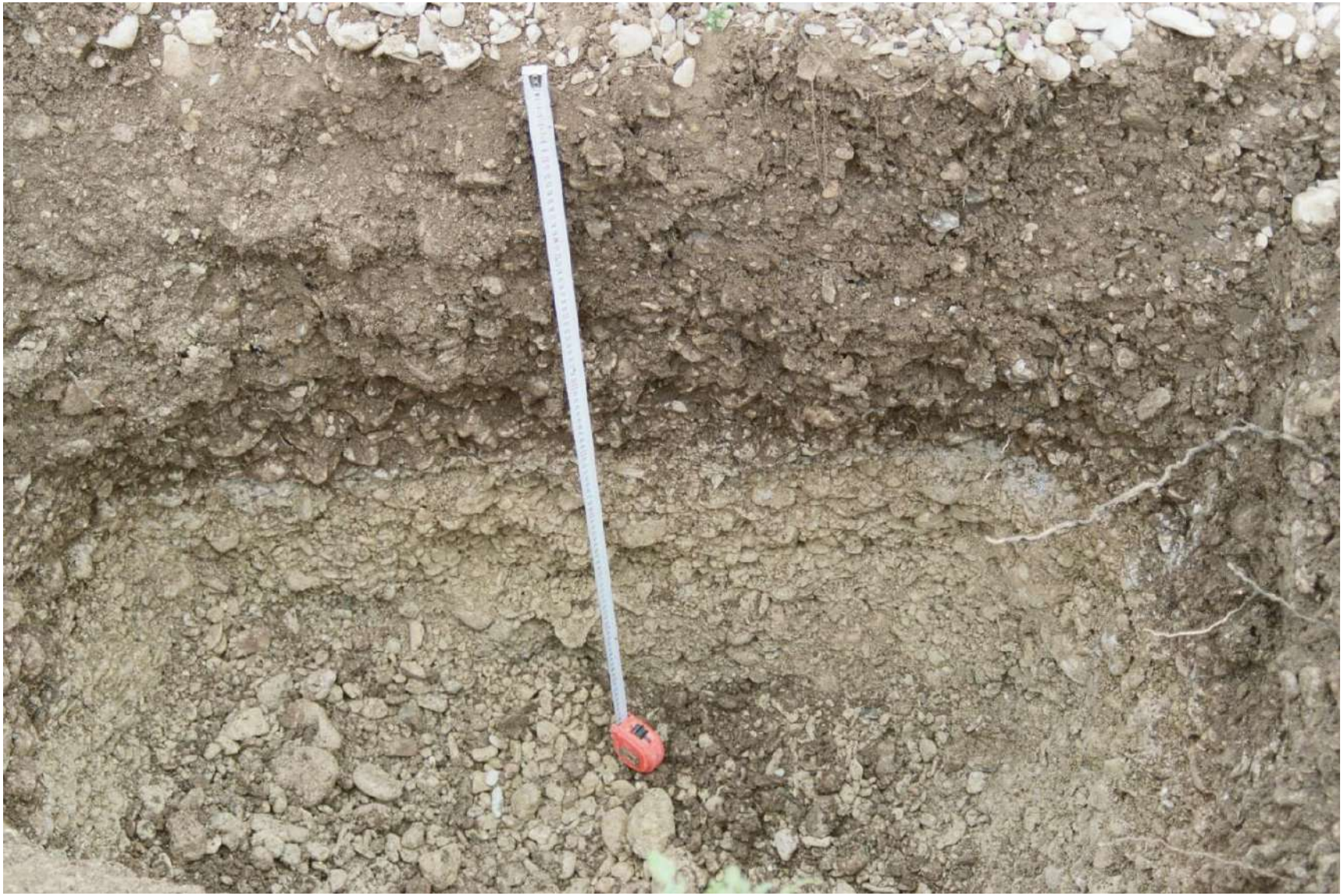
Racines à nu




40
50
60
70
80
90


40
50
60
70
80
90

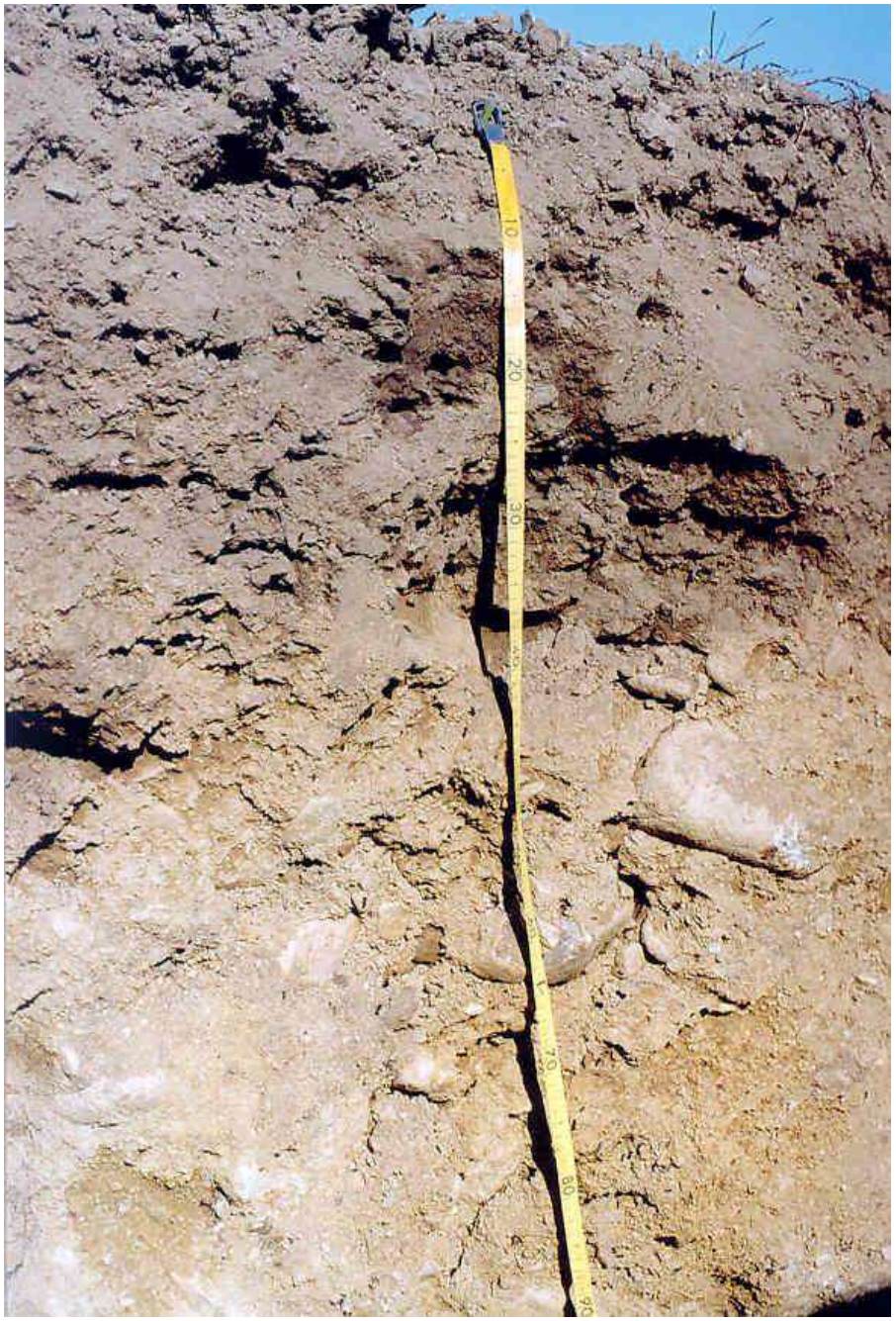
Sol évolué –Plan de Dieu - Côtes du Rhône



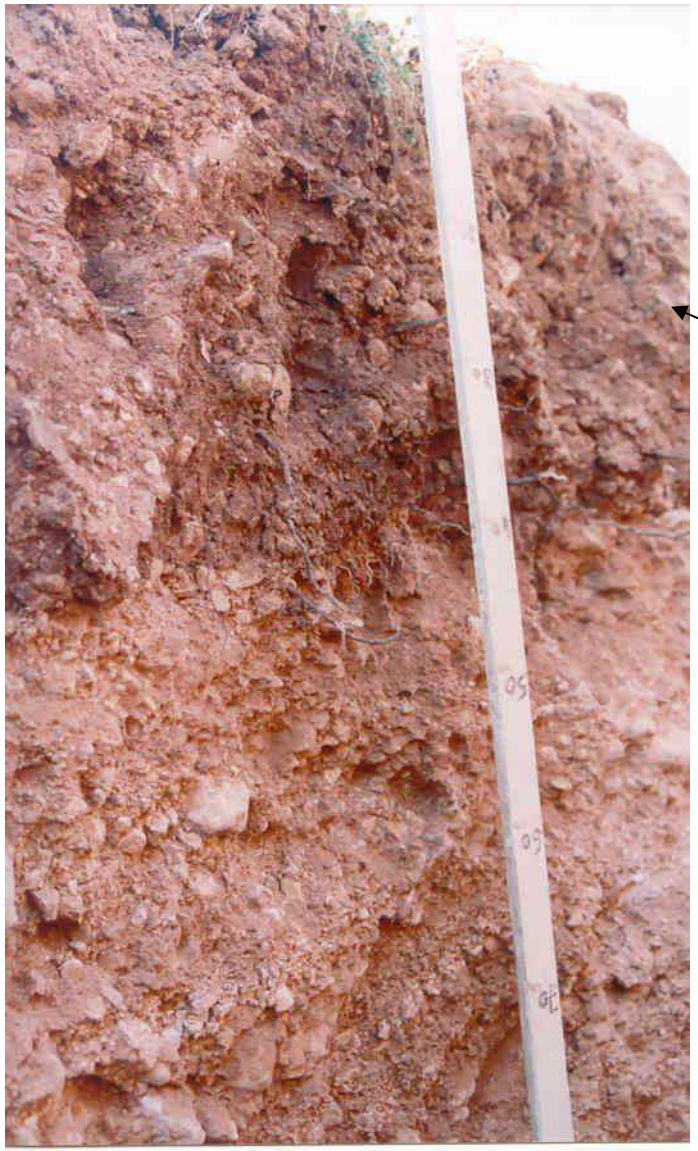
Sol évolué sur dépôts alluviaux granitiques

-

Corse

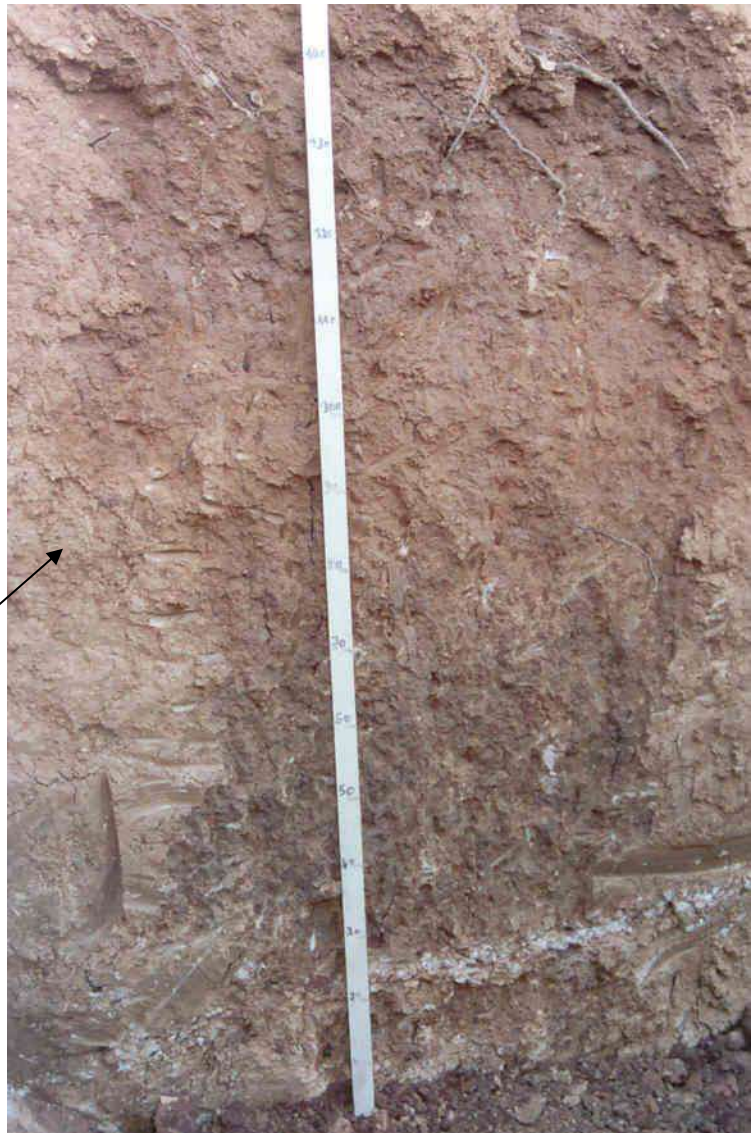


Même appellation (Sainte Victoire) : deux sols à gérer différemment



Ce Sol : faible réserve hydrique.

Celui là : très forte réserve hydrique




Châteauneuf du Pape

Objectives of soil diagnosis

- to point out soil origin and its evolution
- to define its state of fertility : organic, biological, physical and nutritional
- to point out the limiting factors : depth, drainage, clay,…
- to decide the technical improvements

Observations of soil profile

- horizons, depth, stone content, geological subsoil.

- soil structure, pedological phenomenon going on
- rooting of crop and cover crop : density, depth, state
- biological activity (earthworms, ants…)
- presence of raw crop residues

General comments on soil and limiting factors

Taking samples for analysis

Soil : in each horizon, I don’t mix horizons

and if the soil is heterogeneous in the plot I take two samples

Roots: if necessary

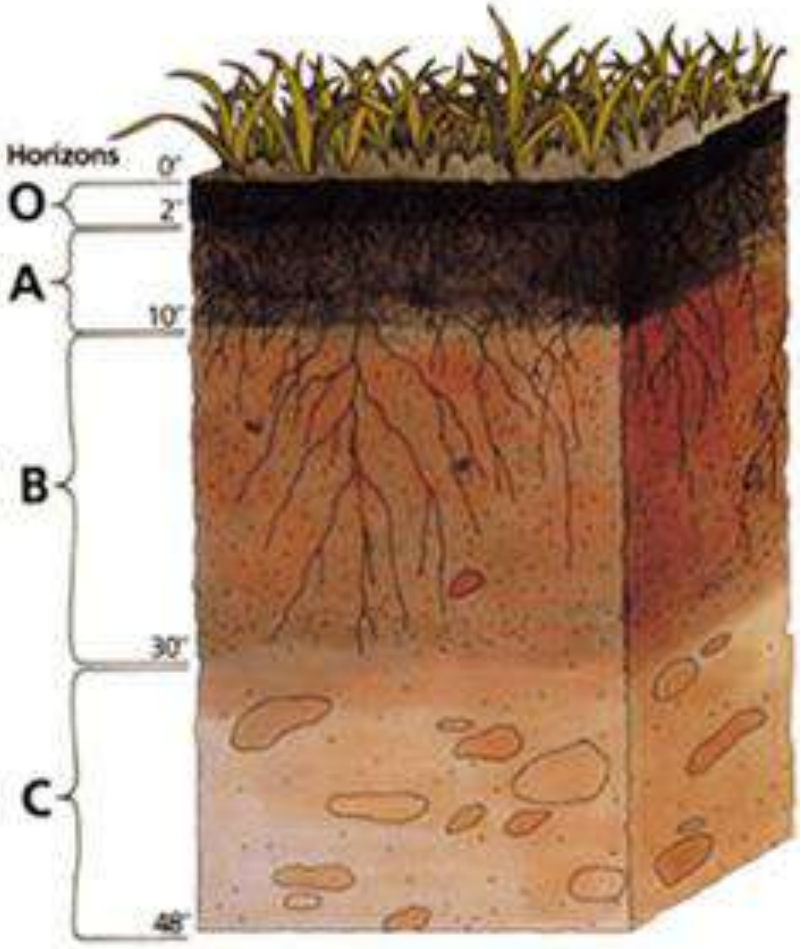
Soil Horizons

Humus

Encore riche en matière organique, horizon appauvri

Encore pauvre en matière organique, horizon d'accumulation

Horizon d'altération de la roche



E des sols, Barot

Flora which indicate soil state

=> All the plants indicates soil state, depending out of the environment composition, its quality and state

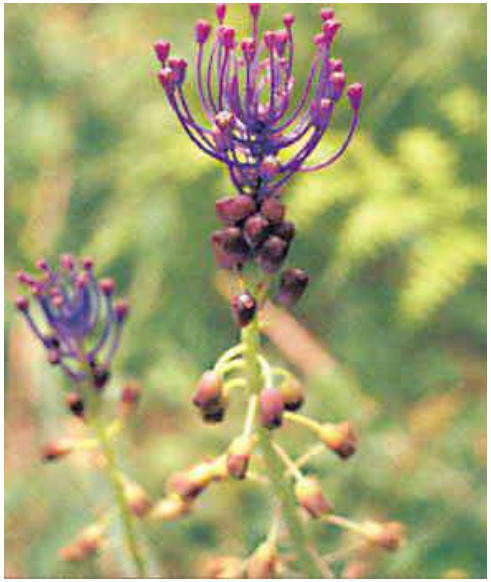
First of all, we need to know their primary "BIOTOPE" = their real naturel environment

Nitrogen

Diplotaxis fausse roquette,

Potassium

- muscari à toupet, …



Organic Matter

- Mouron Blanc

Soil analysis

Complement to field diagnosis

Major criteria used:

Soil fixation capacity, measured from the quantity and quality of ultra-fine particles (“real” clay and fine silt).

This parameter determines level of inputs not to be exceeded and necessity or not to fraction them. CEC Cobaltihéxamine or CEC Metson

Links of organo-mineral complex, measurement of :

Exchangeable calcium and magnesium

total and active limestone and index of chlorosis capacity (In French IPC).
Water pH and KCl pH.
"Exchangeable" aluminium with KCl.

These parameters determine the decision to bring calcareous amendments or not (nature, quantity, fractioning), give an evaluation of blockage risk, and correction needed.

Organic matter: Measurement of total carbon and total nitrogen ;
C/N.

This is not enough in order to characterize the organic soil functioning.

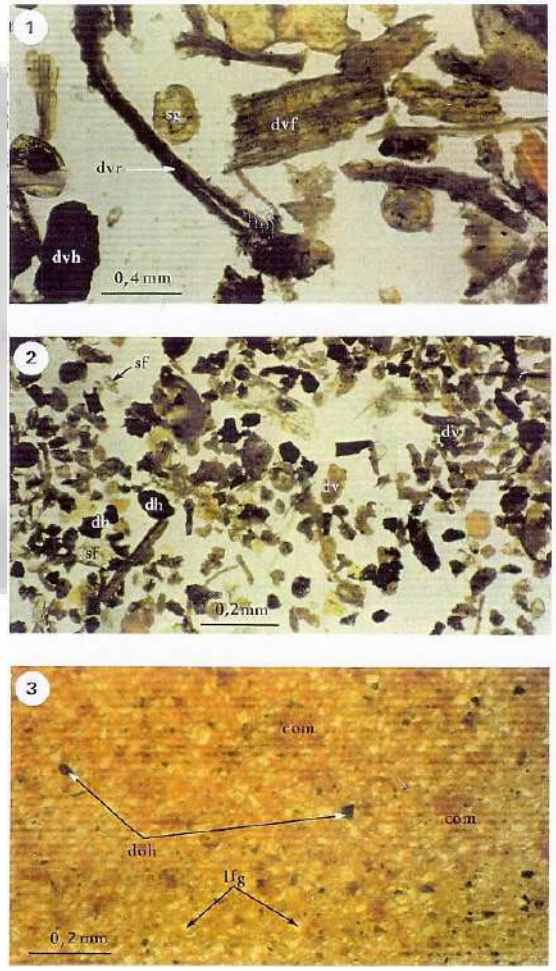
Then we measure two fractions of organic matter :

- **stable humus, complex polymers linked to ultra-fine particles,**

- **free organic matters, easily accessible to microbial biomass; they are measured on the coarse part of fine earth.**
  The level and balance between those two fractions determine the type of product to bring to the soil.

The quantity of inputs depends on crop, soil fixation capacity and on biological activity.

(Photos Feller, 1994)



Fraction 50 – 2000 µm

15 ans

MO libre
= *MO particulaires*
(C/N)

STATUT ORGANIQUE

MO liée
(C/N)

Fraction < 50 µm

50 ans

- Matière organique libre/rapide : facilement accessibles à la biomasse du sol (rôle nourricier), rôle fertilisant pour les plantes. Dégradation rapide (< 12 ans).

- Matière organique liée/très lente : constitue l'humus stable du sol, dégradation très lente (>50 ans),

Microbial Mass and mineralization activities

An important part of soil fertility is linked to its biological components. Microbial Mass constitutes the most active fraction of this component.

The analysis is made on surface earth (5 to 30cm).

The chosen parameters are :

Microbial biomass : expressed in milligrams carbon per kilo of earth : this is the quantity of microscopic organisms in soil (mainly fungi and bacteria

Example :

Biomass mg C/kg of soil	Interpretation
100-150	**LOW**
200-300	**Correct**
300-400	**High**

Éléments minéraux stockés dans la BM (calculés)

Exemple : 395 mg de C microbien

N 178 U - kg /ha

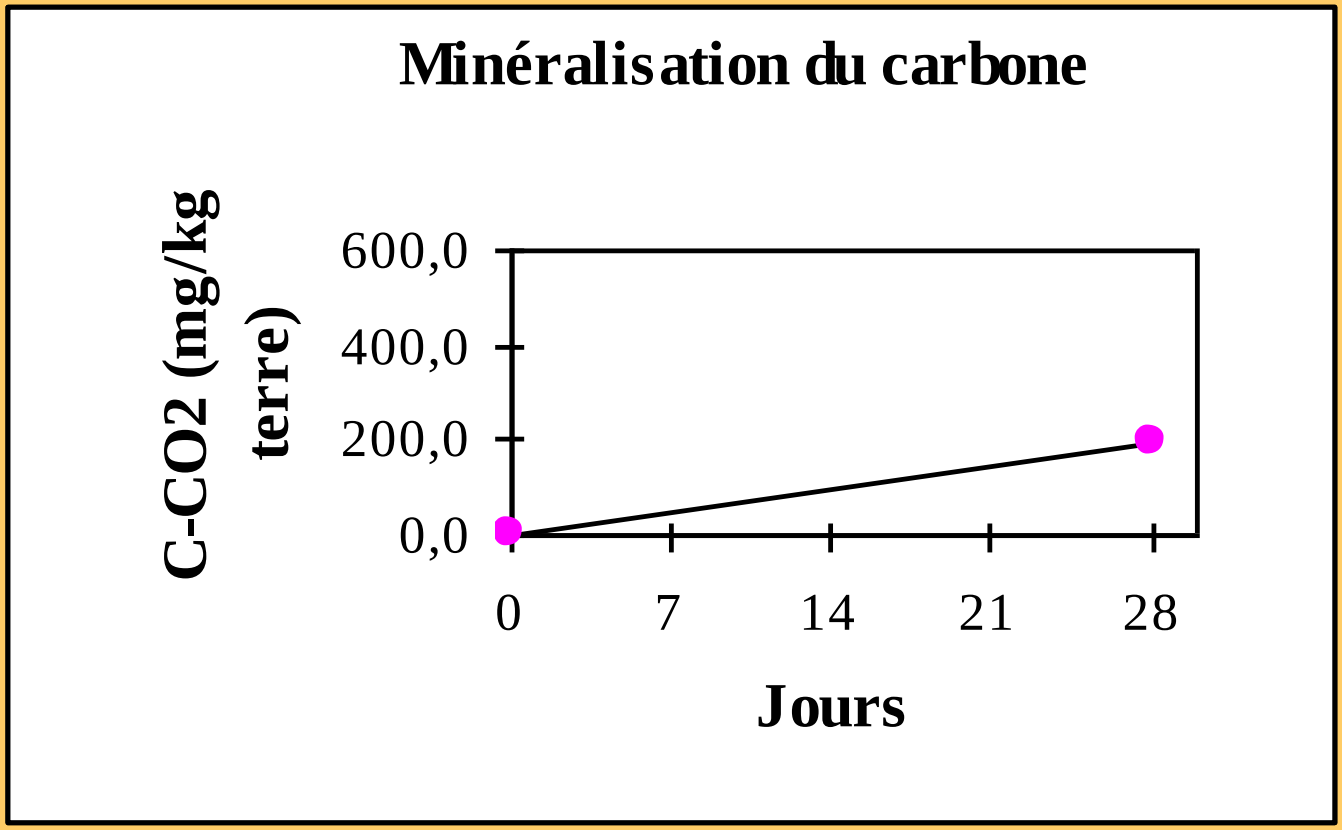
P 137 U – kg /ha

K 116 U - kg /ha

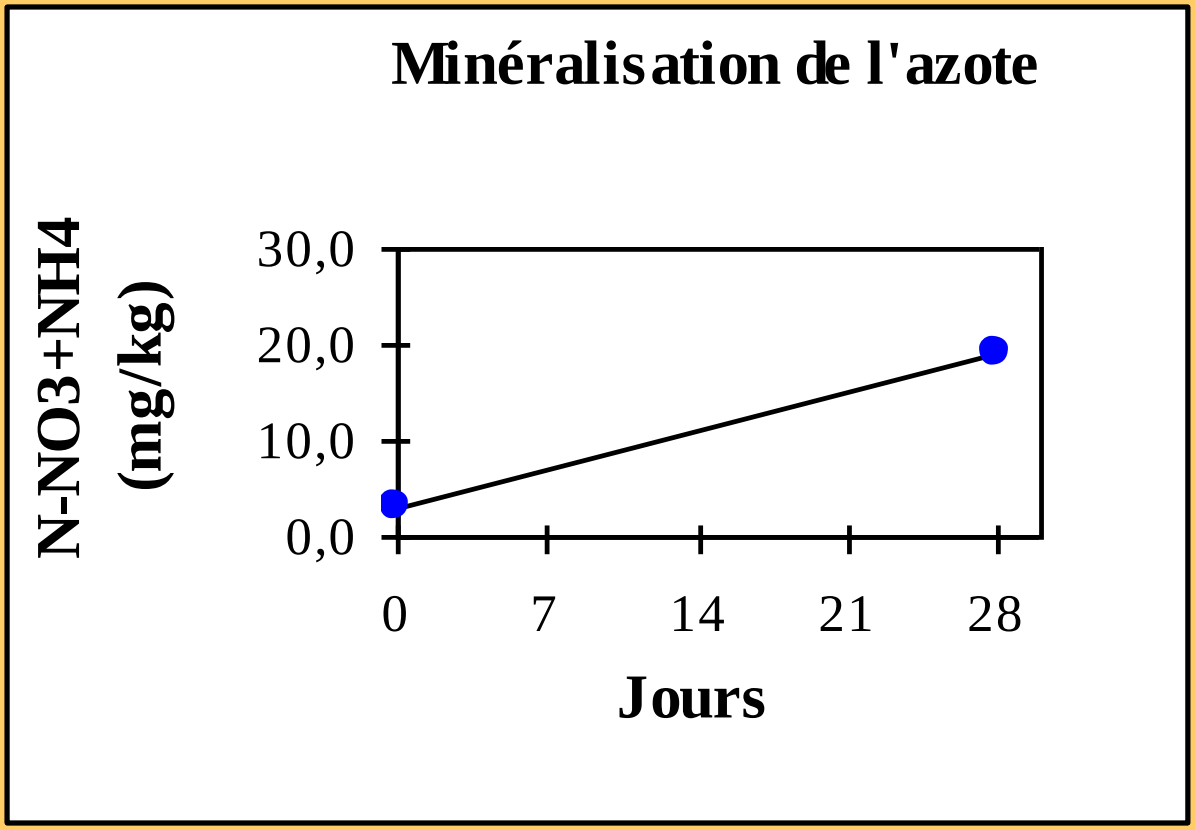
Ca 17 U – Kg /ha

Mg 17 U – kg/ha

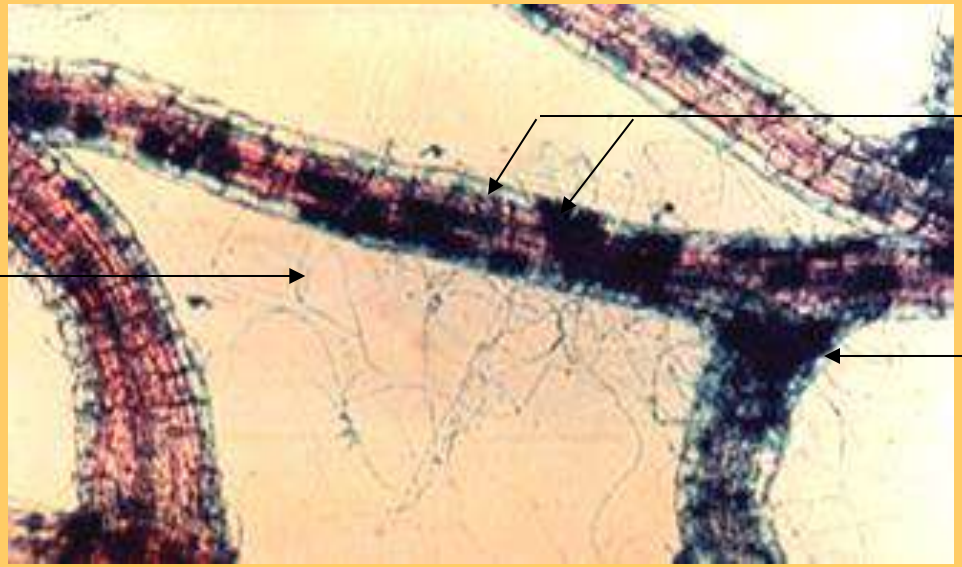
Carbon Mineralization Activity expressed in mg C-CO2/kg/28 days. Calculation of carbon mineralization index.



Nitrogen Mineralization Activity: expressed in mg N-mineral (NO_3^- et NH_4^+)/kg/28 days.
Calculation of nitrogen mineralization index



Analysis of roots mycorrhization rate : qualitative indicator of soil and plant functioning



(Photo INRA)

Mineral content : easily exchangeable elements and trace elements.

Total elements measured on the mineral substratum : P, K, Ca, Mg. *Determines inputs balance and eventual corrections*

Vine nutrients needs

Azote	Phosphore	Potassium	Calcium	Magnésium	soufre	unité
20 à 70	7 à 23	30 à 84	56 à 112	10 à 25	4 à 8	Kg/ha
Cuivre	Fer	Bore	Zinc	Molybdène		
60 à 120	400 à 800	80 à 150	100 à 200	0,3 à 0,8		g/ha

Prélèvements annuels par hectare de vigne (feuilles, rameaux et grappes)
DELAS, 1989

Soil Evolution : *balance between free iron and total iron. Balance between free aluminium and total aluminium.*

Soil Hydromorphy : *manganese easily “reduced” /total manganese*