# Principles of Farm Management

Area 4 – Entrepreneurship in Farming

Lesson 12 – Toolkit for Agripreneurs 4.0

Sequence ID – 51

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Co-funded by the Erasmus+ Programme of the European Union

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Agrismart LAB

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# A4.L12.T1 Toolkit for Agripreneurs 4.0

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Marco Vieri, Daniele Sarri, Stefania Lombardo, Marco Rimediotti, Riccardo Lisci, Valentina De Pascale, Eleonora Salvini, Carolina Perna, Andrea Pagliai, *Toolkit for Agripreneurs 4.0*, © 2020 Author(s), CC BY-SA 4.0 International, DOI 10.36253/978-88-5518-044-3.53, in Marco Vieri (edited by), *SPARKLE - Entrepreneurship for Sustainable Precision Agriculture*, © 2020 Author(s), content CC BY-SA 4.0 International, metadata CC0 1.0 Universal, published by Firenze University Press, ISSN 2704-6095 (online), eISBN 978-88-5518-042-9, DOI 10.36253/978-88-5518-044-3

# Table of Contents



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# Overview

Managing farming activities includes detailed attention to:

1. Agronomical efficacy in terms of biological care of crops, soil conservation and environmental durability.
   - Also, climate change and food/product quality demand, require new tools and practices to mitigate risks due to exceptional weather and pest events.
2. Operative efficiency in terms of higher capacity of field and appropriate use of farm machinery.
   - On other approach that replaces extractive behaviour over the last decades. words, best logistic of work, and perfect layout geometry and pathways conditions.
3. Technological efficiency of machinery.
   - Appropriate type, size, use, maintenance and repair, structure and procedures of the systems.
4. Respect of direct and indirect normative constraints.

Sustainability/durability is the mandatory

# 1. Agronomic Goals

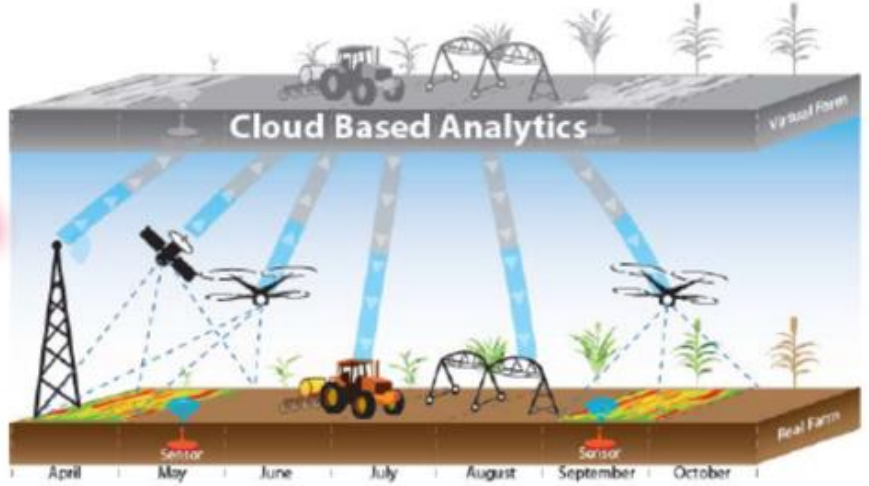
The cultivation activity has as objective the care of the plant, its protection and its production.

This requires the implementation of a set of regularized practices in the seasonal cycle which can be summarized by an operational timetable.

**YEARLY FARMING OPERATIONS CALENDAR**

| operation | JAN | FEB | MAR | APR | MAY | GIU | JUL | AUG | SEP | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PRUNING | ■ | ■ | ■ | ■ | ■ | | | | | | | ■ |
| RECOVER WOOD RESIDUE | | | | ■ | ■ | ■ | | | | | | |
| FERTILIZING | | | | ■ | ■ | ■ | ■ | | | | | |
| CULTIVATING / TILLAGE | | | | | ■ | ■ | | | | | ■ | ■ |
| PEST & RISKS CONTROL | | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| COVER CROPS MANAG | | | | | | | | ■ | ■ | ■ | | |
| GREEN PRUNING | | | | | | | | | | ■ | ■ | ■ |
| GRAPE CONTROL | | | | | | | | | | | | |
| GRAPE HARVEST | | | | | | | | | | | | |
| SOWING COVER CROP | | | | | | | | | | | | |

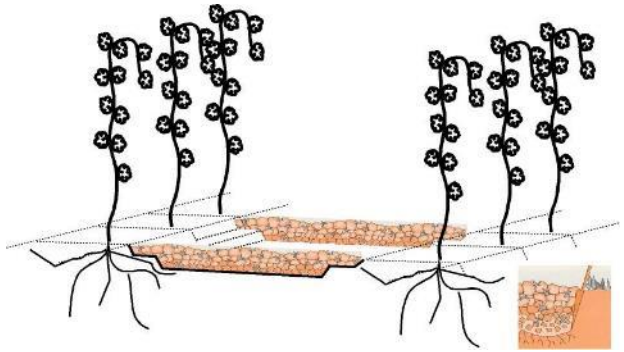
Digitalisation, Connectivity, and High Technology make it possible to implement a multidimensional approach in the yearly timetable of farming operations.



# 1. Agronomic Goals

In pursuing sustainability great importance is given to the soil ecosystem that represents the basic activity of conservation of natural fertility which in some crops represents a characteristic of high value.

Soil management techniques made to restore soil physical structure. The indirect advantages are the restoration of soil gasses equilibrium, water linkage, reduction of erosion, and inclusion of organic matter.



# 1. Agronomic Goals

The choice of technical tools is fundamental for the execution of Best Agronomical Practices (BAT).

The tool is the integration of technology, and its impeccable functionality depends on the correct choice of **TYPOLOGY** & **SET UP**.

The main elements of the machinery are “structural” and “ancillary” components that permit an appropriate set up in working steps.

# 1. Agronomic Goals

Each agronomic intervention must be carried out with the ideal tools to avoid creating issues in the later management  stages.
For instance, during pruning, tools should be used that make clean cuts, to avoid a frayed cuts that results in higher liquid emissions and greater exposure to pest and disease attacks.








# Smart Farming:
## The 3D cyber-physical dimension approach

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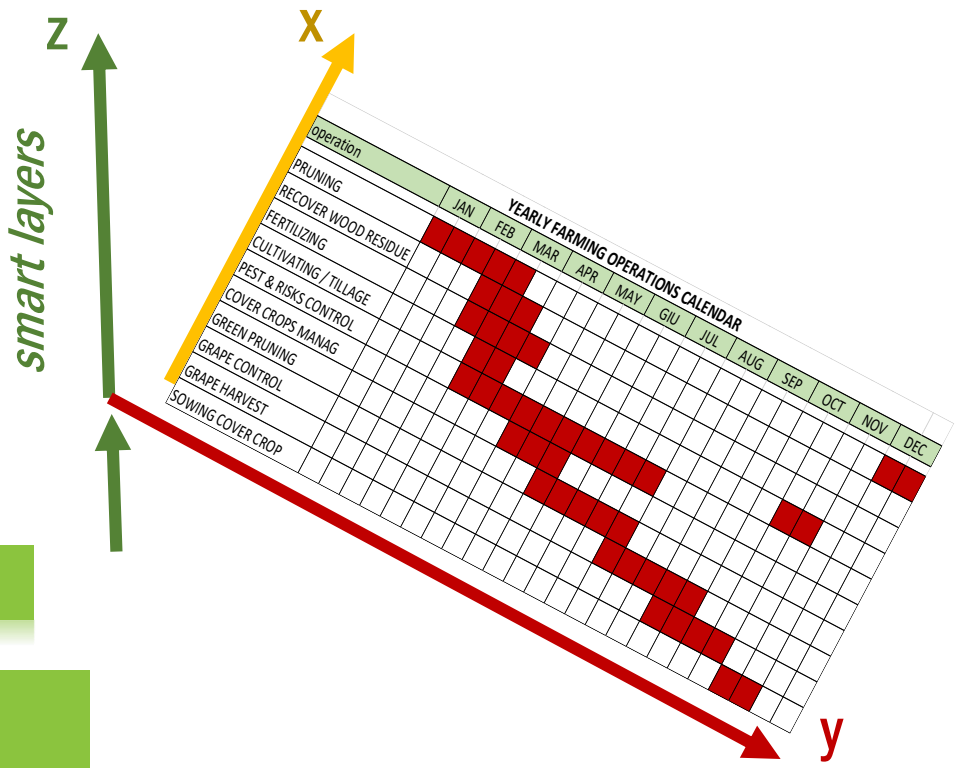
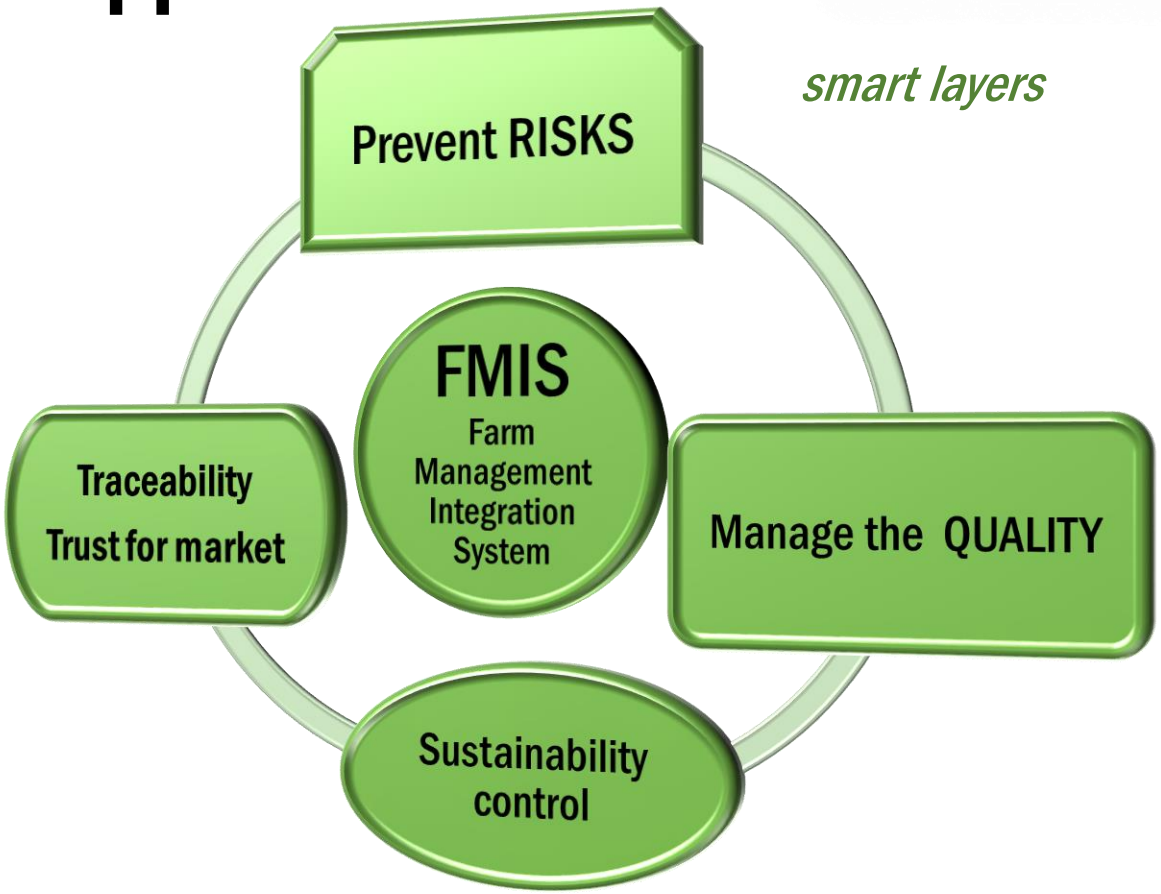



A proper farm management system must consider not only the seasonal operations calendars like a simplified sequence of activities, but all the data and information available (smart layers). This allow to select the more appropriate tools, techniques, input, crop protection strategies and get the so called Fam Management Integration System.

# 1. Agronomic Goals

## a. Quality Control

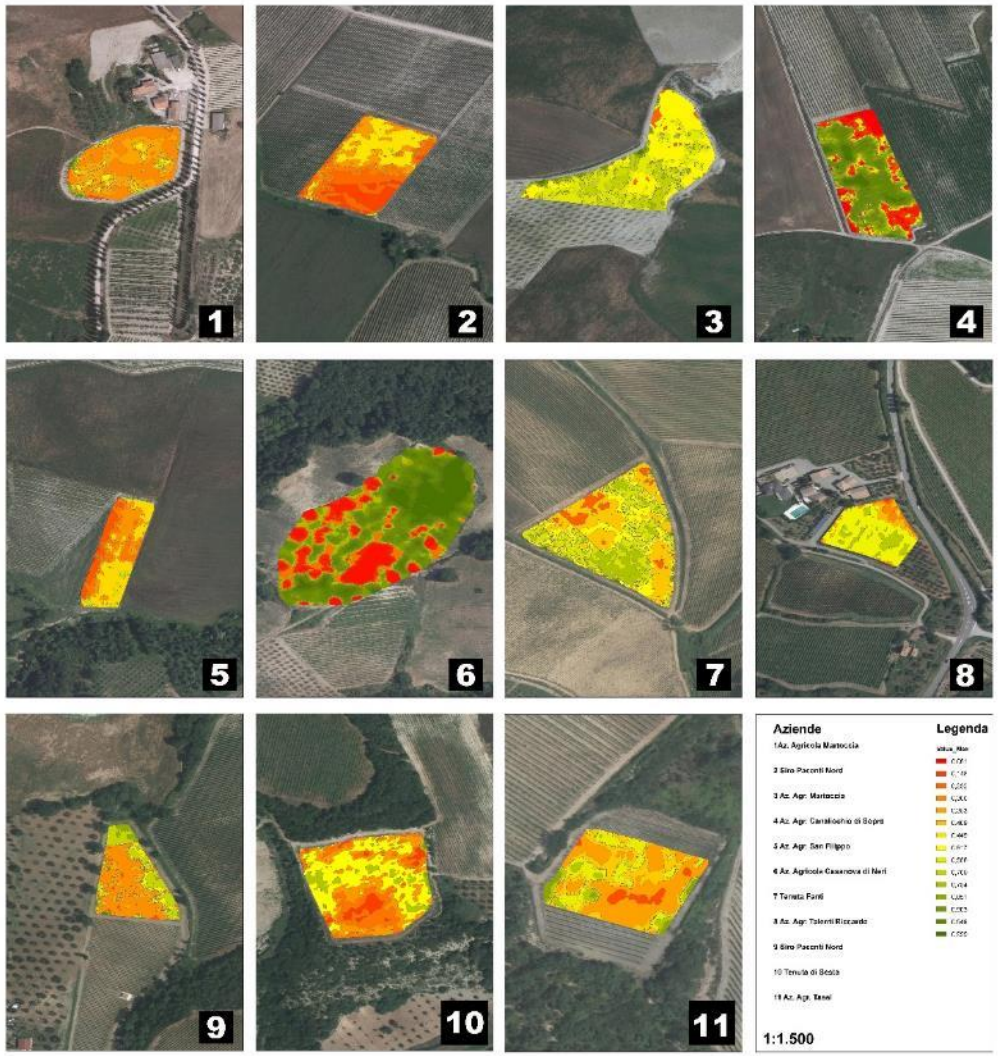
Over the recent years, especially in high value food chain like grape and vine production the quality control has become more and more important.

Therefore, the PA technologies have a great importance to measure parameters with evermore detail.

This allows to manage proper actions and inputs using Variable Rate Treatments in: fertilizing, defoliation, seeding, and harvest

Vine and grape analysis


Yard for the proximal sensing of vigour variability through measuring NDRE-Normal difference Red Edge Index (NIR-Red-Edge)/(NIR+Red edge)



# 1. Agronomic Goals

## b. Climate Change Risk Control

In recent years, more and more importance has been given to extreme climate events.

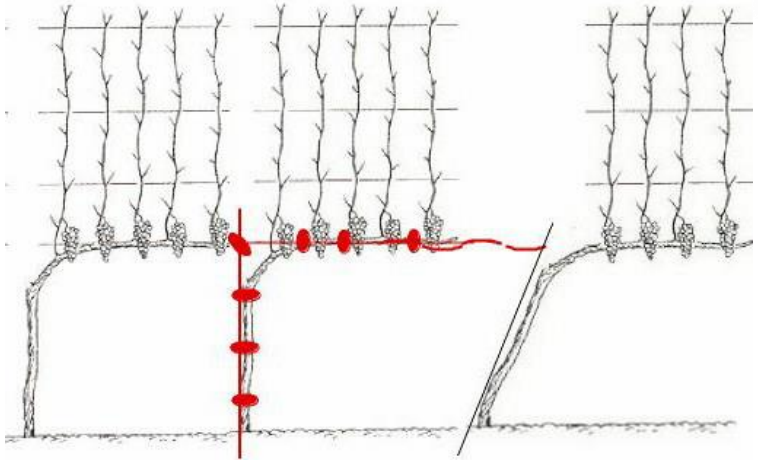
Precise monitoring of the crops, soil, and environment status, allows to mitigate the risks for the crops, especially in the spring time. Fog and Cloud network of meteorological stations are increasing everywhere.

# 2. Operative Efficiency

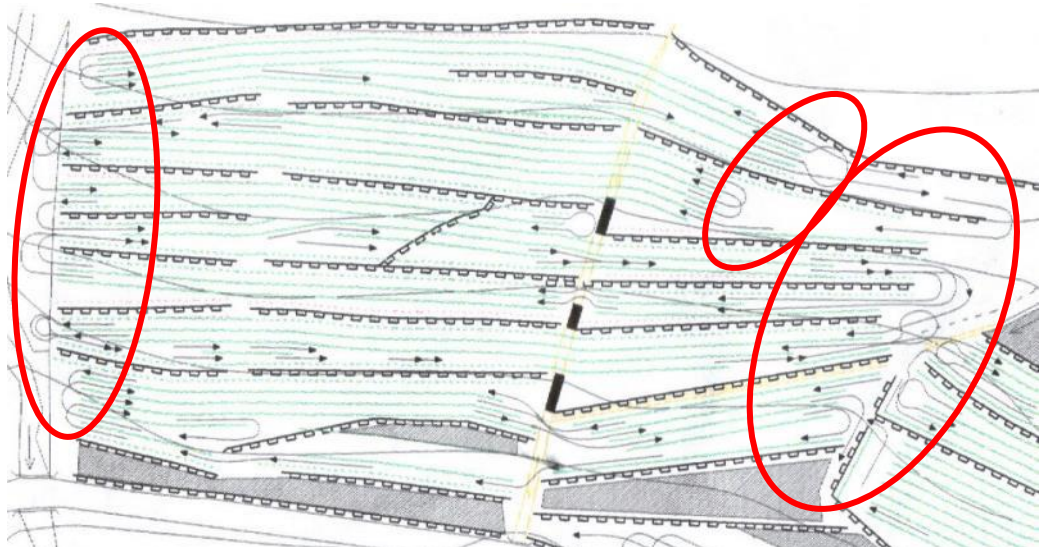
Operative efficiency is essential to maximise the Field Capacity and the Managed Surface.

As those factors depend on Speed, Available Time for working in the field, and ancillary supports. It becomes important to have:

- The maximum perfection in geometry (plant, soil, etc.)
- Well planned pattern and aid controls (auto steering) especially in slopes and irregular areas.
- And also the best quality of work



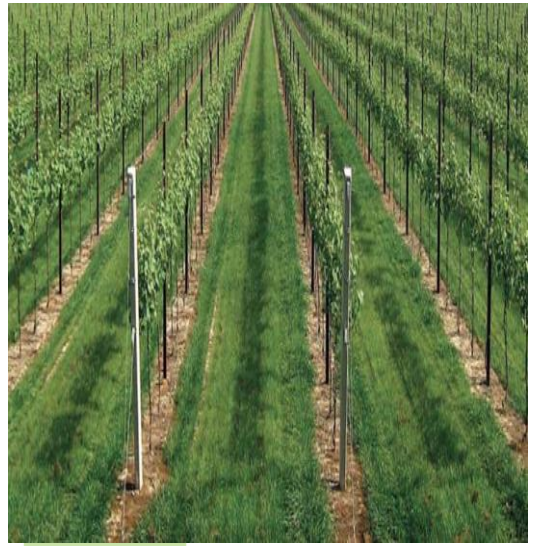
The correct training of vines plantation allows a standardization of growing (limited variability), indirectly enhancing the use of machinery, and thus efficiency.



Example of CAD functional design for field machinery: the turns and pathways simulation in the headland and critical points of the plots.

# 2. Operative Efficiency

Soil management is essential to maintain the perfect geometries which allow to perform operations at the maximum speed with adequate precision.



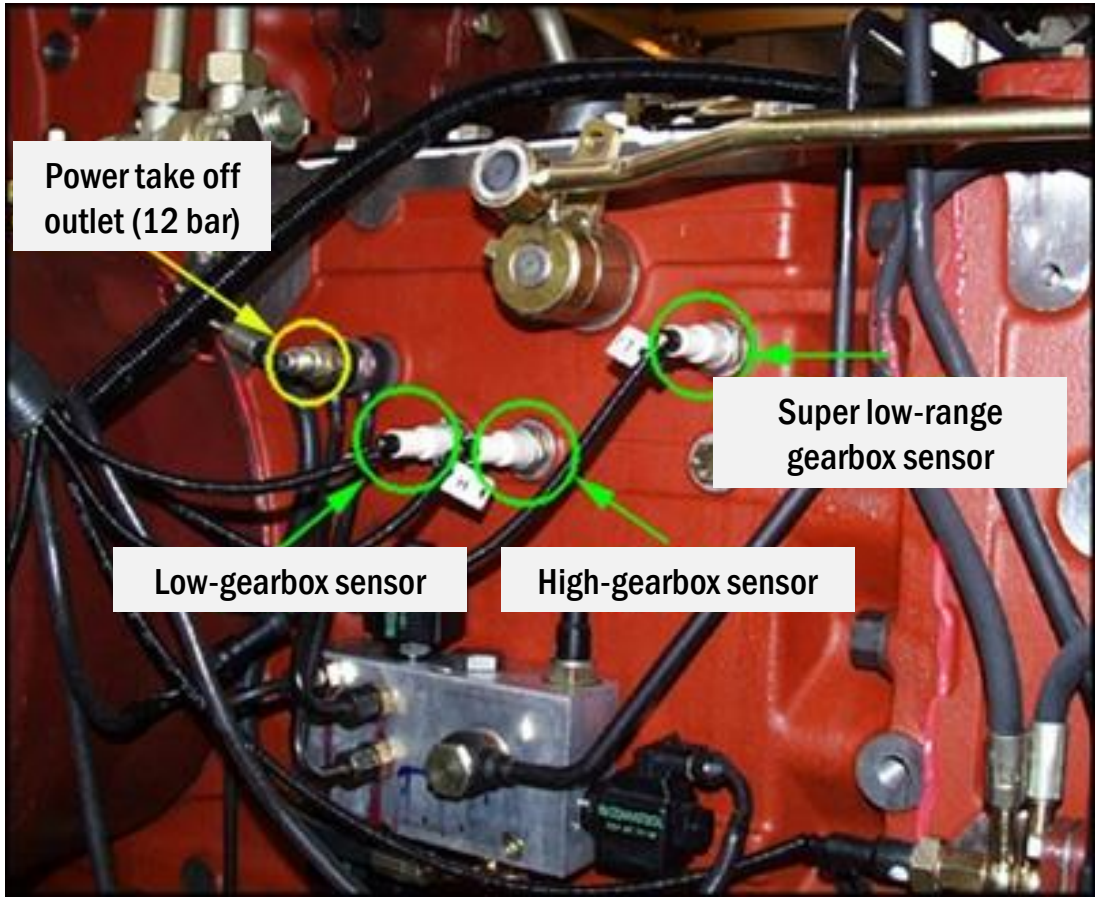
Grass cover increases water absorption and ground bearing capacity. The reduction of stones eliminates roughness and makes the position of the tools more precise.


Excessive soil pulverization may cause erosion in slope fields

# 3. Technological Efficiency

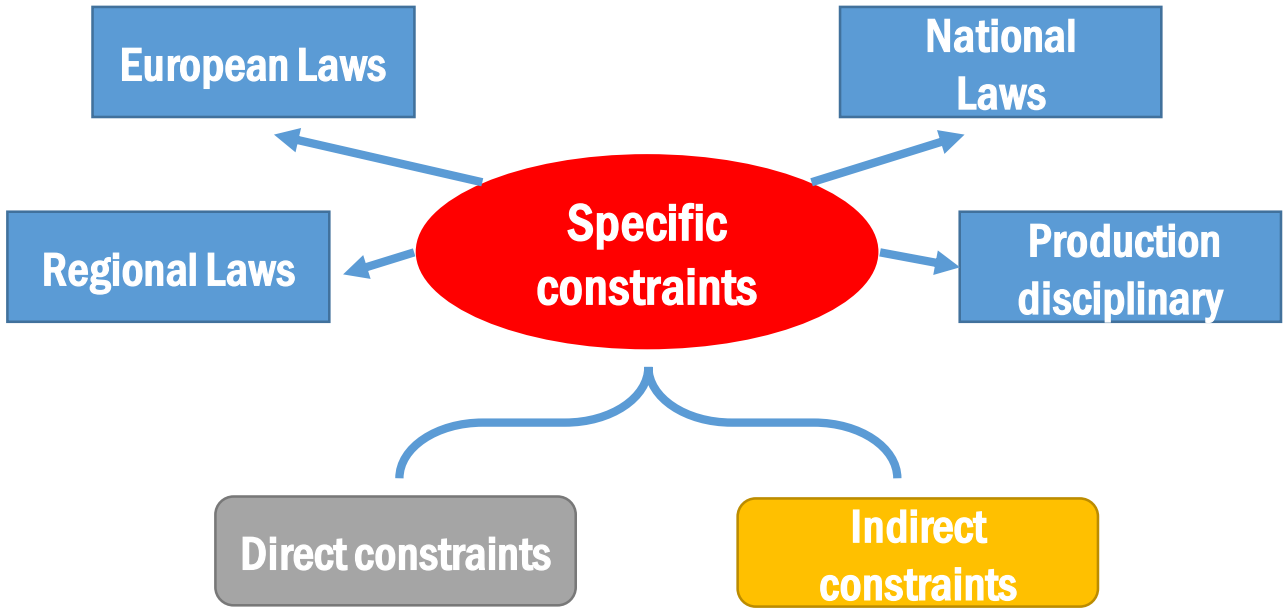
Farm machinery have generally a short annual time of working. So, it becomes very important to have machines at the best in the needed period avoiding late or sudden stops.

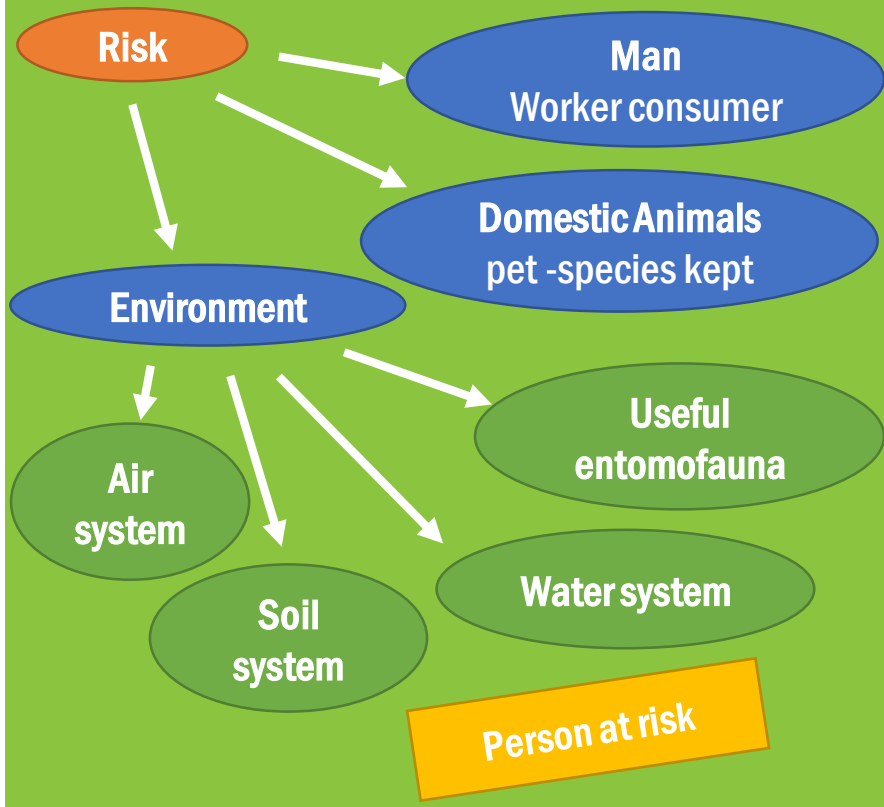
Planned periodical controls and precise onboard monitoring devices are essential to have an economically sustainable use of machinery and to ensure operative reliability and working safety



# 4. Constraints

The farming activity is subjected to several technical constraints to mitigate risks for workers, people and beings, environment and obviously food and product quality.



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# 4. Constraints

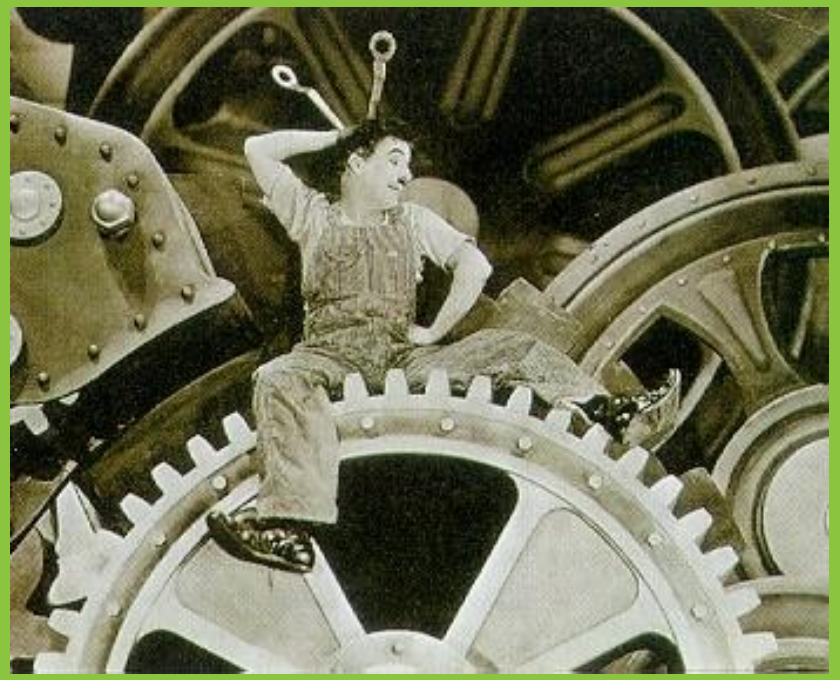
<u>The primary constraint is risk control for workers.</u>

The RISK is the magnitude of gravity and frequency of a dangerous events.

Appropriate devices and procedures are essential to control risks.

And it is not only and ethical issue but also economical.

Wellness that reduces working stress factors enhance productivity and precision.



The modifications to the machinery, made to avoid repeated operations, increases risks. A piece of string used to support a rotating component of the machinery can become lethal for the operator.

# 4. Constraints

The second constraint is for chemical use as pest and weed control or for nutrients application (Directive 2009/128/EC and 91/676/EEC).

Also organic inputs are damaging over the biological integration threshold.

Precision Agriculture techniques have a great importance in mitigating these risks with precise applications and minimizing waste in operative and also in the ancillary phases.

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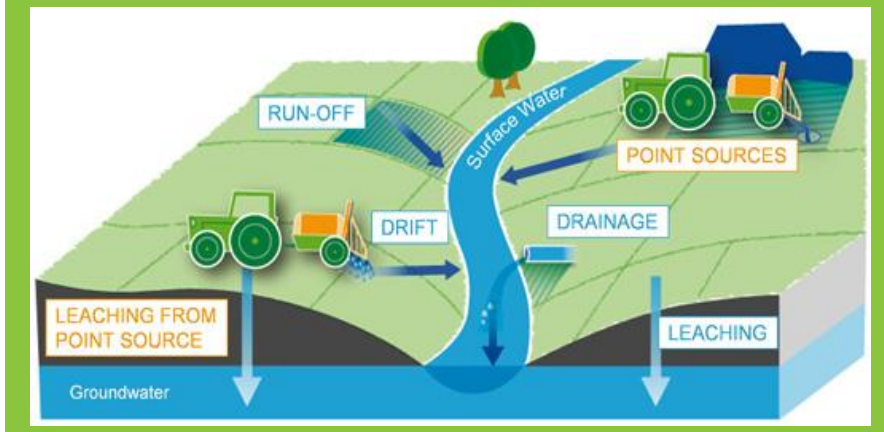
https://eur-lex.europa.eu/legal-content/en/ALL/?uri=CELEX:31991L0676

Pesticide drift generated during crop protection



# 4. Constraints

Thirdly, attention to soil conservation is increasing, avoiding structural inappropriate field profile, improper tillage and compaction due to machine traffic. Proper operation and management as transversal ridge profiling and cover crop adoption are requested.

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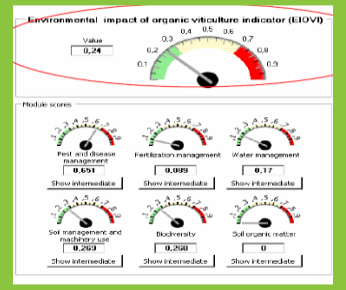
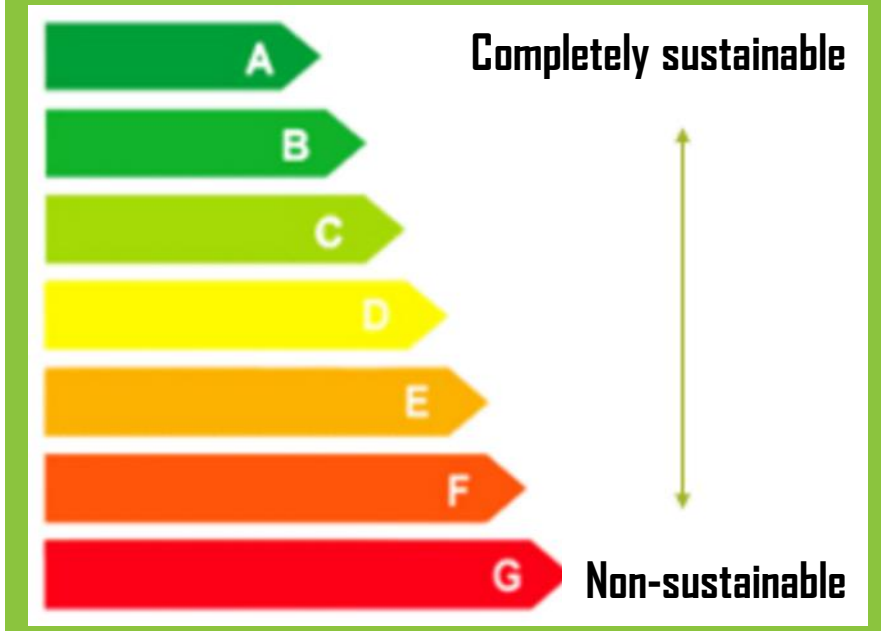
# 5. Data Collection for KPIs

Data gathering it is nowadays part of technical productive process as it is a fundamental outcome as added value in the enterprise appropriateness and market demand on sustainability and innovativeness.

Those Key Performance Indicators are essential both farmers which may analytically assess their farming management performance and policy makers to promote the best policies


A communicative tachymeter to highlight sustainability indicators:
*ROS, WFP, CFP, LCA, …*
Externality



# 6. Uncertainty in Farming

Farming activities in outdoor is subjected to UNCERTANTY that derived mainly from the following factors:

- Seasonal effects
- Meteorological events especially related to Climate Change
- Environmental Variability
- Timeliness
- Great periodical working intensity
- Different operative schemes
- Low professional attention to optimization factors

# 7. Care of the Farming System

In a complex system as the farming enterprise, the role of human resource is fundamental. Some fundamental points are:

- Joint participation of the enterprise and recognize the own role
- Capitalising experiences and observation by common moments of assessment
- Activate life long learning
- Implement operations. Especially those using technologies with detailed procedural rules
- Avoid unforeseen events, providing emergency procedures especially for rescue

# Further Reading


- Donnel Hunt and David Wilson. Farm Power and Machinery Management. Waveland Press Inc. IL. 2016, 11th edition. ISBN 1-4786-2696-1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