

# Diversified annual crop rotations in Italy

## Case Study 5

Experimentation plot of 18.2 ha with durum wheat and tomato located in Padania Valley (Italy)

The diversification included changes in land use, technical management, and new business tools to increase agro-biodiversity, reduce the impact on soil and water quality and mitigate economic risks, respectively. So, the diversifications included are:

- 1 Introduction of a leguminous crop in the rotation (pea for food)
  - 2 Introduction of tomato as second crop after pea (multiple cropping)
    - \* The diversified rotation is tomato, wheat, pea/tomato
- + Use of pig slurry as an amendment and integrated pest management
  - + Multi-year and multi-crop contracts with allocation guarantee, crop insurance schemes and technical support for the pea cultivation

### AGRONOMIC BENEFITS

1. **Double yield:** the multiple cropping of pea and tomato as a second crop allows for a double harvest and increases land productivity
2. Reduced tillage for wheat seed bed preparation **reduces the workload and risk of soil compaction**
3. Productivity of tomato in multiple cropping comparable to pure tomato and average yields of the area

### ENVIRONMENTAL BENEFITS

1. **Increase in total nitrogen**
2. **Increase in functional agro-biodiversity** due to the introduction of the leguminous crop
3. Reduced soil compaction has a **beneficial effect on the soil water infiltration and on the soil functioning**
4. Reduced tillage requires less fuel energy, contributing to a **lower greenhouse gas emissions**



## WHY IMPLEMENT CROP DIVERSIFICATION?

The proposed diversification has been shown to have maintained or increased the gross margin for the farmer and to have improved the general environmental performance. Furthermore, the use of pig slurry had a double advantage: i) it enables the use of an abundant waste material in the area, and ii) it improves some soil properties. The overall results confirm that public policies must continue to support the transition from highly specialised to diversified systems, thereby also responding to social demands

### SOCIOECONOMIC BENEFITS

1. **Higher gross margin** compared to the usual business management of the farmer
2. **Higher gross margin** compared to the baseline common system reference (tomato-tomato-wheat) often applied in the region.
3. **The higher profitability** of diversified system compared to business as usual and baseline systems is mainly due to the contractual component that covered the failures in crop yields due to technical and climatic reasons

### AGRONOMICS DRAWBACKS

1. **Risk of reduction of yield** in the transition period from specialised to diversified
2. **Risk due to reduced timing for soil, planting and seeding operation**
3. It requires a **slightly higher effort and an improvement of knowledge for farmers**

### ENVIRONMENTAL DRAWBACKS

1. **Decrease of soil organic carbon:** particularly evident in the first year
2. No positive effects were observed for microbial biodiversity
3. **Ezymatic activity reduction** in the diversified systems

### SOCIOECONOMIC DRAWBACKS

1. The technical problems of growing tomato as second crop in a very short cycle (under 4 months) can negatively affect the overall gross margin result
2. The re-design of the farms devoted to agri-food production transition costs
3. Increase in land productivity

## FINAL CONCLUSION

The rotation allowed to increase the gross margin for the farmer, essentially because in three years there are four crops and four different products to be sold. Furthermore environmental benefits include the reduction of soil compaction, demonstrated by the reduction in the bulk density of the soil, increase in agro-biodiversity, reduction of tillage



DIVERFARMING