

# Crop rotations in arable crops in Spain

## Case Study 3a

*Experimenting crop diversification and low input farming*



Experimental plot of 1 ha with rainfed winter cereal in a conventional monocropping system located in Zaragoza (Spain).

### 2 CROP ROTATIONS UNDER NO-TILLAGE CARRIED OUT IN THE CASE STUDY

**1** Barley-wheat-pea

**2** Barley-wheat-vetch

#### AGRONOMIC BENEFITS

1. **Greater crop yield stability of cereal crops** in the rotation under no-tillage
2. Crop rotations with different crop species **facilitated weed control**
3. **Improvement of soil nitrogen and subsequent fertilisation** in cereals following legume crops

#### ENVIRONMENTAL BENEFITS

1. Crop rotations and no-tillage favoured the **proliferation of earthworms**
2. The shift from conventional tillage to a no-tillage system increased **soil microbial biomass**
3. Crop diversification enhanced soil physical conditions

#### SOCIOECONOMIC BENEFITS

1. Cropping diversification offers alternatives to the commercialisation of agricultural products, **minimising the risk of commercialising only one crop**
2. The inclusion of legume crops in the crop rotation **reduces the cost in herbicides and other pesticides**
3. Legumes favour nitrogen fixation and thus the reduction in nitrogen fertilisation use with the **concomitant save in fertilizers**



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## WHY IMPLEMENT CROP DIVERSIFICATION?

In order to favor more sustainable and resilient cropping systems facing present/future threats such as global warming

### AGRONOMIC DRAWBACKS

Legume phase showed **lower grain yields** compared with the cereal counterpart

The lower competitive strength against weed infestation of legumes compared with cereals **may limit legume yield**, especially in dry years

In dry years, cereals performed better than legume crops.

### ENVIRONMENTAL DRAWBACKS

**No-tillage may increase soil compaction** under certain conditions especially in the first years after adoption

### SOCIOECONOMIC DRAWBACKS

The conversion to no-tillage implies the acquisition of specialised machinery (no-till seeder) with the concomitant economic cost

The reduction in crop yield in the legumes compared with cereals impacts the gross margin

## FINAL CONCLUSION

Is it beneficial to adopt these sustainable practices?

In rainfed arable systems, the rotation with legumes may **bring significant agronomic, environmental and socioeconomic benefits** which makes it an interesting option for the sustainability of these systems



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