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Is 'durum wheat - winter pea intercropping' efficient to reduce pests and diseases?

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OBJECTIVES

- **Pests and diseases** are often a major concern, particularly in low inputs systems where no or few pesticide treatments are performed.
- Intercropping (IC) can allow a **significant reduction in harmful insects and diseases** compared to sole cropping (SC) (e.g. Kinane and Lyngkjaer, 2002).
- No reference on winter crops IC was available, despite winter crops seems more adapted to Southern Europe conditions.
- *Aim of our study:* **Evaluate the assumption that Durum wheat – Winter pea intercropping (IC) is more efficient than sole crops (SC) for their ability to reduce pests and diseases by:**
  - ***i)*** **Comparing dynamics of green aphids and weevils (two main pea pests) between SC & IC**
  - ***ii)*** **Analysing the development of pea ascochyta (*Mycosphaerella pinodes*) and main durum wheat foliar diseases between SC & IC**

CONCLUSIONS

- **Pests and diseases were never increased in IC** but sometimes reduced (ie Pea aphids and Pea ascochyta with fungicide protection)
- Efficiency of '**Durum wheat - Winter pea intercropping**' to reduce pests and diseases depends on:
  - ***i)*** **Insect behaviour, particularly both its mobility and ability to recognize its target in a mixed cover**
  - ***ii)*** **Disease dispersion which is in interaction with microclimate modification in intercrop**
  - ***iii)*** **Interactions with plant architecture and farming practices, for example the 'umbrella' effect**

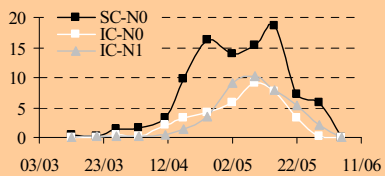
MATERIAL AND METHODS

- An experiment was carried out in Auzeville (SW France) in 2006-2007 on a clay loamy soil. The two species were sown on November 2006 the 9[th] in **row-intercropping**. The experiment was based on a split-split-plot design with 2 replicates.
- **Three main treatments were compared:**
  - ***i)*** **W-SC:** Durum wheat (cv. Neodur sown at 280 seeds/m²) ;
  - ***ii)*** **P-SC:** Winter pea (cv. Lucy sown at 60 seeds/m²) ;
  - ***iii)*** **IC:** Durum wheat-winter pea IC, **each specie sown at half of SC density**
- **Two fertiliser-N sub-treatments:** ***i)*** **N0:** No fertilizer and ***ii)*** **N1:** 140 kg N/ha
- **Two fungi managements:** ***i)*** **NT:** No fungicide and ***ii)*** **T:** 2 applications of metconazole (90 g.ha^{-1})
- **Measurements made:** ***i)*** Evolution of pea aphids population ; ***ii)*** Number of nodules on pea roots and percentage of nodules drilled ; ***iii)*** Attack of ascochyta on stem, leaves and pods of pea and ***iv)*** Attack of mildew, brown rust, fusarium and septoria on durum wheat leaves



RESULTS

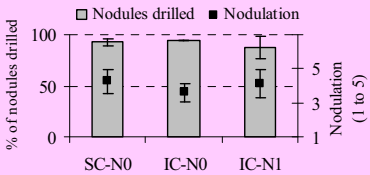
Evolution of pea aphids per plant



- Small number of pea aphids
- Pea aphids reduced in IC
- No difference in N treatments

→ **IC was efficient to reduce pea aphids**
→ **Physical barrier of wheat? Habitat modification?…**

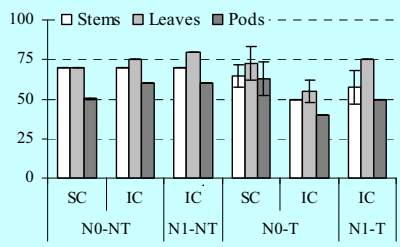
Nodulation and % of nodules drilled



- Nodulation not affected by IC
- % of nodules drilled high and not reduced in IC

→ **IC was not efficient against weevils**
→ **Great mobility of weevils?**

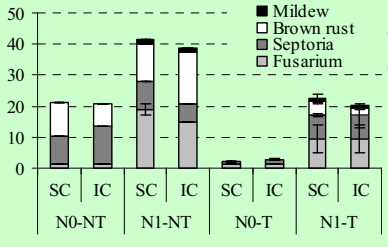
Pea ascochyta attack



- Stems and leaves more attacked than pods
- Fungicide treatment reduced Ascochyta attack only in IC

→ **Efficiency of the fungicide in IC is increased because of the reduction of pea DM ?**

Durum wheat diseases attack



- Diseases not reduced in IC
- N increased wheat diseases
- Wheat diseases reduced by fungicide application

→ **IC was not efficient to reduce wheat diseases this year**

Summary: Durum Wheat - Winter Pea intercropping reduced aphids but not weevils perhaps because of differences in insectes mobility
Durum Wheat - Winter Pea intercropping seems not efficient to reduce wheat fungi diseases but efficient against pea ascochyta