



HAL
open science

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

Laurent Bedoussac, Maud Matura, Emilie Dehant, J-L Hemptinne, Eric E. Justes

► To cite this version:

Laurent Bedoussac, Maud Matura, Emilie Dehant, J-L Hemptinne, Eric E. Justes. Is durum wheat-winter pea intercropping efficient to reduce pests and diseases?. 10. Congress of the European Society for Agronomy, Sep 2008, Bologne, Italy. Italian Journal of Agronomy, 3, 2008, 10th Congress of European Society for Agronomy. Multi-functional agriculture. hal-02754739v2

HAL Id: hal-02754739

<https://hal.inrae.fr/hal-02754739v2>

Submitted on 19 Jun 2023

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

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

L. BEDOUSSAC¹, M. MATURA¹, J.-L. HEMPTINNE² and E. JUSTES¹

¹INRA, UMR ARCHE, BP 52627, 31326 Castanet-Tolosan, France

²ENFA, UMR 5174 EDB, BP 22687, 31326 Castanet-Tolosan, France

E-mail: Laurent.Bedoussac@toulouse.inra.fr – Eric.Justes@toulouse.inra.fr



Xth Congress of the European Society for Agronomy
15-19th September 2008, Bologna, Italy

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:**
 - Comparing dynamics of green aphids and weevils (two main pea pests) between SC & IC
 - 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:
 - Insect behaviour, particularly both its mobility and ability to recognize its target in a mixed cover
 - Disease dispersion which is in interaction with microclimate modification in intercrop
 - Interactions with plant architecture and farming practices, for example the 'umbrella' effect

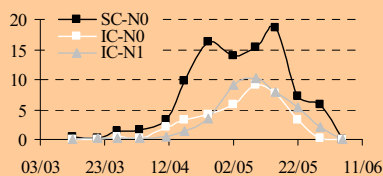
MATERIAL AND METHODS

- 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 9th in **row-intercropping**. The experiment was based on a split-split-plot design with 2 replicates.
- **Three main treatments were compared:**
 - W-SC:** Durum wheat (cv. Neodur sown at 280 seeds/m²) ;
 - P-SC:** Winter pea (cv. Lucy sown at 60 seeds/m²) ;
 - 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



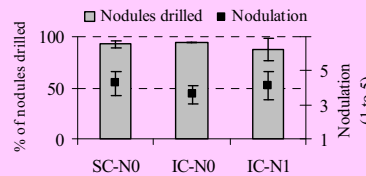
RESULTS

Evolution of pea aphids per plant



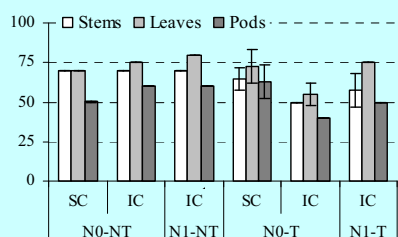
- Small number of pea aphids
- Pea aphids reduced in IC
- No difference in N treatments
- **IC was efficient to reduce pea aphids**
- **Physical barrier of wheat? Habitat modification?...**

Nodulation and % of nodules drilled



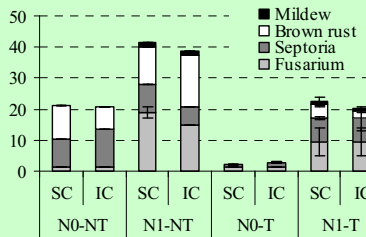
- Nodulation not affected by IC
- % of nodules drilled high and not reduced in IC
- **IC was not efficient against weevils**
- **Great mobility of weevils?**

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**