Does pea/cereal intercropping have an effect on Ascochyta blight epidemic development ?

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Assessment of winter legume-cereals intercrops in France

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Comparison of spring and winter cereal-legume intercrops in organic farming by analysis of interactions between species

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Cereal-legume intercrops are gaining increasing interest in Europe in low input farming systems. In numerous previous studies, intercropping has been shown to result in a higher or equal yield, compared to respective sole crops (1) (2). The comparison between spring and winter intercrops has rarely been studied. Field trials were carried out to compare the performance of spring and winter intercrops in organic farming over three years. Spring pea (*Pisum sativum* L., cv Baccara), winter pea (*Pisum sativum* L., cv Lucy), spring barley (*Hordeum vulgare* L., cv. Scarlett) and winter wheat (*Triticum aestivum* L., cv. Apache) were grown in sole crops and in additive and in substitutive intercrops, in 2003, 2004, and 2005. Analysis of net biodiversity effect (Δ) of intercrops on grain yields in comparison with sole crops was performed using partitioning selection effect (competition) and complementarity effect (both facilitation and niche differentiation) (3).
The yields were higher for winter than spring crops. A yield gain was observed for intercrops compared to sole crops in both winter and spring crops but the types of interaction involved were not similar. The net biodiversity effect (Δ) was mainly correlated with a complementarity effect in spring crops and with a selection effect in winter crops. The variability of these effects was largely explained by cereal density observed after emergence, whereas pea plant density was not determinant. Crop accidents during crop establishment were frequent in winter crops in our study and affected plant densities of pea or wheat. Finally, partitioning methodology proved useful for post-harvest analysis of intercrop performances in comparison with that of sole crops.

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Effects of intercropping on Orobanche control

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Does pea/cereal intercropping have an effect on Ascochyta blight epidemic development?

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Keywords: Ascochyta blight, cereal, disease development, intercropping, microclimate, pea

Ascochyta blight (*Mycosphaerella pinodes*/*Phoma medicaginis* var. *pinodella*/Ascochyta pisi) is one of the most damaging diseases of field peas world-wide. Varieties with robust resistance are not available. Fungicide use and agronomic practices

such as burial or destruction of infected stubble, adoption of a suitable crop rotation, spatial separation of fields from past seasons' infected stubble are not always practiced and may not be suitable for many farm situations particularly in organic farming. Alternative practices have thus to be developed. Using plant and canopy architectural features could be a possible lead to impact disease development through modification of pathogen movement within the canopy and/or modification of microclimate.

Intercropping is the agricultural practice of cultivating two or more crops in the same space at the same time (1). The two or more crops used in an intercrop may be from different species and different plant families, or they may simply be different varieties or cultivars of the same crop species. Growing legume and cereal species simultaneously in the same field can increase the use efficiencies of growth resources and reduce fertilizer N requirements (2). Considering that it also modifies drastically plant and canopy architecture, we investigated if pea/cereal intercropping could contribute to Ascochyta blight control.

Field experiments were conducted in three countries (Denmark, France and Spain) between 2004 and 2006. Row intercrops involving either winter pea/winter wheat (F and SP) or spring pea/spring barley (F and DK) were compared to pea sole crops according to a coordinated protocol. Disease levels in pea sole crops were variable according to sites and years. They were low in several experiments even with artificial inoculation causing difficulties in determining the effect of cropping method. Disease progression on stipules was on average slightly reduced in intercrop compared to pea sole crop but effects were rarely significant. Disease reduction was stronger on pods and stems late in the season. Monitoring microclimate within canopies showed variable results according to the sensor type, sensor location and monitoring period. Late in the season, leaf wetness duration appeared to be slightly shorter within the intercrop compared to the pea sole. This could explain the reduction in disease level on pods and stems.

Finally, the evaluation of the relevance of pea/cereals intercropping for the management of Ascochyta blight has to be placed in the wider framework of sustainable farming taking in consideration all the multifunctional roles of intercropping (addition and recycling of organic material, water management, protection of soil from erosion and pest or disease suppression).

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