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# Lentil – spring cereal intercropping: first results from a field trial in Central Italy

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## Introduction

Lentil (Lens culinaris Med.) generally has low and unstable yields (mainly pests, weeds and inefficient mechanical harvest). Lentil-spring cereal intercropping represents a promising agroecological-based technique to overcame these drawbacks (Loïc et al., 2018).

## Materials and Methods

In 2020 and 2021 at FIELDLAB (Perugia), Lentil+Triticale (LT) and Lentil+Barley (LB) intercrops were compared to pure crop stands (lentil, LL; triticale, TT and barley, BB) in a complete randomized block design with 3 replicates (Fig. 1). Lentil seeding rate was 300 seeds $m^{-2}$, while barley and triticale were sown at 350 and 115 kernels $m^{-2}$ in pure stands and intercropping, respectively.
In both years, sowing took place at the end of February, and crop experienced unusual dry conditions during their entire cycle (rainfall covered just 29% and 15% of ET0 in 2020 and 2021, respectively).
The Land Equivalent Ratio (LER) was used as the criterion for mixed stand advantage/disadvantage assessment (Willey, 1979).

## Results

The lentil yield was significantly reduced in intercropping (Table 1). In 2020, the total LER in intercropping was always lower than 1, showing that competition impaired total grain yield (Fig. 2). On the contrary, in 2021, LER values were significantly higher than 1 showing a more efficient resource use of mixtures as compared to the sole crops (Fig. 2).
Thanks to its low tillering capacity, triticale appeared more suitable than barley for intercropping as it showed a reduced competitiveness against lentil. In 2021, the partial LER of lentil was higher than 0.5, showing that triticale gave some advantages to lentil plants.
Indeed, despite a generally low weed pressure, intercropping greatly affected volunteer plant biomass at harvest, which dropped from 1.32±0.618 (2020) and 0.52±0.260 (2021) in LL to 0.04±0.018 and 0.03±0.003 t $ha^{-1}$ in LB and LT on average .

**References:** Loïc et al., 2018 (doi.org/10.1007/s13593-018-0515-5); Willey, 1979 (Field Crop Abstracts, 32, 73-85)

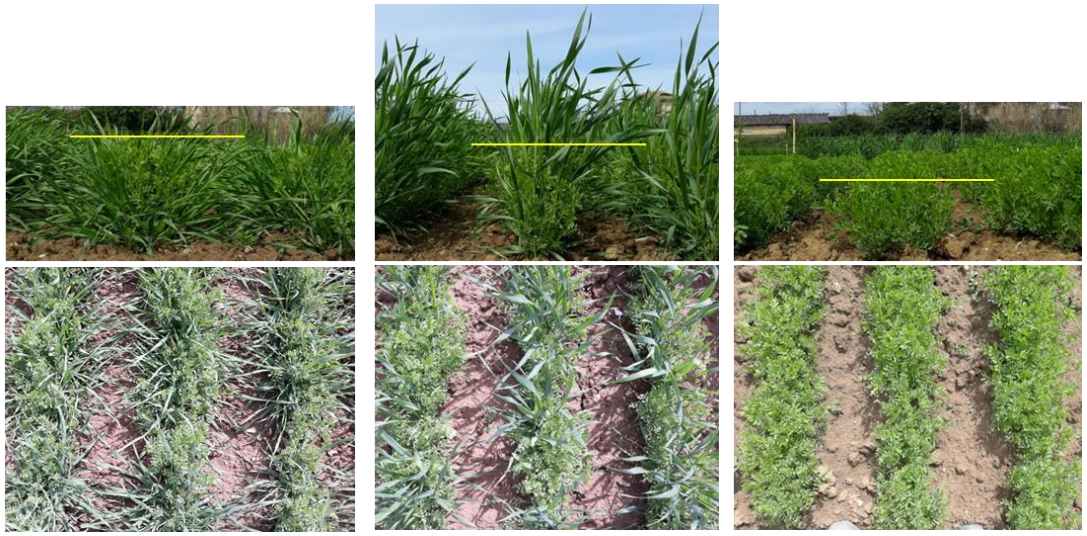

Fig. 1. Side and top views of field plots on May the 3rd 2021 (LB, left; LT, centre; and LL, right). Horizontal yellow lines show the top canopy of lentil.

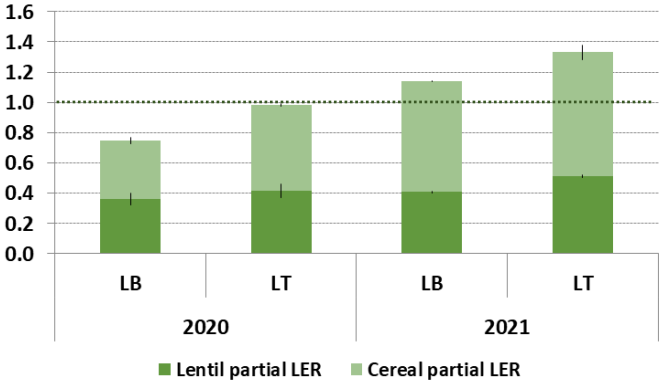


Fig. 2 - Land Equivalent Ratio (LER) in lentil-barley (LB) and lentil-triticale (LT) intercroppings.

Table 1– Lentil and cereal grain yield (kg ha-1) in pure stands and in intercroppings.

| Treatments | Lentil yield (kg $ha^{-1}$) | | Cereal yield (kg $ha^{-1}$) | |
|---|---|---|---|---|
| | 2020 | 2021 | 2020 | 2021 |
| LL | 581 | 787 | - | - |
| BB | - | - | 1911 | 2197 |
| TT | - | - | 3664 | 2220 |
| LB | 211 | 298 | 736 | 1481 |
| LT | 241 | 374 | 2084 | 1660 |
| **SEM and F test** | | | | |
| Treatment (T) | 29.9** | | 72.5** | |
| Interaction (TxYear) | *ns* | | 102.6** | |

## Conclusions

Lentil+spring cereal intercropping seems an interesting agroecological strategy, allowing to contrast weeds and lentil lodging. The culm density of the cereal is the key trait to be considered in order to weaken the cereal competitiveness against lentil. Thus, further research is needed to find the best combination in terms of both cereal species (and variety) choice and sowing density. In particular, data suggest that cereal sowing density should be further reduced to improve the lentil yield in intercropping.

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