



Relay planting cereal and dedicated legume crops

Walter Zegada-Lizarazu, Andrea Parenti, Andrea Monti

Department of Agricultural and Food Sciences, University of Bologna, Viale G. Fanin 44 – 40127, Bologna, IT

Autore corrispondente: walter.zegadalizarazu@unibo.it



Introduction

Climate change and energy security are the main challenges that are forcing governments around the world to put on the top of their agendas the search and development of renewable energy alternatives. Relay cropping is a innovative cropping systems where food/feed crops and dedicated lignocellulosic bioenergy crops could be produced on the same land and growing season while minimizing competition.

The objective of this study was to evaluate the effects of a dedicated lignocellulosic legume crop on relay planted wheat productivity.

Materials and Methods

Location: Cadriano, experimental farm, Bologna, Italy (44 33' N, 11 21' E)

Sunn hemp varieties: KMB01, KMB02, KMB03, Ecofix (control)

Wheat variety: Starpan

Measurements: sunn hemp → biomass;

wheat → grain & straw



| Relay system* | 2019 | | | | | | | 2020 | | | | | |
|--------------------------|-----------|---|---|---|---|---|---|-------|---|---|---|---|---|
| | J | J | A | S | O | N | D | J | F | M | A | M | J |
| H1 (beginning flowering) | Sunn hemp | | | | | | | Wheat | | | | | |
| H2 (full flowering) | Sunn hemp | | | | | | | Wheat | | | | | |
| H3 (end flowering) | Sunn hemp | | | | | | | Wheat | | | | | |

*H1, H2, H3: sunn hemp harvest times

Results

1. Sunn hemp biomass production (Fig. 1a)

- The four sunn hemp varieties reached similar biomass yields;
- The highest yields were registered at the full flowering stage and decreased from H2 to H3.

2. Wheat yields (Fig. 1b)

- Grain and straw production were highest when sunn hemp was harvested at H1;
- At later harvest stages (H2 and H3), wheat productivity was significantly lower than at H1;
- The cumulated biomass yield (sunn hemp biomass + wheat straw) in all tree cropping systems (H1 to H3) was about 15 Mg ha⁻¹.

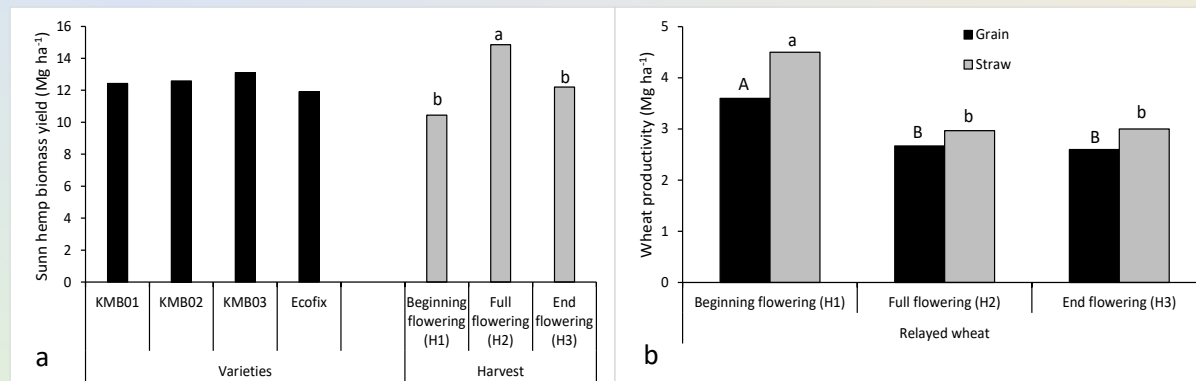


Figure 1. Effects of relay planting on sunn hemp and wheat productivity when sunn hemp was harvested at three different growth stages. The means were tested through LSD at the significance level of 0.05.

Conclusions

These results suggest that relay cropping could be a sustainable cropping systems to integrate food and dedicated biomass crops production in such a way that grain production is not penalized and the local availability of dedicated lignocellulosic feedstocks is greatly enhanced.



Acknowledgments: this study was funded by the BECOOL project that receives funding from Horizon 2020 (H2020) under the grant agreement No. 744821

