Società Italiana di Agronomia
50° Convegno Nazionale

Evoluzione dei sistemi agronomici in risposta alle sfide globali
Udine, 15-17 settembre 2021

Camelina (*Camelina sativa* L. Crantz) A Cash Cover Crop With Potential To Increase Winter Soil Coverage

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Introduction

Winter cover crops are ones of the main features of conservation agriculture. They are able to prevent nutrient leaching, soil erosion caused by wind and rain, while enhancing soil structure and fertility. However, very few winter cover crops can be successfully grown and harvested for seed production in time for sowing the main summer crop, thus allowing double-cropping, and being addressed as "cash cover crops". Camelina sativa [*Camelina sativa* (L.) Crantz] is a multi-purpose oilseed crop characterized by a very short cycle and high cold resistance. Thanks to its rusticity and low input requirement, it has been identified as a promising cash cover-crop. In the framework of the 4CE-MED project a preliminary study was conducted in Bologna (Italy) aiming at identifying the best sowing date, tillage methods and sowing techniques for camelina

Materials and Methods

❖The trial was established at the experimental farm of the University of Bologna (44° 33' N, 11° 23'E, 32 m a.s.l.) in autumn 2020. The site is characterized by a silty-clay-loam soil.

❖The camelina cultivar Alba (Camelina Company Spain) was used.

❖The experimental design was a strip-split-plot with four replicates. Factors were: **tillage methods** (minimum tillage= disk harrowing without soil inversion, vs. no-tillage), **sowing dates** (S1= 8 October, vs. S2= 28 October), and **sowing techniques** (RS = row seeding, vs. B = broadcasting).

❖ Sowing was performed by a mechanical cereal seeder. Seeding rate was adjusted in relation to sowing technique and corresponded to 6 kg ha^{-1} for RS (0.17 m row distance) and 8 kg ha^{-1} for B.

❖ Winter survival was expressed as ratio between the number of plants before and after winter. To monitor soil coverage (%), the "Canopeo" app (Oklahoma State University) was used by taking three images on each replicate starting from the emergence until March 2021. (Fig. 1).

Results

Soil coverage was significantly affected by sowing date. Early sowing (S1) showed a soil coverage of 82%, while S1 averaged only 16%. This significant difference might be related to the gap in the GDD accumulation between the two sowing dates (i.e., +186 GDD, S1 vs. S2), that allowed increased biomass accumulation resulting in higher soil coverage values in S1 (Fig.2) Nevertheless, the earliest sowing date suffered a little of frost injuries with consequent reduction of soil coverage during winter, as highlighted in the last survey carried at 438 GDD (Fig. 2). Despite being Alba, a spring camelina genotype, the surveyed winter survival was extremely high reaching about 100% in all plots. It is worth nothing that winter survival higher than 100% were surveyed in some plots, presumably in relation to prolonged emergence of camelina also during winter months. This finding is commonly reported for spring crops sown with an autumn cycle, as in the present study.

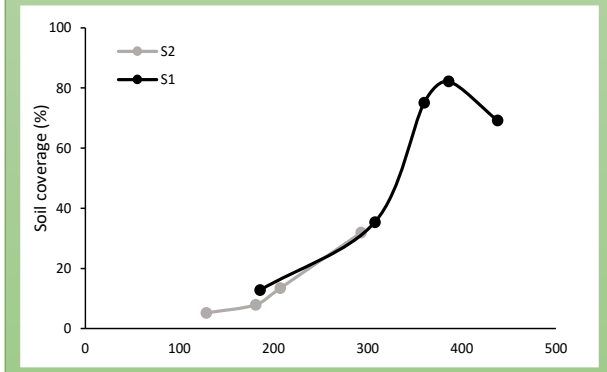

Fig. 2 Soil coverage dynamic, surveyed by the CANOPEO app, from camelina emergence to March 2021, in response to sowing date (S1=08/10/2020, S2=28/10/2020).

Fig. 1. Three photos of camelina (S1) taken with Canopeo app during the growing cycle.
1 a. 29.10.2020 ;1b. 15.12.2020; 1c. 20.01.2021

Conclusions

Camelina was able to accumulate high amounts of biomass thus promoting soil coverage, which are directly related to beneficial soil protection actions against winter erosion. Sowing date played a role in soil coverage, in particular earlier sowing attained higher values, but at the end of winter frost damages were witnessed by the decrease in soil coverage values. Broadcasting could be considered a low-cost technique to establish camelina. Further investigations are ongoing to determine camelina productivity and its nutrients uptake capacity.

Acknowledgments: The present research was funded by the 4CE-MED project that has received funding from the PRIMA foundation research program under grant agreement no. 1911.