



Camelina A New Source Of Healthy Oil and Cake: Effect Of Variety Choice And Growing Conditions

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Introduction

Camelina [*Camelina sativa* (L.) Crantz] is an emerging oilseed crop able to grow in a wide range of environments either as an autumn or spring crop, with limited input requirement. Its oil has high content of PUFAs, in particular n-3, with relevant food, feed and non-food uses. The full exploitation of camelina co-product (i.e., cake) is limited by the glucosinolate content which hampered its use in animal feeding. In this context, the ARGENTO project (PRIN 2017) aims at evaluating the effect of sowing dates and environment on the productive potential and seed quality of newly released camelina lines with the intent to optimize camelina agronomic management for poultry feeding.

Materials and Methods

Three camelina lines with different seed compositions have been tested during 2019/20 growing season at two locations (Bologna and Pisa) in Italy. The tested camelina lines were the following: Ala, characterized by low glucosinolate content, Pearl, with low linoleic acid content and so improved n-3/n-6 ratio, and Calena, a commercial variety used as reference. Trials were sown at each location in two sowing dates (ST1=autumn and ST2=spring). The experimental design was a split-plot with four replicates, with sowing time as main factor and cultivar as sub-factor. Seeding rate was 500 seeds m⁻² and N fertilization was 50 kg ha⁻¹, applied before stem elongation. At full maturity, the central portion of each plot was manually cut at soil level and then threshed with plot combines. After harvesting, representative seed sub-samples were collected for 1000-seed weight (TKW) determination, antinutritional content (glucosinolate, sinapine, etc.), fatty acid (FA) composition and antioxidant capacity (DPPH).



Results

- Biomass production was higher in Bologna than in Pisa and it was significantly affected by sowing date, with ST1 producing 8.01 Mg ha⁻¹ compared with 5.22 Mg ha⁻¹ of ST2. Pearl reached the highest biomass production in Bologna (7.86 Mg ha⁻¹) but the lowest one in Pisa (5.76 Mg ha⁻¹). Conversely, Calena showed the lowest biomass yield in Bologna (5.48 Mg ha⁻¹) and the highest in Pisa (6.62 Mg ha⁻¹) (Figure 1).
- Pearl gave the higher seed yield in Bologna (2.17 Mg ha⁻¹), while Ala was the most productive in Pisa (1.41 Mg ha⁻¹). Calena and Pearl showed the greatest variation across locations, doubling their productivity in Bologna compared with the one in Pisa, while Ala had restrained yield variation (Figure 1). Seed yield was generally higher in Bologna (1.93 Mg ha⁻¹) than in Pisa (1.14 Mg ha⁻¹) and in both locations seed yield in ST1 exceeded ST2.
- TKW ranged from 0.99 to 1.37 g, with the highest values observed in ST1 in Bologna.
- DPPH values were remarkably lower in Bologna (27.29 μmolTE g⁻¹) than in Pisa (36.32 μmolTE g⁻¹), with Calena showing the greatest variation among the three cultivars (CV=0.31).
- Ala was characterized by the significantly lowest glucosinolate content (26.9 mmol kg⁻¹) (Figure 2).

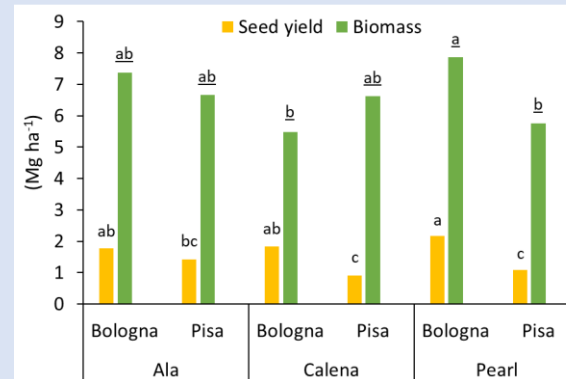


Figure 1. Seed yield and biomass production among cultivars and between locations. Different letters within each parameter: significant different values.

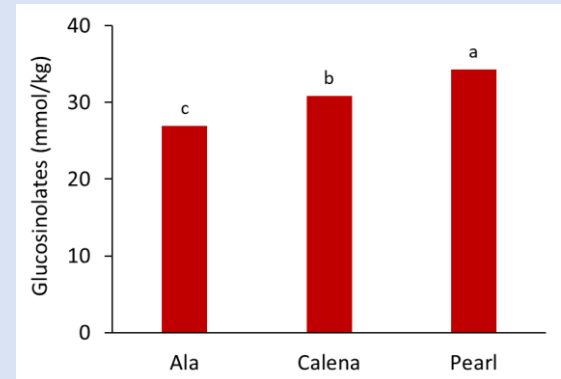


Figure 1. Glucosinolates content in the three cultivars. Different letters: significant different values.

Conclusions

The three camelina lines confirmed to have peculiar qualitative traits and growing conditions significantly affected their productive potential. In particular, autumn-sowing increased seed yields, seed sizes and n-3/n-6 ratio, thus being considered as the optimal sowing time for camelina in Italy. The cultivar Pearl proved to be an optimal source of healthy oil with high n-3/n-6 ratio, while Ala was identified as a suitable source of cake for poultry feeding thanks to its low glucosinolate content.

