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GENETIC STUDY AND CONSTITUTION OF NEW VARIETIES OF CAMELINA SATIVA L.: AGRONOMIC COMPARISON BETWEEN SPRING AND WINTER CULTIVATION IN NORTH ITALY

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Climate change is one of the most pressing global challenges, necessitating the urgent development and adoption of sustainable solutions. In this context, *Camelina sativa*, commonly known as camelina or false flax, has emerged as a promising cover crop with significant potential for mitigating climate change. Camelina is an oilseed crop belonging to the Brassicaceae family, native to Europe and Central Asia. It is known for its resilience to diverse climatic conditions, including arid and semi-arid regions, making it suitable for cultivation in a range of environments. Camelina's ability to thrive with limited water resources and in poor-quality soils makes it a sustainable alternative to traditional oilseed crops. In fact, given the strong interest camelina is nowadays studied as a biofuel crop and a new source of protein and oil, the seed oil content is about 40%, with a high level of polyunsaturated fatty acids (30 –40% α-linolenic acid, 15–25% linoleic acid, 15% oleic acid and about 15% eicosenoic acid). The cake deriving from the seed pressing can be introduced into the animal diet as a source of proteins and oils. However, its use in feed and food is limited by the presence of glucosinolates (GLS), sulfur molecules involved

in plant defense. In this work a breeding program started from a study of the most used commercial varieties in Europe, characterized by molecular markers (SSRs) and subsequently by GBS (Genotyping by Sequencing) technique.

Furthermore, bromatological and chemical analyzes were carried out to better characterize the initial commercial germplasm. Merging the genetic and chemical data we selected the best parentals for the crosses. The progenies were evaluated and compared in open field with the initial commercial varieties under study using quality parameters for DUS examination (CPVO Technical Protocols).

Molecular analyses performed by SSRs markers and confirmed by GBS showed that two main genetic clusters are present in camelina germplasm: i) winter varieties ii) spring varieties. On the base of bromatological and antinutritional compound (i.e., GLS) analyses, we selected the best parents by “bulk selection method” the new variety C1205. The results confirmed that in North Italy, camelina has higher yields if cultivated in the autumn–winter period (about 2 t/ha vs. 0.6 t/ha) and a negative correlation was found between spring and winter yields, indicating that varieties that produce more in winter cultivation produce less in spring cultivation. The new selected variety showed a compromise among the best traits present in winter and spring genotypes such as high yield, early flowering, moderate GLS content and low height representing a promising genetic material for further breeding programs.