

SPATIALS3 PROJECT: IMPROVEMENT OF PRIMARY PRODUCTIONS FOR A HEALTHIER DIET

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The main strategic objective of the sPATIALS3 project is the creation and strengthening of a Lombardy hub of transversal skills for agrifood production and human nutrition, to provide technologically advanced solutions to the agrifood sector. In synergy with private enterprises, sPATIALS3 aims at developing food products of higher nutritional quality, safety, traceability and packaging aimed at a wide range of consumers, with particular attention to vulnerable groups of patients affected by specific diseases.

Work Package 1 of the project is devoted to the characterization and selection of raw materials of plant origin, primarily seeds. Three categories of seeds are considered: pulses (*Phaseolus vulgaris*), cereals (*Triticum aestivum* and *Zea mays*) and oil seeds (*Camelina sativa* and different species of *Linum*). The common strategy consists in the identification of genotypes characterized by improved nutritional and

nutraceutical profile, achieved through the selection of different materials based on their increased content in beneficial compounds, the reduced content in antinutritional factors, or reduced allergenicity. Depending on the specific features of each plant, various seed quality traits are under investigation. A key role is played by the new high resolution NMR spectrometer, acquired within the project, operating at 600 MHz and equipped with a cryoprobe (Prodigy). This last probe delivers a sensitivity enhancement of a factor of 3, thus allowing the identification and quantification of metabolites and bioactive compounds present even in small amount in the various extracts.

The main results obtained so far include the identification of seeds with the following characteristics:

- *Phaseolus vulgaris* genotypes with reduced content in antinutritional compounds (lectins, digestive enzyme inhibitors, phytate, and galactooligosaccharides) or with increased iron concentration;
- *Triticum aestivum* genotypes with reduced content of free asparagine, responsible for the formation of acrylamide, a neurotoxic compound suspected to be carcinogenic which seeps during the baking of bakery products;
- Lombard *Zea mays* varieties with reduced content of specific members of the γ -zein storage protein family, responsible for allergenic reactions in humans and pigs;
- *Camelina sativa* genotypes with a healthy omega6/omega3 ratio and increased glucosinolate content, trait that correlates with the presence of isothiocyanates (anticancer compounds);
- *Linum* species and varieties showing a genetic variability in the content of oil and different phenolic compounds.

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