

Molecular characterization for the valorization of minor crops

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The protection of agrobiodiversity is of paramount importance to prevent food and nutritional waste. The valorization of local and traditional recovered varieties brings producers and consumers closer together in short, ecological, local, solidarity-based and small-scale supply chains, thus limiting the risk of economic losses. Furthermore, by diversifying the agricultural products the soil is enriched because of the variety of nutrients absorbed and released to the soil by the different cultivated crops. Finally, health well-being of the consumer could be improved through the diet by introducing different varieties of legumes, cereals and vegetables.

The present work focused on five of the six minor crops featured in the CROPDIVA project (oats, triticale, buckwheat, lupine and broad bean) developing molecular characterization methodologies which will then be exploited in the subsequent phases of the project to select the better performing varieties, with which to create new food and non-food products.

Bromatological and phytochemical characterization was developed considering i) seeds macromolecular composition, and ii) bioactive properties, relevant for the consumers health.

For this purpose, the classes of molecules that typically characterize the analyzed cultures were quantitatively determined. The protein content was evaluated using the Kjeldahl, and dye-binding methods. Enzymatic assays were used to quantify the total, digestible and resistant starch, as well as the anti-nutritional factors (anti-tryptic activity and phytates). The total lipid content and humidity were quantified through gravimetric determination. Finally, the content of antioxidant molecules and the total antioxidant capacity were evaluated.

All these analyses, although largely standardized and used in the literature, required an optimization of the analytical approach to overcome the matrix effect exerted by the crops.

In conclusion, through the analyzes carried out it was possible not only to set up a pipeline to proceed to high throughput screening of CROPDIVA samples but also to start to deepen the knowledge of the crops in question to highlight their properties and strengths compared to the corresponding major crops. Furthermore This will allow an in-depth varietal characterization and a selection of the best performing crops, in order to provide innovative solutions along the entire food and non-food chain.