Chemical, nutritional and functional characterization of Apulian black chickpeas

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Black chickpeas historically cultivated in Apulia (South of Italy) were shown to display peculiar phenotypic and genetic features compared to the *desi* and *kabuli* chickpeas[1]. There are no scientific reports on the chemical and nutritional composition and the flour functional characteristics of *Apulian black* chickpeas. This ultimately limits their full exploitation by the food processing industry.

The aim of this work was to assess the chemical, nutritional and fuctional characteristics of the Apulian black chickpea in comparison with *desi* and *kabuli* chickpeas.

A wide germplasm collection of 57 different chickpea accessions (17 desi, 19 kabuli and 21 Apulian) from the ex situ repositories of the United States Department of Agriculture (USDA), the Department of Plant, Soil and Food Science of the University of Bari, Italy (DiSSPA), and the Institute of Biosciences and Bioresources of the Italian National Research Council (CNR-IBBR) was examined. Proximate composition, fatty acids profile, bioactive compounds and antioxidant activity were assessed together with fuctional properties of the flours.

As reported in Figures 1 and 2, the majority of the *Apulian black* chickpea accessions were clearly separated from both *desi* and *kabuli* chickpeas, showing peculiar chemical composition and functional properties of the flours. *Apulian black* chickpeas were characterized by higher content of dietary fiber, PUFA, bioactive compounds, and antioxidant activity than *kabuli* type, comparable to those of *desi* type; on the other hand, they were characterized by lower content of proteins and ashes than *desi* chickpeas. Regarding the functional properties of the flours, the pigmented accessions were characterized by high values of the Water Absorbtion Index, which makes them suitable for mixing with cereal flours to produce cereal-pulses foods, such as vegetable/vegan burgers or bread and other bakery products, maintaining a soft texture of the end-product. Low values of Oil Absorbtion Capacity were determined in *Apulian black* chickpeas, thus making them less suitable for food applications where oil incorporation is required, such as meat extenders.

Our findings highlight the nutritional and technological potential of local landraces of *Apulian black* chickpeas, which are particularly suitable for human nutrition and for the preparation of legume-based foods.

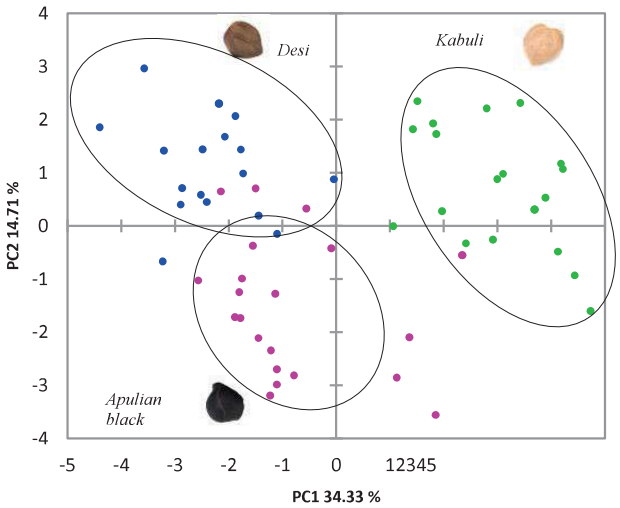

Figure 1. Loading plot of the PCA analisys of 57 chickpeas accessions considering the chemical, nutritional, and functional data

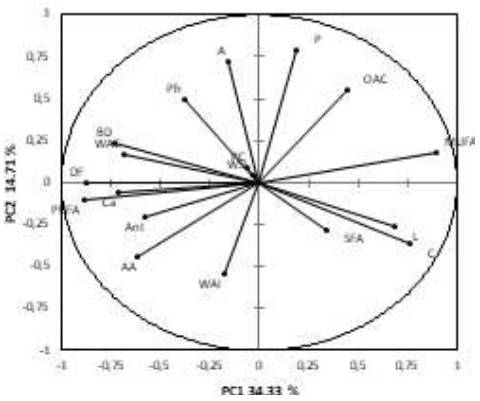

Figure 2. Score plot of the PCA analisys of 57 chickpeas accessions.

A=Ash; P= Protein, L=Lipid; DF=Dietary fiber; C=Carbohydrates; PC= Phenolic compounds; Ca=Carotenoids; Ant= Anthocyanins; AA=Antioxidant activity; Ph=phytate; SFA= Saturated fatty acids, MUFA=Monounsaturated fatty acids; PUFA=Polyunsaturated fatty acids; BD=Bulk density; WAI= Water Absorbtion Index; WAC= Water Absorbtion Capacity; OAC= Oil Absorbtion Capacity

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[1] S. Pavan et al., *The Plant Genome* 2017, **10**, 1.