Data in Brief 34 (2020) 106660

Contents lists available at ScienceDirect

Data in Brief

journal homepage: www.elsevier.com/locate/dib

Data Article

Data on the proximate composition, bioactive compounds, physicochemical and functional properties of a collection of faba beans (*Vicia faba* L.) and lentils (*Lens culinaris* Medik.)

Davide De Angelis[a], Antonella Pasqualone[a], Michela Costantini[a], Luigi Ricciardi[a], Concetta Lotti[b], Stefano Pavan[a], Carmine Summo[a,*]

[a] *Department of Soil, Plant and Food Science (DISSPA), University of Bari "Aldo Moro", Via Amendola, 165/A, I-70126 Bari, Italy*
[b] *Department of the Sciences of Agriculture, Food and Environment, University of Foggia, via Napoli 25, I-71100 Foggia, Italy*

ARTICLE INFO

Article history:
Received 26 October 2020
Revised 7 December 2020
Accepted 10 December 2020
Available online 15 December 2020

Keywords:
Pulses
Proximate composition
Fatty acid composition
Technological properties
Bioactive compounds
Faba bean
Lentil
Germplasm biodiversity

ABSTRACT

This dataset is referred to a collection of 41 faba bean (*Vicia faba* L.) and 15 lentil (*Lens culinaris* Medik.) accessions from the *ex situ* repository of the Institute of Biosciences and Bioresources of the Italian National Research Council (CNR-IBBR). All the accessions were grown at the experimental farm "P. Martucci" of the University of Bari "Aldo Moro" (41°01′22.1″ N 16°54′21.0″ E) during the growing season 2017–2018, according to a randomized block design with two replicates, each constituted by 10 individual plants. The dataset reports raw and elaborated analytical data determined on the flour produced from individual accessions, concerning proximate composition, bioactive compounds, antioxidant activity, fatty acid composition, and physicochemical and functional properties. Elaborated data might be used to understand the compositional variability within the species and, together with raw data, to highlight peculiar accessions characterized by valuable nutritional and/or technological attitude useful in research institutions and food industries. Furthermore, the data can be used for genetic studies aimed at

* Corresponding author.
E-mail address: carmine.summo@uniba.it (C. Summo).

https://doi.org/10.1016/j.dib.2020.106660

identifying genomic regions underlying nutritional and technological traits.

Specifications Table

Subject	Agricultural and Biological Sciences
Specific subject area	Food Science
Type of data	Data, excel files, images and figures
How data were acquired	Proximate composition: Official methods of analysis [1] for moisture, ash and protein content (total nitrogen $\times$ 5.7). Solid-liquid extraction with diethyl ether, using a Soxhlet apparatus (SER 148 extractor – Velp Scientifica srl, Usmate Velate, Italy) for the lipid content. Fatty Acid composition: solid-liquid extraction of the lipid fraction; AOCS method for the preparation of fatty acids methyl esters [2]; Gas-chromatographic determination (7890A gas-chromatograph with Flame Ionization Detector and OpenLAB CDS software C.01.07 - Agilent Technologies, Santa Clara, CA, USA) for fatty acids identification. Bioactive compounds and antioxidant activity: preparation of bioactive extracts (solid-liquid extraction) and spectrophotometric analysis (Cary 60 UV–Vis spectrophotometer - Agilent Technologies, Santa Clara, CA, USA). Physicochemical and functional properties: addition of water or oil to the legume flour, mixing and centrifuging [3–5] (Thermo Fisher Scientific SL16R – Waltham, MA, USA).
Data format	Image, raw data, analysed data
Parameters for data collection	Forty-one faba bean accessions and fifteen lentil accessions were grown in the experimental farm “P. Martucci” of the University of Bari “Aldo Moro” (41°01′22.1″ N 16°54′21.0″ E) during the season 2017–2018, according to a randomized block design with two replicates. Each replicate was constituted by 10 individual plants. The seeds were harvested at physiological maturity, when they were dried. Then the seeds were cleaned and milled to obtain a whole meal flour. All the analytical determinations were carried out in triplicate.
Description of data collection	Proximate composition was determined on the flour derived from 41 faba bean and 15 lentil accessions. The protein, lipid, ash, carbohydrate contents, the fatty acid composition, and the bioactive compounds (total phenolic compounds, total anthocyanins, and total carotenoids) were analysed. The total phytate contents and the antioxidant activities (the latter by means of the DPPH assay) were also determined. The physicochemical (Bulk Density; Water Absorption Index; Water Solubility Index) and functional (Water Absorption Capacity; Oil Absorption Capacity) properties of the flour were analysed.
Data source location	Department of Soil, Plant and Food Science (DISSPA), University of Bari “Aldo Moro”, Italy.
Data accessibility	Data are provided with this article

Value of the Data

- Data provided in the article describe the nutritional composition as well as the physicochemical and functional properties of faba bean and lentil accessions grown in the same agro-ecological condition, thus highlighting genotypic differences.
- Peculiar accessions characterised by valuable nutritional and/or functional properties were identified, which can be exploited by the food industry to develop legume-based products.
- Data are available for researchers and geneticists for studies aiming to identify genomic regions controlling nutritional and technological traits.
- Data provided in this article provide important information on the description of faba bean and lentil biodiversity.

1. Data Description

This data article is composed of three tables and seven figures. The data concern 41 faba bean and 15 lentil accessions from different geographical origin, as listed in Table 1. The accessions were characterized by high phenotypic variation (i.e. for color and size), as displayed by the images of some accessions shown in Figs. 1 and 2.

The data article also shows box plots for the protein, lipid and ash contents of faba bean (Fig. 3) and lentil (Fig. 4) accessions, and box plots of the bioactive compounds content of faba bean (Fig. 5) and lentil (Fig. 6) accessions. The outlier accessions, characterised by a peculiar composition, are highlighted in the box plots. The main fatty acids detected in faba bean and lentil accessions are shown in Fig. 7.

Table 1
Internal code, CNR-IBBR code, geographical origin, color, weight of 10 seeds (faba beans) and seed diameter (lentils) of the accessions examined.

Faba bean (*Vicia faba* L.)

Code	ID Sample	Geographical origin	Color	10 seed weight (g)	Code	ID Sample	Geographical origin	Color	10 seed weight (g)
FB1	110175	Italy	Green	13.90	FB22	107547	Algeria	Green	14.42
FB2	110195	Italy	Green	16.65	FB23	112081	Morocco	Green	12.65
FB3	110201	Italy	Green	11.21	FB24	112082	Morocco	Green	21.11
FB4	110184	Italy	Purple	10.59	FB25	112091	Morocco	Green	8.59
FB5	110360	Italy	Brown	6.23	FB26	111894	Libya	Green	12.79
FB6	110356	Italy	Green	10.72	FB27	111900	Libya	Brown	6.61
FB7	103235	Italy	Green	14.11	FB28	111894	Libya	Green	17.85
FB8	106555	Italy	Brown	8.03	FB29	106478	Ethiopia	Brown	4.58
FB9	106560	Italy	Purple	19.00	FB30	106458	Ethiopia	Green	8.24
FB10	106951	Italy	Green	15.67	FB31	108385	Iran	Brown	11.93
FB11	107640	Egypt	Green	10.47	FB32	109167	Iran	Green	10.25
FB12	108425	Egypt	Green	11.41	FB33	109225	Iran	Brown	5.91
FB13	108428	Egypt	Green	6.74	FB34	108947	Afghanistan	Brown	8.98
FB14	108430	Egypt	Green	13.96	FB35	108969	Afghanistan	Brown	5.47
FB15	108437	Egypt	Green	11.96	FB36	109270	Afghanistan	Brown	6.96
FB16	108438	Egypt	Brown	12.65	FB37	109284	Afghanistan	Brown	13.90
FB17	106406	Algeria	Green	10.56	FB38	109282	Afghanistan	Brown	5.17
FB18	106375	Algeria	Green	12.16	FB39	109290	Afghanistan	Brown	2.55
FB19	106374	Algeria	Brown	14.02	FB40	109163	Pakistan	Brown	5.55
FB20	107537	Algeria	Brown	15.62	FB41	109164	Pakistan	Brown	8.58
FB21	106779	Algeria	Green	10.94					

Lentil (*Lens culinaris* Medik.)

Code	ID Sample	Geographical origin	Color	Seed Diameter (mm)
LC1	106315	Ethiopia	Dark brown	4.00
LC2	106404	Algeria	Light green	5.17
LC3	106407	Algeria	Light green	5.33
LC4	106665	Italy	Brown	4.67
LC5	106729	Tunisia	Brown	4.67
LC6	106763	Tunisia	Light green	5.00
LC7	107400	Pakistan	Dark brown	4.17
LC8	107414	Pakistan	Brown	3.67
LC9	107516	Algeria	Brown	3.83
LC10	107546	Algeria	Brown	3.67
LC11	111849	Italy	Light green	5.17
LC12	111910	Libya	Light green	5.83
LC13	112114	Morocco	Light green	4.50
LC14	Eston-type_1	Canada	Brown	4.17
LC15	Eston-type_2	Italy	Light green	4.33

Fig. 1. Phenotypic variation (size and color) of the faba bean accessions. A: small-seeds (accession 108969); B: medium-seeds (accession 109164); C: large-seeds (accession 112082); D: green seeds (accession 112082); E: brown seeds (accession 108385); F: purple seeds (accession 110184).

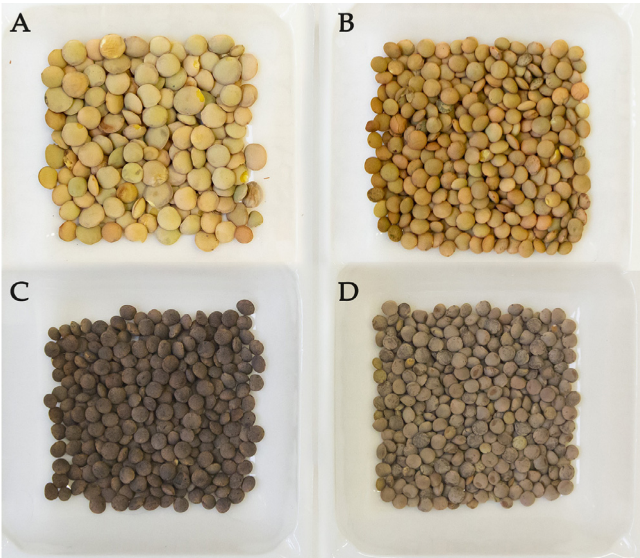

Fig. 2. Phenotypic variation (size and color) of lentil accessions. A: large light green seeds (accession 111910); B: small light green seeds (accession Eston_type_2); C: small dark-brown seeds (accession 106315); D: small brown seeds (accession 107516).

Physicochemical and functional properties of the accessions are reported in Tables 2 and 3, respectively. Finally, supplementary materials report all the raw data regarding proximate composition, bioactive compounds and fatty acid composition of faba bean accessions (Supplementary Table S1) and lentil accessions (Supplementary Table S2).

Supplementary material S1 reports proximate composition, the bioactive compounds content and fatty acid composition of the 41 faba bean accessions examined.

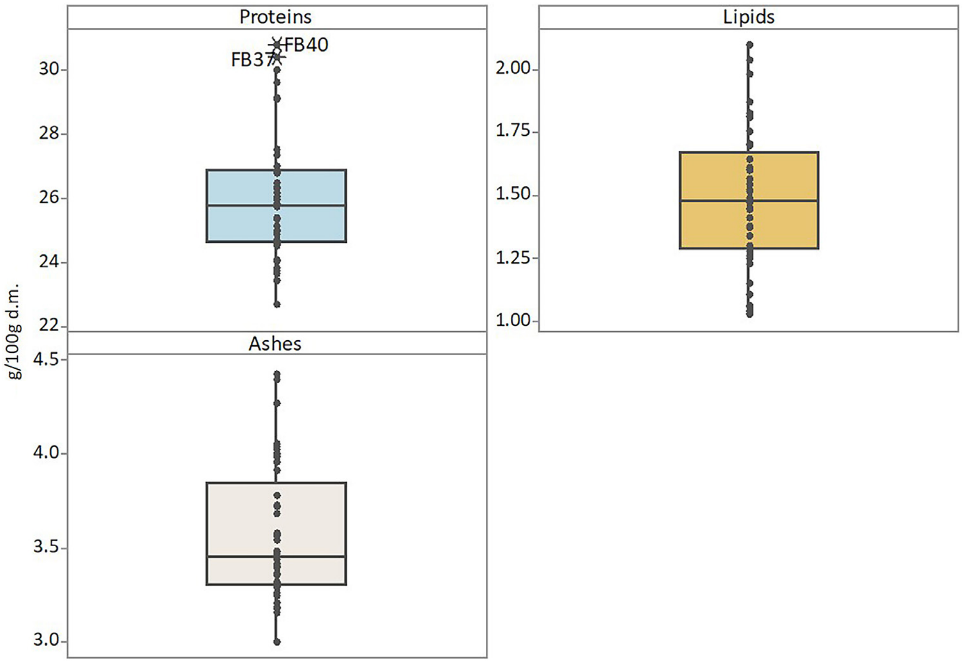

Fig. 3. Box plots of protein, lipid and ash contents (g 100 g^{-1} of dry matter) of faba bean accessions. Outlier samples, characterised by peculiar composition, are highlighted.

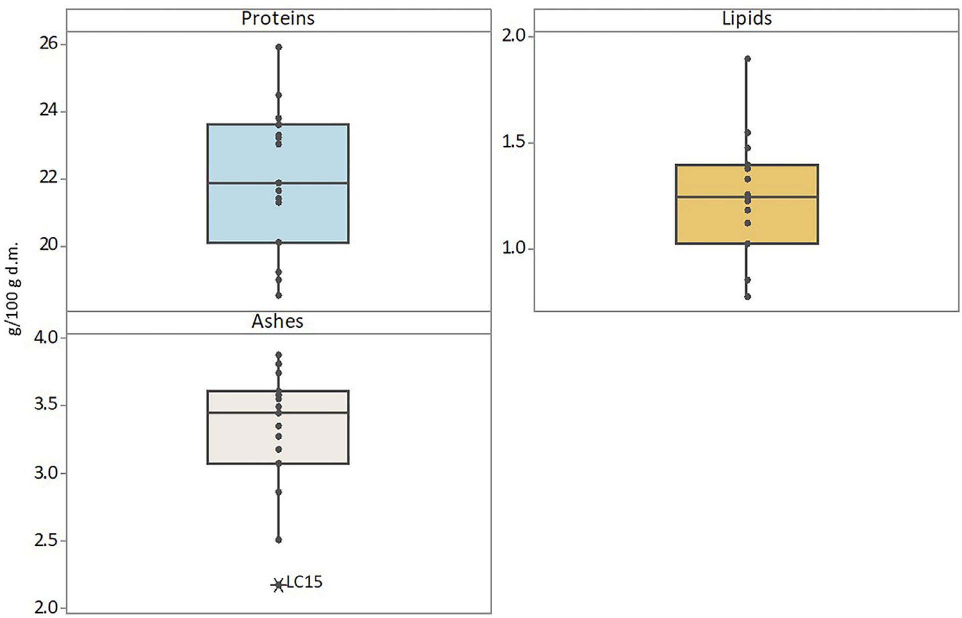

Fig. 4. Box plots of protein, lipid and ash contents (g 100 g^{-1} of dry matter) of lentil accessions. Outlier samples, characterised by peculiar composition, are highlighted.

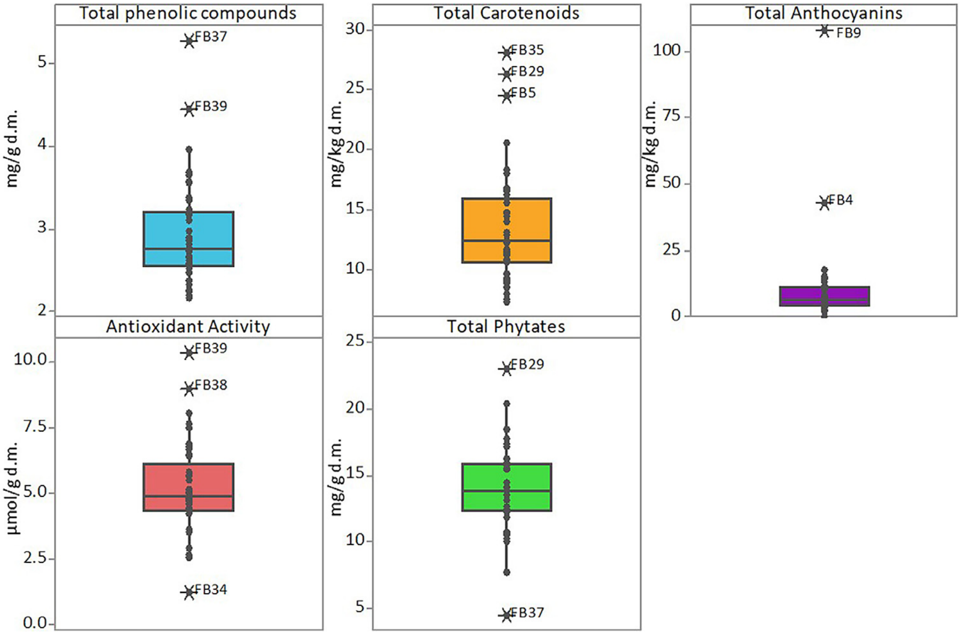

Fig. 5. Box plot of total phenolic compounds, (mg ferulic acid g^{-1} on dry matter), total carotenoids, (mg β-carotene kg^{-1} on dry matter), total anthocyanins (mg cyanidin 3-*O*-glucoside kg^{-1} on dry matter), antioxidant activity (μmol trolox eq g^{-1} on dry matter) and phytate content (mg phytic acid g^{-1} on dry matter) of faba bean accessions. Names of outlier samples are indicated in the figure.

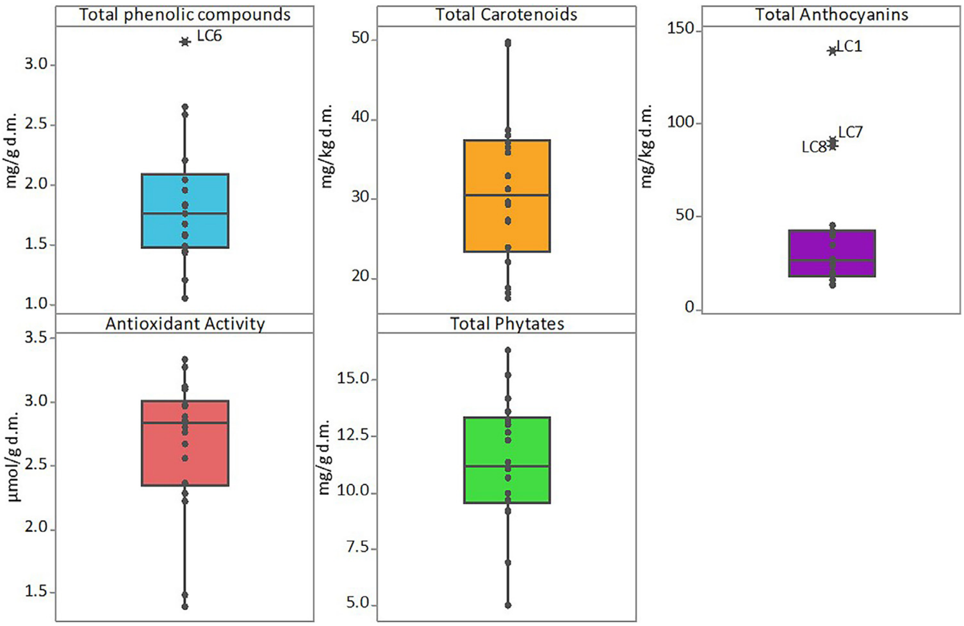

Fig. 6. Box plot for total phenolic compounds, (mg ferulic acid g^{-1} on dry matter), total carotenoids, (mg β-carotene kg^{-1} on dry matter), total anthocyanins (mg cyanidin 3-O-glucoside kg^{-1} on dry matter), antioxidant activity (μmol trolox eq g^{-1} on dry matter) and phytate content (mg phytic acid g^{-1} on dry matter) of lentil accessions. Names of outlier samples are indicated in the figure.

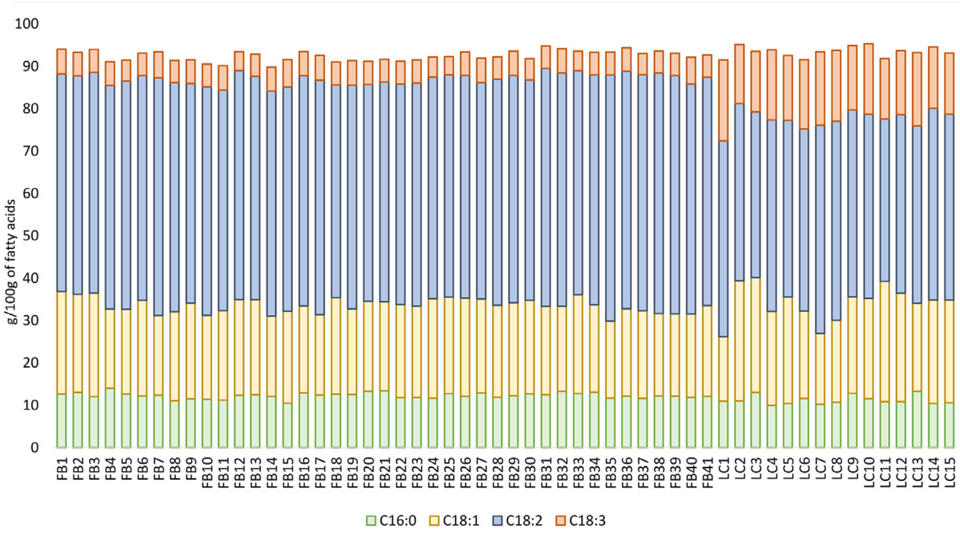

Fig. 7. Main fatty acids occurring in faba bean and lentil accessions (g 100g^{-1} of fatty acids). $C_{16:0}$ – palmitic acid; $C_{18:1}$ – oleic acid; $C_{18:2}$ – linoleic acid; $C_{18:3}$ – linolenic acid.

Supplementary material S2 reports the proximate composition, the bioactive compounds and the fatty acid composition of the 15 lentil accessions examined.

2. Experimental Design, Materials and Methods

2.1. Plant material and sample preparation

The germplasm collection consisted of 41 faba bean and 15 lentil accessions from the *ex situ* repository of the Institute of Biosciences and Bioresources of the Italian National Research Council (CNR-IBBR). The experimental plan was similar to that described in a previous data article [5]. All the plants were grown at the experimental farm “P. Martucci” of the University of Bari “Aldo Moro” (41°01′22.1″ N 16°54′21.0″ E) during the growing season 2017–2018, according to a randomized block design with two replicates. Each replicate was constituted by 10 individual plants. Figs. 1 and 2 show the variation of the seed phenotype for some faba bean and lentil accessions, respectively.

After harvesting at crop maturity (dry seeds), samples were carefully cleaned to remove foreign bodies and damaged seeds. Seeds were then classified on the basis of color (determined by visual observation) and for faba bean the weight of 10 seeds was determined using an analytical scale (Mettel Toledo, Columbus, OH, USA), whereas the diameter of the lentil seeds was determined by a caliper. Whole meal flour of each accession was obtained by milling the seeds with a laboratory mill (Model ETA, Vercella Giuseppe, Mercenasco, Italy) equipped with a sieve having holes of 0.6 mm [3].

2.2. Determination of proximate composition

Proximate composition was determined according to the AOAC methods 979.09, 923.03, 925.10, 945.38F, for protein (total nitrogen × 5.7), ash, moisture, and lipid contents, respectively [1]. In particular, protein content was determined by Kjeldahl method, using a DKL8 Digestor and a UDK139 distillation unit (Velp Scientifica, srl, Usmate Velate, Italy), whereas lipid content

Table 2
Physicochemical (bulk density; water absorption index; water solubility index) and functional (water absorption capacity; oil absorption capacity) properties of the flour from faba bean accessions.

Code	ID Sample	Bulk Density (g/mL)	Water Absorbtion Index	Water Solubility Index (%)	Water Absorbtion Capacity (g water/g flour)	Oil Absorbtion Capacity (g oil/g flour)
FB1	110175	0.78	6.23	16.01	1.45	1.07
FB2	110195	0.77	3.91	18.70	1.37	1.20
FB3	110201	0.78	4.54	17.20	1.29	1.11
FB4	110184	0.80	4.14	18.27	1.15	1.00
FB5	110360	0.82	3.93	22.87	1.25	1.09
FB6	110356	0.79	4.38	15.67	1.32	1.03
FB7	103235	0.77	4.22	18.45	1.18	1.08
FB8	106555	0.76	3.90	20.88	1.24	1.13
FB9	106560	0.77	4.08	18.07	1.10	1.00
FB10	106951	0.78	4.04	19.42	1.18	0.98
FB11	107640	0.78	4.02	19.08	1.10	1.10
FB12	108425	0.79	3.93	18.79	1.19	1.06
FB13	108428	0.76	4.48	13.58	1.30	1.07
FB14	108430	0.79	3.94	19.42	1.29	1.08
FB15	108437	0.80	4.68	16.08	1.32	1.06
FB16	108438	0.78	4.07	20.04	1.12	1.07
FB17	106406	0.84	4.13	18.43	1.31	1.07
FB18	106375	0.75	4.02	18.44	1.30	1.04
FB19	106374	0.77	4.27	18.05	1.33	1.04
FB20	107537	0.78	4.11	17.26	1.23	1.07
FB21	106779	0.78	4.20	15.44	1.36	1.05
FB22	107547	0.76	3.94	18.07	1.30	1.03
FB23	112081	0.77	4.58	13.32	1.31	1.02
FB24	112082	0.77	4.16	17.27	1.25	1.06
FB25	112091	0.76	3.87	17.85	1.21	1.08
FB26	111894	0.77	4.36	16.68	1.17	1.04
FB27	111900	0.81	3.49	19.87	1.12	1.00
FB28	111894	0.79	4.25	16.80	1.28	0.51
FB29	106478	0.81	6.40	15.10	1.11	0.98
FB30	106458	0.76	4.36	15.21	1.29	1.00
FB31	108385	0.77	4.93	11.93	1.22	1.05
FB32	109167	0.76	4.16	17.46	1.12	1.04
FB33	109225	0.76	4.22	16.64	1.17	1.06
FB34	108947	0.77	6.71	13.24	1.47	1.02
FB35	108969	0.80	3.73	18.50	1.21	0.99
FB36	109270	0.79	4.23	17.72	1.07	0.99
FB37	109284	0.79	6.32	17.55	1.08	0.95
FB38	109282	0.79	5.86	17.19	1.18	1.00
FB39	109290	0.83	5.99	13.10	1.09	0.97
FB40	109163	0.81	5.91	15.27	1.08	0.98
FB41	109164	0.80	5.70	17.75	1.08	1.01

was determined by means of a Soxhlet apparatus (SER 148 extractor – Velp Scientifica srl, Usmate Velate, Italy) using diethyl ether (Merck KGaA, Darmstadt, Germany) as extracting solvent. Carbohydrate content was determined as difference.

2.3. Determination of fatty acid composition

Fatty acid composition was determined by gas-chromatographic (GC) analysis of fatty acid methyl esters on the lipid fraction extracted using diethyl ether (Merck KGaA, Darmstadt, Germany) with the Soxhlet apparatus. The analytical conditions were similar to those described in a previous data article [5]. The gas-chromatographic system used consisted of a 7890A gas-chromatograph (Agilent Technologies, Salta Clara, CA USA) equipped with a flame ionization de-

Table 3
Physicochemical (bulk density; water absorption index; water solubility index) and functional (water absorption capacity; oil absorption capacity) properties of the flour from lentil accessions.

Code	ID Sample	Bulk Density (g/mL)	Water Absorbtion Index	Water Solubility Index (%)	Water Absorbtion Capacity (g water/g flour)	Oil Absorbtion Capacity (g oil/g flour)
LC1	106315	0.82	4.69	9.15	0.89	0.84
LC2	106404	0.79	5.11	12.57	0.94	0.79
LC3	106407	0.82	4.96	9.59	1.10	0.82
LC4	106665	0.82	5.08	8.60	0.95	0.82
LC5	106729	0.81	4.99	9.33	1.06	0.79
LC6	106763	0.84	5.41	2.52	1.37	0.83
LC7	107400	0.80	5.52	11.14	1.05	0.52
LC8	107414	0.81	5.24	13.94	1.25	0.77
LC9	107516	0.76	5.20	14.93	0.89	0.77
LC10	107546	1.08	5.12	14.78	0.97	0.86
LC11	111849	0.80	5.66	9.07	1.05	0.77
LC12	111910	0.79	5.39	10.39	1.05	0.73
LC13	112114	0.77	5.23	12.02	1.04	0.85
LC14	Eston-type_1	0.77	4.17	16.64	1.10	0.64
LC15	Eston-type_2	0.78	5.15	8.34	1.13	0.49

tector and an SP2340 fused silica capillary column 60 m × 0.25 mm × 0.2 μm film thickness (Supelco Park, Bellefonte, PA, USA). The temperature of the split injector was 230 °C, with a splitting ratio of 1:50; the detector temperature was 220 °C. The oven temperature was programmed at 160 °C for 1 min, then from 160 to 200 °C, with increments of 1.3 °C min^{-1}, hold 5 min, then from 200 to 240 °C with increments of 10 °C min^{-1} and final isothermal of 5 min. Helium was utilized as carrier gas at a constant flow rate of 3 mL min^{-1}. The identification of each fatty acid was achieved by comparing the retention time with that of the corresponding methyl ester standard (Merck KGaA, Darmstadt, Germany). The results were expressed as g 100 g-^{1} of the lipid fraction.

2.4. Determination of bioactive compounds

The determination of bioactive compounds was described in detail in the data article by Summo et al. [5].

2.5. Physicochemical and functional properties of flours

The physicochemical (Bulk density -BD, water absorption index -WAI, and water solubility index -WSI) and functional properties (water absorption capacity -WAC, and oil absorption capacity -OAC) of flours were determined according to Du et al. [4] with the procedures reported in the previous data article by Summo et al. [5].

2.6. Analysis of data

The data were plotted by using the Minitab 17 Software (State College, PA: Minitab, Inc.) and Microsoft Excel 365 (Microsoft Corporation, Redmond, WA, USA).

Ethics Statement

The analysis did not involve the use of human subjects and animal experiments.

CRediT Author Statement

Davide De Angelis: Writing- Original draft preparation, Data curation, Visualization; **Antonella Pasqualone:** Writing- Reviewing and Editing, Supervision; **Michela Costantini:** Data curation, Investigation; **Luigi Ricciardi:** Writing- Reviewing and Editing, Supervision; **Concetta Lotti:** Writing- Reviewing and Editing, Methodology; **Stefano Pavan:** Methodology, Writing- Reviewing and Editing; **Carmine Summo:** Conceptualization, Writing- Reviewing and Editing, Supervision

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships which have or could be perceived to have influenced the work reported in this article.

Acknowledgments

This research has been performed within the project "LEgume GEnetic REsources as a tool for the development of innovative and sustainable food TEchnological system" supported under the “Thought for Food” Initiative by Agropolis Fondation (through the “*Investissements d’avenir*” program with reference number ANR-10-LABX-0001-01″), Fondazione Cariplo, and Daniel & Nina Carasso Foundation. We also acknowledge the IBBR-CNR Institute for kindly providing the plant material.

Supplementary Materials

Supplementary material associated with this article can be found in the online version at doi:10.1016/j.dib.2020.106660.

References

[1] AOAC InternationalOfficial Methods of Analysis, 17th edition, Association of Analytical Communities, Gaithersburg, MD, 2006.

[2] AOCSOfficial Methods and Recommended Practices of the American Oil Chemists’ Society, 4th ed., AOCS Press, Champaign, IL, 1993.

[3] C. Summo, D. De Angelis, L. Ricciardi, F. Caponio, C. Lotti, S. Pavan, A. Pasqualone, Nutritional, physico-chemical and functional characterization of a global chickpea collection, J. Food Compos. Anal. 84 (2019) 103306, doi:10.1016/j.jfca.2019.103306.

[4] S.K. Du, H. Jiang, X. Yu, J.L. Jane, Physicochemical and functional properties of whole legume flour, LWT Food Sci. Technol. 55 (2014) 308–313, doi:10.1016/j.lwt.2013.06.001.

[5] C. Summo, D. De Angelis, L. Ricciardi, F. Caponio, C. Lotti, S. Pavan, A. Pasqualone, Data on the chemical composition, bioactive compounds, fatty acid composition, physico-chemical and functional properties of a global chickpea collection, Data Brief 27 (2019) 104612, doi:10.1016/j.dib.2019.104612.