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Genetic characterisation and agronomic and nutritional value of bitter vetch (*Vicia ervilia*), an under-utilised species suitable for low-input farming systems

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Table S1. Geographical data, gene bank and breeding status of bitter vetch accessions studied

Accession		Gene Bank	Country	Location	Province ²	Breeding status	Alt. (m)	Long.	Lat.
Name in this study ¹	Name in the Gene Bank								
Acc#01	TR 31966	Aegean Agricultural Research Institute	Turkey	Eastern Anatolia Region	Elazığ	Landrace	1200		
Acc#02	TR 33630	Aegean Agricultural Research Institute	Turkey	Aegean region	İzmir	Landrace	60		
Acc#03	TR 26392	Aegean Agricultural Research Institute	Turkey	Aegean region	İzmir	Landrace	130		
Acc#04	TR 26454	Aegean Agricultural Research Institute	Turkey	Aegean region	Manisa	Landrace	390		
Acc#05	TR 26470	Aegean Agricultural Research Institute	Turkey	Aegean region	İzmir	Landrace	90		
Acc#06	TR 26510	Aegean Agricultural Research Institute	Turkey	Aegean region	Manisa	Landrace	200		
Acc#07	TR 44238	Aegean Agricultural Research Institute	Turkey	Aegean region	Denizli	Landrace	1460		
Acc#08	TR 35131	Aegean Agricultural Research Institute	Turkey	Central Anatolia Region	Yozgat	Landrace	1100		
Acc#09	TR 38022	Aegean Agricultural Research Institute	Turkey	Black Sea Region	Çorum	Landrace	890		
Acc#10	TR 36927	Aegean Agricultural Research Institute	Turkey	Marmara Region	Çanakkale	Landrace	360		
Acc#11	TR 26560	Aegean Agricultural Research Institute	Turkey	Marmara Region	Balıkesir	Landrace	50		
Acc#12	TR 26597	Aegean Agricultural Research Institute	Turkey	Marmara Region	Balıkesir	Landrace	36		
Acc#13	TR 26603	Aegean Agricultural Research Institute	Turkey	Marmara Region	Çanakkale	Landrace	380		
Acc#14	TR 26615	Aegean Agricultural Research Institute	Turkey	Marmara Region	Çanakkale	Landrace	90		
Acc#15	TR 26638	Aegean Agricultural Research Institute	Turkey	Marmara Region	Çanakkale	Landrace	200		
Acc#16	TR 26649	Aegean Agricultural Research Institute	Turkey	Marmara Region	Çanakkale	Landrace	10		
Acc#17	TR 26663	Aegean Agricultural Research Institute	Turkey	Marmara Region	Çanakkale	Landrace	50		
Acc#18	TR 26688	Aegean Agricultural Research Institute	Turkey	Marmara Region	Balıkesir	Landrace	10		
Acc#19	TR 26702	Aegean Agricultural Research Institute	Turkey	Marmara Region	Bursa	Landrace	20		
Acc#20	TR 26725	Aegean Agricultural Research Institute	Turkey	Marmara Region	Balıkesir	Landrace	230		
Acc#21	<i>in situ</i> (Mociarino)	Gerace & Giunti farm	Italy	Central Italy	Arezzo	Landrace			
Acc#22	3742	DSA3 University of Perugia	Italy	Central Italy	Perugia	Landrace			
Acc#23	3942	DSA3 University of Perugia	Italy	Central Italy	Perugia	Landrace			
Acc#24	4006	DSA3 University of Perugia	Italy	Central Italy	Aquila	Landrace			
Acc#25	4770 (replica of 3742)	DSA3 University of Perugia	Italy	Central Italy	Perugia	Landrace			
Acc#26	4771 (replica of 3942)	DSA3 University of Perugia	Italy	Central Italy	Perugia	Landrace			
Acc#27	4772 (replica of 4006)	DSA3 University of Perugia	Italy	Central Italy	Aquila	Landrace			
Acc#28	AR100228	Agricultural Research Institute	Cyprus	Nicosia District	A. Theodoros	Landrace	560	32°56' E	35°03' N
Acc#29	AR100231	Agricultural Research Institute	Cyprus	Paphos District	Mesa Khorio	Landrace	220	32°27' E	34°48' N
Acc#30	AR100235	Agricultural Research Institute	Cyprus	Paphos District	Tala	Landrace	240	32°26' E	34°50' N
Acc#31	AR100237	Agricultural Research Institute	Cyprus	Paphos District	Peyia	Landrace	100	32°23' E	34°53' N
Acc#32	AR100239	Agricultural Research Institute	Cyprus	Paphos District	Inia	Landrace	280	32°21' E	34°57' N
Acc#33	AR100241	Agricultural Research Institute	Cyprus	Limassol District	Anoyira	Landrace	480	32°44' E	34°45' N
Acc#34	AR100244	Agricultural Research Institute	Cyprus	Limassol District	Anoyira	Landrace	410	32°44' E	34°44' N

Acc#35	AR100248	Agricultural Research Institute	Cyprus	Limassol District	Prastio	Landrace	380	32°46' E	34°44' N
Acc#36	AR100306	Agricultural Research Institute	Cyprus	Nicosia District	A. Theodoros	Landrace	400	32°55' E	35°04' N
Acc#37	AR100312	Agricultural Research Institute	Cyprus	Limassol District	Apesha	Landrace	500	32°58' E	34°47' N
Acc#38	AR100314	Agricultural Research Institute	Cyprus	Limassol District	Paramytha	Landrace	360	32°57' E	34°45' N
Acc#39	AR100320	Agricultural Research Institute	Cyprus	Limassol District	Anoyira	Landrace	510	32°46' E	34°45' N
Acc#40	AR100334	Agricultural Research Institute	Cyprus	Larnaca District	Melini	Landrace	700	32°08' E	34°51' N
Acc#41	AR100335	Agricultural Research Institute	Cyprus	Larnaca District	Ora	Landrace	500	33°13' E	34°51' N
Acc#42	BGE001115	Centro de Recursos Fitogeneticos – INIA	Spain	Andalucia	Granada	Landrace	834	04°00' W	37°19' N
Acc#43	BGE013845	Centro de Recursos Fitogeneticos – INIA	Spain	Castilla y Leon	Valladolid	Landrace	788	05°13' W	41°13' N
Acc#44	BGE001828	Centro de Recursos Fitogeneticos – INIA	Spain	Castilla-La Mancha	Cuenca	Landrace	831	01°54' W	39°33' N
Acc#45	BGE001865	Centro de Recursos Fitogeneticos – INIA	Spain	Castilla-La Mancha	Albacete	Landrace	700	01°54' W	39°16' N
Acc#46	BGE027059	Centro de Recursos Fitogeneticos – INIA	Spain	Andalucia	Almeria	Landrace	970	02°36' W	37°23' N
Acc#47	1959-VIC-ER-1	Inst. of Plant Genetic Resources “K. Malkov”	Czech Rep.			Landrace			
Acc#48	1967-VIC-ER-1	Inst. of Plant Genetic Resources “K. Malkov”	Netherlands			Landrace			
Acc#49	1967-VIC-ER-2	Inst. of Plant Genetic Resources “K. Malkov”	Bulgaria			Landrace			
Acc#50	1969-VIC-ER-2	Inst. of Plant Genetic Resources “K. Malkov”	Georgia			Landrace			
Acc#51	1969-VIC-ER-3	Inst. of Plant Genetic Resources “K. Malkov”	Morocco			Landrace			
Acc#52	1969-VIC-ER-4	Inst. of Plant Genetic Resources “K. Malkov”	Belgium			Landrace			
Acc#53	1980-VIC-ER-1	Inst. of Plant Genetic Resources “K. Malkov”	Bulgaria			Landrace			
Acc#54	1980-VIC-ER-2	Inst. of Plant Genetic Resources “K. Malkov”	Bulgaria			Landrace			
Acc#55	1982-VIC-ER-7	Inst. of Plant Genetic Resources “K. Malkov”	Bulgaria			Landrace			
Acc#56	2003-VIC-ER-1	Inst. of Plant Genetic Resources “K. Malkov”	Bulgaria			Variety Rodopi			

¹ The symbol Acc#01 indicates the number assigned to the accession (1 in this case).

² For the accessions 28-41 is indicated not the Province but the city or the village of Cyprus.

The accessions indicated in bold are those cultivated in the greenhouse in 2013 and 2014 and in the experimental field in 2014 and 2015. They were evaluated by both agro-morphological analysis and utilization tests of the seeds.

Table S2. Feed digestibility and growth performance of rabbits

	Experimental diets			s.e.m.	<i>P</i>
	Control	BV-low	BV-high		
Feed digestibility (%)					
Dry matter	65.57	66.43	66.49	0.56	0.479
Organic matter	66.55	67.53	67.55	0.59	0.442
Crude protein	79.02	80.25	78.99	0.97	0.653
Ether extract	82.45 ^a	80.86 ^{ab}	79.29 ^b	0.41	0.005
Ash	56.15	56.09	56.67	0.66	0.801
Neutral detergent fiber	30.29	33.83	33.43	0.76	0.052
Non-fiber carbohydrates	92.04	91.51	91.11	0.28	0.139
Growth performance					
Overall feed intake (g/day)	123.2	123.9	124.1	0.27	0.125
Overall feed conversion ratio	3.50	3.24	3.56	0.08	0.219
Final body weight (g)	2505.8	2644.4	2614.0	49.76	0.373

Means without a common superscript letter differ significantly.

Supplementary Figures



Fig. S1. Example of an experimental field for agronomical evaluation of *Vicia ervilia* L. (bitter vetch) accessions. a) A bitter vetch plant with green siliques. b) Bitter vetch plots organized as a randomized complete block design with three replicates. In the first line of plots from the bottom of the figure, there are plants of field pea.

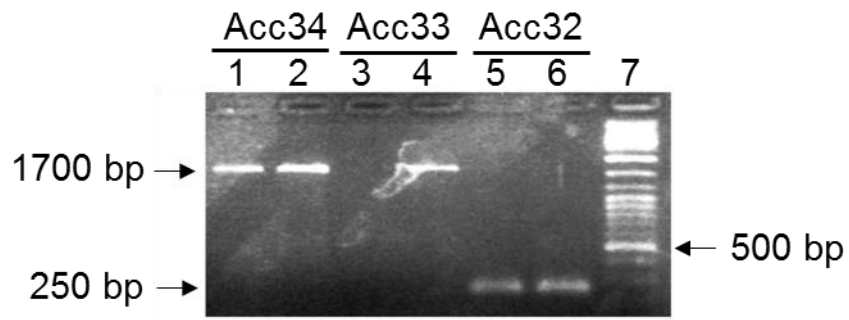


Fig. S2. Example of the banding pattern obtained for the SSR locus VE7 by agarose gel electrophoresis. Arrows at left indicated the length in bp of the amplified amplicons. Lanes 1-6: 2 plants of Acc#34 (Acc#34.2 and Acc#34.1), 2 plants of Acc#33 (Acc#33.2 and Acc#33.1), and 2 plants of Acc#32 (Acc#32.2 and Acc#32.1). Lane 7: DNA molecular mass marker.

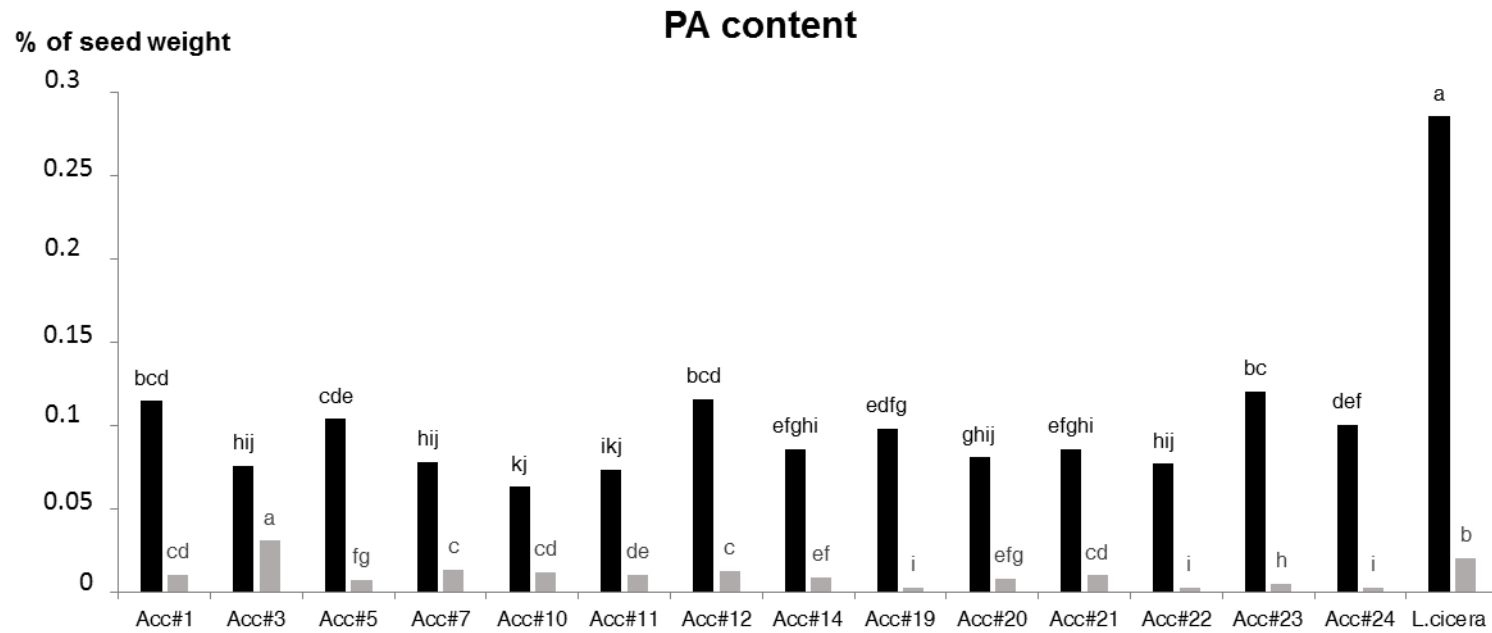


Fig. S3. Seed content (% of seed weight) of condensed tannins, also known as proanthocyanidins (PAs), in *V. ervilia* accessions. An example of 14 out of 22 accessions is shown. The PA content of the other 8 bitter vetch accession is similar to that shown in the figure. Left (black) columns, soluble PAs; right (grey) columns, insoluble PAs. Columns of the same side labelled with the same letter do not differ for $P < 0.05$. The name of the *V. ervilia* accessions is indicated on the x-axis. *L. cicera* seeds are used as positive control.