ON-LINE SUPPLEMENTARY MATERIAL

Nour, I.H., Osman, A.K, Hamdy, R.S., El Garf, I.A.: Seed morphological diversity of Egyptian *Allium* L. (Amaryllidaceae) and its taxonomic significance. Acta Botanica Croatica, DOI: 10.37427/botcro-2025-014.

On-line Suppl. Tab 1. List of *Allium* taxa examined in this study with voucher information.

No.	Studied taxa	Subgenus/ Section	Collector	Date of collection	Locality	Herbarium
1	*Allium ampeloprasum* L.	*Allium* subg. *Allium* L./ *Allium* sect. *Allium* L.	G. Maire s.n.	20/05/1907	M: Kinghi Mariut, Egypt.	CAI
			J. Hobbs 75	14/07/1989	S: Sinai, Wadi Tinya, 1750 a.s.l., Egypt.	
2	*Allium artemisietorum* Eig & Feinbrun	*Allium* subg. *Allium* L./ *Allium* sect. *Allium* L.	S. Eid s.n.	04/1964	S: N. Sinai, Gebel El Halal, Egypt.	CAI
3	*Allium aschersonianum* Barbey	*Allium* subg. *Melanocrommyum* Webb et Berth./ *Allium* sect. *Melanocrommyum* Webb et Berth.	El Garf s.n.	15/03/2021	M: East Mersa Matruh, Wadi Hashim, Egypt.	CAI
			El Garf s.n.	22/03/2022	M: West Mersa Matruh, Barley fields, Wadi Hashim, Egypt.	
4	*Allium barthianum* Asch. & Schweinf.	*Allium* subg. *Allium* L./ *Allium* sect. *Allium* L.	V. Täckholm et al s.n.	22/03/1975	M: Mersa Matruh area, Egypt.	CAI
5	*Allium blomfieldianum* Asch. & Schweinf.	*Allium* subg. *Amerallium* Traub./ *Allium* sect. *Molium* G.Don ex Koch.	V. Täckholm s.n.	22/05/1958	M: 18 km West of Mersa Matrouh to the right of Sidi Barrani Road, El Sidra, Egypt.	CAI
			El Garf s.n.	24/03/2022	M: Mersa Matruh, Wadi Halazeen, Egypt.	
6	*Allium cepa* L.	*Allium* subg. *Cepa* Radi/ *Allium* sect. *Cepa* (Mill.) Prokh.	N. El Hadidi	04/1954	N: Giza, Faculty of Agriculture, Egypt.	CAI
			R. Hamdy	01/2021	N: Fayum, Egypt.	
7	*Allium crameri* Asch. & Boiss.	*Allium* subg. *Melanocrommyum* Webb et Berth./ *Allium* sect. *Melanocrommyum* Webb et Berth.	V. Holmén	14/05/1965	N: Wadi Degla, Maadi near Great petrified forest, Egypt.	CAI
8	*Allium curtum* Boiss. & Gaill.	*Allium* subg. *Allium* L./ *Allium* sect. *Allium* L.	L. Boulos s.n.	27/05/1958	M: Mariut, near Burg el Arab, Abu Sir, Egypt.	CAI
			F. Hussein s.n.	1958	M: Mariut, Abu Sir, near Burg el Arab, Egypt.	
9	*Allium desertorum* Forssk.	*Allium* subg. *Allium* L./ *Allium* sect. *Codonoprasum* Rchb.	Imam s.n.	04/04/1957	De: Suez desert road, Egypt.	CAI
			J. Shabetai 106.255	05/03/1945	De: Suez desert road, Gebel Yahmum El Asmar, Egypt.	
10	*Allium erdelii* Zucc.	*Allium* subg. *Amerallium* Traub./ *Allium* sect. *Molium* G.Don ex Koch.	M. Hassib s.n.	20/03/1930	M: Mariut, Egypt.	CAI

On-line Suppl. Tab. 1. continued

No.	Studied taxa	Subgenus/ Section	Collector	Date of collection	Locality	Herbarium
11	*Allium kurrat* Schweinf. ex K. Krause	*Allium* subg. *Allium* L./ *Allium* sect. *Allium* L.	El-Garf s.n.	04/1995	M:Cultivated field, Burg El Arab, Egypt.	CAI
			N. El Hadidi s.n.	04/1953	N: Giza, Faculty of Agriculture farm, Egypt.	
12	*Allium mareoticum* Bornm. & Gauba	*Allium* subg. *Allium* L./ *Allium* sect. *Allium* L.	M. Drar s.n.	01/04/1940	M: Northwest Coast, El Hammam, El Omayid, in Sand, Egypt.	CAIM
13	*Allium neapolitanum* Cirillo	*Allium* subg. *Amerallium* Traub./ *Allium* sect. *Molium* G.Don ex Koch.	Salah Eid s.n.	Spring, 1980	M: El-Sallum, Egypt.	CAI
			L. Boulos s.n.	11/03/1968	Wadi Maboul, Gebl Akhdar, Libya.	
14	*Allium pallens* L.	*Allium* subg. *Allium* L./ *Allium* sect. *Codonoprasum* Rchb.	V. Täckholm s.n.	30/05/1962	M: Mariut, Abu Sir, in sandy dunes, Egypt.	CAI
15	*Allium papillare* Boiss.	*Allium* subg. *Amerallium* Traub./ *Allium* sect. *Molium* G.Don ex Koch.	G. Täckholm s.n.	22/03/1928	S: Sinai, Rafah, near the Station, Egypt.	CAI
16	*Allium porrum* L.	*Allium* subg. *Allium* L./ *Allium* sect. *Allium* L.	N. El Hadidi s.n.	04/1953	N: Giza, Faculty of Agriculture farm, Egypt.	CAI
17	*Allium roseum* subsp. *tourneuxii* Boiss.	*Allium* subg. *Amerallium* Traub./ *Allium* sect. *Molium* G.Don ex Koch.	V. Täckholm s.n.	22/05/1958	M: 18 km West of Mersa Matrouh to the right of Sidi Barrani Road, Elsidra, Egypt.	CAI
			Merxmüller et al. s.n.	03/08/1978	M: Burg El-Arab, El-Omaid, Egypt.	
			Adel El-Gazzar et al. s.n.	24/03/1977	M: Burg El Arab, Egypt.	
			A.K. Osman s.n.	15/03/2022	M: El-Sallum, Egypt.	South Valley University Herbarium, Qena
18	*Allium sativum* L.	*Allium* subg. *Allium* L./ *Allium* sect. *Allium* L.	J.D.C. Pfund	6/1875	Kordofan "Bara", Sudan.	CAI
19	*Allium sinaiticum* Boiss.	*Allium* subg. *Allium* L./ *Allium* sect. *Allium* L.	S. Eid s.n.	04/1965	Wadi el Hommur at El-Ramla Plain, near Abu Zenema, Egypt.	CAIM
20	*Allium spathaceum* Steud. ex A.Rich.	*Allium* subg. *Amerallium* Traub./ *Allium* sect. *Briseis* (Salisb.) Stearn.	M. Drar	06/03/1938	Erkwit, Gebel Sila, Sudan.	CAI
21	*Allium sphaerocephalon* L.	*Allium* subg. *Allium* L./ *Allium* sect. *Allium* L.	V. Täckholm, L. Boulos, Ibrahim, Mahdi s.n.	01/06/1964	Along the Road of Burg El-Arab to El Alamein, Egypt.	CAI
22	*Allium trifoliatum* Cirillo	*Allium* subg. *Amerallium* Traub./ *Allium* sect. *Molium* G.Don ex Koch.	Maire s.n.	15/03/1908	M: El-Amriya, Egypt.	CAI

On-line Suppl. Tab 2. Descriptive quantitative data of *Allium* taxa seed morphometry. Q1 – Quartile 1, Q3 – Quartile 3 and IQR – Interquartile

	Variable	Mean ± SD	SE Mean	Minimum	Q1	Median	Q3	Maximum	IQR
	Seed length (mm)	2.5358 ± 0.5938	0.069	1.54	2.0097	2.5355	3.0135	3.7	1.0038
	Seed width (mm)	1.6843 ± 0.4275	0.0497	0.89	1.3345	1.6355	2.0457	2.55	0.7112
	Seed L/W ratio	1.5342 ± 0.2577	0.03	1.017	1.343	1.5062	1.6763	2.41	0.3333
	Seed area (mm^2)	3.257 ± 1.493	0.172	1.045	1.872	3.169	4.4	7.15	2.528
Dorsal surface	Epidermal cell count/unit area	26.667 ± 7.715	0.95	14	20	27	31	48	11
	Epidermal cell length (μm)	47.53 ± 14.56	1.69	19.2	37.43	47.72	55.07	83.88	17.64
	Epidermal cell width (μm)	46.63 ± 15.4	1.79	23.23	35.68	43.9	54.23	97.18	18.55
	Epidermal cell L/W ratio	1.0423 ± 0.3735	0.0434	0.4471	0.7601	0.9988	1.2669	2.4213	0.5067
	Epidermal cell area (μm^2)	663.8 ± 841	98.4	582.9	993.5	1418.1	2115.6	4753.4	1122
	Intercellular space length (μm)	4.105 ± 3.352	0.392	0	1.771	3.06	6.022	13.448	4.252
	Count of undulation elements/cell (if present)	18.397 ± 6.516	0.856	8	13.75	16.5	23.25	33	9.5
	Undulation element length (μm) (if present)	6.092 ± 3.107	0.408	1.296	3.898	5.425	8.207	14.351	4.31
	Undulation element width (μm) (if present)	5.13 ± 1.994	0.262	2.115	3.695	4.785	6.195	11.197	2.501
	Undulation element L/W ratio (if present)	1.2091 ± 0.50	0.0656	0.4005	0.8596	1.224	1.4916	2.6003	0.632
	Distance between two undulation elements (μm) (if present)	5.141 ± 2.832	0.372	0.991	2.444	4.894	7.295	11.648	4.851
Ventral surface	Epidermal cell count/unit area	24.106 ± 7.052	0.868	12	20	23	28	43	8
	Epidermal cell length (μm)	47.89 ± 14.53	1.74	18.55	36.3	44.75	56.52	99.98	20.22
	Epidermal cell width (μm)	50.53 ± 15.7	1.88	21.22	38.95	47.01	64.19	90.38	25.24
	Epidermal cell L/W ratio	0.9652 ± 0.339	0.0405	0.314	0.7448	0.8984	1.2079	1.8507	0.463
	Epidermal cell area (μm^2)	1794 ± 889	106	856	1131	1561	2203	5785	1071
	Intercellular space length (μm)	3.477 ± 2.686	0.321	0	1.532	2.859	5.047	11.378	3.516
	Count of undulation elements/cell (if present)	17.552 ± 5.685	0.747	10	13	16.5	21.25	32	8.25
	Undulation element length (μm) (if present)	5.887 ± 2.781	0.365	2.017	3.384	5.099	7.975	12.701	4.591
	Undulation element width (μm) (if present)	5.278 ± 1.721	0.226	1.993	4.169	5.091	6.626	9.095	2.457
	Undulation element L/W ratio (if present)	1.1415 ± 0.4547	0.0597	0.519	0.7479	1.1497	1.3983	2.5881	0.6504
	Distance between two undulation elements (μm) (if present)	5.738 ± 3.155	0.414	0.586	3.052	5.916	7.872	17.583	4.82

On-line Suppl. Tab. 3. Quantitative seed macromorphological traits of the studied *Allium* taxa. Grouping information was obtained using Tukey pairwise comparisons at 95% confidence.

No	Studied taxa	Seed length (mm)		Seed width (mm)		Seed L/W ratio		Seed area (mm^2)	
		Min–Max	Mean±SD	Min–Max	Mean±SD	Min–Max	Mean±SD	Min–Max	Mean±SD
1	*A. ampeloprasum* L.	3.40–3.58	3.50±0.08^{AB}	1.99–2.30	2.14±0.12^{ABC}	1.55–1.73	1.63±0.07^{ABC}	4.84–5.63	5.10±0.36^{AB}
2	*A. artemisietorum* Eig & Feinbrun	1.61–2.00	1.80±0.19^{JKL}	0.89–0.91	0.90±0.01^{J}	1.75–2.24	1.98±0.24^{A}	1.04–1.13	1.07±0.04^{I}
3	*A. aschersonianum* Barbey	1.95–2.76	2.37±0.34^{EFGHI}	1.33–2.40	1.77±0.38^{BCDEFG}	1.15–1.46	1.35±0.11^{BCDE}	1.86–4.87	3.41±1.12^{CD}
4	*A. barthianum* Asch. & Schweinf.	1.76–2.10	1.94±0.13^{IJKL}	1.03–1.27	1.17±0.11^{IJ}	1.57–1.73	1.66±0.06^{ABC}	1.22–1.87	1.61±0.27^{I}
5	*A. blomfieldianum* Asch. & Schweinf.	1.54–1.77	1.64±0.11^{KL}	1.21–1.59	1.45±0.21^{EFGHI}	1.01–1.27	1.14±0.12^{E}	1.48–2.03	1.78±0.28^{GHI}
6	*A. cepa* L. (Giza 20)	2.54–3.26	2.91±0.27^{C}	1.97–2.55	2.25±0.21^{A}	1.07–1.43	1.30±0.12^{DE}	4.20–6.09	4.98±0.72^{AB}
7	*A. crameri* Asch. & Boiss.	3.41–3.70	3.59±0.15^{A}	2.2–2.38	2.26±0.10^{AB}	1.43–1.67	1.59±0.13^{ABCD}	6.08–7.14	6.50±0.56^{A}
8	*A. curtum* Boiss. & Gaill.	1.97–2.02	2.00±0.02^{IJKL}	1.28–1.32	1.29±0.02^{HI}	1.52–1.58	1.54±0.03^{ABCD}	1.81–1.86	1.83±0.02^{FGHI}
9	*A. desertorum* Forssk.	2.68–3.17	2.94±0.24^{ABCD}	1.81–2.13	2.00±0.16^{ABCDE}	1.44–1.48	1.47±0.02^{ABCDE}	4.14–5.02	4.62±0.44^{ABC}
10	*A. erdelii* Zucc.	1.56–1.64	1.60±0.04^{L}	1.20–1.29	1.24±0.04^{HIJ}	1.27–1.31	1.29±0.01^{A}	1.25–1.75	1.57±0.27^{I}
11	*A. kurrat* Schweinf. ex K.Krause	2.49–3.0	2.68±0.32^{CDEFGH}	1.55–1.83	1.70±0.14^{ABCDEFGH}	1.35–1.96	1.58±0.32^{CDE}	3.16–3.58	3.33±0.22^{CDE}
12	*A. mareoticum* Bornm. & Gauba	1.90–2.39	2.12±0.24^{HIJKL}	1.20–1.44	1.33±0.12^{GHI}	1.31–1.98	1.60±0.33^{ABCD}	1.67–2.05	1.88±0.19^{EFGHI}
13	*A. neapolitanum* Cirillo	2.61–3.16	2.84±0.28^{CDEF}	1.77–2.54	2.11±0.39^{ABC}	1.24–1.47	1.35±0.11^{ABCD}	3.84–5.36	4.52±0.76^{ABC}
14	*A. pallens* L.	2.56–3.00	2.80±0.22^{CDEF}	1.47–1.70	1.58±0.11^{CDEFGHI}	1.63–1.93	1.77±0.15^{BCDE}	2.72–3.85	3.15±0.60^{CDEFG}
15	*A. papillare* Boiss.	3.07–3.47	3.25±0.20^{ABC}	1.74–2.04	1.89±0.14^{ABCDEF}	1.50–1.99	1.72±0.24^{AB}	4.55–4.90	4.68±0.19^{ABC}
16	*A. porrum* L.	2.73–2.96	2.87±0.12^{BCDE}	1.45–1.79	1.63±0.17^{BCDEFGH}	1.64–2.03	1.78±0.22^{ABC}	3.00–3.69	3.24±0.38^{CDEF}
17	*A. roseum* subsp. *tourneuxii* Boiss.	2.24–2.45	2.33±0.10^{DEFGHIJ}	1.46–1.74	1.58±0.14^{CDEFGHI}	1.28–1.67	1.48±0.19^{AB}	2.62–3.37	3±0.37^{CDEFGH}
18	*A. sativum* L.	2.73–2.76	2.74±0.01^{CDEFG}	2–2.1	2.03±0.05^{ABCD}	1.31–1.37	1.35±0.03^{ABCDE}	3.2–3.3	3.26±0.05^{CDEF}
19	*A. sinaiticum* Boiss.	2.13–2.38	2.22±0.13^{FGHIJ}	0.88–1.34	1.14±0.23^{IJ}	1.77–2.40	1.99±0.36^{BCDE}	1.10–2.32	1.71±0.60^{HI}
20	*A. spathaceum* Steud. ex A.Rich.	1.84–1.99	1.91±0.07^{IJKL}	1.42–1.48	1.45±0.03^{DEFGHI}	1.23–1.39	1.31±0.07^{BCDE}	2.08–2.15	2.11±0.03^{DEFGHI}
21	*A. sphaerocephalon* L.	2.10–2.25	2.16±0.07^{GHIJK}	1.33–1.39	1.36±0.03^{FGHI}	1.50–1.69	1.59±0.09^{ABCD}	2.03–2.17	2.10±0.07^{DEFGHI}
22	*A. trifoliatum* Cirillo	3.10–3.16	3.13±0.03^{ABC}	2–2.09	2.05±0.04^{ABC}	1.51–1.55	1.52±0.02^{ABCD}	4.12–4.14	4.13±0.01^{BC}

Means that do not share a letter are significantly different.

On-line Suppl. Tab. 4. Quantitative seed micromorphological traits of the studied *Allium* taxa. Grouping information was obtained using Tukey pairwise comparisons at 95% confidence.

No	Studied taxa	Epidermal cell count/unit area				Epidermal cell length (μm)				Epidermal cell width (μm)			
		Dorsal		Ventral		Dorsal		Ventral		Dorsal		Ventral	
		Min–Max	Mean±SD	Min–Max	Mean±SD	Min–Max	Mean±SD	Min–Max	Mean±SD	Min–Max	Mean±SD	Min–Max	Mean±SD
1	*A. ampeloprasum* L.	17–17	$17\pm0^{MN*}$	14–14	$14\pm0^{M*}$	41.58–58.83	50.53 ± 8.63^{ABC}	57.49–65.96	62.76 ± 4.59^{ABC}	80.13–84.03	81.94 ± 1.96^{A}	69.98–82.56	77.08 ± 6.44^{AB}
2	*A. artemisietorum* Eig & Feinbrun	37–37	$37\pm0^{B*}$	28–28	$28\pm0^{DE*}$	23.70–30.79	26.93 ± 3.58^{DE}	27.34–36.36	31.77 ± 4.51^{DE}	34.24–37.88	36.51 ± 1.98^{CDEF}	39.52–64.48	50.40 ± 12.7^{ABCDEF}
3	*A. aschersonianum* Barbey	21–22	21.6 ± 0.57^{J}	20–21	20.6 ± 0.57^{IJ}	41.99–54.43	46.57 ± 5.42^{ABC}	33.04–61.67	45.81 ± 12.8^{ABCDE}	46.21–58.87	$52.10\pm5.49^{ABCDE*}$	38.42–47.69	$42.46\pm3.85^{CDEFG*}$
4	*A. barthianum* Asch. & Schweinf.	27–27	$27\pm0^{G*}$	26–26	$26\pm0^{EF*}$	44.21–52.82	48.58 ± 4.30^{ABC}	42.70–61.44	49.96 ± 10.0^{ABCDE}	38.28–47.92	43.43 ± 4.84^{BCDEF}	38.08–52.81	43.49 ± 8.10^{CDEFG}
5	*A. blomfieldianum* Asch. & Schweinf.	27–27	$27\pm0^{G*}$	22–22	$22\pm0^{HI*}$	43.71–67.59	54.20 ± 12.2^{AB}	42.87–56.17	51.43 ± 7.42^{ABCD}	44.73–55.08	51.33 ± 5.72^{ABCDE}	39.56–66.20	53.28 ± 13.3^{ABCDEF}
6	*A. cepa* L. (Giza 20)	26–28	27 ± 1^{G}	21–26	23.6 ± 2.51^{GH}	32.27–56.23	42.69 ± 8.48^{BCD}	39.19–56.11	49.85 ± 7.64^{ABCD}	23.22–35.83	29.50 ± 5.26^{F}	26.61–39.12	33.97 ± 4.22^{FG}
7	*A. crameri* Asch. & Boiss.	20–22	21 ± 1^{JK}	20–20	20 ± 0^{JK}	48.61–80.98	62.11 ± 16.8^{AB}	42.63–99.97	76.34 ± 29.9^{A}	57.3–65.59	61.84 ± 4.20^{ABC}	34.85–82.09	61.20 ± 24.0^{ABCDE}
8	*A. curtum* Boiss. & Gaill.	20–20	$20\pm0^{KL*}$	19–19	$19\pm0^{K*}$	54.25–68.45	62.36 ± 7.30^{AB}	45.60–56.19	52.08 ± 5.68^{ABCD}	50.39–70.41	57.43 ± 11.2^{ABCD}	72.58–90.38	79.54 ± 9.51^{A}
9	*A. desertorum* Forssk.	35–35	$35\pm0^{C*}$	33–33	$33\pm0^{B*}$	31.71–54.67	42.77 ± 11.4^{BCD}	33.75–59.44	47.95 ± 13.0^{ABCDE}	23.67–27.01	25.22 ± 1.68^{F}	21.22–32.73	26.14 ± 5.93^{G}
10	*A. erdelii* Zucc.	35–35	$35\pm0^{C*}$	32–32	$32\pm0^{BC*}$	40.46–50.56	$45.17\pm5.08^{ABCD*}$	33.46–37.90	$35.82\pm2.22^{BCDE*}$	31.98–42.18	$36.15\pm5.34^{DEF*}$	42.65–44.32	$43.51\pm0.83^{CDEFG*}$
11	*A. kurrat* Schweinf. ex K.Krause	19–19	$19\pm0^{LM*}$	20–20	$20\pm0^{JK*}$	44.16–65.73	53.43 ± 11.1^{ABC}	46.82–58.48	52.67 ± 5.83^{ABCD}	47.86–59.44	52.85 ± 5.95^{ABCDE}	46.90–60.28	52.76 ± 6.83^{ABCDEF}
12	*A. mareoticum* Bornm. & Gauba	31–31	$31\pm0^{E*}$	30–30	$30\pm0^{CD*}$	47.15–52.64	$49.35\pm2.89^{ABC*}$	28.08–43.98	$35.44\pm8.01^{CDE*}$	37.79–42.76	$40.07\pm2.51^{CDEF*}$	51.12–67.82	$58.55\pm8.50^{ABCDE*}$
13	*A. neapolitanum* Cirillo	14–14	$14\pm0^{N*}$	12–12	$12\pm0^{N*}$	66.30–83.87	$73.95\pm9.00^{A*}$	37.86–57.90	$46.65\pm10.2^{ABCDE*}$	45.46–97.18	72.75 ± 25.9^{AB}	52.77–70.55	63.03 ± 9.20^{ABCD}
14	*A. pallens* L.	48–48	$48\pm0^{A*}$	43–43	$43\pm0^{A*}$	19.19–24.82	$21.72\pm2.85^{E*}$	32.22–37.79	$35.18\pm2.79^{CDE*}$	35.17–43.71	40.60 ± 4.72^{BCDEF}	33.00–38.26	34.99 ± 2.85^{EFG}
15	*A. papillare* Boiss.	27–27	$27\pm0^{G*}$	23–23	$23\pm0^{H*}$	50.09–64.62	56.09 ± 7.58^{AB}	33.64–50.47	41.33 ± 8.50^{ABCDE}	34.03–40.60	38.15 ± 3.59^{CDEF}	37.73–47.11	42.02 ± 4.74^{CDEFG}
16	*A. porrum* L.	20–20	$20\pm0^{KL*}$	17–17	$17\pm0^{L*}$	64.51–73.55	67.82 ± 4.98^{AB}	63.06–68.71	65.26 ± 3.02^{AB}	54.38–65.75	58.67 ± 6.17^{ABCD}	52.31–70.62	59.19 ± 9.96^{ABCDE}
17	*A. roseum* subsp. *tourneuxii* Boiss.	24–24	$24\pm0^{I*}$	23–23	$23\pm0^{H*}$	37.33–42.64	39.98 ± 2.65^{BCD}	41.87–43.53	42.91 ± 0.90^{ABCDE}	34.62–44.64	40.69 ± 5.33^{BCDEF}	42.72–46.61	44.10 ± 2.17^{BCDEFG}
18	*A. sativum* L.	28–28	$28\pm0^{F*}$	25–25	$25\pm0^{FG*}$	22.73–39.38	33.12 ± 6.22^{CDE}	28.98–33.18	30.56 ± 2.28^{DE}	27.20–51.89	$39.20\pm8.36^{DEF*}$	56.05–65.81	$61.98\pm5.20^{ABCD*}$
19	*A. sinaiticum* Boiss.	26–26	$26\pm0^{H*}$	22–22	$22\pm0^{HI*}$	37.45–54.01	47.31 ± 8.72^{ABCD}	54.17–72.98	65.60 ± 10.0^{AB}	37.50–73.66	53.25 ± 18.5^{ABCDE}	39.43–62.66	50.21 ± 11.7^{ABCDEF}
20	*A. spathaceum* Steud. ex A.Rich.	34–34	$34\pm0^{D*}$	33–33	$33\pm0^{B*}$	27.75–40.62	31.81 ± 6.01^{CDE}	18.54–35.46	28.21 ± 8.71^{E}	25.48–42.83	34.76 ± 7.99^{EF}	32.60–59.05	45.93 ± 13.2^{BCDEFG}
21	*A. sphaerocephalon* L.	20–20	$20\pm0^{KL*}$	17–17	$17\pm0^{L*}$	54.65–58.45	55.93 ± 2.18^{AB}	54.19–68.19	60.66 ± 7.05^{ABC}	49.44–71.21	57.80 ± 11.7^{ABCD}	57.16–75.37	68.98 ± 10.2^{ABC}
22	*A. trifoliatum* Cirillo	28–28	$28\pm0^{F*}$	27–27	$27\pm0^{E*}$	34.92–76.19	57.85 ± 21.0^{AB}	43.36–45.30	44.07 ± 1.06^{ABCDE}	42.15–57.19	48.28 ± 7.89^{ABCDE}	30.83–43.61	37.94 ± 6.51^{DEFG}

Means that do not share a letter are significantly different.

Asterisks (*) indicate a significant difference between the seed's dorsal and ventral surfaces.

On-line Suppl. Tab. 4. continued

No	Studied taxa	Epidermal cell L/W ratio				Epidermal cell area (μm²)				Intercellular space length (μm)			
		Dorsal		Ventral		Dorsal		Ventral		Dorsal		Ventral	
		Min–Max	Mean±SD	Min–Max	Mean±SD	Min–Max	Mean±SD	Min–Max	Mean±SD	Min–Max	Mean±SD	Min–Max	Mean±SD
1	*A. ampeloprasum* L.	0.51–0.70	0.61±0.09^{BC*}	0.79–0.82	0.81±0.01^{ABCD*}	2292.36–2978.83	2574.16±359.34^{ABC}	2652.27–3459.98	3071.51±404.73^{A}	5.61–7.28	6.31±0.86^{BCD}	4.75–6.00	5.31±0.63^{ABCD}
2	*A. artemisietorum* Eig & Feinbrun	0.63–0.89	0.74±0.13^{ABC}	0.42–0.80	0.66±0.20^{BCD}	715.773–853.892	766.861±75.750^{HI*}	999.605–1339.14	1213.60±186.25^{BCDE*}	2.68–3.85	3.25±0.58^{DEFG}	2.01–3.20	2.76±0.64^{CDEF}
3	*A. aschersonianum* Barbey	0.76–1.10	0.90±0.14^{ABC}	0.79–1.60	1.09±0.35^{ABCD}	1364.09–2042.23	1748.84±281.83^{CDEF}	1042.20–1844.65	1426.81±404.46^{ABCDE}	0.46–3.06	2.08±1.15^{FG*}	0.23–0.93	0.44±0.33^{F*}
4	*A. barthianum* Asch. & Schweinf.	1.00–1.27	1.12±0.13^{ABC}	0.86–1.55	1.17±0.34^{ABC}	1146.03–1619.37	1327.97±254.94^{DEFGH}	1057.37–1679.20	1446.65±339.24^{ABCDE}	7.14–8.92	8.04±0.88^{ABC}	3.42–8.29	5.58±2.47^{ABC}
5	*A. blomfieldianum* Asch. & Schweinf.	0.94–1.22	1.05±0.15^{ABC}	0.79–1.41	1.01±0.35^{ABCD}	1501.31–2852.58	2164.09±676.00^{BCDE}	1765.26–2626.42	2067.81±484.32^{ABCD}	0.76–2.06	1.26±0.69^{FG*}	2.38–2.93	2.59±0.29^{CDEF*}
6	*A. cepa* L. (Giza 20)	1.07–2.42	1.50±0.51^{A}	1.21–1.60	1.46±0.14^{A}	893.825–1108.49	1007.69±77.295^{GHI*}	918.541–1652.13	1329.95±285.95^{BCDE*}	6.45–13.45	9.59±2.58^{AB}	5.94–11.3	8.44±2.30^{A}
7	*A. crameri* Asch. & Boiss.	0.74–1.29	1.00±0.27^{ABC}	1.21–1.29	1.24±0.04^{ABC}	1900.39–2924.80	2298.81±548.81^{ABCD}	978.15–5785.03	3821.03±2521.0^{AB}	2.00–4.95	3.38±1.48^{DEFG}	0.76–2.50	1.56±0.87^{EF}
8	*A. curtum* Boiss. & Gaill.	0.77–1.35	1.12±0.31^{ABC*}	0.60–0.75	0.65±0.08^{BCD*}	2321.16–2328.42	2325.30±3.7362^{ABC}	2113.55–2915.24	2500.94±401.52^{AB}	3.74–5.99	5.02±1.16^{CDEF}	2.04–4.28	2.90±1.20^{CDEF}
9	*A. desertorum* Forssk.	0.45–0.85	0.62±0.20^{BC}	0.35–0.96	0.60±0.32^{CD}	706.027–1122.86	887.037±213.75^{HI}	1001.32–1126.04	1070.02±63.315^{CDE}	2.17–2.56	2.41±0.21^{EFG}	1.75–2.78	2.16±0.54^{CDEF}
10	*A. erdelii* Zucc.	1.05–1.47	1.26±0.20^{ABC*}	0.76–0.88	0.82±0.06^{ABCD*}	930.399–1428.32	1186.32±249.25^{FGHI}	1174.90–1455.78	1348.11±151.46^{ABCDE}	1.91–5.53	3.65±1.81^{DEFG}	2.12–4.31	3.49±1.19^{CDEF}
11	*A. kurrat* Schweinf. ex K.Krause	0.92–1.10	1.00±0.09^{ABC}	0.77–1.24	1.01±0.23^{ABCD}	1709.61–2759.91	2177.03±534.0^{BCDE}	1996.53–2045.97	2013.37±28.2^{ABCD}	2.07–4.89	3.37±1.42^{DEFG}	3.21–7.24	5.09±2.03^{BCDE}
12	*A. mareoticum* Bornm. & Gauba	1.12–1.32	1.23±0.09^{ABC*}	0.49–0.67	0.60±0.09^{CD*}	1157.11–1567.37	1310.40±223.91^{DEFGH}	1025.55–1630.47	1267.88±319.88^{BCDE}	1.30–2.49	1.83±0.60^{FG}	0.94–1.79	1.43±0.44^{EF}
13	*A. neapolitanum* Cirillo	0.68–1.84	1.15±0.60^{ABC}	0.62–0.88	0.74±0.12^{BCD}	3062.23–4753.42	3930.24±846.48^{A}	1800.90–3298.44	2570.01±749.59^{AB}	0–0	0±0^{G}	0–0	0±0^{F}
14	*A. pallens* L.	0.44–0.60	0.53±0.08^{C*}	0.84–1.14	1.01±0.15^{ABCD*}	582.905–769.823	691.625±97.125^{I*}	856.108–903.21	880.095±23.563^{E*}	1.56–1.99	1.70±0.24^{FG}	1.31–2.39	1.83±0.54^{DEF}
15	*A. papillare* Boiss.	1.23–1.62	1.47±0.21^{AB}	0.71–1.22	0.99±0.26^{ABCD}	1375.89–1698.98	1535.98±161.56^{CDEFG}	1327.67–1857.98	1513.82±298.37^{ABCDE}	3.18–4.62	4.02±0.74^{DEF}	4.16–5.12	4.73±0.50^{BCDE}
16	*A. porrum* L.	0.99–1.35	1.16±0.17^{ABC}	0.97–1.20	1.11±0.12^{ABCD}	2621.64–3294.19	2930.50±339.61^{AB}	2315.49–2889.17	2585.38±288.33^{AB}	0.53–2.02	1.46±0.81^{FG}	1.42–2.13	1.84±0.37^{DEF}
17	*A. roseum* subsp. *tourneuxii* Boiss.	0.83–1.23	1.00±0.20^{ABC}	0.93–1.00	0.97±0.03^{ABCD}	1153.17–1343.74	1270.43±102.0^{EFGH*}	1505.43–1631.02	1557.03±65.7^{ABCDE*}	4.37–7.17	5.76±1.40^{CDE}	4.10–5.10	4.72±0.54^{BCDE}
18	*A. sativum* L.	0.51–1.44	0.89±0.33^{ABC*}	0.44–0.52	0.49±0.04^{D*}	801.207–1244.47	981.082±162.41^{GHI*}	1133.28–1437.73	1297.15±153.55^{ABCDE*}	8.97–12.2	10.2±1.19^{A*}	6.56–9.18	8.03±1.33^{AB*}
19	*A. sinaiticum* Boiss.	0.50–1.44	0.99±0.46^{ABC}	0.86–1.85	1.38±0.49^{AB}	1309.12–2045.07	1590.76±397.20^{CDEFG}	2013.68–2667.49	2291.02±337.98^{ABC}	1.28–1.63	1.41±0.18^{FG}	1.24–2.05	1.53±0.44^{EF}
20	*A. spathaceum* Steud. ex A.Rich.	0.65–1.59	0.98±0.42^{ABC}	0.31–1.09	0.69±0.38^{BCD}	701.156–978.432	876.344±152.40^{HI}	874.347–1298.99	1054.29±219.60^{DE}	0–0	0±0^{G}	0.67–1.17	0.92±0.24^{F}
21	*A. sphaerocephalon* L.	0.76–1.18	0.99±0.21^{ABC}	0.72–1.19	0.90±0.25^{ABCD}	1826.50–2959.16	2230.23±632.48^{BCDE}	2235.94–2662.92	2451.81±213.53^{AB}	1.16–3.25	2.10±1.05^{EFG*}	3.56–5.93	5.11±1.34^{BCDE*}
22	*A. trifoliatum* Cirillo	0.61–1.80	1.26±0.60^{ABC}	0.99–1.41	1.18±0.21^{ABC}	1769.19–2448.59	2103.50±339.82^{BCDE*}	1013.03–1530.22	1274.44±258.63^{BCDE*}	2.09–2.55	2.35±0.23^{EFG}	2.29–3.35	2.91±0.55^{CDEF}

Means that do not share a letter are significantly different.
Asterisks (*) indicate a significant difference between the seed's dorsal and ventral surfaces.

On-line Suppl. Tab. 4. continued

No	Studied taxa	Count of undulation elements/cell				Undulation element length (μm)				Undulation element width (μm)			
		Dorsal		Ventral		Dorsal		Ventral		Dorsal		Ventral	
		Min–Max	Mean±SD	Min–Max	Mean±SD	Min–Max	Mean±SD	Min–Max	Mean±SD	Min–Max	Mean±SD	Min–Max	Mean±SD
1	*A. ampeloprasum* L.	16–18	17±1DE	17–19	18±1^{DEFG}	8.51–9.40	8.90±0.45^{BC*}	11.3–12.7	12.1±0.73^{A*}	4.06–4.42	4.24±0.18^{EFGH*}	4.78–5.21	5.00±0.21^{CDEFG*}
2	*A. artemisietorum* Eig & Feinbrun	12–14	13±1^{FG}	12–12	12±0^{JKL}	1.29–2.91	2.24±0.84^{KLM}	2.91–5.03	4.31±1.21^{EFGH}	2.11–4.53	3.60±1.30^{FGH*}	5.07–6.71	6.09±0.88^{BCDE*}
3	*A. aschersonianum* Barbey	11–13	12±0^{GH}	10–12	11±0^{L}	4.20–8.59	6.67±1.82^{CDEFG}	4.28–8.31	5.81±1.74^{CDEFG}	6.34–7.75	6.96±0.61^{B}	6.62–8.26	7.62±0.73^{AB}
4	*A. barthianum* Asch. & Schweinf.	13–14	13±0^{EFG}	12–17	14±2^{GHIJKL}	7.84–9.27	8.58±0.71^{BCD}	5.18–8.69	7.42±1.94^{BCD}	3.56–3.83	3.66±0.14^{FGH}	3.54–7.87	5.38±2.23^{CDEF}
5	*A. blomfieldianum* Asch. & Schweinf.	24–27	26±1^{BC*}	14–16	15±1^{GHIJKL*}	3.02–3.06	3.04±0.01^{IJKL}	2.94–4.57	3.65±0.83^{GH}	4.72–6.07	5.21±0.74^{BCDEF}	4.72–8.67	6.46±2.01^{ABCD}
6	*A. cepa* L. (Giza 20)	0–0	0±0^{I}	0–0	0±0^{M}	0–0	0±0^{M}	0–0	0±0^{J}	0–0	0±0^{I}	0–0	0±0^{J}
7	*A. crameri* Asch. & Boiss.	8–9	8.±0^{H*}	10–12	11±1^{KL*}	12.7–14.35	13.4±0.82^{A*}	4.62–6.45	5.59±0.91^{CDEFG*}	10.5–11.1	10.8±0.34^{A*}	3.82–5.30	4.56±0.74^{CDEFG*}
8	*A. curtum* Boiss. & Gaill.	13–14	13±0^{EFG*}	16–17	16±0^{FGHI*}	7.63–8.10	7.84±0.24^{BCDE}	6.84–9.63	8.59±1.52^{BC}	4.22–5.75	5.03±0.77^{CDEF}	5.78–6.89	6.43±0.58^{ABCD}
9	*A. desertorum* Forssk.	0–0	0±0^{I}	0–0	0±0^{M}	0–0	0±0^{M}	0–0	0±0^{IJ}	0–0	0±0^{I}	0–0	0±0^{IJ}
10	*A. erdelii* Zucc.	18–21	19±1^{D}	16–18	16±1^{FGHI}	3.48–4.74	4.05±0.63^{HIJKL}	2.95–3.43	3.19±0.23^{GH}	2.63–3.72	3.05±0.58^{GH*}	4.04–4.76	4.32±0.38^{DEFGH*}
11	*A. kurrat* Schweinf. ex K. Krause	16–20	18±2.30^{D}	15–17	16±1^{FGHIJ}	5.28–5.76	5.48±0.25^{EFGHI*}	6.93–7.67	7.28±0.37^{BCDE*}	4.73–4.84	4.79±0.05^{CDEFG}	4.52–5.26	4.96±0.39^{CDEFG}
12	*A. mareoticum* Bornm. & Gauba	13–14	13±0^{EFG}	13–13	13±0^{HIJKL}	6.33–7.85	7.27±0.82^{BCDEF}	5.66–8.75	6.80±1.69^{CDEF}	5.16–6.00	5.69±0.45^{BCDE}	4.07–6.00	5.07±0.96^{CDEFG}
13	*A. neapolitanum* Cirillo	27–33	30±3^{AB}	23–29	26±3^{ABC}	3.82–4.14	4.01±0.16^{HIJKL}	3.54–4.30	3.98±0.39^{FGH}	5.21–6.79	5.98±0.79^{BCDE*}	4.74–4.81	4.77±0.03^{CDEFG*}
14	*A. pallens* L.	32–33	32±0^{A*}	23–29	27±3^{AB*}	1.91–2.67	2.32±0.38^{JKLM}	2.01–2.80	2.41±0.39^{HIJ}	2.43–3.03	2.68±0.30^{H}	2.79–3.30	3.01±0.26^{GH}
15	*A. papillare* Boiss.	23–25	24±1^{C}	20–26	22±3^{BCD}	3.92–5.99	4.81±1.06^{FGHIJK}	4.05–5.10	4.64±0.53^{DEFGH}	2.82–4.58	3.54±0.92^{FGH}	3.42–4.35	3.97±0.48^{EFGH}
16	*A. porrum* L.	14–16	15±1^{DEFG*}	17–18	17±0^{EFGH*}	6.89–11.8	9.74±2.56^{B}	6.83–9.33	8.07±1.24^{BC}	6.68–7.69	7.02±0.57^{B}	5.38–6.82	6.15±0.72^{ABCDE}
17	*A. roseum* subsp. *tourneuxii* Boiss.	17–21	18±2.08^{D*}	22–22	22±0^{CDE*}	4.30–4.61	4.44±0.16^{GHIJKL}	3.09–4.73	4.13±0.90^{FGH}	2.42–4.19	3.46±0.92^{FGH}	2.69–4.19	3.37±0.76^{FGH}
18	*A. sativum* L.	0–0	0±0^{I}	0–0	0±0^{M}	0–0	0±0^{M}	0–0	0±0^{J}	0–0	0±0^{I}	0–0	0±0^{J}
19	*A. sinaiticum* Boiss.	13–15	13±1^{EFG}	11–13	12±1^{IJKL}	5.10–7.55	6.10±1.28^{DEFGH}	6.44–7.95	7.40±0.83^{BCDE}	5.29–7.59	6.19±1.22^{BCD*}	8.03–9.09	8.47±0.55^{A*}
20	*A. spathaceum* Steud. ex A.Rich.	17–23	19±3^{D}	20–21	20±0^{DEF}	1.40–2.07	1.83±0.37^{LM*}	2.88–3.24	3.12±0.20^{GH*}	3.50–4.99	4.42±0.80^{DEFGH}	4.43–5.25	4.97±0.46^{CDEFG}
21	*A. sphaerocephalon* L.	15–18	16±1^{DEF}	14–17	15±1F^{GHIJK}	8.52–10.4	9.74±1.06^{B}	8.10–12.2	10.3±2.07^{AB}	6.14–7.42	6.64±0.68^{BC}	6.25–6.97	6.71±0.40^{ABC}
22	*A. trifoliatum* Cirillo	26–27	26±0^{BC}	26–32	29±3^{A}	4.46–5.45	4.99±0.49^{FGHIJ*}	2.74–3.10	2.92±0.18^{GHI*}	3.44–4.16	3.73±0.37^{FGH*}	1.99–2.16	2.09±0.09^{HI*}

Means that do not share a letter are significantly different.
Asterisks (*) indicate a significant difference between the seed's dorsal and ventral surfaces.

On-line Suppl. Tab. 4. continued

No	Studied taxa	Undulation element L/W ratio				Distance between two undulation elements (μm)			
		Dorsal		Ventral		Dorsal		Ventral	
		Min–Max	Mean±SD	Min–Max	Mean±SD	Min–Max	Mean±SD	Min–Max	Mean±SD
1	*A. ampeloprasum* L.	2.00–2.16	2.10±0.08^{A}	2.16–2.58	2.42±0.22^{A}	8.49–10.0	9.15±0.78^{AB}	8.46–10.0	9.11±0.79^{AB}
2	*A. artemisietorum* Eig & Feinbrun	0.60–0.64	0.61±0.01^{FG}	0.57–0.76	0.69±0.10^{E}	2.44–5.14	3.38±1.52^{EFGH*}	5.98–8.92	7.31±1.48^{ABCD*}
3	*A. aschersonianum* Barbey	0.66–1.29	0.95±0.26^{CDEF}	0.51–1.10	0.77±0.25^{DE}	4.98–8.24	6.71±1.41^{BCD}	6.22–8.76	7.25±1.15^{ABCD}
4	*A. barthianum* Asch. & Schweinf.	2.18–2.60	2.34±0.22^{A*}	1.10–1.77	1.44±0.33^{B*}	7.29–8.12	7.57±0.48^{BC}	5.38–7.40	6.06±1.15^{ABCDEF}
5	*A. blomfieldianum* Asch. & Schweinf.	0.49–0.64	0.59±0.08^{FG}	0.52–0.62	0.57±0.04^{E}	2.05–2.43	2.18±0.21^{FGHI}	1.97–9.54	5.56±3.80^{BCDEF}
6	*A. cepa* L. (Giza 20)	0–0	0±0^{H}	0–0	0±0^{F}	0–0	0±0^{I}	0–0	0±0^{G}
7	*A. crameri* Asch. & Boiss.	1.13–1.31	1.23±0.08^{BCD}	1.21–1.24	1.22±0.02^{BC}	10.2–11.6	10.7±0.77^{A}	5.34–17.58	11.0±6.16^{A}
8	*A. curtum* Boiss. & Gaill.	1.32–1.84	1.58±0.26^{B}	1.18–1.40	1.32±0.12^{B}	7.58–9.35	8.43±0.88^{AB}	7.84–8.47	8.09±0.33^{ABC}
9	*A. desertorum* Forssk.	0–0	0±0^{H}	0–0	0±0^{F}	0–0	0±0^{I}	0–0	0±0^{G}
10	*A. erdelii* Zucc.	1.27–1.40	1.33±0.06^{BCD*}	0.72–0.76	0.73±0.02^{E*}	3.50–6.54	4.97±1.52^{CDEFG}	2.64–5.84	3.88±1.71^{BCDEFG}
11	*A. kurrat* Schweinf. ex K.Krause	1.10–1.21	1.14±0.06^{BCDE*}	1.31–1.60	1.47±0.14^{B*}	3.22–6.76	4.89±1.78^{CDEFG}	5.99–8.66	7.07±1.41^{ABCD}
12	*A. mareoticum* Bornm. & Gauba	1.22–1.32	1.27±0.05^{BCD}	1.16–1.45	1.33±0.15^{B}	4.83–6.09	5.26±0.71^{CDEF}	5.70–9.86	7.77±2.08^{ABCD}
13	*A. neapolitanum* Cirillo	0.61–0.78	0.67±0.09^{EFG}	0.74–0.89	0.83±0.08^{CDE}	1.45–1.69	1.57±0.12^{HI}	1.03–2.01	1.46±0.50^{EFG}
14	*A. pallens* L.	0.78–0.91	0.86±0.06^{DEFG}	0.72–0.95	0.80±0.12^{CDE}	0.99–1.68	1.29±0.35^{HI}	1.44–2.06	1.77±0.31^{EFG}
15	*A. papillare* Boiss.	1.22–1.60	1.37±0.19^{BC}	1.15–1.18	1.17±0.01^{BCD}	3.00–4.61	4.04±0.90^{DEFGH}	2.72–4.17	3.50±0.73^{CDEFG}
16	*A. porrum* L.	1.02–1.57	1.37±0.30^{BC}	1.09–1.49	1.31±0.20^{B}	5.94–7.29	6.80±0.74^{BCD}	6.35–6.65	6.47±0.15^{ABCDE}
17	*A. roseum* subsp. *tourneuxii* Boiss.	1.05–1.77	1.35±0.37^{BCD}	1.12–1.41	1.22±0.15^{BC}	4.53–4.97	4.80±0.24^{CDEFG*}	3.16–4.07	3.63±0.45^{CDEFG*}
18	*A. sativum* L.	0–0	0±0^{H}	0–0	0±0^{F}	0–0	0±0^{I}	0–0	0±0^{G}
19	*A. sinaiticum* Boiss.	0.96–0.99	0.98±0.01^{CDEF*}	0.80–0.95	0.87±0.07^{CDE*}	4.59–9.79	6.49±2.86^{BCDE}	5.83–8.58	7.34±1.39^{ABCD}
20	*A. spathaceum* Steud. ex A.Rich.	0.40–0.43	0.41±0.01^{GH*}	0.61–0.65	0.62±0.01^{E*}	1.27–3.69	2.13±1.35^{GHI}	0.58–1.47	1.15±0.49^{FG}
21	*A. sphaerocephalon* L.	1.14–1.66	1.48±0.29^{B}	1.29–1.76	1.53±0.23^{B}	4.42–5.71	5.14±0.65^{CDEFG}	5.84–8.80	7.37±1.48^{ABCD}
22	*A. trifoliatum* Cirillo	1.23–1.47	1.34±0.12^{BCD}	1.37–1.43	1.39±0.02^{B}	1.12–1.99	1.53±0.44^{HI}	1.87–3.29	2.63±0.71^{DEFG}

Means that do not share a letter are significantly different.
Asterisks (*) indicate a significant difference between the seed's dorsal and ventral surfaces.

On-line Suppl. Tab. 5. Qualitative seed morphological characteristics of the studied *Allium* taxa.

No	Studied taxa	Seed shape	Epidermal cell shape	Epidermal cell arrangement	Curvature pattern of the anticlinal wall	Cell boundary	Relief of intercellular space (cell boundary)	Curvature of the periclinal wall (PW)	Fine relief of the PW	Diameter of verrucae on PW	Number of verruca on PW	P/A of granules on PW
1	*A. ampeloprasum* L.	Ovate	Mostly orbicular (some widely elliptic & elliptic)	Jigsaw-like	U-type undulation	Channeled	Narrow mesh of thin connecting threads	convex	Many small domes with dispersed verrucae	Medium	≤15	Absent
2	*A. artemisietorum* Eig & Feinbrun	Elliptic	Oblong	Jigsaw-like	S-type undulation	Channeled	Scabrate	Convex	Many small domes without verrucae	Absent	0	Densely granulated
3	*A. aschersonianum* Barbey	Widely ovate	Mostly orbicular (some widely elliptic & elliptic)	Jigsaw-like	Ω-type undulation	Channeled	Scabrate	Convex	Many small domes with dispersed verrucae	Small	>15	Sparsely granulated
4	*A. barthianum* Asch. & Schweinf.	Elliptic	Mostly widely elliptic & elliptic (some orbicular)	Jigsaw-like	U-type undulation	Channeled	Narrow mesh of thin connecting threads	Convex	One small central dome or many domes with dispersed verrucae	Small to large	>15	Absent
5	*A. blomfieldianum* Asch. & Schweinf.	Widely ovate	Variably polygonal (4-7)	Side-by-side	S-type undulation	Channeled	Narrow mesh of thin connecting threads	Convex	One small central dome with central and marginal verrucae	Small to medium	>15	Moderately granulated
6	*A. cepa* L. (Giza 20)	Widely elliptic	Variably polygonal (5-7)	Side-by-side	Straight to Irregularly curved	Channeled	Reticulate tissue with a broad mesh of connecting threads	convex	Dispersed verrucae without domes	Small to medium	>15	Absent
7	*A. crameri* Asch. & Boiss.	Widely elliptic & elliptic	Mostly widely elliptic & elliptic (some orbicular)	Jigsaw-like	Ω-type undulation	Channeled	Scabrate	Convex	Many small domes with dispersed verrucae	Medium	>15	Absent
8	*A. curtum* Boiss. & Gaill.	Elliptic	Mostly widely elliptic & elliptic (some orbicular)	Jigsaw-like	Ω-type undulation	Channeled	Narrow mesh of thin connecting threads	Convex	Many small domes with dispersed verrucae	Small to large	≤15	Absent
9	*A. desertorum* Forssk.	Widely elliptic	Variably polygonal (4-8)	Side-by-side	Straight to Irregularly curved	Channeled	Narrow mesh of thin connecting threads	Convex	Dispersed verrucae without domes	Small to large	>15	Sparsely granulated
10	*A. erdelii* Zucc.	Widely elliptic	Variably polygonal (5-7)	Side-by-side	U-type undulation	Channeled	Scabrate	Convex	One small central dome with central and marginal verrucae	Small to large	≤15	Sparsely granulated
11	*A. kurrat* Schweinf. ex K.Krause	Widely elliptic & elliptic	Mostly orbicular (some widely elliptic & elliptic)	Jigsaw-like	U-type undulation	Channeled	Narrow mesh of thin connecting threads	Convex	Many small domes with dispersed verrucae	Medium	>15	Absent
12	*A. mareoticum* Bornm. & Gauba	Widely elliptic & elliptic	Mostly widely elliptic & elliptic (some orbicular)	Jigsaw-like	U-type undulation	Channeled	Narrow mesh of thin connecting threads	Convex	One small central dome or many domes with dispersed verrucae	Small to medium	>15	Absent
13	*A. neapolitanum* Cirillo	Widely elliptic	Variably polygonal (4-6)	Side-by-side	S-type undulation	Raised	Striate	Convex	One large central dome with central and marginal verrucae	Medium	≤15	Sparsely granulated

On-line Suppl. Tab. 5. continued

No	Studied taxa	Seed shape	Epidermal cell shape	Epidermal cell arrangement	Curvature pattern of the anticlinal wall	Cell boundary	Relief of intercellular space (cell boundary)	Curvature of the periclinal wall (PW)	Fine relief of the PW	Diameter of verrucae on PW	Number of verruca on PW	P/A of granules on PW
14	*A. pallens* L.	Elliptic	Variably polygonal (4-6)	Side-by-side	S-type undulation	Channeled	Scabrate	Convex	Many small domes with dispersed verrucae	Small to medium	>15	Moderately granulated
15	*A. papillare* Boiss.	Elliptic	Variably polygonal (5-6)	Side-by-side	U-type undulation	Raised	Scabrate	Convex	One small central dome without verrucae	Absent	0	Densely granulated
16	*A. porrum* L.	Elliptic	Variably polygonal (5-7)	Jigsaw-like	U-type undulation	Channeled	Scabrate	Flat and centrally concave	Centrally wrinkled without verrucae	Absent	0	Absent
17	*A. roseum* subsp. *tourneuxii* Boiss.	Widely elliptic & elliptic	Variably polygonal (5-6)	Side-by-side	U-type undulation	Channeled	Scabrate	Convex	One large central dome with central and marginal verrucae	Small to medium	≤15	Moderately granulated
18	*A. sativum* L.	Widely elliptic	Variably polygonal (4-8)	Side-by-side	Straight to Irregularly curved	Channeled	Reticulate tissue with a broad mesh of connecting threads	convex	Dispersed verrucae without domes	Medium	>15	Sparsely granulated
19	*A. sinaiticum* Boiss.	Elliptic	Mostly widely elliptic & elliptic (some orbicular)	Jigsaw-like	U-type undulation	Channeled	Narrow mesh of thin connecting threads	convex	One large central dome with dispersed verrucae	Small	>15	Sparsely granulated
20	*A. spathaceum* Steud. ex A.Rich.	Widely ovate	Variably polygonal (4-7)	Side-by-side	S-type undulation	Channeled	Scabrate	convex	One small central striate dome with central and marginal verrucae	Small to medium	≤15	Absent
21	*A. sphaerocephalon* L.	Elliptic	Mostly widely elliptic & elliptic (some orbicular)	Jigsaw-like	U-type undulation	Channeled	Narrow mesh of thin connecting threads	convex	Many small domes with dispersed verrucae	Small to large	≤15	Absent
22	*A. trifoliatum* Cirillo	Ovate	Variably polygonal (4-8)	Side-by-side	S-type undulation	Channeled	Narrow mesh of thin connecting threads	convex	One small central dome with central and marginal verrucae	Small	>15	Sparsely granulated

On-line Suppl. Tab. 6. Principal component analysis (PCA) with eigenvalues and percentage variances for 22 *Allium* taxa based on the seed morphometric characteristics.

PC	Eigenvalue	% Variance
1	1.09E+06	87.901
2	149401	12.068
3	141.497	0.011429
4	116.706	0.0094266
5	38.8311	0.0031365
6	37.6095	0.0030378
7	19.998	0.0016153
8	11.4607	0.00092571
9	8.34677	0.00067419
10	4.17632	0.00033733
11	2.68005	0.00021647
12	1.48392	0.00011986
13	1.22689	9.91E-05
14	1.00915	8.15E-05
15	0.631364	5.10E-05
16	0.285874	2.31E-05
17	0.140951	1.14E-05
18	0.061212	4.94E-06
19	0.0280893	2.27E-06
20	0.0149838	1.21E-06
21	0.00304354	2.46E-07

On-line Suppl. Tab. 7. Character loadings of the principal component analysis (PCA) for the first two axes based on 26 quantitative seed morphological characteristics.

	Variable	PC 1	PC 2
	Seed length (mm)	0.34809	0.10312
	Seed width (mm)	0.2989	–0.062588
	Seed L/W ratio	0.016648	0.28528
	Seed area (mm^2)	0.35484	0.11554
Dorsal surface	Epidermal cell count/unit area	–0.83442	0.087439
	Epidermal cell length (μm)	0.85046	–0.25829
	Epidermal cell width (μm)	0.90521	–0.015698
	Epidermal cell L/W ratio	0.11564	–0.2586
	Epidermal cell area ($μm^2$)	0.94723	–0.32057
	Intercellular space length (μm)	–0.21571	0.30233
	Count of undulation elements/cell (if present)	0.21413	–0.46778
	Undulation element length (μm) (if present)	0.68102	0.31462
	Undulation element width (μm) (if present)	0.68945	0.19633
	Undulation element L/W ratio (if present)	0.39418	0.080172
	Distance between two undulation elements (μm) (if present)	0.54611	0.47814
Ventral surface	Epidermal cell count/unit area	–0.84737	0.052991
	Epidermal cell length (μm)	0.75599	0.40108
	Epidermal cell width (μm)	0.69995	0.18052
	Epidermal cell L/W ratio	0.16948	0.16332
	Epidermal cell area ($μm^2$)	0.92666	0.3759
	Intercellular space length (μm)	–0.21261	0.20898
	Count of undulation elements/cell (if present)	0.24594	–0.42002
	Undulation element length (μm) (if present)	0.59837	0.17359
	Undulation element width (μm) (if present)	0.41972	0.061124
	Undulation element L/W ratio (if present)	0.536	0.061392
	Distance between two undulation elements (μm) (if present)	0.5268	0.44778