

7.4.4. *Amaranthus graecizans* L., Sp. Pl., ed. 1, 990 (1753); Boulos, Fl. Egypt 1:133 (1999).

subsp. *graecizans*

subsp. *thellungianus* (Nevski) Gusev, Bot. Zhurn. 57: 462 (1972).

Syns. *Amaranthus thellungianus* Nevski, Acta Inst. Bot. Acad. Sci.

USSR, ser. 1, 4: 311 (1937);

*Amaranthus polygonoides*, sensu Täckh., Stud. Fl. Egypt, ed. 2, 13 (1974).

subsp. *silvestris* (Vill.) Brenan, Watsonia 4: 237 (1961).

Syn. *Amaranthus silvestris* Vill., Cat. Pl. Jard. Strasbourg (1807).

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### Proximate Composition

The proximate composition and the amino acids of *Amaranthus graecizans*, *Amaranthus lividus* and *Amaranthus viridis*, growing in the Nile Delta, Egypt are shown in Tables 38 and 39. *Amaranthus graecizans* contains a relatively high percentage of acid insoluble ash and total carbohydrates (Abu Ziada *et al.*, 2008). The proximate composition, amino acid pattern and mineral content of *Amaranthus graecizans*, growing in Mozambique are shown in Tables 26 - 28 (Oliveira and De Carvalho, 1975).

The foliage of 61 accessions of *Amaranthus* (including *Amaranthus graecizans*) comprising both the grain and vegetable types and referable to 10 species were evaluated for carotenoid, protein, nitrate, oxalate, and moisture contents (fresh wt.). Carotenoids varied from 90 to 200 mg/kg in vegetable types and from 60 to 200 mg/kg in the leaves of grain types. Variation for leaf protein was 14-30, 15-43; nitrate 1.8-8.8, 4.1-9.2; oxalate 5.1-19.2, 3-16.5; and moisture 780-860, 750-840 g/kg in vegetable and grain types, respectively. Leaf protein of some high-carotenoid lines revealed a well-balanced amino acid composition with high lysine (40-56 g/kg). Variation of all five parameters (carotenoids, protein, nitrate, oxalate, and moisture) with respect to the leaf position in vegetable types (4- and 8-week-old plants) and with respect to age (1- to 4-months old plants) in grain type was also studied

Table 38. Mean value of chemical constituents in different organs of some *Amaranthus* species \*

Constants	<i>Amaranthus graecizans</i>						<i>Amaranthus lividus</i>						<i>Amaranthus viridis</i>					
	Leaves	Stems	Roots	Mean	Leaves	Stems	Roots	Mean	Leaves	Stems	Roots	Mean	Leaves	Stems	Roots	Mean		
Moisture content (%)	6.37	10.18	7.36	7.97	8.7	8.11	11.73	9.51	9.29	8.1	8.7	8.7	8.7	8.1	8.7	8.7		
Ash content (%)	24.2	17.3	9.9	17.13	21.5	27.5	13	20.67	15.5	14.5	15.5	15.17	15.5	14.5	15.5	15.17		
Water-soluble ash (%)	5	15.75	9.05	9.93	9.5	15.5	8.5	11.17	0.5	7	10	5.83	0.5	7	10	5.83		
Acid-insoluble ash (%)	7.15	0.015	0.05	2.45	2	0.5	0.5	1	3.5	1.5	0.5	1.83	3.5	1.5	0.5	1.83		
Total nitrogen (mg/100 g dry wt.)	359.7	136.3	128.5	208.2	239	144.1	115.9	242	438.4	217.4	158.5	271.14	438.4	217.4	158.5	271.14		
Total protein (mg/100 g dry wt.)	232	173.3	204.6	203.3	246.6	208.3	189.6	214.8	277.6	158.3	254	144.8	277.6	158.3	254	144.8		
Total lipid (%)	11.69	17.54	10.05	13.09	14.26	13.92	13	13.73	11.76	18.81	1.09	10.55	11.76	18.81	1.09	10.55		
Carbohydrates (mg g <sup>-1</sup> dry wt.)																		
Total soluble sugar	43.95	62.64	71.2	59.25	18.56	36.96	70.64	42.05	20.16	14.96	12.16	15.76	20.16	14.96	12.16	15.76		
Glucose	0.9	1.93	0.18	1	0.31	0.89	0.97	0.72	0.2	0.26	0.18	0.21	0.2	0.26	0.18	0.21		
Sucrose	2.06	4.06	1.94	2.69	8.26	2.44	2.18	4.29	1.31	1.15	1.04	1.17	1.31	1.15	1.04	1.17		
Polysaccharides	139.2	121.3	128.2	29.56	135.7	142.4	114.8	131	148.1	136.2	143.7	142.65	148.1	136.2	143.7	142.65		
Total carbohydrates	186	190	211.6	196.5	162.8	182.7	188.5	178	163.8	158.6	157.9	160.09	163.8	158.6	157.9	160.09		

\* Abu-Ziada *et al.* (2008)

Table 39. Mean value of amino acid concentrations (ug mg<sup>-1</sup>) in some *Amaranthus* species\*

Amino acid	Species			Mean
	<i>Amaranthus graecizans</i>	<i>Amaranthus lividus</i>	<i>Amaranthus viridis</i>	
Aspartic acid	51.659	37.272	35.957	41.629
Threonine	17.422	11.512	7.391	12.108
Serine	21.529	19.142	3.738	18.136
Glutamic	104.254	50.562	50.562	68.459
Proline	124.179	73.733	69.339	89.084
Glycine	16.442	13.959	14.871	15.091
Alanine	21.445	14.257	15.898	17.200
Valine	26.079	9.246	14.325	16.550
Leucine	12.859	5.969	10.209	9.679
Isoleucine	25.391	15.779	21.318	20.829
Phenylalanine	4.162	3.617	1.209	2996
Tyrosine	15.373	9.728	10.641	11.914
Histidine	8.822	7.314	8.164	8.100
Lysine	18.869	10.285	16.025	15.060
Arginine	17.457	7.581	10.184	11.741
Cystine	0.012	0.000	0.000	0.004

\* Abu-Ziada *et al.* (2008)

(Prakash and Pal, 1991). The nutrient composition of *Amaranthus graecizans*, growing in Tanzania (Lyimo *et al.*, 2003), and Burkina Faso (Ibrahim *et al.*, 2011) as well as the characterization of proteins and amino acids of the plant growing in Spain (Juan *et al.*, 2007) have been reported. The KNO<sub>3</sub> of the plant exceeds 4.2 % (Gilbert *et al.*, 1946).

### Flavonoids and Other Constituents

The phytochemical screening of the plant growing in Qatar revealed the presence of alkaloids, flavonoids and saponins (Rizk *et al.*, 1986). Abdulla-Zade and Agamirova (1964) reported that the poisonous plants *Amaranthus blitum*, *Amaranthus graecizans*, and *Caesalpinia gilliesii* contained 0.63-0.73 of total alkaloids in the leaves and 0.40-0.45 in the stems. Glycinebetaine and trigonelline were identified in *Amaranthus graecizans* (Table 35) (Blunden *et al.*, 1999).

The following flavonoids were identified from *Amaranthus graecizans*, growing in Egypt: quercetin 3-glucoside-7-rhamnoside, quercetin 3,4'-diglucoside, 3,4'-dihydroxy-flavone-7-glucoside, 3-hydroxyflavone 7,4'-diglucoside, daidzein 7-galactoside and afrormosin 7-glucoside (traces) (Kawashty *et al.*, 1999).