Calligonum polygonoides L. Shrubs Provide Species-Specific Facilitation for the Understory Plants in Coastal Ecosystem

Ahmed M. Abd-ElGawad[1,2*±], Younes M. Rashad[3], Ahmed M. Abdel-Azeem[4], Sami A. Al-Barati[5], Abdulaziz M. Assaeed[1] and Amr M. Mowafy[2±]

Supplementary Materials

Table S1. The plant species composition, families, life forms, chorotypes, and frequency (F) percentage of the recorded species associated with *C. polygonoides* shrubs.

No.	Plant species	Family	Life	Chorotype	F (%)
Perennials					
1	*Alhagi graecorum* Boiss.	Fabaceae	H	PAL	3.70
2	*Arthrocnemum macrostachyum* (Moric.) K.	Chenopodiaceae	Ch	ME+SA-SI	11.11
3	*Cynanchum acutum* L.	Ascliapedicaeae	H	ME+IR-TR	3.70
4	*Cynodon dactylon* (L.) Pers.	Poaceae	G	PAN	7.41
5	*Cyperus capitatus* Vand.	Cyperaceae	G	ME	3.70
6	*Echinops spinosus* L.	Asteraceae	H	ME+SA-SI	3.70
7	*Launaea mucronata* (Forssk.) Muschl.	Asteraceae	H	ME+SA-SI	70.37
8	*Pancratium maritimum* L.	Amaryllidaceae	G	ME	11.11
9	*Paspalidium geminatum* (Forssk.) Stapf.	Poaceae	He	PAL	3.70
10	*Phragmites australis* (Cav.) Trin ex Steud.	Poaceae	G, He	COSM	3.70
11	*Reicharadia tingitana* (L.) Roth	Asteraceae	H	ME+SA-SI	14.81
12	*Silene succulenta* Forssk.	Caryophyllaceae	H	ME	3.70
13	*Suaeda pruinosa* Lange	Chenopodiaceae	Ch	ME	3.70
14	*Zygophyllum aegyptium* Hosny	Zygophyllaceae	Ch	ME	11.11
15	*Zygophyllum album* L.	Zygophyllaceae	Ch	ME+SA-SI	7.41
Annuals					
16	*Aegilops bicornis* (Forssk.) Jaub & Spach	Poaceae	Th	ME+SA-SI	7.41
17	*Anchusa humilis* (Desf.) I M. Johnst.	Boraginaceae	Th	ME+SA-SI	3.70
18	*Bassia indica* (Wight) A. J. Scott	Chenopodiaceae	Th	S-Z+IR-TR	18.52
19	*Bassia muricata* (L.) Asch.	Chenopodiaceae	Th	SA-SI+IR-TR	3.70
20	*Brassica tournefortii* Gouan	Brassicaceae	Th	ME+IR-TR+SA-SI	18.52
21	*Bromus diandrus* Roth.	Poaceae	Th	ME	48.15
22	*Cakile maritima* Scop.	Brassicaceae	Th	ME+ER-SR	66.67
23	*Carduus pycnocephalus* L.	Asteraceae	Th	ME+IR-TR	25.93
24	*Carthamus tenuis* (Boiss. & Blanche) Bornm.	Asteraceae	Th	ME	14.81
25	*Chenopodium murale* L.	Chenopodiaceae	Th	COSM	11.11
26	*Cutandia maritima* (L.) Barbey	Poaceae	Th	ME+IR-TR+SA-SI	22.22
27	*Emex spinosa* (L.) Campd.	Polygonaceae	Th	ME+SA-SI	3.70
28	*Erodium laciniatum* (Cav.) Willd.	Geraniaceae	Th	ME	22.22
29	*Hordeum murinum* L.	Poaceae	Th	ME+IR-TR+ER-SR	14.81
30	*Ifloga spicata* (Forssk.) Sch. Bip.	Asteraceae	Th	ME+SA-SI	18.52
31	*Lolium perenne* L.	Poaceae	Th	ER-SR+ME+IR-TR	3.70
32	*Malva parviflora* L.	Malvaceae	Th	ME+IR-TR	14.81

33	*Mesembryanthemum crystallinum* L.	Aizoaceae	Th	ME+ER-SR	29.63
34	*Mesembryanthemum nodiflorum* L.	Aizoaceae	Th	ME+SA-SI+ER-SR	25.93
35	*Parapholis incurva* (L.) C. E. Hubb.	Poaceae	Th	ME+IR-TR+ ER-SR	3.70
36	*Plantago squarrosa* Murray	Plantaginaceae	Th	ME	3.70
37	*Rumex pictus* L.	Polygonaceae	Th	ME+SA-SI	77.78
38	*Salsola kali* L.	Chenopodiaceae	Th	COSM	18.52
39	*Senecio glaucus* L.	Asteraceae	Th	ER-SR+ME+IR-TR	62.96
40	*Urospermum picroides* (L.) F. W. Schmidt	Asteraceae	Th	ME+IR-TR	3.70

H: Hemicryptophytes, Ch: Chamaephytes, G: Geophytes, He: Helophytes, Th: Therophytes, PAL: Palaeotropical, ME: Mediterranean, SA-SI: Saharo-Sindian, IR-TR: Irano-Turanian, PAN: Pantropical, COSM: Cosmopolitan, ER-SR: Euro-Siberian.

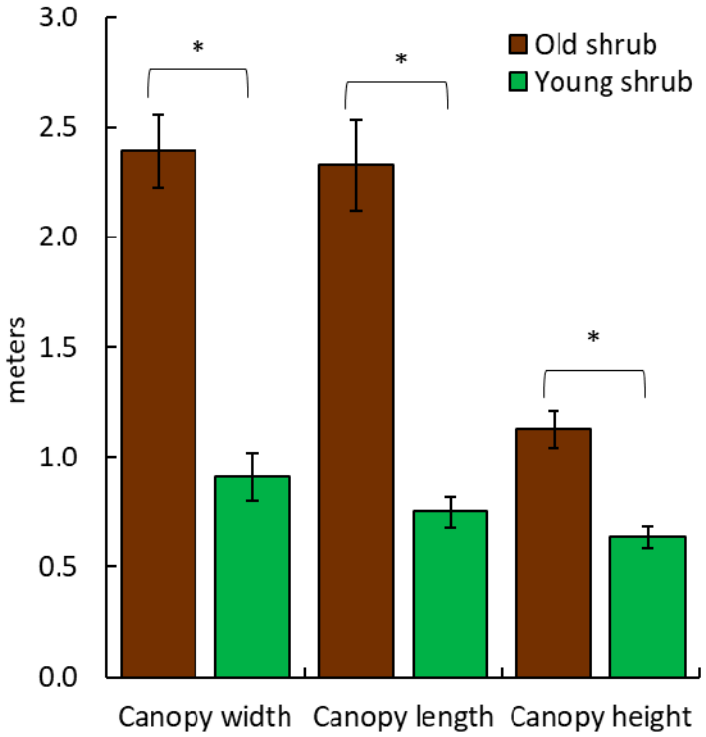

Figure S1. Measurments of *C. polygonoides* shrubs measurements within the studied locations in the study area. Values are average ± standard error ($n = 40$). * represents significant difference at $P < 0.05$ (two-tailed *t-test*).

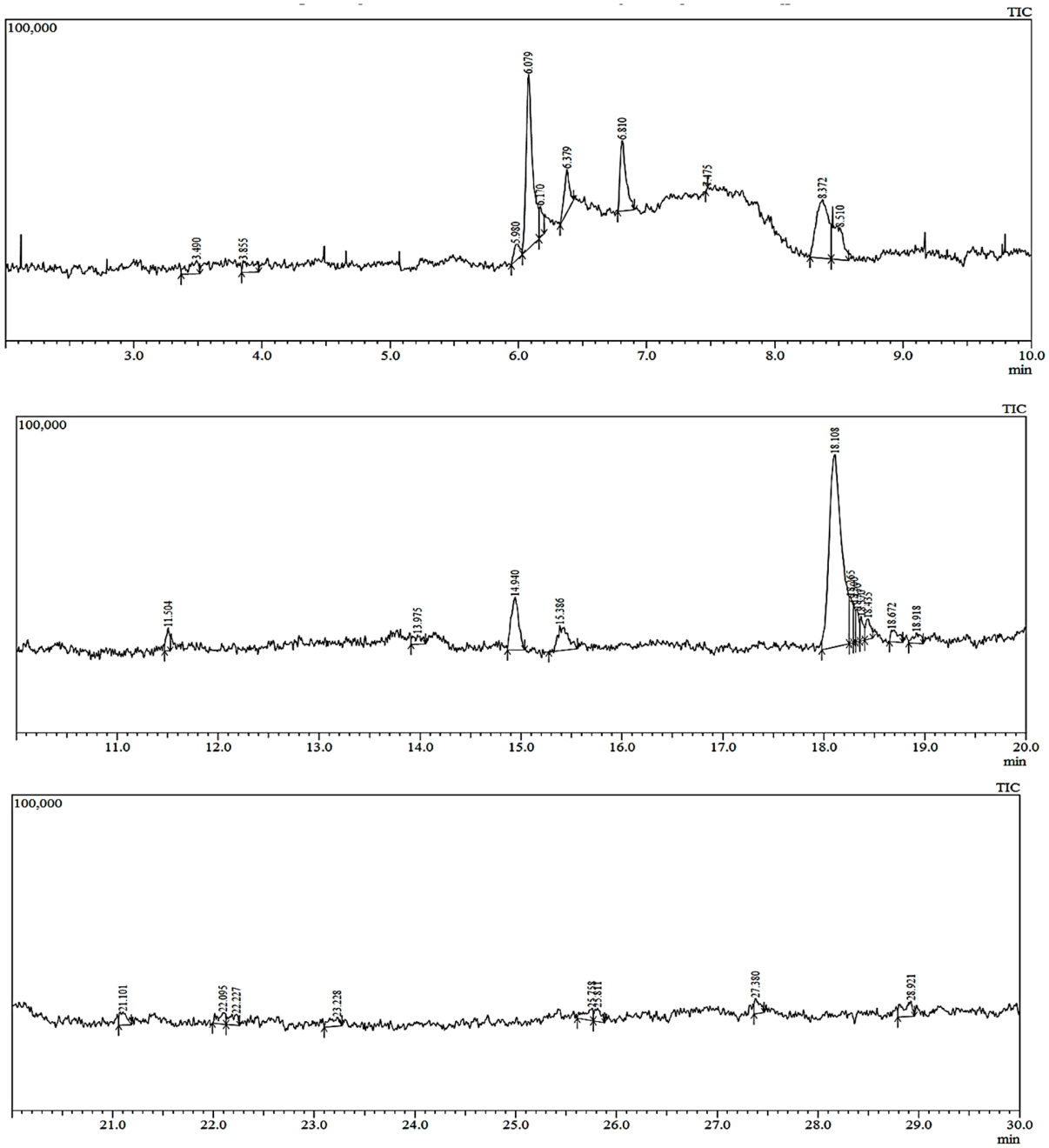

Figure S2. GC-MS chromatograms, in a sequence time, of the *Calligonum polygonoides* root extract. The peaks with a number showing the identified chemical compounds.