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Soil seed bank of three populations of *Capparis decidua* (Forssk.) edgew

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Key words: *Capparis decidua*, seed bank, rangelands, Saudi Arabia

Introduction *Capparis decidua* occurs in isolated populations in Saudi Arabia. Abdel-Mawgood et al., (2006) reported that a *C. decidua* population near Riyadh, Saudi Arabia apparently did not regenerate for several years. This observation raises the question about soil seed bank status of the species as soil seed bank plays an important role in the composition and conservation of plant communities (Luo and Wang, 2006). The aim of this study was to assess soil seed bank status of *C. decidua* and companion species in three *C. decidua* populations near Riyadh, Saudi Arabia and the possible influence of wind direction and distance from plant source on soil seed bank size and species richness.

Materials and methods Three populations of *C. decidua*, located in Rawdhat Khuraim RK (25°30'250" N 47°46'300" E), Hawayir Assos HS (25°11'450" N 48°37'500" E) and Khor Assos KS (26°59'750" N 45°33'353" E) were selected in this study as they are the only population known to exist near Riyadh. Soil in all locations were sandy loam. Population size of *C. decidua* are 183, 35 and 53 in Rawdhat Khuraim, Hawayir Assos and Khor Assos respectively. Rawdhat Khuraim habitat is in fair condition. However the other two locations are degrading.

Soil seed bank was assessed by collecting soil samples from around five randomly selected *C. decidua* shrubs (replicates) in each site. Two adjacent samples (20×20 cm) from the upper 5 cm of soil surface were taken at 1.5 and 3 m distances from canopy edge at all main cardinal directions. Because of the concern over the seed viability of *C. decidua*, one set of samples (one of the two adjacent sample units) was used for the assessment of *C. decidua* seeds by soil sieving through 1mm sieve. The other set was assessed for seeds by germination and seedling identification using germination trays (40×40cm and 5 cm deep) in growth chambers. Plant species were classified into functional groups (legumes, grasses, forbs, shrubs and shrublets) regardless of their life form. The experiment was analyzed as a factorial design (SAS, 1996).

Results and discussions Results of manual sieving of soil indicated that no significant differences occurred in soil seed bank size of *C. decidua* among the three populations (28.1, 33.8 and 24.4 seeds/m² in RK, HS and KS respectively). However, all collected seeds of *C. decidua* were damaged by insects beyond viability. This could partially explain the slow regeneration rate of the species in its natural habitats and warrants further investigation. Assessment of soil seed bank by means of germination revealed significant differences among all *C. decidua* populations in all functional groups (Table 1). Rawdhat Khuraim was the highest in seed bank size in all functional groups (except for shrubs) and species richness. Khor Assos was the lowest among the three populations and was not significantly different from Hawayir Assos except for forb seed bank size and species richness. Rawdhat Khuraim is known for its vegetation density and richness (Al-Yemeni et al., 2000) and this was reflected here in the present study.

No significant differences were detected in seed bank size or species richness in response to cardinal direction (data not shown). Distance from shrub edge had only significant effect ($P \leq 0.001$) on shrublet seed bank size (73.8 and 19.2 seeds/m² for 1.5 and 3 m away from *C. decidua* respectively). Over the different *C. decidua* populations, there were 25 species most of them were forbs (17 species). *Trigonella stellata* (annual legume), *Pulicaria crispa* (perennial shrublet) and *Lycium shawi* (shrub) were the most abundant species in soil seed bank.

Table 1 Soil seed bank of plant functional groups in three *C. decidua* populations (seed/m²) and species richness.

Population	Legumes	Grasses	Forbs	Shrublets	Shrubs	Richness
R. Khuraim	349.4	250.6	408.1	113.1	33.1	7.8
H. Assos	82.5	11.3 b	218.8	23.1	201.9	4.3
K. Assos	28.8	5.0 b	43.8	3.1	23.8	2.1
LSD _{0.05}	144.44	39.307	145.52	48.83	128.29	1.25

Conclusions Soil seed bank of *C. decidua* and hence its future conservation is likely to be governed by many factors of which insect herbivory plays a major role. Further investigation is needed to determine seed longevity.

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