Plant Archives Volume 20 No. 2, 2020 pp. 4467-4476 **e-ISSN:2581-6063 (online), ISSN:0972-5210**

THE CURRENT STATUS, ECOLOGICAL, BIOMETRICAL ASSESSMENT AND THREATS ON *ACACIA GERRARDII NEGEVENSIS* ZOHARY (FABACEAE) IN AL-NAJAF DESERT, IRAQ

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Abstract

Only a few controversial reports on the status of the Talh tree *Acacia gerrardii negevensis* Zohary had been reported in the Al-Najaf desert, in south western Iraq. These reports indicated that the Talh tree has been present in Iraq since pre-Islamic period. During February 2019 to March 2020, 26 field trips were conducted in order to sampling, collecting pertinent data and monitoring. The Talh tree species identification was made by the National Herbarium of Iraq. The Talh trees concentrations were distributed in five different sites. A total of 758 Talh trees were counted and brief description of each site was provided. The main important characters of the Talh tree were presented in the plant profile presented in the text. The ecology of the Talh tree and its relationship with other plants, mammals, birds, reptiles and insects was discussed. The major threats facing the Talh tree in Al-Najaf desert were assessed and recommendations to the Talh tree restoration program were provided. Furthermore, reporting of *Caryedon gonagra* from the Talh tree represents a new host record for this bruchid beetle.

Key words: *Acacia gerrardii negevensis*, Al-Najaf desert, Iraq, Talh tree, Fabaceae.

Introduction

The genus *Acacia* is a pantropical genus and contains approximately 1500 species which was described for the first time in 1754 (Dyer, 2014). Among vascular plants, *Acacia* is the largest (Mishra, 2013). The species included in genus *Vachellia* were considered members of genus *Acacia* until 2009 (David Clarke *et al.*, 2009; Kyalangalilwa *et al.,* 2013). Among of 160 species included in this genus, 32 of species have identified in Asia (Thiele *et al*., 2011). They can be discriminated from the rest of acacias by the stipules being spinescent (thorned) and the inflorescences being capitate (flowers of head-like) (Dyer, 2014).

The area of Shaeeb (Arabic = ephemeral stream) "Abu Talah" which is situated in the Al-Najaf desert, is most likely acquired its name from the Arabic name of the "Talh" tree. This name is an ancient site dating back to pre-Islamic period. The pre-Islamic historical records mentioned "Thu Toloh" area (the Arabic word "Toloh" is probably the pleural of Talh indicating existence of plenty of Talh trees) (Al-Iskandari ,1972), Mandaville (1984) and Ghazanfar and McDaniel (2015) believed that Talh trees are of ancient geological origin. They considered that the Talh tree is a Sudanian relict, which may migrated from the western parts of Arabia during the pluvial times in the late Pliocene (*c*.2.5 MYBP) through the flow cut channels. Also, Nature Iraq (2019) found that *Acacia gerrardii* and *Rhazya stricta*, which are tropical species, are present in relic areas in the Iraqi desert landscape dated back to a time of climatic optimum. The Talh tree *Acacia gerrardii negevensis* is distributed in Israel, Iraq, Jordan and the Arabian Peninsula (Nyunaï, 2011; Brink and Achigan-Dako, 2012). The natural desert landscape in Iraq supports plant communities of *A. gerrardii* (Mares, 2017). It is of socio-economic importance in Al-Najaf desert through providing animal fodder, as the leaves contain more than 17% crude protein (Brink and Achigan-Dako, 2012) and wood for energy demands of locals. Furthermore, from an environmental point of view, the Talh tree improves the fertility of soil by the Nitrogen fixation and probably enhancing plant cover and consequently the animal life (Fagg and Stewart, 1994;

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Aldawood, 2009).

Musil (1928) reported the Talh trees to the north of the Birkat al-Haytham in Iraq on the caravan traffic along with Darb Zubaydah, the millennium-old pilgrim track. According to Townsend and Guest (1974), only 30 *Acacia gerrardii* subspecies *negevensis* (synonym: *iraquensis*) trees were present in 1947 and only one tree was found later onin the 1960s-1970s. Thalen (1979) mentioned the presence of a small clump of *Acacia iraquensis* near Shabicha in the Southern Desert, stating that this species is only known from this location in Iraq. He concluded that there is no evidence of more widely distributed in earlier times. Mandaville (2011) stated that the Talh tree is extremely rare in Iraq. Nature Iraq (2017) could not observe this tree during the Key Biodiversity Areas (KBA) survey conducted at Al-Najaf desert perhaps due to their team did not find the exact locality, considering this species of conservation concern. The 5th national report of Iraq to Convention on Biological Diversity (Anon, 2014) reported five related species as aliens including *Acacia karroo, A. saligna*, *Vachellia cornigera, V. farnesiana* and *V. nilotica*. On the other hand, the 6th National Report of Iraq to Convention on Biological Diversity (CBD) (Anon, 2018) provided a list of 99 globally endemic threatened plants recorded in Iraq, but surprisingly, the Talh tree is not indexed in this list.

In view of lacking a systemic scientific study on the status and ecology of Talh tree in Iraq, as well as to provide biometrical data for this threatened tree, this study was conducted to fill the gap in our knowledge of the Iraqi population of this tree.

Materials and Methods

The study was carried out in Al-Najaf desert which falls within the Arabian Desert and East Sahero-Arabian Xerik Shrubland ecoregion during the period from February 2019 up to March 2020. A total of 26 field trips were conducted to the entire of study area; the aim of the field trips was to collect specimens, pertinent data, monitoring and photographic documentation. Different dried parts of Talh tree museum specimens were submitted to the Iraqi National Herbarium, Directorate of Seed Testing and Certification, Ministry of Agriculture, Abu Ghraib, Baghdad, Iraq for identification. All Talh trees were counted by line transect method mentioned by Bonyad and Mirzaei (2015). The tree diameter obtained by divide the circumference of the tree by π. The height of tree measured with laser finder equipped with many functions include height measurement. Other parts of tree were measured by digital caliper. All collected seeds were examined by a stereoscope to investigate the insect eggs and/or larvae.

Results and Discussion

The status of Talh tree in Iraq remains obscure and rather not fully covered by available literature, although they were scarce. The assessment of the subject ranges from general high potential estimation (Mares, 2017), to presence of small number (Townsend and Guest, 1974; Thalen, 1979) to very rare (Mandaville, 2011; Suleiman, 2017), to indication of absence (Nature Iraq, 2017), and to ignorance of mention (Anon, 2018). According to present tree counting, the total number of Talh trees of different growth stages in Al-Najaf desert was 758 trees, distributed over five sites (map 1). According to the authors' field records, the Talh trees are not found at any place in Iraq outside the Al-Najaf desert that situated within the administrative boundaries of Al-Najaf Governorate. This result is in disagreement with all previous counts or assessments provided by Townsend and Guest (1974), Thalen (1979), Mares (2017), Suleiman (2017), Suleiman *et al.,* (2017a, b), Nature Iraq (2017) and Anon (2018). The mentioned authors underestimated the number of trees in their assessment of the Talh tree situation in Iraq. The present results are in disagreement also with Ghazanfar and McDaniel (2015) and Llewellyn-Smith (2020) who mentioned presence of *Acacia pachyceras* only in the ecoregion Red Sea Nubo-Sindian tropical desert and semi-desert which is difficult to distinguish as a separate region in Al-Najaf desert. Our results confirmed presence of all the trees within the Arabian Desert and east Saharo-Arabian xeric shrublands ecoregion outside of the Red Sea Nubo-Sindian tropical desert and semi-desert ecoregion which is represented by rather a small pocket in the north western corner of Al-Najaf desert. The present distribution data of the Talh tree is in disagreement also with Suleiman (2017) who mentioned that it is found only in Wadi Al-Mahari.

The taxonomic position of *Acacia* species proved to be difficult as they are with remarkable phenotypic plasticity and similarity (Suleiman, 2017) especially in Middle East and Arabian Peninsula environments where the closely related species distribution often overlapped. Ghazanfar and McDaniel (2015), Suleiman *et al.,* (2017a) and Danin (2020) synonymized *Acacia gerrardii* with *A. pachyceras*, while Suleiman *et al.,* (2017a) concluded that *A. gerrardii* and *A. pachyceras* are distinct species. The present data are more related to Suleiman *et al.,* (2017b) as for that the Israeli trees with pods look like a horn and not coiled while Iraqi trees are with straight, crescent and coiled fruit shapes. Since the Talh tree

population of this area is not connected with their counterparts in adjacent countries, this situation may lead to a sort of geographical isolation for thousands of years which may be reflected at the morphological and/or genetic levels. In this work, the authors prefer to use *Acacia gerrardii negevensis* in accordance with the identification provided by the NH of Iraq-Abu Ghraib, Baghdad and planning to examine this subject through molecular methods in another separate study.

The Talh trees were recognized in 5 different sites within the boundaries of Al-Najaf governorate as follows:

Site1 Birkat Al-Talhat: A flat ground gathering mud sediments coming from the neighboring heights with several unpaved motorways pass through it, Its elevation is 310m asl.

Site 2 mid part of Abu Talah stream: It represents the eastern branch of mid part of Abu Talah stream. Its elevation is 126m asl. The stream is rocky with rocks of different sizes accumulated at both sides while there are mud and sand sediments at its base.

Site 3 first part of Weier stream: This site represents the west side of Weier stream begins from small branches considered as its tributaries and end at the security trench. Its elevation is 137m asl. The stream is deep, very bumpy, difficult to reach, and with rocky edges.

Site 4 Abu Talah stream: The Talh trees are distributed at the end of Abu Talah ephemeral stream which is rather deep heading northeast towards Al-Najaf city. Its elevation 44m asl. The stream generally rocky, rocks of different sizes accumulate especially at the banks, the ground of the stream composed of large rocky plates alternate with muddy and sandy patches. This part of the stream is the last part that remains moist after rain.

Site 5 terminal part of Weier stream: It is a rocky ephemeral stream running parallel to Wadi Abu Talah. It is considered a point of water flow concentration during heavy rains due to its rocky nature. Table 1 represents the counted talh trees in each site.

According to the calculations of Walter (1963), the main channel of the wadi in an area with 25mm mean annual precipitation could receive water corresponding to a rainfall of 500mm. Also, in depressions, the sheet runoff accumulation enriches water revenues. This generally explains the existence of the total five Talh tree sites in wadis (sites 2-5) and a depression (site 1 Birkat Al-Talhat).

Map 1: Revealed the survey sites of Talh tree in Najaf desert.

Table 1: The numbers of counted talh tree in different sites.

Site	Talh tree No.	Start point	End point
1	275	30.575202 N, 43.563061 E	30.530033 N, 43.510909 E
2	204	31.320373 N, 44.15178 E	31.332201 N, 44.161417 E
3	221	31.3339 N, 44.1557 E	31.3601 N, 44.1015 E
4	52	31.392036 N, 44.175791 E	31. 400591, N 44.185986
5	6	31.405386N, 44.175727E	31.411396N, 44.182715E

Talh tree profile

Due to lack of sources and the possibility of Talh trees being subjected to genetic variation due to their isolation for a long time, a special profile of the trees was prepared based on the strict criteria.

Name: Talh tree *Acacia gerrardii negevensis* Zohary

Distribution: This taxon is distributed in Israel, Iraq, Jordan and the Arabian Peninsula (Nyunaï, 2011).

Plant type: Tree, in summer months the vegetative parts of the tree is at its best, while in winter, after the fall of flowers, it is almost barren, so that new shoots appear in the middle of March.

Height and canopy

Table 2 demonstrated the data on tree height, in meters, of the Talh trees presented as mean and range in all presence sites in Al-Najaf desert categorized into three groups in correlation to the number of flowering trees in each category.

According to the height categories results presented in table 2, the majority of the trees fall within 2-5m category (63.19%), followed by the <2 m category (25.6%) and then >5 category (11.21%). These figures indicate rather good rate of recruitment at the population level. On the other hand, Herlocker (1974) give 3-5m height range to *A. gerrardii* in Tanzania. This tree may be related to *A. g. gerrardii.* The overall categories mean height in the Iraqi population of the Talh trees is calculated to 3.42 m. This figure is lower than that provided by Hosny *et al.,* (2018) for the same subspecies in Taif area, Saudi Arabia. This reflects more severe droughts conditions and/or lager anthropogenic effect on older trees of larger heights.

The flowering trees in the Iraqi population of the Talh trees are counted to 122 representing 16.1% of the total number of trees. In relation of tree height to the flowering state, table 1 would show that the majority of the flowering trees fall within the category 2-5m with 12.01%, followed by <5m and >2 categories with 3.30% and 0.79% respectively. These figures suggest that the flowering process is at its best in the medium sized trees which are relatively young. This is an indication for a continuous regeneration inputs in the plant community in view of the harsh conditions in the local environment.

The analysis of canopy shape of 758 trees revealed that opened shape represents 87.34%, while the percentage of round and flat shape were 8.04% and 4.61% respectively. Nyunaï (2011) considered *Acacia gerrardii* with a wide genetic variation within the species. According to these results it could be concluded that Talh population in Al-Najaf desert is with a wide genetic plasticity within the subspecies *negevensis* level. Alatar *et al*., (2015) found that populations of *Acacia gerrardii* showed site specific variations in response to character variations of soil and grazing level.

Table 2: Tree numbers within height categories, mean and range of height and their relation to flowering in Talh tree.

Height (m)	No.	Mean (m)	Range (m)	%	No. of flowering tree	% of flowering trees
<2	194	1.19±0.319	0.3-2	25.6	6	0.08
2-5	479	3.59±1.222	2.2-4.8	63.19	91	12.01
>5	85	7.59±1.706	5.2-11	11.21	25	3.30

Table 3: The numbers of Talh tree with one stem vs. multi stem at different sites.

Site	Total No. trees	One main stem	%	Multi stem	%
1	275	84	30.55	191	69.45
2	204	38	18.63	166	81.37
3	221	6	2.71	215	97.29
4	52	3	5.77	49	94.23
5	6	1	16.67	5	83.33
Total	758	132	17.41	626	82.59

Trunk and bark: Out of 758 Talh trees, 132 (17.41%) were with one main stem, while 626 (82.59%) with multi stems. The diameter ranged from 20 cm to about 65 cm. Generally, the texture of bark is rough and of bronze color in healthy trees (pl.2 A), while in injured or damaged trees the bark gets the very rough texture (pl. 2B) and become of dark grey color with secretion of very dense gum (pl.2C). The terminal branches are more brownish and often puberulent. The Talh tree is exposed continuously to dying drying phenomenon in drought period and the length of the dead parts of the plant is proportional to drought time, and when the rains come back a new rapid twigs appear. Table 3 shows that the trees in all sites were severely affected by water shortage represented by the dying drying phenomenon which was originally proposed by Negash (2010). On this basis, table 3 indicates that site 1 (Birkat Al-Talhat) was the most receiving water site among the other sites while the site 3 is the least receiving water. This conclusion is supported by the nature of topography of the site 1 and the field observations that the site represents a concentration point of water flows in the area besides the sedimentary type of soil which held water for a period enough to permit the trees to benefit from this amount of water. Another important factor in multi stem issue is the cut down of Talh trees mainly for fuel needs of the locals. In some cases, a diesel portable saw was apparently used for this purpose. This usage in addition to be a very dangerous threat for the trees, it increases at the same time the multi stem counting in the area since the main stem was often targeted to cut.

Table 4 summarized the main character values of Talh trees at their five presence- sites in Al-Najaf desert. It would show that the mean values of characters fit well with known data of the subspecies *A. g. negevensis* (Dhakad, 2019 personal communication).

Gum: Talh tree is a copious producer of a glossy clear to light brown, water soluble and light amber tears of Samgh gum Arabic. It is often noted on the damaged part of trunk, pods and branches.

Table 4: Main character values presented as mean±SD of Talh trees at their presence five sites in Al-Najaf desert, southern desert of Iraq.

Character	Site1 mean ± SD (range)	Site2 mean ± SD (range)	Site3 mean ± SD (range)	Site4 mean ± SD (range)	Site5 mean ± SD (range)	Overall mean ± SD (range)
Spine (mm)	35.37±11.715 (12.8-61.35)	35.24±9.88 (4.8-61.36)	34.35±9.201 (4.5-61.35)	36.63±10.85 (2.6-56.56)	35.42±9.84 (3.14-58.21)	32.9 ±11.369 (2.6-61.36)
Leaflet pairs	12.028 ± 3.065 (7-21)	14.46 ± 3.455 (7-21)	10.578 ± 2.184 (8-22)	12.41 ± 4.114 (9-20)	14.5 ± 4.833 (7-21)	12.66 ± 3.66 (7-22)
Petiole (mm)	5.6 ± 3.111 (2.55-18.19)	6.5 ± 3.356 (3.55-18.3)	5.6 ± 3.305 (3-18)	3.4 ± 3.164 (2.55-5.5)	4.6 ± 3.284 (3.2-5)	5.48 ±2.246 (2.55-18.3)
Rachislength	18.64±6.374 (7.63-34.12)	16.96± 8.881 (7.9-38.22)	18.3±7.767 (6.9-38.1)	12.6±8.262 (9.6-15.08)	16.23±8.149 (6.34-36.04)	17.39 ±7.11 (6.34-38.22)
Inflorescence diameter (mm)	9.24±1.758 (5.77-13.6)	9.1±1.501 (7.6-13.75)	8.55±1.439 (6.7-13.67)	8.5±1.488 (6.91-10)	8.82±1.645 (7.2-12.3)	8.84 ±1.501 (5.77-13.75)
Peduncle (mm)	17.12±6.327 (7.6-25)	15.8±5.591 (7.9-25)	16.8±5.505 (6.9-23)	17.01±5.93 (2.4-11.8)	16.9±4.801 (7.1-18.4)	16.72±6.409 (2.4-25)
Pod length (mm)	102.52±18.006 (60.92-150.75)	100.34±18.156 (68.92-150.3)	99.8±17.381 (60-143.1)	62.7±8.765 (76-110.82)	86.75±6.09 (68-96.6)	90.42 (60-150.75)
Pod width (0.995)	5.6±1.109 (5.31-21.1)	5.85±1.006 (5.64-22.7)	4.8±2.765 (4.7-19.3)	6.91±1.045 (6.91-10)	5.92±2.901 (5.2-21.6)	5.86±0.962 (4.7-22.7)
No. Seeds/pod	9±2.608 (5-12)	8.8±1.88 (5-13)	8±3.152 (6-11)	9.8± 1.89 (5-16)	8.5±2.76 (6-13)	8.88 ± 2.286 (5-16)
Seed length (mm)	7.36±0.978 (6.1-8.3)	8.1± 0.923 (5.2-8.7)	7.7±1.09 (6.3-0.9)	8.3±1.981 (7.1-8.8)	6.8±0.760 (5.4-8.5)	7.65 ±0.867 (5.2-8.8)
Seed width (mm)	5.76±0.760 (4.3-6.8)	4.3±0.911 (3.1-5.8)	5.1±2.732 (4.1-5.8)	4.9±0.867 (3.7-5.6)	6.5±1.09 (4.3-6.7)	5.31±0.516 (3.1-6.8)

Leaves: Bipinnate, finely puberulent, leaflet pair number 12.66±3.66 (7-22) sometimes unsymmetrical with difference of 1 or 2 leaflets between the two sides of the leaf, leaflet mean length 6.982 (4.9-9)mm, petiole mean length 5.14 (2.55-18.19)mm, rachis mean length 17mm (6.90-39.12). The leaflet mean length presented in table 4 is rather larger than that provided by Elkhalifa and Aref (2004) for *A. g. iraquensis* (= *A. g. negevensis*) which was calculated to 5.375mm. This may be related to that his number retrieved from seedlings, or explained by Alatar *et al*., (2015) suggestion that plant characters vary with the site variation. However, Elkhalifa and Aref (2004) did not consider the leaflet mean length as an important identification character of *Acacia* seedlings (pl. 1A).

Spines: Straight, whitish to creamy, finely puberulent, in pairs diverged from one point, the distal end is faint brown becomes darker with increasing of length, seedlings without spines till about a week when spines begin to appear, mean length and range 32.9 ± 11.369 (2.6-61.36)mm table 4, sometimes reduced into a pair of spinelets with length of 2-4 mm resemble horns. The point of divergence of spines and spinelets is with a small, dark and circular pit (pl.1B).

Flowers: Inflorescence are whitish creamy to yellow in color with a large number of florets, in single or clustered globular heads, inflorescence mean diameter and range of 8.84 (5.77-13.75)mm, peduncle mean length and range 16.729 (2.4-25)mm, some climatic variabilities can make abnormalities to flower's shape (pl.1C).

Reproduction: The reproduction season begins in Al-Najaf desert at mid of April and lasts up to mid of December (summer, autumn and winter). This means that the plant is in bloom during 8 months of the year. In Africa, flowering takes place just before or at the start of the rains (Nyunaï, 2011). Almost, the same flowering pattern occurs in Iraqi tree population in Al-Najaf desert. Another important factor is blooming twice a year from May to October as stated by Dharani (2007). This is most likely the case in the studied Talh trees in 2019.

Moreover, the damage caused by mammals, birds, and insects feed on the flower heads and flower buds lead to the mass flowerage character of this tree. Author's observations support this character in that good flowering activity was noticed at November 8, 2019 just near the end of blooming period in 2019-2020 seasons.

Pods: Out of 794 pods examined, the crescent shape observed in 651(81.99%), the spiral 96(12.09%), while the circular, straight and irregular shape were 41(5.16), 4(0.5%) and 2(0.25%) respectively. The pods were

compressed, constricted when seeds are fully grown, margin is linear or slightly sinuated, pod mean length is 90.42 (16-150.75) mm, the width is 5.86 (4.7-22.7), the mean number of seeds per pod is 8.9 (pl. 1D).

Seeds: Faint brown to light green when freshly collected, becomes dark brown when left on ground to after summer, generally with typical oval shape, sometimes almost circular or elongated oval, chunky, with very hard shell, mean length and range 7.65 (5.2-8.8)mm, width 5.31 (3.1-6.8)mm. The surface of the seed is generally smooth occasionally wrinkled. Careful monitoring of pods showed that most of them were ripe, fully grown and even dried by the beginning of March.

Roots: Generally deep, although it could not be possible to measure the length exactly. The perennial plants in the deserts of the Middle East are with a common feature of the development of an extensive root system (Abdel Rahman and Batanouny, 1959; Zohary, 1962; Kausch, 1968; Evenari *et al.*, 1971; Batanouny and Abdel Wahab, 1973). *Acacia* is known to be capable of extracting water from depths of at least 50m (de Vries *et al.*, 2000). In Al-Najaf desert this sort of root vertical length is necessary to benefit from the groundwater continuously fed by old faults characterized by fractures and fissures during rainy season (Al-Jiburi and Al-Basrawy, 2007; Al-Kafaji, 2016). The main root is with many different sizes of lateral roots. Nyunaï (2011) mentioned that the roots of *A. gerrardii* are moderately deep and with small lateral roots. It is not the case in our population of the tree. In the rainy storm of 24-25 February 2020, at the site #2 a torrent water flow removes the sandy surface and uncovers some Talh roots. The authors were able to trace a lateral root in an uncovered ephemeral stream with a diameter of 2cm extending more than 12m off the tree just about only 20cm deep in the middle of the ephemeral stream which consists of shallow sandy soil mixed with small rocks. Presence of such intensive lateral roots is considered here as an adaptive trait to the severe arid environment allows these roots that spread laterally to collect as much water and nutrients as possible during the short rainy season. This situation was indicated by Negash (2010) who studied Acacias in Ethiopia emphasizing that the lateral roots can go well beyond the extent of the crown. In our present case the lateral root goes far beyond the extent of the crown which is with a radius of 2.6m in the tree shown in plate 4 to record more than 12m. The authors were afraid to unearth the rest of the lateral root to avoid harming the tree.

Plate 1: Reveal different Talh tree parts, A: leaves, B: spines, C: flower, D: pods.

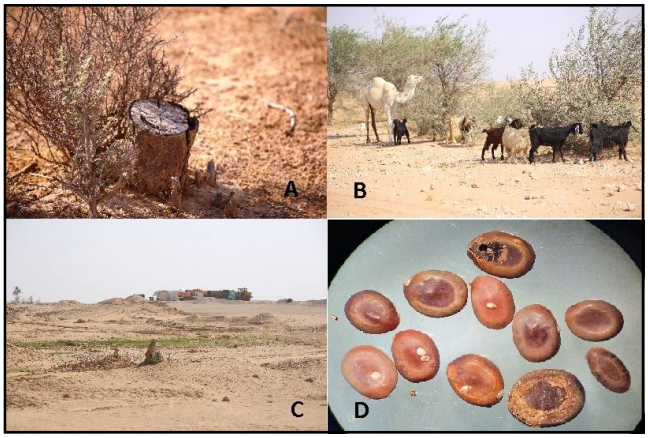

Plate 2: Threats on some Talh tree: A- Logging; B- Domestic grazing cattle; C- gravel quarries;D-infestation with bruchid beetle.

Threats:

Rohner and Ward (2001) found that human activities are the major threats for *A. raddiana* and *A. tortilis*. The present study shows that the main threat is logging for fuel. The percent of one stem tree is only 17.28%. This indicates the pressure on the tree through cutting stem and branches (pl. 2A). The human pressure on trees differs among the sites from 69.45% branched tree in site 1, 81.37% in site 2, 97.29% in site 3, 94.23% in site 4, and 83.33% in site 5. This shows that the human intervention is very severe. Effect of grazing by domestic animals (pl. 2B) should be scientifically assessed. The sand and gravel quarries represent local threat through probable tree shoveling (pl. 2 C). The 30 Talh trees mentioned to be present in 1947 in Wadi Al-Weier by Townsend and Guest (1974) might be vanished due to this type of work. The same wadi witnesses the beginning of invasion of *A. farnesiana* which is an invasive aggressive colonizer and a potential genetic pollution resource. Furthermore, the bruchid insects represent a serious danger for *Acacia* spp. (Rohner and Ward, 2001; Delobel *et al.*, 2003; Aldawood, 2009; Nyunaï, 2011). Results of counting 1082 Talh seeds collected during autumn for infestation with either egg deposition and/or

presence of larva emergence pore showed that 972 (89.8%) were infested (pl. 2D). However, reporting *Caryedon gongra* from *Acacia gerrardii negevensis* in this study represents a new host record. Drought conditions related to climate change as revealed by inconsistency and paucity of mean annual precipitation delayed the growth and incorporated in dying drying phenomenon.

Ecology and role in ecosystem: The Talh trees occur at 44-266 m altitude on loamy to silty soil in the Birkat Al-Talhat (site 1) and on calcareous clay and gravel soil, most often in the basin of seasonal streams in the four other sites. The tree is completely dependent on ground water availability and annual precipitation. Its interactions with the other living organisms are summarized herein.

Interaction with plants: Talh tree, itself, contributes to the fertility of soil through fixing Nitrogen and Phosphorus by root nodules, accumulating fallen organic matter and providing shade. Besides these services, Kebbede (2017) added the dropping of livestock seeking shelter from sun heat to enrich soil around *Acacia albida*. The dominant plants recorded were *Prosopis farcta, Lycium shawii, Calandula arevensis, Malva parviflora* and *Cynodon dactylon*.

Interaction with mammals: Talh tree is grazed mainly *Camelus dromedarius* grazing on high trees, *Capra aegagrus hircus*, and *Ovis aries* grazing on small and medium height trees where branches and leaves reaching the ground. Large numbers of these mammals are existed around the year wherever the stands of Talh trees are found. Rohner and Ward (2001) confirmed that ungulates were the principal dispersers of *Acacia* spp. seeds and their germination was facilitated through gut passage. In view of the absence of wild ungulates in the study area, it can be concluded that these domestic ungulates are the main Talh seed dispersers. However, authors' observations did not came along with Rohner and Ward (2001) conclusion that survival of seedlings was determined mainly by water availability. Many seedlings in sites# 1 and 5 were disappeared at an interval of two weeks because of intensive grazing by goats and sheep.

Wild mammals such as *Hystrix indica* and *Meriones libycus* were observed getting benefit from the spines which keep their natural predators away. *M. libycus* burrows were often seen at the base of the tree. *Pipestrellus kuhlii* was seen using the tree upper parts as roosting places through their feeding on insects. Hackett *et al.,* (2013) found that *Acacia* trees provide resource of foraging for desert bats. *Vulpes vulpes Arabica* was observed digging its den near the Talh tree as it provides preys as *M. libycus* and various kinds of insects and also shade during harsh summer. *Lepus capensis arabicus* was frequently seen, while *Canis lupus* was seen sometimes especially at site 2 which is called locally Gar Altheeb (= wolf residence). *Felis margarita* was occasionally sighted. The interspecific relationship between these mammals and Talh trees is still unknown.

Interaction with birds: occurrence of 24 bird species on Talh tree was documented. The benefits of birds from the association with Talh tree could be categorized into:

i- Nesting: *Streptopelia decaocto*, *Oena capensis*, *Passer domesticus* and *P. hispaniolensis*.

ii- Protection: *Oenanthe deserti, O. oenanthe, O. xanthopryma, Phoenicurus phoenicurus, Phylloscopus collybita, Prinia gracilis, Saxicola torquata* and *Sylvia crassirostris* were found protected deep beneath dense thickets of spines from predators.

iii- Roosting sites: *Bubo ascalaphus, Caprimulgus aegyptius, Clamydotis macqueeni, Crex crex,* and *Upupa epops,* were found roosting either on the ground shaded by tree or on branches.

iv- Looking for preys/food (foraging): *Coracias garrulus, Lanius excubitor,* L. *senator, Monticola solitarius,* and *Argya caudatus* were found foraging either on tree leaves and flowers or insects.

v- Prey storing: *Lanius meridionalis* was observed preying on *Adesmia cancellata*, *Blaps gigas*, *Mesalina brevirostris*, juveniles of *Uromastyx aegyptia* and *Galerida cristata*. The bird stitches the prey in the medium to large size spines to store them for consuming in another time in deep place beneath heavily entangled twigs.

Interaction with reptiles: *Spalerosophis diadema* frequently encountered at daytime getting shelter under Talh tree either to avoid direct sun heat or, to feed on rodents like *M. libycus* or birds visiting the tree. Yadollahvandmiandoab *et al.,* (2018) confirmed presence remains of *Meriones* spp. and various bird species in the alimentary tract of this snake in Iran. *Cerastes cerastes gasperettii* was seen only once, resting at the shade during daytime. Since it is a carnivorous snake (Al-Sadoon and Paray, 2016), it could be guessed that it gets an ambush to attack rodents which comprise its main preys. *Bunopus tuberculatus* was seen many times getting shelter at the cracks of the tree park. Such places provide both shelter

and small insects and other arthropods food items for this gecko. Individuals of the lizard *Mesalina brevirostris* were observed near their burrow entrances at the base of the tree stem.

Interaction with insects: The 10 insect species list recorded till now on Talh tree is considered tentative and rather preliminary. *Apis mellifera* low number was observed when the tree was in bloom. It is considered one of the pollinators of Talh tree (Stone *et al.,* 2003). Alqarni *et al.,* (2015) found that honey bees play important roles in the transfer of *Acacia gerrardii* pollen in Saudi Arabia due to their long-distance flying behavior.

Another two pollinator species are the butterflies *Belenois aurota* and *Colotis fausta*. Generally, they help in pollination and feed on foliage, nectar and pollen (Jeevith and Samydurai, 2015).

Other insects observed in present study include: a nymph of *Blepharopsis mendica* was collected. *Coccinella septempunctata* and *Eupeodes corollae* forage on a wide range of aphids (Majerus and Kearns, 1989; Hodek and Honek, 1996; Rojo *et al.,* 2004). Hence, a careful search for aphids on the Talh tree should be carried out. *Prionyx niveatus* was observed may be to the greater chance of getting a prey than any other reason. *Chrysomya albiceps* was seldom seen. All of the last five insect species are predators and this means, consequently, presence of rich insect fauna of Talh tree which deserves future specialized detailed study.

The termites *Psammotermes hypostoma* and *Microcerotermes* sp. were found infest both live and dead parts of the tree. Kaakeh (2005) mentioned two *Acacia* spp. affected by termite damage in UAE naming five species including *Psammotermes hypostoma* and *Microcerotermes diversus*. Finally, ants were only seldom seen on the Talh trees. At this stage of work, it could not be possible to get specific identification of these ants. However, Alqarni *et al.,* (2017) found four ant species foraging on flower heads and extrafloral nectarines of *A. g. negevensis* in KSA.

Conclusions

1- Most members of the Iraqi population of the Talh tree *Acacia gerrardii negevensis* are young as most of them fall within the category 2-5 m height representing 63.19% of the total number of the trees, indicating that regeneration input is rather high.

2- According to the pertinent literature and authors' own observations through field trips to different parts of Iraq during the last four decades, the Talh trees are found only in the Al-Najaf desert within the provincial boundaries of Al-Najaf Al-Ashraf Governorate.

3- The main threats facing the Iraqi Talh tree population are the anthropogenic activities especially, the logging of the large tree stems by the aid of portable diesel saw for fuel needs, the probable potential removing of trees through the sand and gravel quarry works and the grazing on Talh seedlings by sheep and goats. Another natural threat is the ground nut beetle *Caryedon gonagra* which was found infests seeds with a high rate, putting the eggs on the testa. After hatching, it bores the envelope and feeds on the seed contents during the larval stage make it impossible for the seed to germinate.

4- The Talh tree is not evaluated yet from the conservation status view. The limited number of the trees, the harsh environmental conditions and the threats they are facing, these factors represent negative impacts on the tree survival. A future detailed study is needed to assess its conservation status according to IUCN criteria in this regard.

Acknowledgments

The authors would like to thank Numan Organization for Protection of Desert Environment and Heritage as the support agency for the research as it has provided all facilities for its completion, with special warm thanks to the members Ahmed Abdel Hassan Mohamed, Agricultural Projects Supervisor and Hassan Al Mamouri, Biodiversity Archive Manager for their continuous assistance in the field workduring the course of the study. The authors wish also to express their profound thanks to Ashouk Kumar Dhakad, Scientist (Tree Breeding) and department. of Forestry and Natural Resources, Punjab Agricultural University, Ludhiana, Punjab, India for his kind help and advice regarding the specific identity of the Talh tree. Grateful thanks are also emended to the staff of the National Herbarium, Directorate of Seed Testing and Certification, Ministry of Agriculture, Abu Ghraib, Baghdad, Iraq especially to Mr. Ali Haloob Kadhim for identifying the museum specimens of the Talh tree. Specific identity of insects was determined by Prof. Dr. Razzaq S. Uqul, Iraq Natural History Museum, Baghdad to whom the authors are indebted. Finally, efforts of Mr. Saman R. Afrasiab, retired herpetology expert in identifying the reptilian species recorded in this study is highly appreciated.

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