

Determination the Environmental Impact of Random Collection and Overgrazing in Samawa Desert, Samawa-Almuthanna-Iraq

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ABSTRACT

The effects of the random collection and overgrazing on Samawa desert were studied. Terfezia and Artemisia were selected to conduct the study in addition to report overgrazing activity near the collection area. Questionnaire form was prepared then 28 forms were filled from different locations and cities at Almuthanna governorate. The results showed that the collection processes is completely random and there is no regulation to organize the processes. There are several industrial facilities and archeological sites that could be harmed due to the processes and wastes from the sites may be accumulated through the food chain. Results also showed there are different animals and plants in the area and food chains have been affected by the random collection and overgrazing. The collector's behavior also impacts the surrounding environment, they are mostly uneducated, unemployed, and not well-trained people. They used primitive tools for collection, generate plastic wastes in the area. On the other hand, overgrazing has an essential impact on the food chain, natural plants, and animals in Samawa desert. In conclusion random collection and overgrazing have many impacts on the natural life in Samawa desert. The local government has to regulate the processes to save the desert environment from the anthropological activity. Some actions are required urgently such as: limited the collected amounts per person, no collection near the histological and industrial areas, and use developed tools for collection to save the soil in the area. The study is very important in the field because it is trying to grab the attention of local government to put strict regulations organizing the collection and grazing.

I. INTRODUCTION

Terfezia known commercially as Truffle, is a natural fungus grows in deserts after rainfall in the middle east and north Africa and it is safe to be used as food by human (Bouatia et al., 2018). It has a high nutritive value, it contains protein, fat, carbohydrates, fibers, vitamins, metals, amino acids, and fatty acids (Ahmed et al., 1981; Benzeggouta, 2014; Dundar et al., 2012; Hammami et al., 2023; Khlaif et al., 2021). It has pharmaceutical properties; it has been used as an ointment, it has antimicrobial effects (Dođan and Aydin, 2013). It has been reported that *Terfezia* has antioxidant activity (Sonji et al., 2022; Wu et al., 2021). Alcoholic extract of *Terfezia boudieri* has a significant effect on the testosterone and LH levels (Khojasteh et al., 2013). It also has anticancer and immunomodulatory activities (Al Obaydi et al., 2020). Many factors could determine the growth, species, and amount of the Truffle, soil physical and chemical properties, soil texture, climate conditions, and surrounding plants (Gezer et al., 2014). Due to the economical and nutritive values of Truffle many articles have been investigated its composition, conservation, and cultivation (Hammami et al., 2023; Slama et al., 2010; Tagnamas et al., 2020;

Zambonelli et al., 2015). In Iraq there are many species such as: *T. boudieri*, *T. claveryi*, *Tirmania nivea*, *T. pinoyi*, *Phaeangium lefebvrei* (Aish et al., 2020; Alrawi et al., 2020; Moubasher, 2010). The quantities and the price could be determined in Iraq depending on the rain times and levels, but overall, it is expensive in Iraq (Owaid, 2016, 2018).

Historically *Artemisia absinthium* (Wormwood) is a very famous medicinal plant in different parts of the world such as west Asia, Europe and north America, the discovery of artemisinin, from *Artemisia* to treat malaria, was awarded Nobel prize in 2015 (Szopa et al., 2020). It has been reported as antioxidant because its leaves extracts contain many phenolic acids and flavonoids (Lee et al., 2013). *Artemisia* is used in east Asia as tea, spices, food additives because of its the health benefits (Kim et al., 2015). *Artemisia* has many medicinal benefits, oils used as anti-inflammatory, antimicrobial antifungal, antiseptic, antitumor, and antimalarial (Bora and Sharma, 2010; Goud et al., 2015; Juteau et al., 2003; Kordali et al., 2005). *Artemisia absinthium* active compounds have many pharmaceutical uses, they could be use as treatment for fever, hepatitis gastritis, wound healing, indigestion, gastric pain, anemia, urinary disorders, and cancer (Ahamad, 2019; Batiha et al., 2020). On the other hand, some *Artemisia* species cause several types of allergies, *Artemisia vulgaris* pollen associate with allergic reactions especially in Europe (Borghesan et al., 2013; Jahn-Schmid et al., 2002; Wopfner et al., 2002).

When species is unable to maintain itself overtime due to high herbivory or associated actions that called overgrazing (Mysterud, 2006). It could effect the function and the structure of the ecosystems (Gaitán et al., 2018). As a result of overgrazing, favorite species could disappear others would be dominant, in addition to the effect on soil components, that including plant, animal, and microbes communities (El-Keblawy, 2003; Gamoun, 2014; Wada et al., 1995). It is very important to pay more attention to this problem in Iraq especially with the dissertation and the dusty winds that we are facing every year (Al-Obaidi et al., 2022; Kazem et al., 2014).

All the previous studies in Iraq were focusing on the nutritive, economical, and medicinal values of the Truffle and Wormwood. No study pointed out the disadvantages of overgrazing on the desert ecosystem, Therefore, we are focusing here on the environmental impacts of the random collection and overgrazing on Samawa desert ecosystem.

MATERIALS AND METHODS

Samawa desert located at Almutanna governorate, south of Iraq. We started our work by visiting the Samawa desert during the Truffle collection season to design a questionnaire form (Fig.1). The questionnaire form was designed to contain three parts, first part is the collectors' information, second part including the environmental conditions around the collection area while the third part contains information about the collection processes, transportation, and selling. The information was obtained using different ways, most forms were filled by contacting the collectors directly at the collection sites others were filled by contacting sellers at local markets of the main five cities in Samawa governorate: Samawa, Rumaith, Khudher, Wrkaa, and Salman. Sometime the collector sells the truffle by himself. Eleven forms were filled for Truffle collection, while twelve forms for Wormwood collection and five forms for overgrazing. SPSS software was used for results statistical analysis.

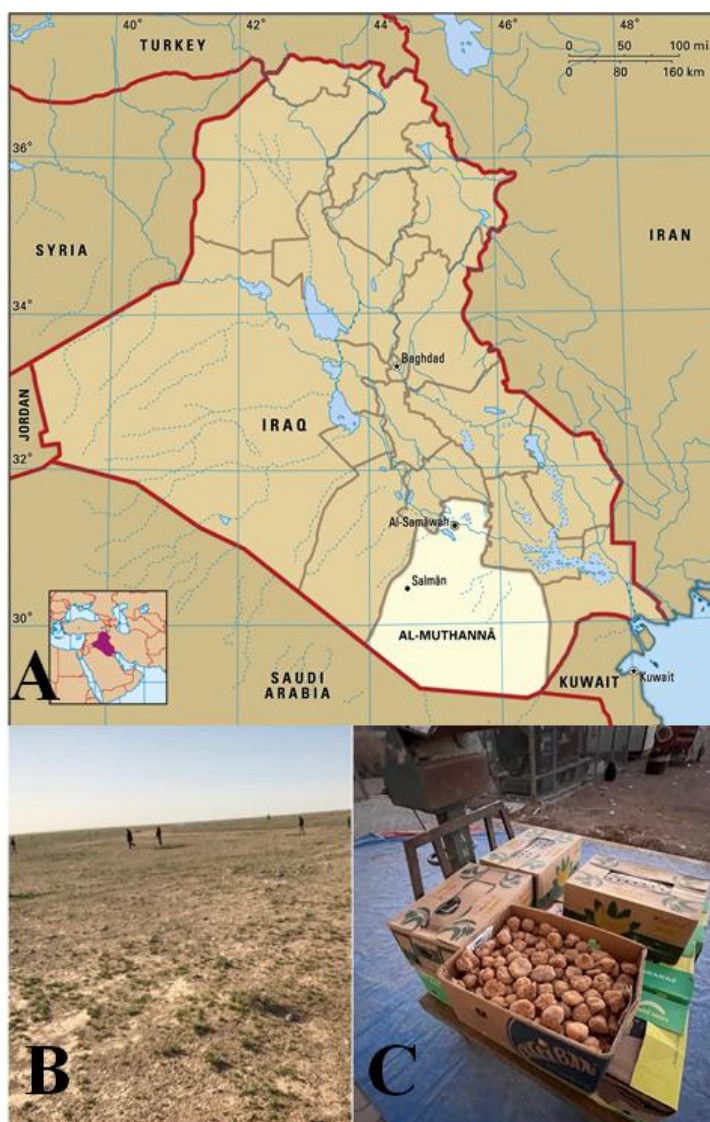


Fig.1: A. Samawa a desert location on the Iraqi map.
<https://pocket-guidebook.com/city.php?param=as-samawah-in-iraq>

B) Picture of Samawa desert land (Truffle collection season).

C) Picture of Truffle from Samawa desert (market at Samawa city).

II. RESULTS AND DISCUSSION

1.) Workers in collection and grazing.

Results indicated that the worker are mostly men and their age more than 30 years old, 96.4% and 57.2% respectively (Table.1), that because of culture of the community in the area, and the possesses required a lot of efforts could be very difficult for women and young men. Women and young generations should be given more opportunities to work in this field, we are sure they will improve and organize the possesses. Results also showed workers in collection and grazing are all Iraqis (Table.1), so they know the area very well and they also know there is no monitoring system by the local or federal governments to organize their work and there is no limitation to the collection and grazing. Most of the workers live in suburban area, unemployed, and uneducated. 71.4%, 85.7%, and 60.7% respectively (Table. 1). It is logic they will impact to the environment around the collection and overgrazing area more than other people, could be they do not know they are hurting the environment, but they are looking for the short-term benefits only. Workers should be well trained, educated, and aware of any behavior that could impact the

environment negatively, training courses are very useful to improve their behavior.

Table.1: Information of the workers in collection and grazing

Sex	Frequency	Percentage
Male	27	96.4
Female	1	3.6
Total	28	100
Age	Frequency	Percentage
Less than 20 years	0	0
20-30 years	12	42.8
More than 30 years	16	57.2
Total	28	100
Citizenship	Frequency	Percentage
Iraqi	28	100
Other	0	0
Total	28	100
Place of living	Frequency	Percentage
Suburban	20	71.4
Urban	8	28.6
Total	28	100
Employment status	Frequency	Percentage
Employed	4	14.3
Unemployed	24	85.7
Total	28	100
Education status	Frequency	Percentage
None	17	60.7
Read and write	3	10.7
Primary	6	21.4
Secondary	1	3.6
High school	1	3.6
Total	28	100

2.) Environmental conditions around the collection or grazing area.

Samawa was the main city to get the information about collection and grazing, that is logic, it's the biggest city in the governorate, at the same time most of our activities were in Samawa. Fifty percent of the questionnaire forms were filled with information from Samawa city (Table2). Most of the Truffle and wormwood collection area was used for gracing as well and vice versa (92.9% Table.2), that could put more pressure on the environment and the ecosystem in the area. It has been reported the ecosystem could be harmed more if the pressure factors applied together (Gaitán et al., 2018). On the other hand if you protect the area from grazing the diversity in the area will be maintained in the normal way (El-Keblawy, 2003).

We find that several (35.7% Table2) industrial and petroleum facilities near the collection and grazing area, that is very serious issue because various chemicals could be reach plants and animals in the area and accumulate through the food chain, especially there is a debate about whether Truffle and sand in the area were contaminated or not by radioactive materials (Abdulameer et al., 2014; Mohammed et al., 2018). We also reported some archeological sites (39.2% Table 2) near by the collection or gracing area. Gracing and collection effect directly or indirectly on the sites, physical damage could be happened by those activities. These precious sites must stay away from the human activity that could cause any damage to them, most of the site are open and there is no restriction rule to save them.

The results showed that the soil of the collection and grazing area is mainly cohesive, we think

that because the season of grazing and collection comes after rain fall and that could make the soil more cohesive. (64.3% Table 2). Sand dunes also noticed during the season near the collection and grazing area (50% Table 2), Sand dunes were different in shape and size, that depending on many factors especially wind speed and directions, sand grain size, and the water content (Reffet et al., 2010; Tsoar, 2001).

Table.2: Environmental conditions around the collection or grazing area.

Collection or grazing place	Frequency	Percentage
Rumaitha	4	14.3
Salman	4	14.3
Samawa	14	50
Khudher	2	7.1
Warkaa	4	14.3
Total	28	100.0
Gracing near the collection area (vice versa)	Frequency	Percentage
Yes	26	92.9
No	2	7.1
Total	28	100
Is there any Industrial or petroleum facilities	Frequency	Percentage
Yes	10	35.7
No	18	64.3
Total	28	100
Any archeological sites	Frequency	Percentage
Yes	11	39.3
No	17	60.7
Total	28	100
Is the soil cohesive	Frequency	Percentage
Yes	18	64.3
No	10	35.7
Total	28	100
Any sand dunes	Frequency	Percentage
Yes	14	50
No	14	50
Total	28	100

3.) Biodiversity in the collection or grazing area.

Biodiversity is very important to any ecosystem to be healthy and to maintain itself. Results showed some biodiversity in the collection or grazing area. Various animals and plants were noticed, we are sure there are microbial communities as well, but this is not our subject, could be a good subject to a separate study. Rabbits were the dominant animals (46.1%) followed by foxes (15.3 %), other animals such: dogs and birds were reported in same percentages (10.3%). Cattle were noticed as well, and some workers did not notice any animals (Table.3).

Alhagi was the dominant plant in Samawa desert (40% Table.3), this plant adapted to live in desert environments, it could tolerate the environmental conditions there. Different type of herbs was also found in addition to Lepidium and Malva 28%,20%, and 12% respectively (Table.3). We could see the limitation in species in the area, that could be normal in desert environments (Bidak et al., 2015). According to that the food chain and webs are also limited. The pressure of random collection and overgrazing have effects on the availability of the species, so if any species was affected by that it will affect the entire ecosystem and its balance.

Table.3: Environmental animals and plants in the collection or grazing area.

Note: More than one animal or plant type could be mentioned in one questionnaire form, so the total could be different than the total of the forms.

Animals near the collection or grazing area	Frequency	Percentage
Rabbit	18	46.1
Cattle	3	7.7
Fox	6	15.3
Dog	4	10.3
Birds	4	10.3
None	4	10.3
Total	39	100.0
Plants near the collection or grazing area	Frequency	Percentage
Alhagi	10	40
Herbs	7	28
Lepidium	5	20
Malva	3	12
Total	25	100.0

4.) Collection and grazing processes in the field.

The critical point in this part of our results that we found there is no permission required for collection or grazing (Table. 4), that will lead to random collection and overgrazing. Workers are collecting as much as they could of Truffle and Woodworm. Furthermore, there is no monitoring or assessment system if they are suitable for human use, that is dangerous especially with a possibility of contamination in the area or the crops are contaminated (Mohammed et al., 2018), that will lead to the contaminant be accumulated and magnified through the food chain. Results also indicated less activities during rainfalls and strong winds, (28.6% and 3.6% respectively Table. 4), that is normal because rain and winds are not suitable for collection and grazing.

The results also showed dust generation during and after the collection and grazing activities. More than seventy eight percent of the workers are generating dust during their work (Table. 4), this a high percentage could play an important role in the soil erosion and effect on the microbial community in the soil (Mello et al., 2013), It impacts the cohesivity the structure of the soil.

Plastic bags, containers, and bottles were used a lot, all workers use plastic materials during their work (100% Table. 4). Accumulation of plastic waste impact the environment especially the degradation time of the plastic materials is very long (Chamas et al., 2020; Prian and Barkatt, 1999). Most workers used primitive mechanical tools for collection (82.6% Table 4), that could affect the soil structure and put more pressure on our environment. Cars were the main transportation tool in the collection processes (78% Table.3), Trucks also have been used in the transportation processes (14.3% table. 4) to collect very big quantities and for transport the grazing animals. They reported other transportation tools such as animals and local tools (7.1% Table. 4). Using transportation tools could affect the air quality there and some chemicals could reach to the crops and animals. Sheep and camels were the grazing animals that we reported in the area. They effect the environment in different ways depending on the number of each group. Overall, the grazing area need to be used wisely to avoid overgrazing phenomenon.

Table.4: Collection and grazing processes in the field.

Any permission required	Frequency	Percentage
Yes	0	0
No	28	100
Total	28	100
Collection or grazing during rainfalls	Frequency	Percentage
Yes	8	28.6
No	20	71.4
Total	28	100
Collection or grazing during strong wind	Frequency	Percentage
Yes	1	3.6
No	27	96.4
Total	28	100
Any dust during or after Collection or grazing	Frequency	Percentage
Yes	22	78.6
No	6	21.4
Total	28	100
Use plastics (bags or other)	Frequency	Percentage
Yes	28	100
No	0	0
Total	28	100
Collection tool	Frequency	Percentage
Manual	4	17.4
Mechanical	19	82.6
Electrical	0	0
Other equipment	0	0
Total	23	100
Transportation	Frequency	Percentage
Car	22	78.6
Bus	0	0
Truck	4	14.3
Other	2	7.1
Total	28	100
Grazing animals	Frequency	Percentage
Sheep	3	60
Camels	2	40
Total	5	100

5.) Difficulties facing the workers in collection and grazing.

Land mine was the main difficulty that faced the workers (25% Table. 5). It is a serious and life-threatening issue. Land mines were widely distributed in Iraq because of the several wars that happened during last and current centuries. Feasibility in another problem facing the workers (21.4% Table. 5) especially the Wormwood collectors because it is cheap in the local markets. Transportation also a problem (17.9% Table. 5) because the area is far from the city center and there is no road established in the area. Rain falls level effect on the workers (10.7% Table. 5), the weather, and the entire ecosystem in the area, if the level of the rain is low then the truffle quantities will be affected significantly. Other problems were reported but in low percentages such as weather conditions predatory animals 7.1% and 3.6% respectively (Table 5).

Table. 5: Difficulties facing the workers in the field.

Difficulty	Frequency	Percentage
Weather conditions	2	7.1
Rain falls level	3	10.7
Predatory animals	1	3.6
Land mine	7	25
Transportation	5	17.9
Feasibility	6	21.4
None	4	14.3
Total	28	100

III. CONCLUSION

Our findings pointed out that the random collection and overgrazing put a lot of pressure on the Samawa desert. It is interfering with the food chain, effect on the animals and plants, especially some species are very rare and could be extinct in the future, so we have to keep and maintain the biodiversity in the area. Human activities there generate plastic waste and there is no effective way to collect and dispose it and it requires very long time to be degraded. The soil texture also been affected by the activities. Transportation could effect on the air quality and contaminate the crops and the area. To our knowledge this is the first study point out these important environmental issues. The local government needs to put regulation regarding how to deal with this area, women and young people should be encouraged to involve in working there. Investment could be a good solution to organize the use of the area. Workers must be well-trained and get a proper permission to work there. The amount of collected Truffle and Wormwood should be limited per person or group. We should put regulations to save soil, animals, plants in the area. Collection and grazing activities near archeological, industrial sites must be prohibited. All that will save the desert ecosystem and keep it in balance in addition to getting the economical benefits.

CINIFLICT OF INTEREST

The authors declare no conflict of interest.

AUTHER CONTRIBUTION

Authors have equal contribution.

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