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Problems of medicinal plant in Jazan region and solutions

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ABSTRACT

The present study classifies medicinal plants in the flora of Jazan region according to species threatened into rare, vulnerable, endangered, critically endangered and extinct. It focuses on the reasons of species decline as habitat loss (agriculture, harvesting practices, over-grazing, urban development, shore activities and tourist torsion), introduction of exotic species, diseases, pollution and drought. The solutions for conservation of species including preservation, restoration, examination, documentation, research, advising, treatment, training and education are discussed. The information provided in this study points to the need for broader monitoring for existing species and continuous conservation research should be given top priority.

Keywords: Habitat loss, Jazan region

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INTRODUCTION

Medicinal plants represent an important health and economic component of biodiversity. It is important to establish the complete inventory of the medicinal plants of any country for conservation and sustainable use although the protection of medicinal plants in their habitats is not effective. The flora of Saudi Arabia is one of the richest biodiversity in Arabian areas and includes important medicinal plants¹. There are 306 species present in the Kingdom with 11 endemic species on the other hand, there are 141 species in Jizan region which constitute about (46.08%) of total medicinal plants in the Kingdom with 5 endemic species with (45.45%)². Twenty one species were estimated to be extinct in Saudi Arabia³.

The extensive exhaustion of medicinal plants from the wild and continuous habitat loss have led to the shortage number of medicinal plants over the years⁴. The weakening of customary laws which has adjusted natural resource uses is the main cause of the medicinal plants endangerment⁵. There are other causes of rarity in medicinal plant species, such as specificity of habitat, limited range of covering, land use disturbances, introduction of exo-natives, habitat changing, alteration of climatic factors, over grazing, explosion of human population, fragmentation of population and genetic drift⁶.

The aim of this study is to focus on the problems of medicinal plants in Jazan region and causes of population decline in their habitats and suggest the solutions for conservation planning concern.

MATERIALS AND METHOD

The study area was positioned to collect data and pictures from the Jazan city and extending eastward to Al-Aridah town crossing to Wadi Jazan and Jazan Dam, northward to Baysh town crossing to Wadi Baysh , then extending westward to Farasan island (Figure 1).

Medicinal plants have been traditionally used by local Bedouin communities as a source of affordable health care. They have less amount of knowledge about the properties of these plants and their effective roles.

An interview method was followed to get an insight into the various causes of depletion of the medicinal plants in the natural habitat of study area. A standard questionnaire method was used to collect information such as current harvesting practices, biotic and abiotic factors, man-made factors, fire for garbage, grazing etc. The data was also collected from different sources, such as the Presidency of Meteorology and Environment, the Saudi Authority Wildlife, Prince Sultan Chair for Environment and Wildlife, local people, herbal practitioners etc.

Literature including, textbooks, journals, proceedings, periodicals and databases written in Medicinal Plants especially the plant density of each medicinal plant was taken from Mossa

A. B. (2013) Survey on Medicinal Plants in the Flora of Jizan Region, Saudi Arabia. The fourth scientific conference for students of higher education in the K. S. A. Makkah, 19-22 Jumada Alakhera 1434 H. besides books for flora of Saudi Arabia Kingdom written by Dr. Shaukat A. Chaudhary, National Agriculture and Water Research Center, Riyad. Books for flora of Jizan are written by staff members of College of Science, King Saud University. Another book for Picture Guide of Wild Plants In Jazan Region is written by Dr. Yaheia S. Massrahy, Vice dean for education and students affairs, College of Science, Jazan University. Herbarium specimens of the medicinal plants were available at College of Science, Jazan University.



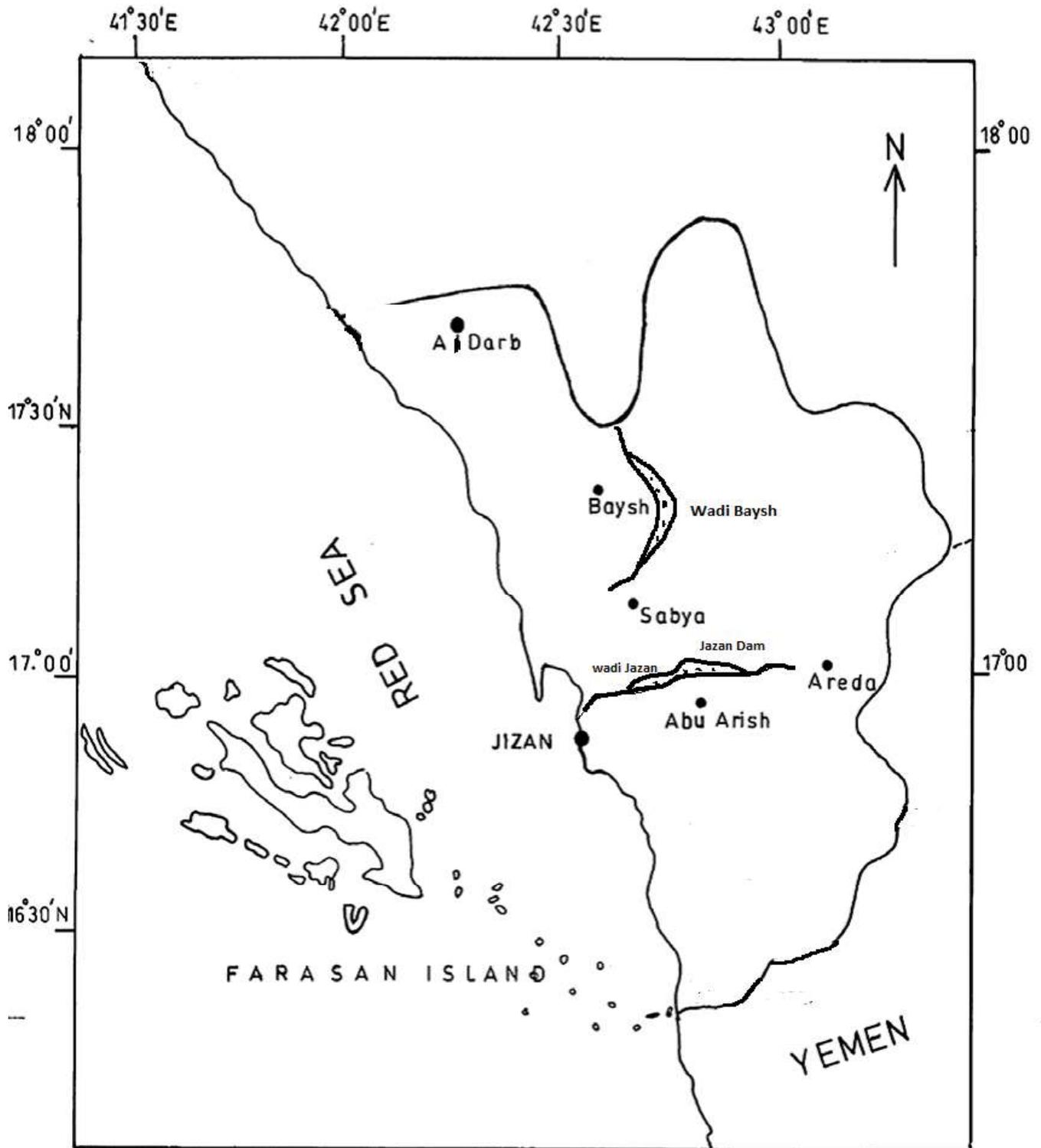


Figure 1: Map of studied area

RESULTS AND DISCUSSION

According to the IUCN Red List of Threatened Species classification, the medicinal plant species can be classified into rare, vulnerable, endangered, critically endangered and extinct.

Figure (2) illustrated that critically endangered species in Jazan region attained the maximum percentage (53.85%), while *Euphorbia arabica* Hochst. & Steud. was the only case of extinct medicinal plant species (0.77%).

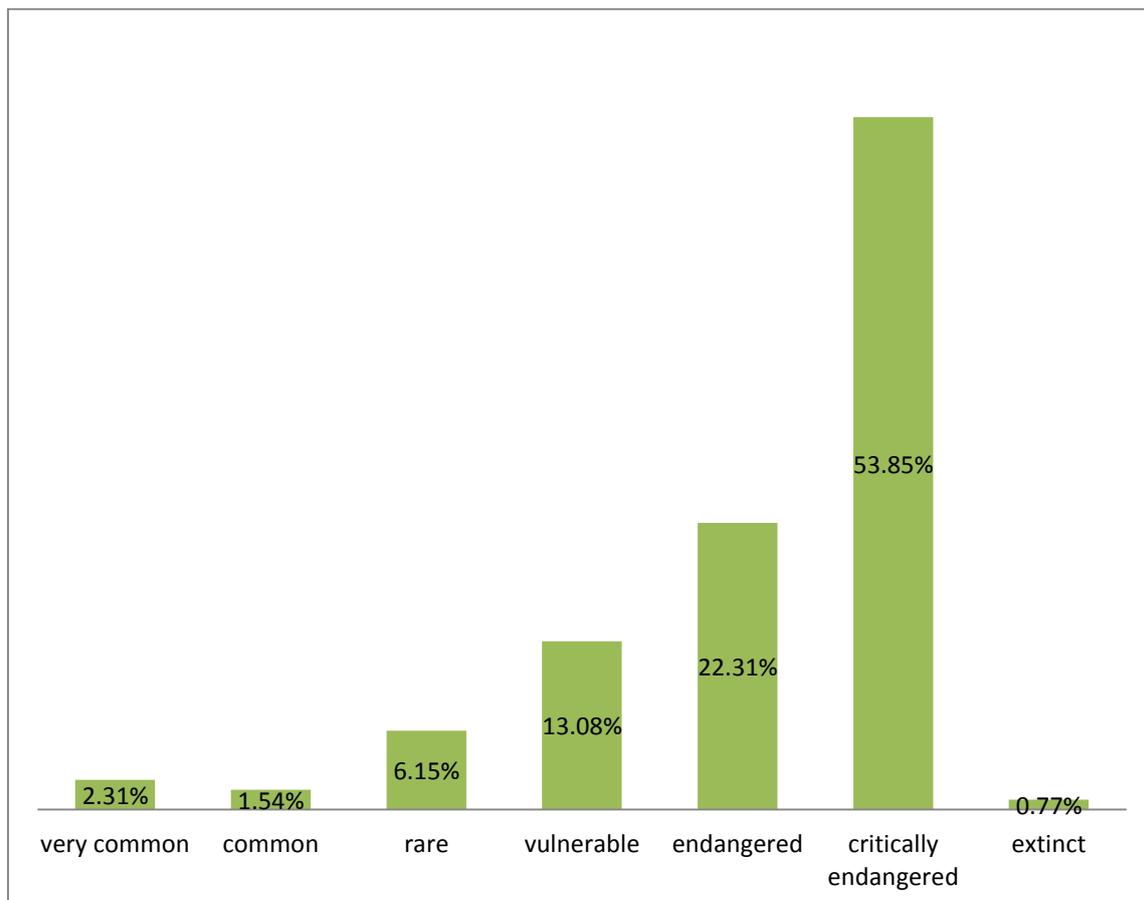


Figure 2: Percentage of IUCN categories for medicinal plant species in Jazan region.

There are a number of reasons for threatening medicinal plants:

Habitat Destruction

It is the destruction of medicinal plant habitat in the wildlife. Habitat degradation threatens 91% of the medicinal plants in the world. Many medicinal plants are endemic and need unique habitat so they are restricted in their distribution throughout the world⁷. When human activities make any change in the environment, plant species are unable to adapt to new circumstances. This can create disastrous results, so fast habitat degradation threatens medicinal plant species⁸.

Habitat destruction includes:

- Agriculture

More lands are cleared for creating more farm land. Increment of cultivation continues as the tribal and local human population spreads (figure 3).



Figure 3: Cultivation exploited medicinal plants owing to improper management.

- Harvesting practices

The local people resort to over-harvesting of medicinal plants for food and medicines. People harvest such flowers, rhizome or even entire plant. Most of people have hardly any alternative means to earn a livelihood from other sources⁹.

- Over-grazing

The threatening of medicinal plants also increases when animals feed and graze on them. Uncontrolled camel's grazing is highly detrimental natural vegetation. Camels cause extensive damage to the vegetation. They have the habit of eating anything including the regenerating shoots and seedlings. During past several centuries, large areas of virgin lands have been turned into agriculture terraces. Most of these terraces are now the seat of weeds and other exotic species such as *Calotropis procera*¹⁰ (figure 4).



Figure 4: Camels depends for grazing on natural wildlife.

- Urban development

Saudi Arabia has a population of 16.9 million which distribute from metropolitan areas of over 2 million to few houses of villages¹¹. Except for the Nafud desert in the north and big Empty Quarter of Rub-al-Khali in the southeast, the rest of the national space has scattered settlement with highest density in the southwest¹². Medicinal plants have been destroyed to accommodate more urban development. Human activities like quarrying, lumbering etc. keep destroying the natural habitat and affect severely on population and growth of medicinal plants (figure 5).



Figure 5: Fragmentation of urban development causes isolation of plant population.

- Shoreline activities

Plant communities on the coastal areas have been declining due to seawater inundation caused by ground subsidence¹³. There are other threats which affect on medicinal plant wildlife in the Farasan Island, including the cutting of mangroves, agricultural exploitation, off-road driving and mining operations.

- Tourist intrusion

Development of the islands and wadis for tourism is also another threat to plant biodiversity conservation. Tourist activities should not be located on important sites for plant and animal biodiversity. Recreational visitors crushed plants and unregulated collection of plants. Fishermen litter the area, but probably cause little disturbance¹⁴.

Introduction of Exotic Species

Exotic species can disrupt ecological balances and may produce harmful consequences on environment. One of the most threats is from the invasive species *Prosopis juliflora*, which has established on Farasan Al-Kabir near the Al-Muharraaq junction. This area of *Prosopis*

has established at the expense of the native *Acacia* woodland and is spreading into the densest areas of *Acacia ehrenbergiana* woodland in the Al-Muharraqa area. It has been noticed that *Prosopis juliflora* decreases the density and frequency of native plant species¹⁵ (figure 6).



Figure 6: *Prosopis juliflora* as an exotic species in Farasan Island.

Diseases

Plant diseases impact negatively on both people through economic and agricultural loss from one side, and also biodiversity conservation from other side¹⁶. Diseases of cultivated plants may be threaten wild plants¹⁷. The emergence of plant diseases, similar to those of humans¹⁸, domestic animals¹⁹ and wildlife¹⁶ is driven largely by anthropogenic environmental change (such as introductions, habitat disturbance and farming techniques). For plant diseases, these changes are those mainly related to trade, land use and severe weather events²⁰.

Pollution

Human actions cause the extinction of flora and fauna in environment through toxic pollution due to technological and industrial advancement in recent decades²¹. Another danger threat is the chemical pollution which is spread by the use of herbicides and pesticides leading to the death of wild medicinal plants. Sewage effluent, rubbish and continuous land clearing for urbanization threaten medicinal plant habitats²² (figure 7).



Figure 7: Contamination is spread from human being activity.

Drought

The global mean temperature has risen 0.61°C over the last 100 years²³. By the 2080s, average annual temperature may rise by 3.51°C ²⁴ predicting that future distribution changes are likely to be great. A changing climate may cause extreme meteorological events, such as drought and sinking of islands²⁰ (figure 8).



Figure 8: Dryness of Wadi Baysh is due to greenhouse phenomenon

Discussion

The results made a significant focus on the problems of medicinal plants in Jizan region illustrating the main causes of endangered plant species. Conservation and sustainable

utilization of medicinal plants are recognized in a definite number of steps for the natural resource management:

Preservation

Establish field gene banks, botanic garden and conventional preservation facilities for storage seeds of medicinal plants.

Restoration

Medicinal plants should be allowed to mature up to definite time and thereafter some rhizomes should necessarily be left behind for further regeneration. At least 1/3 of the plants should be left on the ground after harvesting. We want to set field trials in other similar locations. These trials will establish medicinal crops and help the farmers to support its commercial cultivation which will decrease the pressure on natural habitats.

Examination

Reintroduction and reinforcement should be allowed in various form of in-situ or ex-situ facility.

1. Documentation

Collect and document information on medicinal plant and indigenous knowledge

2. Research

The rarity of medicinal plants in the wild needs for the development of efficient symbiotic seed germination protocols, because they cannot stay for long time as an independent entity in their natural habitats²⁵. Fungal associates with some medicinal plants in natural habitats include improved management and translocation opportunities for rebuilding wild populations²⁶.

Plant biotechnology is another research tool which can be used. It is a process of *de novo* reconstruction of an organism from a cell in differentiated stage^{27 28}. The process of root formation (rhizogenesis) and tissue culture can be useful for regeneration of medicinal plant²⁹.

3. Advise

Government and other conservation agencies may take initiatives in distributing, developing and establishing nursery grown plants in suitable habitats.

4. Treatment

Biological control can be used against introduction of exotic species. Large scale cultivation using bio-fertilizers provides good quality in environment management.

5. Training and Education

Educating people on the use of medicinal plants to keep traditional knowledge is one aspect of the NGO's work; they also carried out analysis of threat reduction assessments for the medicinal plants in the governorate.

CONCLUSION

Medicinal plants are regarded as the main core for the health and medical research. Any one is not allowed to reduce the importance of any plant species which may have active ingredient which is not discovered yet. So, Modern civilization should take into account that without wildlife present, we will not survive any more.

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