

Ethnomedicinal and Conservation Status of plant species in Tehsil Takht Bhai, District Mardan, Pakistan

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ABSTRACT

The study was design to draw attention to correlation of locals with plants and their conservation status. The research work was carried out in tehsil Takht Bhai, district Mardan during 2008-2010. Fieldwork was conducted using an arrangement of interviews, questioners and personal observation. The IUCN 2001, Red Data List Categories and Criteria was used to determine the conservation status of plants. The present study documents the ethno medicinal and conservation status of 34 plant species belonging to 20 families. Among these 12 species were found to be rare, vulnerable (11 species), endangered (9 species) and Infrequent (2 species). From this study we have concluded that most plant species are going to become endangered and no one plant specie was found dominant because the natural vegetation area was change into urbanization and agricultural reason.

1. INTRODUCTION

To determine the conservation status of plant species in an area is necessary because it will show the position of plant species in feature. Due to urbanization and agriculture the plant species become threaten. On the basis of IUCN 40% plant species are endangered [1]. According to the authors [2,4] various factors i.e. removal and loss of habitat, preface of alien plants, environmental pollution, different disease of plants, in excess of plant utilization and climatic change, which influence plant community and changed our ecosystem. It is estimated that some 270,000-425,000 vascular plant species are already known [3]. Pakistan's situation is not different from the rest of the world. The author [5] expressed that a limited literature is initiated in our home land. 19 flowering plants has been recorded from Pakistan [1]. The author [6] classified *Astragalus gilgitensis* as a Critically Endangered. According to the author [7] four flowering plant species are threatened. Author [8] reported one specie as threatened plant from Tehsil Takht-e-Nasrati, District Karak, Pakistan. The author [15] reported 7 shrubs and tree as threatened species form Takht-e-Nasratti Pakistan. Ethnobotany deals with the study of plant uses in human society. Ethnobotanical studies in various areas of Pakistan have also been carried out [7; 9; 10; 11; 12; 13; 14; 24]. The present research was aimed to collect, document and compile diverse and disperse traditional local information of century's experienced therapeutic uses of medicinal plants and conservation status of plant species in Takht Bhai, District Mardan. The present work is first step for the feature researchers who work in such field.

2. MATERIALS AND METHODS

2.1. STUDY AREA

The tehsil lies at 34.28° latitude and 71.93° longitude. The elevation of the valley is 1148 ft to 1456 ft above sea level. It is bounded on the North by District Buner and Malakand, on the East by district Swabi and Buner, on the South by district Nowshera and on the West by district Charsadda and Malakand (Figure 1). In 1908/9 the ancient Buddhist history was discovered in the mountains. Large numbers of buildings look beautiful on top of the mountains. The research area may broadly

be divided into two parts, North-Eastern hilly area and south western plain. Takht Bhai is a Parthian archaeological site in Mardan, Pakistan. It was first a Zoroastrian complex which, after the later coming of Buddhism, was then changed into a Buddhist monastic complex. The complex is regarded by archaeologists as being particularly representative of the architecture of Buddhist monastic centers from its era (UNESCO world Heritage Site, 1980) [16] (Figure 2). The research area provides habitat for the growth of a large number of plants. It has rich diversity of plant resources. In summer, from May to June the temperature is high which reaches to 42 C⁰. However a rapid fall of temperature is seen from October onwards. The coldest months are December and January. The relative humidity is quite high throughout the year while maximum humidity has been recorded in December. i.e. 73.33%. Most of the rainfall occurs in the month of July, August, December and January. Maximum rainfall (125.85mm) is recorded in the month of August. Toward the end of the cold weather, these are occasional thunderstorms and hail storms.

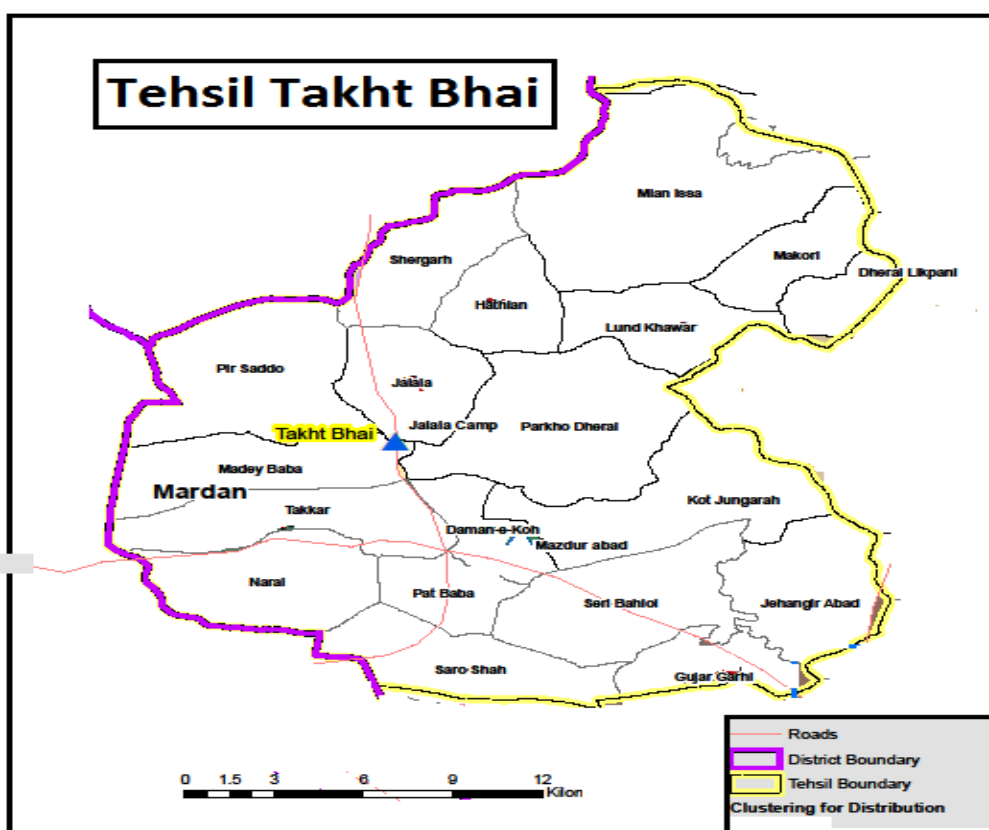


Figure 1. Map of research area.

2.2. RESEARCH PROTOCOL

During research work the whole tehsil was investigate throughout the year during 2008-2010. During research survey different factors i.e. Habit and habitat of plant species were also observed for the accuracy. Each plant species were collected and label with specific number from different habitat. Population of seedling and mature plant species were counted separately on different characteristic. Semi-structured questionnaires were used to accomplish the ethno medicinal and conservation position of plant species [5]. Information was also search out by personal observation and interviewing of 1000 respondents from different gender and sex. Analysis of data was made with the help of group discussions and questioners among different age classes of Takht Bhai people that include both genders of society. The data was classified, tabulated, analyzed and concluded for final report. The following formula was used for data collecting:

$$CSP = A + C + G + P$$

Where

CPS = Conservation status of Plants

A = Availability of plant species

C = Collection of plant species

G = Growth of plant species

P = Part used of plant species

3. RESULTS

In the present study the ethnomedicinal and conservation status of plant species were determined in Takht Bhai, District Mardan. A total of 34 species belonging to 20 families were found in which 20 were trees and 14 were shrub. The Moraceae with 5 species, Mimosaceae with 4 species, Solanaceae with 3 species, Cactaceae, Myrtaceae, Papilionaceae, Poaceae and Rosaceae with 2 species, Asclepidaceae, Bombacaceae, Caesalpinaceae, Euphorbiaceae, Lamiaceae, Meliaceae, Punicaceae, Rhamnaceae, Rutaceae, Sapindaceae, Simaroubaceae and Tamaricaceae with single specie. The plants were divided on the basis of conservation into five classes i.e. endangered, vulnerable, rare, infrequent and dominant. In the present investigation the 12 species (*Alhagi maurorum* Medic., *Calotropis procera* (Wight.) Ali., *Citrus aurantifolia* Christmann., *Dalbergia sissoo* Roxb., *Datura metel* L., *Eucalyptus camaldulensis* Dehnh., *Melia azedarach* L., *Morus alba* L., *Opuntia littoralis* (Engelm.), *Otostegia limbata* Boiss., *Prunus persica* (L.) Batsch. and *Ricinus communis* L.) were found to be rare, vulnerable (11 Species i.e. *Alianthus althesema* (Mill.) Swingle., *Cassia fistula* L., *Eucalyptus lanceolatus* honey., *Ficus carica* Hausskn. Ex. Boiss., *Ficus palmata* Forssk., *Morus nigra* L., *Opuntia monacantha* haw., *Punica granatum* L., *Rosa indica* L., *Tamarix indica* Willd. and *Withiana somnifera* L.) endangered (9 Species i.e. *Acacia modesta* Wall, *Acacia nilotica* L., *Albezzia lebbak* L., *Bombax ceba* L., *Dodonea viscosa* L., *Ficus religiosa* L., *Saccharrum munja* Roxb., *Saccharum spontaneum* L. and *Ziziphus jujuba* Mill.) and 2 species (*Broussonitia papyrifera*(L.) Vent and *Datura alba* Nees) were Infrequent (Table.1).

4. DISCUSSION

The present study was conducted according to the IUCN standard [17] questioner and personal interviews. The environmental changes, erosion and construction work i.e. road formation, mining etc disturbed the plant habitat. Our observations agree with the workers [7; 15] they reported the species from almost similar habitats from other parts of the region. The research area is semi arid therefore in summer, the area is very warm. In hilly area, due to grazing of plant species i.e. *Acacia modesta* and *Dodonea viscosa*, cannot reach to maturity stage, which results constantly falling of rare plant species at an alarming rate, without having natural conscription.

Table 1. Floristic list, ethnomedicinal and conservation status of plant species in Takht Bhai, District Mardan.

Species	Common Name	Uses	Availability				Collection				Growth				Plant used				Total score	Status	
			0	1	2	3	0	1	2	3	0	1	2	3	4	0	1	2			3
<i>Broussonetia papyrifera</i> (L.) Vent FGCM-129	Lewani Beta	Poisonous, oligomenorrhea in animals, diarrhea	-	-	-	3	-	-	-	3	-	-	-	-	4	-	-	-	-	13	Infrequent
<i>Bombax ceiba</i> L. FGCM-128	Sumbal	bone fracture, cracks	-	1	-	-	0	-	-	-	-	-	-	3	-	0	-	-	-	4	Endangered
<i>Alianthus althesema</i> (Mill.) Swingle FGCM-127	wana	Constipation, Piles, stomach pain, toothache, skin irritation	-	1	-	-	-	1	-	-	-	-	-	3	-	0	-	-	-	5	Vulnerable
<i>Alhagi maurorum</i> Medic. FGCM-126	Pamana	Refrigerant agent, skin irritation, belly pain	-	-	2	-	0	-	-	-	-	-	3	-	-	-	-	-	4	9	Rare
<i>Albezzia lebbak</i> L. FGCM-125	Sreen	male sexual power, nocturnal emission,	-	1	-	-	0	-	-	-	-	-	3	-	0	-	-	-	-	4	Endangered
<i>Acacia nilotica</i> L. FGCM-124	Kikar	aprodiasic, Diarrhea, toothache Cough	-	1	-	-	0	-	-	-	-	-	3	-	0	-	-	-	-	4	Endangered
<i>Acacia modesta</i> Wall FGCM-123	Palosa	Blood purifier, backache, belly pain, abdomen swelling	-	1	-	-	0	-	-	-	-	-	3	-	0	-	-	-	-	4	Endangered

<i>Dodonea viscosa</i> L. FGCM- 136	Ghuraske	<i>Datura alba</i> Nees. FGCM-135	Spalmay	<i>Datura metel</i> L. FGCM- 134	Spalmay	<i>Dalbergia sissoo</i> Roxb. FGCM- 133	Norang	<i>Citrus aurantifolia</i> Christmann FGCM- 132	Lamdais	<i>Cassia fistula</i> L. FGCM-131	Spalmai	<i>Calotropis procera</i> (Wight.) Ali FGCM- 130.
-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	1	1	1	1	-	-	1	-	-	-
2	2	2	-	-	-	-	2	2	-	2	-	2
-	-	-	-	-	-	-	-	-	-	-	-	-
0	-	-	-	-	-	-	0	0	-	-	0	0
-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	3	3	3	3	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-
2	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	3	3	3	3	3	3	-	-	3	3
-	-	4	-	-	-	-	-	-	4	4	-	-
0	-	-	-	-	-	-	-	-	0	0	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	2	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	4	-	4	4	-	4	-	-	-	-	4
4	13	11	9	9	9	9	9	9	5	5	9	9
Endangered	Infrequent	Rare	Rare	Rare	Rare	Rare	Rare	Rare	Vulnerable	Vulnerable	Rare	Rare

<i>Saccharum munja</i> Roxb. FGCM- 152	<i>Rosa indica</i> L. FGC- 151	Aranda	<i>Ricinus communis</i> L. FGCM- 150	<i>Punica granatum</i> L. FGCM- 149	<i>Prunus persica</i> (L.) Batsch. FGCM- 148	<i>Otostegia limbata</i> Boiss. FGCM- 147	<i>Opuntia monacantha</i> haw. FGCM- 146	<i>Opuntia littoralis</i> (Engelm.) FGCM- 145	<i>Morus nigra</i> L. FGCM- 144
Kana	Gulab	Aranda	Aranda	Anar	Shaltalo	Pesh knar	Zargum	Zargum	Toor toth
Vormifuge	Asthma, Vermicide, cough	Poisonous, asthma, duration, diarrhea, arthritis	Poisonous, asthma, duration, diarrhea, arthritis	Laxative, Antitussive agent	Strep throat	Ear wound, acne	Antitussive, anti diabetic, kidney pain, diarrhea	Hepatitis, abdominal pain, Diarrhea	Laxative, emollient, Antitussive agent
-	-	-	-	0	-	-	-	-	-
1	1	1	1	-	-	1	1	-	-
-	-	-	-	-	2	-	-	-	2
-	-	-	-	-	-	-	-	3	-
-	0	-	-	-	-	-	0	-	-
1	-	-	-	-	-	-	-	-	1
-	-	-	-	-	2	2	-	-	-
-	-	3	3	3	-	-	-	3	-
-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	1	1
2	-	-	-	-	-	2	-	-	-
-	3	3	3	3	-	-	3	-	-
-	-	-	-	-	4	-	-	-	-
0	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-
-	-	2	2	2	2	-	-	-	-
-	-	-	-	-	-	-	-	-	-
-	4	-	-	-	-	4	4	4	4
4	8	9	9	8	10	9	8	11	8
Endangered	Vulnerable	Rare	Rare	Vulnerable	Rare	Rare	Vulnerable	Rare	Vulnerable

<i>Ziziphus jujuba</i> Mill. FGCM- 156	<i>Withiana somnifera</i> L. FGCM- 155	<i>Tamarix indica</i> Willd. FGCM- 154	<i>Saccharum spontaneum</i> L. FGCM- 153
Bera	Koti lal	Ghaz	kahi
Bronchitis, diabetes, tonsils, refrigerant	Antipyretic, nausea animal mistatus, pregnant women in dysmenorrhoea	burnt regions, Toothache	Constipation, Piles, stomach pain, toothache
-	-	-	-
1	1	-	1
-	-	-	-
-	-	3	-
-	0	-	-
1	-	-	1
-	-	-	-
-	-	3	-
-	-	0	-
-	-	-	-
2	-	-	2
-	3	-	-
-	-	-	-
0	-	0	0
-	-	-	-
-	-	-	-
-	-	-	-
-	4	-	-
4	8	6	4
Endangered	Vulnerable	Vulnerable	Endangered

It was noticed that erosion rate was increased with increasing the grazing rate. Our research agree with the author [13] who stated that the population size is often affected by grazing and dry periods because the plant cannot reach to maturation. The author [13] also stated that force of grazing choice from almost invisible elimination of plant material to harsh reduction of vegetation wealth and extensive erosion. In research area a huge number of native plant cutting was seen for different purposes i.e. fuel, fodder etc which reduce the population size and provide the space for invader plant species. Our results also agree with that of authors [8; 18; 19]. The author [17; 20] stated that no accurate study was taken on impacts of invalid use of plant species. Due to unavailability of natural gas and electricity, the locals and poultry farms used a lot of plant species specially trees as a result badly affecting its population and in next 10-20 years the rare species will become vulnerable. The conservation status of trees and shrub species were determined on the basis of geographic range and number of localities. On the basis of number of localities, the endangered species were reported from a few localities in research area. Based on the small geographic range and single locality, 9 species i.e. *Albezzia lebbak*, *Acacia modesta*, *Acacia nilotica*, *Bombax ceba*, *Dodonea viscosa*, *Ficus religiosa*, *Saccharum spontaneum*, *Saccharrum munja* and *Ziziphus jujube* were placed under Endangered Category. Commercial scale stone excavation activities is found high in the area which decrease the population of native plant species and give space for invasive species. Such threat was also noticed by authors [7, 15]. Consequently, urgent conservation methods should be taken to avoid its extirpation from research area because conservation of plant species are the international issue. According to the author [21], ethno botany is the branch of biological sciences which deals with the documenting of traditional knowledge and methods from different communities. These trees and shrubs which are growing naturally in research area are used for different purposes. The benefits of all these plant species were studied and explained by local people and inhabitants. The locals used all these plant species for different medicinal purposes in different ways (Table. 1). During study it was noticed that most plant species were misplaced on the basis of unskilled manpower and shortage of resources. From research area most plant species were transported to other part of the country in a crude form. On the basis of questioner the men have more knowledge than women; the percentage was 80 and 55 respectively. The younger had less knowledge than older which prove that the traditional knowledge will be lost easily in future. The authors [4; 7; 10; 11; 12] reported the same position in other part of the country. In some remote area, the people used old traditional methods for different diseases due to lack of modern health facilities or high prices of medicine. In Asia more than 80 percent people cannot afford health facilities [1]. Similar finding were also reported from other areas of Pakistan [11; 12; 13; 14; 22; 23]. Therefore, there is an urgent need of conserving these plants and their uses, which in future the coming generations could benefit from these precious plants that are a real gift of nature for the mankind.



Figure 2. Buddhist monastic center in Takht Bhai, District Mardan.

5. CONCLUSION

The present study we have concluded that the people of the area possess good knowledge of herbal drugs but as people are going to modernization; their knowledge of traditional uses of plants may be lost in due course. From this study we have noted that most plant species are going to become endangered and no one plant specie was found dominant because the natural vegetation area was change into urbanization and agricultural reason. In the present study some ornamentals and introduced species have assigned endangered category, which may not be applicable as well as some species which are very commonly distributed throughout the country but the study was entirely carried out on questioners, personal interviews and assessment.

COMPETING INTERESTS

The authors declare that they have no competing interests.

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References

- [1] Anonymous. IUCN Red List of threatened species, www.iucnredlist.org cited on December 27th 2009. 2008.
- [2] Khan M, Hussain F, Musharaf S. Biodiversity of plant species in Tehsil Takht-e-Nasrati, Pakistan. *International Journal of Biodiversity and Conservation*, 2013a. 5(1): 39-46. DOI: 10.5897/IJBC12.130.
- [3] Govaerts R. How many species of seed plants are there? *Taxon*. 2001. 50(4): 1085-1090.
- [4] Khan M, Hussain F, Musharaf S. Floristic Composition and Biological Characteristics of the Vegetation of Sheikh Maltoon Town, District Mardan, Pakistan. *Annual Review & Research in Biology*. 2013b. 3(1): 31-41.
- [5] Khan M. Dimension and composition of plant life in Tehsil Takht-e-Nasrati, District Karak, Khyber Pakhtunkhawa, Pakistan. PhD. Thesis (Plant Ecology), Department of Botany, University of Peshawar, Peshawar, Pakistan. 2013.
- [6] Alam J, Ali SL. Conservation status of *Astragalus gilgitensis* Ali (Fabaceae): a critically endangered species in Gilgit district, Pakistan. *Phyton (Horn, Austria)*. 2009. 48(2): 211-223.
- [7] Khan M, Shinwari ZK, Musharaf S. Conservation and ecological characteristic of Trees in Tehsil Karak Pakistan. *Journal of Biodiversity and Environmental Sciences*. 2011a. 1(6): 155-164.
- [8] Khan M, Hussain F, Musharaf S. Maturity dynamism of plant life in Tehsil Takht-e-Nasrati, District Karak, Pakistan. *International Journal of Biosciences*. 2012b. 2(3): 67-74.
- [9] Shinwari MI, Khan MA. Folk use of medicinal herbs of Margalla Hills National Park, Islamabad. *J. thnopharmacol*. 2000. 69: 45-56.
- [10] Hussain F, Badshah L, Dastigar G. Folk medicinal uses of some plants of South Waziristan, Pakistan. *Pak. J. Pl. Sci*. 2006. 12: 27-40.
- [11] Shinwari ZK. Medicinal plants research in Pakistan. *J. Med. Pl Res*. 2010. 4: 161-176.
- [12] Khan M, Musharaf S, Shinwari ZK. Ethnobotanical importance of halophytes of Noshpho salt mine, District Karak, Pakistan. *Research In Pharmaceutical Biotechnology*. 2011b. 3(4): 46-52.
- [13] Khan M, Hussain F. Palatability and animal preferences of plants in Tehsil Takht-e-Nasrati, District Karak, Pakistan. *African Journal of Agricultural Research*. 2012. 7(44): 5858-5872. DOI: 10.5897/AJAR12.2095
- [14] Khan M, Hussain F, Musharaf S. Ethnobotanical profile of Tehsil Takht-e-Nasrati, District Karak, Pakistan. *Journal of Medicinal Plant Research*. 2013c. 7(22): 1636-1651, DOI: 10.5897/JMPR12.1168.
- [15] Khan M, F. Hussain. Conservation status of plant species in Tehsil Takht-e-Nasrati, District Karak, Khyber Pakhtunkhawa, Pakistan. *International Journal of Biodiversity and Conservation*. 2013. 5(1): 20-26. DOI: 10.5897/IJBC12.003
- [16] Anonymous. Takht-i-Bahi, UNESCO Office, Islamabad, Pakistan. 2002.
- [17] Anonymous. IUCN Red List Categories: Version 3.1. Species Survival Commission. IUCN, Gland, Switzerland & Cambridge, UK. 2001.
- [18] Engler M. The Value of International Trade. *Traffic Bulletin*. 2008. 22(1): 4-5.
- [19] Rabinowitz D. Seven forms of rarity. In: *The Biological Aspects of Rare Plant Conservation*. (Ed.): H. Synge. Wiley & Sons Ltd. 1981. 205-217.

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- [20] Davis SD, Heywood VH, Hamilton AC. Centres of Plant Diversity: a guide and strategy for their conservation, Vol. 2 (Asia, Australasia and the Pacific). Cambridge: IUCN. 1995.
- [21] Shenji P. Himalayan Biodiversity Conservation Strategies. Himavikes Pub. 1994. No.3.
- [22] Shah A, Marwat SK, Gohar F, Khan A, Bhatti KH, Amin M, Din NU, Ahmad M, Zafar M. Ethnobotanical study of medicinal plants of semi-tribal area of Makerwal and GullaKhel (Lying between Khyber Pakhtunkhwa and Punjab Provinces), Pakistan. *Am J plant Sci.* 2013. 4: 98–116.
- [23] Khan M, Hussain F, Musharaf S. Conservation Status of Tree species in Tehsil Takht-e-Nasrati, Karak Pakistan. *Journal of Biodiversity and Environmental Sciences.* 2012a. 2(3): 48-56.
- [24] Shinwari ZK, Gilani SS. Sustainable harvest of medicinal plants at Bulashbar Nullah, Astore (Northern Pakistan). *J. Ethnopharmacol.* 2003. 84: 289-298.

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