

Possibility of an Information System on Plants of South-West Asia with Particular Reference to the Turkish Plants Data Service (TUBIVES)

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Abstract: For quick and accurate access to information about a flora of a country it is becoming increasingly important to develop databases. Databases developed and provided by international organisations are expensive to use and difficult to maintain without outside help. It is therefore important for developing countries to develop their own plant databases best suited to their requirements. One such example is the Turkish Plant Data Service (TUBIVES), designed by Turkish systematists. This database is described with some samples, and the possibility of creating a South-West Asian Plants Information Service (SWAP-IS) is briefly discussed.

Key Words: Systematic botany, database, information system, Internet, Turkey, South-West Asia

Türkiye Bitkileri Veri Servisinin Tanıtımı İle Güneybatı Asya Bitkileri Hakkında Bir Enformasyon Sisteminin Olasılıkları

Özet: Bir ülke florasına ait bilgilere doğru ve çabuk erişimi için veri tabanlarının geliştirilmesi önemli hale gelmektedir. Uluslar arası kuruluşlar tarafından geliştirilen ve sağlanan veritabanlarını kullanmak ve dış yardım olmaksızın devamlılığını sağlamak pahalı ve zor olmaktadır. Bu nedenle, gereksinimlerine en uygun olan kendi bitki veri tabanlarını oluşturmak geliştirmekte olan ülkeler için önemlidir. Türk sistematiği tarafından tasarılan Türkiye Bitkileri Veri Servisi (TUBIVES) buna bir örnek oluşturur. Bazı örneklerle, bu veri tabanı anlatılmış ve bir Güney Batı Asya Bitkileri Enformasyon Servisi'nin (SWAP-IS) kurulması olasılığı kısaca tartışılmıştır.

Anahtar Sözcükler: Sistematik botanik, veritabanı, enformasyon sistemi, İnternet, Türkiye, Güney Batı Asya

Introduction

Half a century or so ago, with the development of numerical taxonomy, computer technology became a part of systematic botany (Michener & Sokal, 1957; Sneath, 1957a, 1957b). This was a revolutionary approach in taxonomic methodologies. Through rapid advances in computers, network technology and web-based programs, systematic botany has been opened up to the network-space over the last 7 years.

The bases of digital floras, monographs and herbaria are currently being created by taxonomists all over the world. It is reasonable to say that within the next 5 years we will be able to use such floras, monographs and herbaria through Internet facilities and even with mobile telephones. According to Bisby (2000), introducing the Internet into these information systems has created "a

chaotic but exciting quiet revolution" in the fields of taxonomy and biodiversity.

Biodiversity Databases in Turkey

Databases documenting the great biological diversity of Turkey started about 2 decades ago. These were designed by the efforts of a few individual scientists. Later, such projects were supported by government organisations. The first database of Turkish plants was created by Babaç (1988a) in 1985. In this database, data on the Tribe *Vicieae* (Leguminosae) from Elazığ province in East Turkey were recorded and distribution maps prepared on screen using a 'Commodore 128+' computer. Later, a floristic database of the Pütürge district of Malatya province was created using the hierarchical database structure written in GWBasic. At the same time, Babaç & Evren (1987) created another

database containing the medicinal and industrial plants of Elazığ province, using a commercial database program, dBASEII, and in 1988 Babaç (1988b) developed the first taxonomic database with nomenclature, ecological and distribution data of the Tribe Viciae in Turkey using dBASEIII+.

The first national database, the Database of Turkish Plants (TUBVET), supported by the Scientific and Technical Research Council of Turkey (TÜBİTAK), contains 21 data fields, and approximately 10,000 taxa (Babaç et al., (1995); the second largest database, the Central Database of Turkish Herbaria (TURKHERB) was started in 1997, with support from TÜBİTAK and the State Planning Organisation (DPT). This database is still in use and maintained. It contains 23 data fields and holds information on approximately 80,000 herbarium specimens from 23 different herbaria belonging to 21 Turkish national universities. Data is entered from herbarium labels (TÜBİTAK-DPT project 1998, pers. com.).

Other databases, a Nomenclatural Database of Turkish Vascular Plants (NOMVET) designed by Doğan (TÜBİTAK project 2002, pers. com.) and one on Turkish Fresh Water Algae (ALGVET) created by Şen (TÜBİTAK project 2002, pers. com.), are not in public use yet.

TURKKRIP, a database of Turkish spore plants started by Babaç in 2001 (supported by TÜBİTAK-DPT), contains several subdatabases on Turkish biological diversity. These are all under preparation and are expected to be completed by 2003. A Turkish faunistic database (Kence, TÜBİTAK-DPT Project 2002) being developed has not yet opened for service. It is agreed that after the completion of the aforementioned databases, BioCes, a Turkish national biodiversity database, will be used to integrate all these.

Turkish Plants Data Service (TUBIVES)

<http://www.tubitak.gov.tr/tubives>

In September 2001, a data service about Turkish plant diversity was established at the Abant İzzet Baysal University in Bolu (North-West Anatolia), under the name of the Turkish Plants Data Service (TUBIVES), in Turkish. The database, TUBVET (Data Base of Turkish Plants), was primarily used in establishing the TUBIVES system.

In order to access TUBIVES, one must become a user member with a full e-mail address as one's user name and with a user password. A user name and password, after acceptance of a user's application, are sent back to

applicants with an address with ".edu", ".org", ".mil" or ".gov" extensions only and are valid for a temporary period of time. TUBIVES consists of 2 main data-retrieval systems for Turkish plants. These link to the "geographic" or "taxonomic" database searches.

Data Retrieval for Geographic Distributions of Turkish Plants

On this page, the geographic option is used to retrieve data about the geographic distributions of taxa. When the "Geographic" button is selected "Taxon" (Takson) and "Endemics" (Endemik) buttons appear on the screen from which, distribution data of Turkish endemic plants can be retrieved. Information is based on grid squares as used in the Flora of Turkey (Davis, 1965) and according to Turkish provinces (Figure 1). The distributions of the taxa are entered according to the 81 Turkish provinces. The taxonomic page consists of 6 search options: taxa in grid squares; taxa in a province; taxa in either provinces or grid squares; taxa in more than one province; a single taxon occurring in provinces; and a single taxon occurring in grid squares. The same options are present for endemic taxa, plus endemic taxa particular to a single province. These are illustrated by Figures 1 to 3.

Data Retrieval for Taxonomic Information about Turkish Plants

The second main system of TUBIVES has a "Taxonomic" [Taksonomik] option, in which there are two search sub-options: "Independent" and "Dependent".

On the independent search page there is a form that has to be filled in for data retrieval. In this form, there are 3 columns: fields, show and key words. There are 20 numbered fields in Figure 4. Their English equivalents are: (1) Family, (2) Genus, (3) Species, (4) Species Author, (5) Subspecies, (6) Subspecies Author, (7) Variety, (8) Variety Author, (9) Life Span, (10) Habit, (11) Life Form, (12) Habitat, (13) First Flowering Month, (14) Last Flowering Month, (15) Minimum Altitude, (16) Maximum Altitude, (17) Endemism, (18) Phytogeographic Element, (19) Distribution in Turkey and (20) General Distribution around the World. All of the options under the "Show" column are "No" [HAYIR] as default, except for numbers 3-8 which are "Yes" [EVET]. Any of them may be changed to "Yes" or "No" depending on one's preference (Figures 4 and 5). At the least, the Genus or Species boxes must be completed. Otherwise, the search result gives an error message.

The screenshot shows a web browser window with the URL <http://arkeoloji.muhtemul.com.tr/TUBIVES>. The page header includes the logo of TÜRKİYE BİLİMSEL YERİ SERVİSİ and the text "TUBIVES TÜRKİYE BİLİMSEL YERİ SERVİSİ TÜRKİŞE PLANTS DATA SERVICE".

The main heading is **(Searching Endemic Taxa Occurring in a Province)**. Below it is the sub-heading **Bir İlde Bulunan Endemik Taksonların Sorgulanması**.

The central feature is a map of Turkey with all provinces color-coded. A black arrow points to the province of Van, which is highlighted in purple. The word "Van" is written in bold black text above the arrow.

Below the map is the heading **(Alphabetical Order)**. Underneath this heading is the sub-heading **Bir İlde Bulunan Taksonların Sorgulanması (Alfabetik Sıralama)**. Below this sub-heading is a grid of six orange buttons arranged in two rows and three columns. The buttons are labeled: Adana, Edirne, Kütahya, Adıyaman, Malatya, and Elazığ.

The browser's address bar shows the URL, and the status bar at the bottom indicates the page is from "TUBIVES".

Figure 1. Taxa occurring in a Province. The black arrow shows the selected province, Van, from where the taxa are retrieved.

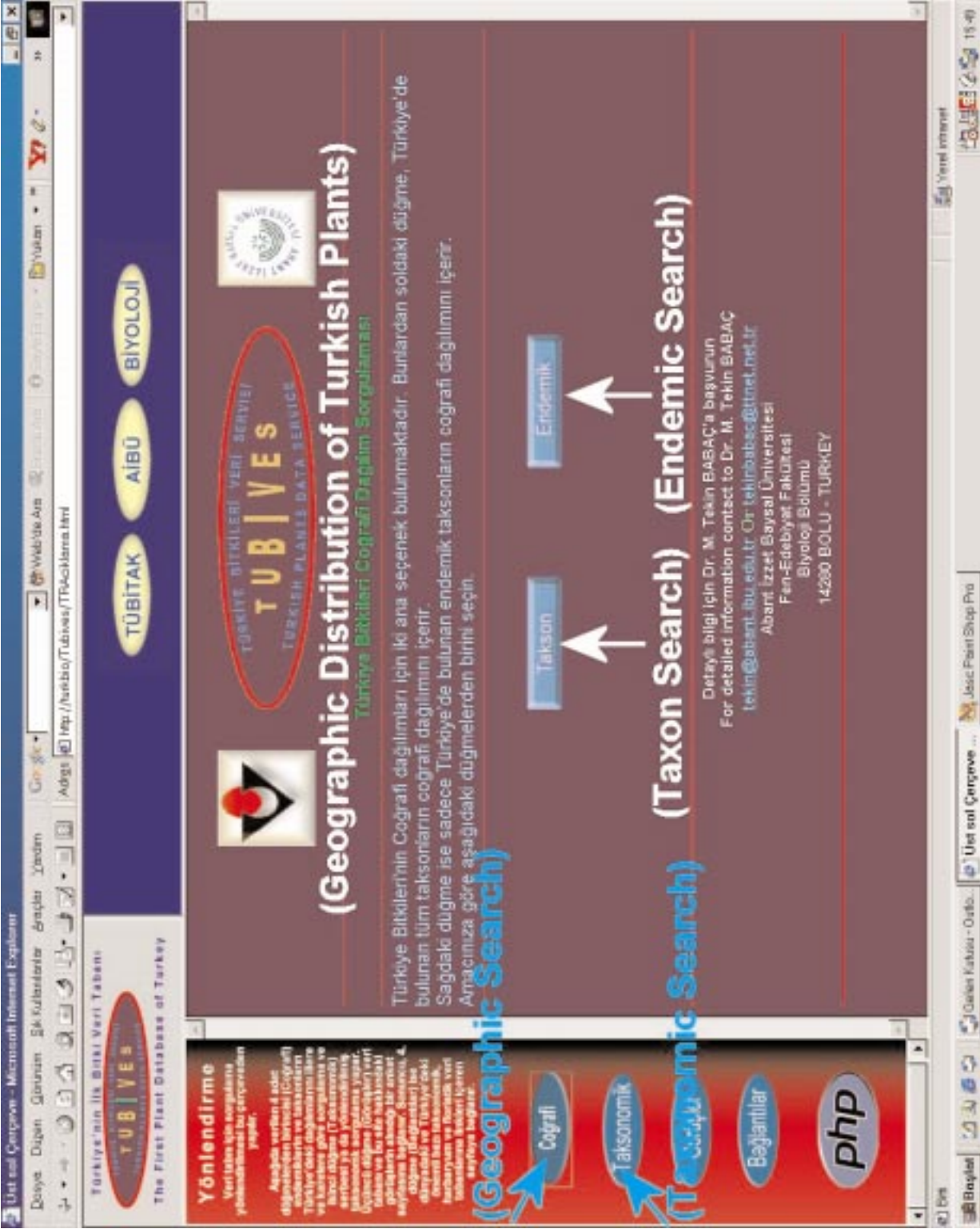


Figure 2. When the Geographic option has been selected, the page appearing on the monitor indicates another 2 options: "Taxon" and "Endemic".

(Searching a Single Taxon From Provinces)
Endemik Bir Taksonun Bulunduğu illerin Sorgulanması

(Choose an Endemic Genus)

(Endemic Genus) → **(Submit)** → **(Choose an Endemic Taxon)** → **(Erase)**

(Abies nordmanniana subsp. bornmuelleriana)

(Endemic Taxon)

Endemik bir oğul seçin
 Abies cilicica subsp. issanica
 Abies nordmanniana subsp. bornmuelleriana
 Abies nordmanniana subsp. equi-trojani
 Abies nordmanniana subsp. brachystachyum
 Acantholimon acerosum var. parvifolium
 Antholimon bracteatum var. capitatum

Endemik bir oğul seçin
 Cins: Crenoscladum
 Cythobasis

EYLEM: BUL EYLEM SİL

TAKSON : BUL EYLEM SİL

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Figure 3. Retrieving a single endemic taxon occurring in provinces. As an example of data retrieval, *Abies nordmanniana subsp. bornmuelleriana* is selected from the combo-box menu listing all the endemic taxa in Turkey.

(Independent General Taxonomic Search)
İsteğe Bağlı Genel Taksonomik Sorgulama

(Field) (Show)(Key Word) (Field) (Show)(Key Word)

ALAN	GÖSTER	ANAHTAR VERİ	ALAN	GÖSTER	ANAHTAR VERİ
1 FAMILYA	HAYIR	2	CINS	HAYIR	(No)
3 TUR	EVET	4	TUR YAZARI	EVET	
5 ALTTUR	EVET	6	ALTTUR YAZARI	EVET	(Yes)
7 VARYETE	EVET	8	VARYETE YAZARI	EVET	
9 ÖMÜR	HAYIR	10	YAPI	HAYIR	
11 HAYAT FORMU	HAYIR	12	HABITAT	HAYIR	
13 İLK ÇİÇEKLENME	HAYIR	14	SON ÇİÇEKLENME	HAYIR	
15 MINİMUM YÜKSEKLİK	HAYIR	16	MAKSİMUM YÜKSEKLİK	HAYIR	
17 ENDEMİZM	HAYIR	18	ELEMENT	HAYIR	
19 TÜRKİYE DAĞILIMI	HAYIR	20	GENEL DAĞILIM	HAYIR	
		BUL	Eylem	SİL	(Delete)

(Search)

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Figure 4. Form for retrieving data from the TUBVET database by TUBIVES. This contains 20 data boxes into which key words are entered. The numbers are explained in the text.

İns Sorgulama - Microsoft Internet Explorer

Çağır... WebSite Ana... Y7

Adres: http://habes.vtrhp.gov.tr/genelextguyes.html

TÜRKİYE SİRKELERİ VERİ SERVİSİ
TUBİVES
TÜRKLER PLAZINA DATA SERVICE

(Independent General Taxonomic Search)
İsteğe Bağlı Genel Taksonomik Sorgulama

Lathyrus

ALAN	GÖSTER	ANAHTAR VERİ	ALAN	GÖSTER	ANAHTAR VERİ
1 FAMILYA	EVET	2	CINS	EVET	Lathyrus
TUR	EVET		TUR YAZARI	EVET	
ALTTÜR	EVET		ALTTÜR YAZARI	EVET	
VARYETE	EVET		VARYETE YAZARI	EVET	
ÖMÜR	HAYIR		YAPI	HAYIR	
HAYAT FORMU	HAYIR	12	HABİTAT	EVET	
13 İLK ÇİÇEKLENME	EVET	14	SON ÇİÇEKLENME	EVET	
15 MINİMUM YÜKSEKLİK	0	16	MAKSİMUM YÜKSEKLİK	KUÇUK	750 m.
17 ENDEMİZİM	EVET	18	ELEMENT	EVET	
19 TÜRKİYE DAĞILIMI	EVET	20	GENEL DAĞILIM	EVET	
		BUL	Eylem		SL

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Figure 5. An example of retrieving data from the database. Here, taxa belonging to genus *Lathyrus* occurring at a minimum altitude, above sea level, and at a maximum altitude, below 750 m, are requested. At the same time, data for these taxa from number fields 12-20 have been requested.

In the dependent sub-option, the selections are directed by the program itself. All families reported from Turkey are listed on that page, on which one family may be clicked. The list of the genera belonging to that family then appears on the screen. If a genus is clicked for a selection, all the taxa of that genus from Turkey can be seen. When a taxon name is clicked, then a table containing all the taxonomic information about the selected taxon can be seen, together with its geographic distribution in Turkish provinces and grid squares.

A Suggested Southwest Asian Plants Information System (SWAP-IS)

Most countries in South-West Asia now take an active interest in their biological diversity and are equipped to enter information onto the database. To benefit from this digital environment, it is suggested that the South-West Asian countries should create their own floristic, taxonomic, monographic and herbarium

databases and disseminate them. These databases could build into a South-West Asian Plant Information System (SWAP-IS).

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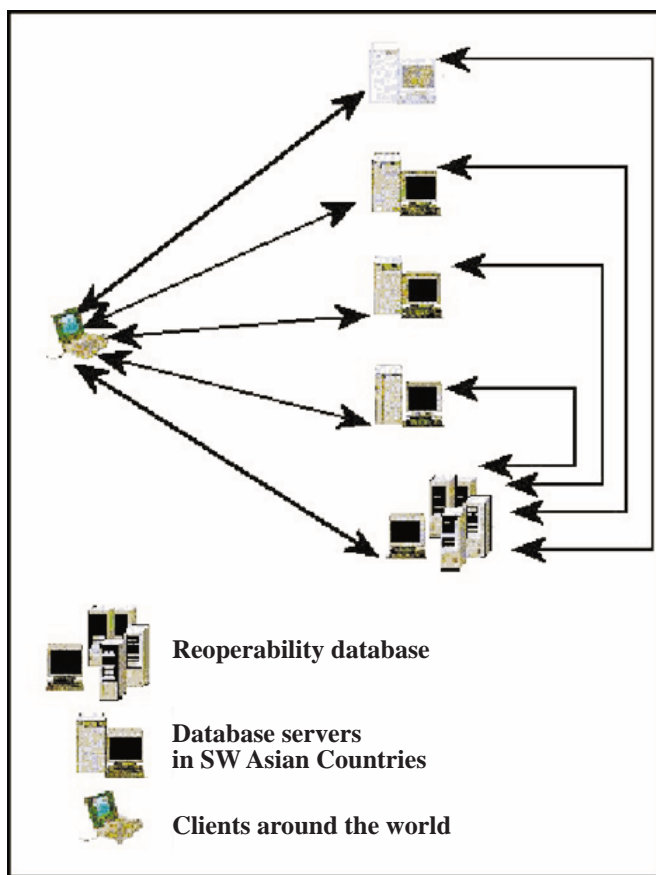


Figure 6. A possible structure of the South-West Asian Plants Information System (SWAP-IS).

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