

## **Review of plant species cited in the Bible**

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### **ABSTRACT**

The study compares the opinions of biblical flora researchers published in recent decades, in order to present a verified and updated list of plants referred to in the Bible. The work was based on the available references and the author's own research of the flora of Israel, conducted during three summer research field camps. The present level of knowledge on the subject yields a compiled list of 206 species of biblical plants, of which 95 are recognised by all contemporary researchers of the flora of the Bible. This study may be classified as an inter-disciplinary approach designed to enable the correct interpretation of botanical and horticultural terms in the course of translating the Bible, and facilitate a better understanding of the context of the Holy Scripture. The updated list of plant species referred to in the Holy Scripture is also helpful when designing and developing biblical gardens.

## INTRODUCTION

In 1737, Alexander Cruden wrote in Concordance: ‘nothing is less certain than the Hebrew names of plants in the Bible’. Although the studies on plant species appearing in the Bible have made some progress since then, however, as admitted by Zohary (1982) and Hepper (1992), even today one cannot be sure which plant species are referred to in many fragments of biblical texts. There exists no list of plants appearing in the Bible, often referred to as ‘biblical plants’, which could be accepted as completely indisputable.

The knowledge of the different species of ‘biblical plants’, is a matter of primary importance when translating the Bible into various languages, because correct translation facilitates more profound understanding of the texts and enhances their message. Unfortunately, even the latest translations of the Holy Scripture contain major errors in the nomenclature of plants (Włodarczyk 2006); thus, there is an urgent need to compile and publish an updated list of biblical plants. Such an updated list is also necessary to help the designers of biblical gardens. The modern type of such gardens is quite popular in the United States, Western Europe and Australia, and now, for the first time, such gardens are also established in Poland and the Ukraine.

The aim of this paper is to present a verified and updated list of plant species referred to in the Bible, based on available references and the author’s own studies on the flora of Israel, carried out during three research field camps there.

## MATERIAL AND METHODS

This study presents and compares the opinions of biblical flora researchers, published in recent decades. The oldest reference reviewed, is the work by Harold and Alma Moldenke, who in their book titled ‘*Plants of the Bible*’, presented all the opinions and hypotheses concerning the identification of biblical plant species until 1952, listing 230 taxa. No older references were reviewed by the author of this study, as the above mentioned work is universally recognised by modern researchers of biblical flora, as the basic reference and starting point for any further studies. The work of Michael Zohary ‘*Plants of the Bible*’ (1982), was also reviewed in which 128 species were described and additional 16 species were mentioned. Both Moldenkes’ and Zohary’s works were arranged in the form of lexicons.

Another work which has been taken into account is the ‘*Illustrated Encyclopaedia of Bible Plants*’, published in 1992, worked out by F. Nigel Hepper, the Director of the Royal Botanic Gardens in Kew, U.K. in the 1980s and 1990s. This work follows a pattern different to the earlier references. The author described bible plants using the format of lectures devoted to specific themes. He presented

ca. 180 species of bible plants, grouped by subjects, accompanied by modern theories and hypotheses concerning the issue of identifying the species of bible plants. The 1992 German translation of Hepper's book titled '*Pflanzenwelt der Bibel*' has been used for this study.

The latest among the basic sources concerning bible plants, quoted in this study is '*Les plantes dans la Bible*' by Jean and Solange Maillat (1999), following a format similar to Hepper's book. The authors listed 174 species of bible plants. Other publications, e.g. by Nogah Hareuveni (1988, 1989, 1991, 1996), the founder and Director of the Neot Kedumim Biblical Landscape Reserve, do not include all biblical plants but provide an exhaustive analysis of numerous fragments of the Scripture, containing references to themes of nature. The interpretations of the biblical events are very careful and detailed, because their author possesses a profound knowledge of the Bible, the Talmud and botany. The correspondence exchanged by the author with Hareuveni during the work on this paper indicates that his goals do not include provision of the full catalogue of bible plants.

The analysis of the origin of plants regarded as "biblical plants" has been carried on the basis of '*Flora Palaestina*', by Zohary (1966 a, 1966 b, 1987 a, 1987 b) and Feinbrun-Dothan (1977, 1978, 1986 a, 1986 b), as well as '*Nouvelle Flore du Liban et de la Syrie*' (Mouterde 1966), '*Flora des pharaonischen Agypten*' (Germer 1985) and '*Flora of Egypt*' (Boulos 1999, 2000). These works, together with additional publications of Brosse (1979), Browicz (1982, 1992), Hoffman et al. (2000), Hoppe (1975), Krüssmann (1972, 1976, 1977, 1978), Lecomte (1910), Lippert and Podlech (1995), Mirek et al. (1995), Otałęga (2000), Seneta (1991, 1994, 1996), and Seneta and Dolatowski (2000) helped to identify the names of currently used plant names and their synonyms.

In this paper, the Polish translation of the Bible by the Benedictine monks of Tyniec (the so-called Millennium Bible) (Biblia Tysiąclecia 1980) has been used. The English quotation from The Book of Jeremiah (39,10) was taken from English Standard Version of the Holy Bible (2001).

A preliminary survey of the library holdings, carried out on the basis of the aforementioned references, has been supported by the author's own research during three extended visits to Israel in 1996, 2004 and 2006. Each time, the visit involved participation in a 2-week camp devoted to scientific field research, aimed at studies of the flora of Israel, helpful in verifying the knowledge of biblical flora and clarify without any doubts.

## RESULTS AND DISCUSSION

The 230 species list presented by the Moldenkes' includes bacteria, blue algae, fungi, lichens and higher plants. In this study, bacteria and fungi which are pathogens or organisms responsible for spoiling food, as well as those used in the fermentation of wine and baking bread, were omitted. The lichens of the genus

*Lecanora* have been included in the compilation for the purpose of discussing the phenomenon of manna and the lichen species *Roccella tinctoria* was also included, due to the fact that it was used to obtain blue dye. Also omitted from consideration were the grass species listed by the Moldenkes, as examples of species of pastures. In all, 199 out of the original 230 were included in comparative analysis. The discussion covers some species not accepted by the Moldenkes, but appearing in the various opinions they presented, later verified as plants appearing in the Bible. These species (16 in total) are marked in Table 1 with (•) symbol.

Many species have been reported under a number of synonymic names, even by the same author. The synonym names are listed in the same line as the name of the species applied in the modern nomenclature (Table 1) but not in bold characters. A similar solution was applied to the botanical varieties of the same species, e.g. *Origanum maru* L. and *Origanum maru* var. *aegyptiacum* (L.) Dinsm, or in the case of two or three species whose distinction was of no importance in the translation of biblical texts, e.g. *Ruta halepensis* and *Ruta graveolens*; *Capparis spinosa* L. and *Capparis sicula* Duham. = *C. spinosa* var. *canescens*.

The analysis of the basic references indicated that the Moldenkes' list was known to all other authors and frequently cited. Only Zohary (1982) faulted Moldenkes for not verifying the species, thus extending it to 230 species. Although Zohary declared that his list was complete, he did state in the introduction to his book, that many of the plants appearing in the Bible were difficult to identify and thus it was hard to predict whether they would ever be finally identified. Zohary (1982) excluded certain plant species presented in earlier hypotheses, while introducing new ones (Table 2), based on the similarities between the biblical names and the epithets in the contemporary Arabic language. Zohary submits that throughout the seven centuries of Roman and later Byzantine occupation (from 70 BC to 640 AD), Jewish peasants continued to till the soil, irrespective who their ruler was. This is supported by a quote from the Book of Jeremiah 39,10: *Nebuzaradan, the captain of the guard, left in the land of Judah some of the poor people who owned nothing, and gave them vineyards and fields at the same time* (English Standard Version 2001).

Thus, they used the traditional names describing plants, tools and farming occupations. From 640 AD, after Palestine had been conquered by Muslims, the new Arab settlers borrowed a number of the names identifying plants from the natives of the land. Through this process, the Arabic language retained the old-Hebrew names of apple, fig, grapevine, pistachio, almond, pomegranate, carob, woad-waxen, and acacia, while many of these names were changed in the contemporary Hebrew (Zohary 1982).

The same attitude aimed at finding more accurate and concrete names for bible plants through tracking them in the Arabic language was applied by other Hebrew researchers, e.g. Hareuveni (1989, 1991, 1996), who documented the occurrence of

several new species in the Bible, namely *Dalbergia melanoxylon*, *Eryngium creticum*, *Salvia judaica*, and *Thymelaea hirsuta* but also provided robust evidence supporting the occurrence of species suggested by other researchers, e.g. *Citrus medica*, *Cynomorium coccineum*, *Loranthus acaciae*, *Pancratium maritimum*, *Populus euphratica*, *Urginea maritima*, and *Ziziphus spina-christi*.

Hepper (1992) was of the opinion that the new discoveries by Zohary should be treated with utmost caution. Apart from the studies of the similarities in the linguistic domain, it is also important to study thoroughly the context in which a given plant appears in the biblical text, and to determine its distribution within the biblical lands throughout the period biblical texts were created. He is not in favour of adding the following species suggested by Zohary: *Acanthus syriacus*, *Alcea setosa*, *Allium porrum*, *Anabasis atriculata*, *Cassia senna*, *Citrus medica*, *Echinops viscosus*, *Hammada scoparia*, *Hedera helix*, *Hyoscyamus muticus*, *Lagenaria siceraria*, *Laurus nobilis*, *Malus sylvestris*, *Panicum miliaceum*, *Reichardia tingitana*, *Scolymus hispanicus* and *Viburnum tinus*. He also rejects some plants suggested by the Moldenkes', primarily those which did not originate from the Holy Land.

Hepper is the only author who lists five species never previously regarded as bible plants: *Acorus calamus*, *Allium kurrat*, *Cistus laurifolius*, *Morus alba* and *Portulaca oleracea*. He includes two more species, *Triticum turgidum* and *Typha latifolia*, which had been presented in earlier studies but not accepted by Moldenke and Moldenke (1952) and other authors. Maillat and Maillat (1999) refer to the publications by Moldenke and Moldenke (1952) and Zohary (1982), but they do not refer to the Hepper's studies. In all, they list 14 species after the Moldenkes': *Agrostemma githago*, *Boswellia thurifera*, *Cistus salviifolius*, *Commiphora africana*, *Commiphora kataf*, *Iris pseudacorus*, *Nymphaea lotus*, *Ornithogalum umbellatum*, *Paliurus spina-christi*, *Salicornia fruticosa*, *Salsola inermis*, *Sinapis arvensis*, *Tamarix mannifera* and *Zostera marina*, which were rejected by Zohary (1982) and Hepper (1992). While discussing a number of excerpts from the Bible related to plant life, the Maillats' introduce, along with universally accepted species, several other species on the sole grounds that they are native to Palestine. Not all species proposed by Zohary (1982) are accepted by the Maillats'. This fact concerns nineteen species: *Acacia albida*, *Acanthus syriacus*, *Anabasis atriculata*, *Cephalaria syriaca*, *Curcuma longa*, *Echinops viscosus*, *Haloxylon persicum*, *Hammada scoparia*, *Hyoscyamus muticus*, *Juniperus excelsa*, *Lagenaria siceraria*, *Laurus nobilis*, *Lilium candidum*, *Reichardia tingitana*, *Suadea palaestina*, *Typha domingensis*, *Ulmus canescens*, *Viburnum tinus* and *Vicia faba*. Maillat and Maillat (1999) introduce new species which have not been considered in the discussions as yet: *Calycotome villosa*, *Cistanche tubulosa*, *Ochradenus baccatus*, *Sonchus oleraceus* and *Verbascum sinaiticum*. Among these newly proposed species, *Ochradenus baccatus*, indicated as the source of the biblical manna, has been of particular importance.

During her research visits to Israel, the author made observations of this particular plant and experimented with storing its fruits. Both indicate that the biblical manna could have been the fruits of the shrub *Ochradenus baccatus*, as their appearance immediately after harvest as well as later after storage, corresponds with the descriptions given in the books of the Bible: the Book of Exodus 16,31-35 and Numbers 11,6-9. *Ochradenus baccatus* shrubs occur in numbers within the beds of seasonal rivers (wadi) in hot deserts: Desert of Juda, Negev, the lower part of the River Jordan valley, around the Dead Sea, in the Arava valley, and in the deserts of Moab and Edom (Zohary 1966).

The species listed by the Moldenkes' and rejected by all later researchers were deemed no longer current, i.e. such species whose occurrence could not be substantiated given the present level of knowledge. There are 49 such species: *Acacia nilotica*, *Acacia seyal*, *Alhagi camelorum* var. *turcorum*, *Allium ascalonicum*, *Anastatica hierochuntica*, *Astragalus tragacantha*, *Atriplex dimorphostegia*, *Atriplex rosea*, *Atriplex tatarica*, *Centaurea calcitrapa*, *Centaurea verutum*, *Cichorium endivia*, *Crocus cancellatus* var. *damascenus*, *Crocus hyemalis*, *Crocus vitellinus*, *Crocus zonatus*, *Cucumis chate*, *Cucumis sativus*, *Diospyros melanoxydon*, *Elaeagnus angustifolia*, *Fraxinus ornus*, *Hyacinthus orientalis*, *Juncus effusus*, *Juniperus oxycedrus*, *Lecanora affinis*, *Lecanora esculenta*, *Lecanora fruticulosa*, *Lilium chalcedonicum*, *Nasturtium officinale*, *Quercus ilex*, *Quercus lusitanica*, *Roccella tinctoria*, *Rumex acetosella* var. *multifidus*, *Ruscus aculeatus*, *Saccharum officinarum*, *Salicornia herbacea*, *Salix fragilis*, *Salix safsaf*, *Scirpus holoschoenus* var. *linnaei*, *Scirpus maritimus*, *Styrax benzoin*, *Tamarix pentandra*, *Tamarix tetragyna*, *Triticum aestivum* var. *spelta*, *Triticum compositum*, *Urtica caudata*, *Urtica dioica*, *Vitis orientalis*, and *Xanthium spinosum*.

Table 1 presents 290 taxa which have appeared in the accounts of biblical flora since 1952. In this list, 23 synonyms were found. In nine lines marked by asterisks (\*), close related species or the varieties that concern the same plant in the Bible are presented. Thus, 255 items containing a single species or related groups were left for the comparative analysis. After 1952, 49 taxa were omitted from the discussions on biblical flora. After excluding these, 206 species (given in bold characters) remain, which are accepted by contemporary researchers and may be used as a basis for selection of plants when arranging biblical plant collections or gardens. Among these 206 species, 95 (indicated in Table 1 by the shaded fields) were listed by all authors, i.e. Moldenke and Moldenke (1952), Zohary (1982), Hepper (1992) and Maillat and Maillat (1999) and as such can be deemed universally accepted.

Table 1. List of taxa of bible plants according to the most recognized authors: Moldenke and Moldenke (1952), Zohary (1982), Hepper (1992), Maillat and Maillat (1999) and Hareuveni (1988, 1989, 1991, 1996)

Serial numbers (all species covered by the analysis)	Serial numbers of species confirmed by contemporary researchers	Name of species	Moldenke, Moldenke (1952)	Zohary (1982)	Hepper (1992)	Maillat, Maillat (1999)	Hareuveni (1988, 1989, 1991, 1996)
1	1.	<b><i>Abies cilicica</i> (Ant. &amp; Ky) Carr</b>	(■)	+	+	+	
2	2.	<b><i>Acacia albida</i> Delile</b>		+	+		+
3		<i>Acacia nilotica</i> (L.) Forssk	+				
4	3.	<b><i>Acacia raddiana</i> Savi</b>	(■)	+	+	+	
5		<i>Acacia seyal</i> Delile	+				
6	4.	<b><i>Acacia tortilis</i> (Forssk.) Hayne</b>	+		+	+	
7	5.	<b><i>Acanthus syriacus</i> Boiss.</b>	+	+			
8	6.	<b><i>Acorus calamus</i> L.</b>				+	
9	7.	<b><i>Agrostemma githago</i> L.</b>	+			+	
10	8.	<b><i>Alcea setosa</i> (Boiss.) Alef.</b>		+		+	
11		<i>Alhagi camelorum</i> var. <i>turcorum</i> Boiss.	+				
12	9.	<b><i>Alhagi maurorum</i> Medik.</b>	+		+	+	
13		<i>Allium ascalonicum</i> L.	+				
14	10.	<b><i>Allium cepa</i> L.</b>	+	+	+	+	
15	11.	<b><i>Allium kurrat</i> Schweinf. ex Krause</b>			+		
16	12.	<b><i>Allium porrum</i> L.</b>	+	+		+	
17	13.	<b><i>Allium sativum</i> L.</b>	+	+	+	+	
18	14.	<b><i>Aloe succotrina</i> Lam.</b>	+	+	+	+	
19	15.	<b><i>Aloe vera</i> L.</b>		+	+	+	
20	16.	<b><i>Anabasis atriculata</i> (Forssk.) Moq.</b>		+			
21		<i>Anastatica hierochuntica</i> L.	+				
22	17.	<b><i>Anemone coronaria</i> L.</b>	+	+	+	+	+
23	18.	<b><i>Anethum graveolens</i> L.</b>	+	+	+	+	
24	19.	<b><i>Anthemis palaestina</i> Reut.</b>	+	+	+	+	
25	20.	<b><i>Aquilaria agallocha</i> Roxb.</b>	+	+	+	+	+
26	21.	<b><i>Artemisia herba-alba</i> Asso</b>	+	+	+	+	
27	22.	<b><i>Artemisia judaica</i> L.</b>	+		+	+	
28	23.	<b><i>Arundo donax</i> L.</b>	+		+	+	
29	24.	<b><i>Astragalus bethlehemiticus</i> Boiss.</b>		+	+	+	
30	25.	<b><i>Astragalus gummifer</i> Labill.</b>	+	+	+	+	

Serial numbers (all species covered by the analysis)	Serial numbers of species confirmed by contemporary researchers	Name of species	Moldenke (1952)	Zohary (1982)	Hepper (1992)	Maillat, Maillat (1999)	Hareuveni (1988, 1989, 1991, 1996)
31		<i>Astragalus tragacantha</i> L.	+				
32		<i>Atriplex dimorphostegia</i> Kar. & Kir.	+				
33	<b>26.</b>	<b><i>Atriplex halimus</i> L.</b>	+	+	+	+	+
34		<i>Atriplex rosea</i> L.	+				
35		<i>Atriplex tatarica</i> L.	+				
36	<b>27.</b>	<b><i>Balanites aegyptiaca</i> (L.) Delile</b>	+		+	+	
37	<b>28.</b>	<b><i>Boswellia papyrifera</i> (Delile) Hochst.</b>	+		+		
38	<b>29.</b>	<b><i>Boswellia sacra</i> Flueck. syn. <i>Boswellia carteri</i> Birwd.</b>	+	+	+	+	
39	<b>30.</b>	<b><i>Boswellia thurifera</i> Roxb.</b>	+			+	
40	<b>31.</b>	<b><i>Brassica nigra</i> (L.) Koch</b>	+	+	+	+	
41	<b>32.</b>	<b><i>Butomus umbellatus</i> L.</b>			+	+	
42	<b>33.*</b>	<b><i>Buxus sempervirens</i> L. <i>Buxus longifolia</i> Boiss. = <i>B. s. f. longifolia</i></b>	+		+		
43	<b>34.</b>	<b><i>Calotropis procera</i> R. Br.</b>		+	+	+	
44	<b>35.</b>	<b><i>Calycotome villosa</i> (Poir.) Link</b>				+	
45	<b>36.*</b>	<b><i>Capparis spinosa</i> L. <i>Capparis sicula</i> Duham. = <i>C. spinosa</i> var. <i>canescens</i></b>	+	+	+	+	+
46	<b>37.</b>	<b><i>Cassia senna</i> L.</b>		+		+	
47	<b>38.</b>	<b><i>Cedrus libani</i> Barrel.</b>	+	+	+	+	+
48		<i>Centaurea calcitrapa</i> L.	+				
49	<b>39.</b>	<b><i>Centaurea iberica</i> Trev. ex Spreng.</b>	+	+	+	+	+
50		<i>Centaurea verutum</i> L.	+				
51	<b>40.</b>	<b><i>Cephalaria syriaca</i> (L.) Schrad.</b>	(*)	+	+		
52	<b>41.</b>	<b><i>Ceratonia siliqua</i> L.</b>	+	+	+	+	+
53	<b>42.</b>	<b><i>Cercis siliquastrum</i> L.</b>	+		+	+	+
54	<b>43.</b>	<b><i>Chrysanthemum coronarium</i> L.</b>		+	+	+	+
55	<b>44.</b>	<b><i>Cicer arietinum</i> L.</b>		+	+	+	
56		<i>Cichorium endivia</i> L.	+				
57	<b>45.</b>	<b><i>Cichorium intybus</i> L.</b>	+		+		
58	<b>46.</b>	<b><i>Cichorium pumilum</i> Jacq.</b>		+	+	+	
59	<b>47.</b>	<b><i>Cinnamomum cassia</i> Blume</b>	+	+	+	+	
60	<b>48.</b>	<b><i>Cinnamomum zeylanicum</i> Nees</b>	+	+	+	+	



Serial numbers (all species covered by the analysis)	Serial numbers of species confirmed by contemporary researchers	Name of species	Moldenke, Moldenke (1952)	Zohary (1982)	Hepper (1992)	Maillat, Maillat (1999)	Hareuveni (1988, 1989, 1991, 1996)
61	49.	<i>Cistanche tubulosa</i> (Schenk) Wight				+	
	50.	<i>Cistus incanus</i> L.		+	+	+	+
62		syn. <i>Cistus creticus</i> L.	+		+		
		syn. <i>Cistus villosus</i> L.	+				
63	51.	<i>Cistus laurifolius</i> L.			+		
64	52.	<i>Cistus salviifolius</i> L.	+			+	
65	53.	<i>Citrullus colocynthis</i> (L.) Schrad.	+	+	+	+	
66	54.	<i>Citrullus lanatus</i> (Thunb.) Mansf.		+	+	+	
		syn. <i>Citrullus vulgaris</i> Schrad.	+		+		
67	55.	<i>Citrus medica</i> L.		+		+	+
68	56.	<i>Commiphora abyssinica</i> (Berg.) Engl.		+	+	+	
69	57.	<i>Commiphora africana</i> (Arn.) Engl.	+			+	
	58.	<i>Commiphora gileadensis</i> (L.) Christ		+	+	+	
70		syn. <i>Commiphora opobalsamum</i> (L.) Engl.	+				
71	59.	<i>Commiphora kataf</i> (Forssk.) Engl.	+			+	
72	60.	<i>Commiphora myrrha</i> (Nees) Engl.	+		+	+	
73	61.	<i>Conium maculatum</i> L.	(*)	+	+	+	
74	62.	<i>Coriandrum sativum</i> L.	+	+	+	+	
75		<i>Crocus cancellatus</i> var. <i>damascenus</i> (Herb.) G. Maw	+				
76		<i>Crocus hyemalis</i> Boiss. & Bl.	+				
77	63.	<i>Crocus sativus</i> L.	+	+	+	+	
78		<i>Crocus vitellinus</i> Wahlenb.	+				
79		<i>Crocus zonatus</i> J. Gay	+				
80		<i>Cucumis chate</i> L.	+				
81	64.	<i>Cucumis melo</i> L.	+	+	+	+	
82		<i>Cucumis sativus</i> L.	+				
83	65.	<i>Cuminum cyminum</i> L.	+	+	+	+	
84	66.	<i>Cupressus sempervirens</i> L.	+	+	+	+	+
85	67.	<i>Curcuma longa</i> L.		+	+		
	68.	<i>Cymbopogon martinii</i> Stapf		+	+	+	
86		syn. <i>Andropogon aromaticus</i> Roxb.	+				
87	69.	<i>Cymbopogon schoenanthus</i> Spreng.		+	+	+	
88	70.	<i>Cynomorium coccineum</i> L.	+		+	+	+
89	71.	<i>Cyperus papyrus</i> L.	+	+	+	+	+

Serial numbers (all species covered by the analysis)	Serial numbers of species confirmed by contemporary researchers	Name of species	Moldenke (1952)	Zohary (1982)	Hepper (1992)	Maillat, Maillat (1999)	Hareuveni (1988, 1989, 1991, 1996)
90	72.	<i>Dalbergia melanoxydon</i> Guill. & Perr.			+		+
91	73.	<i>Diospyros ebenum</i> Koenig syn. <i>Diospyros ebenaster</i> Retz.	+	+	+	+	
92		<i>Diospyros melanoxydon</i> Roxb.	+				
93	74.	<i>Echinops viscosus</i> DC.		+			
94		<i>Elaeagnus angustifolia</i> L.	+				
95	75.	<i>Eruca sativa</i> Mill.		+	+	+	
96	76.	<i>Eryngium creticum</i> Lam.			+	+	+
97	77.	<i>Ferula galbaniflua</i> Boiss. & Buhse syn. <i>Ferula gummosa</i> Boiss.	+	+	+	+	
98	78.	<i>Ficus carica</i> L.	+	+	+	+	+
99	79.	<i>Ficus sycomorus</i> L.	+	+	+	+	+
100		<i>Fraxinus ornus</i> L.	+				
101	80.	<i>Fraxinus syriaca</i> Boiss.	+		+		
102	81.	<i>Gossypium herbaceum</i> L.	+	+	+	+	
103	82.	<i>Gundelia tournefortii</i> L.	+	+	+	+	
104	83.	<i>Haloxylon persicum</i> Bunge		+	+		
105	84.	<i>Hammada salicornica</i> (Moq.) Iljin		+	+	+	
106	85.	<i>Hammada scoparia</i> (Pomel) Iljin		+			
107	86.	<i>Hedera helix</i> L.	+	+		+	
108	87.	<i>Hordeum distichon</i> L.	+		+	+	
109	88.	<i>Hordeum hexastichon</i> L.	+		+	+	
110	89.	<i>Hordeum vulgare</i> L.	+	+	+	+	+
111		<i>Hyacinthus orientalis</i> L.	+				
112	90.	<i>Hyoscyamus aureus</i> L.		+	+	+	
113	91.	<i>Hyoscyamus muticus</i> L.		+			
114	92.	<i>Iris pseudacorus</i> L.	+			+	
115	93.	<i>Juglans regia</i> L.	+	+	+	+	
116		<i>Juncus effusus</i> L.	+				
117	94.	<i>Juncus maritimus</i> Lam.	+		+	+	
118	95.	<i>Juniperus excelsa</i> Bieb. syn. <i>Sabina excelsa</i> (Bieb.) Antoine	+	+	+		
119		<i>Juniperus oxycedrus</i> L.	+				
120	96.	<i>Juniperus phoenicia</i> L. syn. <i>Sabina phoenicia</i> (L.) Antoine	+	+	+	+	

Serial numbers (all species covered by the analysis)	Serial numbers of species confirmed by contemporary researchers	Name of species	Moldenke, Moldenke (1952)	Zohary (1982)	Hepper (1992)	Maillat, Maillat (1999)	Hareuveni (1988, 1989, 1991, 1996)
121	97.	<i>Lactuca sativa</i> L.	+		+	+	
122	98.	<i>Lagenaria siceraria</i> (Mol.) Standl.		+			
123	99.	<i>Laurus nobilis</i> L.	+	+			
124	100.	<i>Lawsonia inermis</i> L.	+	+	+	+	
125		<i>Lecanora affinis</i> Eversm.	+				
126		<i>Lecanora esculenta</i> (Pall.) Eversm.	+				
127		<i>Lecanora fruticulosa</i> Eversm.	+				
128	101.	<i>Lens culinaris</i> Medik. syn. <i>Lens esculenta</i> Moench	+	+	+	+	
129	102.	<i>Lilium candidum</i> L.	(*)	+	+		+
130		<i>Lilium chalcedonicum</i> L.	+				
131	103.	<i>Linum usitatissimum</i> L.	+	+	+	+	
132	104.	<i>Liquidambar orientalis</i> Mill.	(*)	+	+	+	
133	105.	<i>Lolium temulentum</i> L.	+	+	+	+	
134	106.	<i>Loranthus acaciae</i> Zucc.	+			+	+
135	107.	<i>Lycium europaeum</i> L.	+	+	+	+	+
	108.*	<i>Majorana syriaca</i> (L.) Rafin.			+		+
136		<i>Origanum maru</i> L. <i>Origanum maru</i> var. <i>aegyptiacum</i> (L.) Dinsm syn. <i>Origanum syriacum</i> L.	+	+			
				+	+	+	+
137	109.	<i>Malus sylvestris</i> Mill.		+		+	
138	110.	<i>Malva nicaeensis</i> All.		+	+	+	
139	111.	<i>Malva sylvestris</i> L.	(*)	+	+	+	
140	112.	<i>Mandragora officinarum</i> L.	+	+	+	+	
141	113.	<i>Mentha longifolia</i> L.	+	+	+	+	
142	114.	<i>Morus alba</i> L.			+		
143	115.	<i>Morus nigra</i> L.	+	+	+	+	
144	116.	<i>Myrtus communis</i> L.	+	+	+	+	+
145	117.	<i>Narcissus tazetta</i> L.	+	+	+	+	+
146	118.	<i>Nardostachys jatamansi</i> (D. Don) DC.	+	+	+	+	
147		<i>Nasturtium officinale</i> R. Br.	+				
148	119.	<i>Nerium oleander</i> L.	+	+	+	+	+
149	120.	<i>Nigella sativa</i> L.	+	+	+	+	
150	121.	<i>Notobasis syriaca</i> (L.) Cass.	+	+	+	+	

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151	122.	<i>Nymphaea alba</i> L.	+		+		
152	123.	<i>Nymphaea caerulea</i> Sav.	+		+	+	
153	124.	<i>Nymphaea lotus</i> L.	+			+	
154	125.	<i>Ochradenus baccatus</i> Delile				+	
155	126.	<i>Olea europaea</i> L.	+	+	+	+	+
156	127.	<i>Ornithogalum narbonense</i> L.			+	+	
157	128.	<i>Ornithogalum umbellatum</i> L.	+			+	
158	129.	<i>Paliurus spina-christi</i> Mill.	+			+	
159	130.	<i>Pancreatium maritimum</i> L.	( $\square$ )	+	+	+	+
160	131.	<i>Panicum miliaceum</i> L.	+	+		+	
161	132.	<i>Papaver rhoeas</i> L.		+	+	+	
162	133.	<i>Phoenix dactylifera</i> L.	+	+	+	+	+
163	134.	<i>Phragmites australis</i> (Cav.) Trin ex Steud. syn. <i>Phragmites communis</i> Trin.	+	+	+	+	
164	135.	<i>Pinus brutia</i> Ten.	+	+	+	+	
165	136.	<i>Pinus halepensis</i> Mill.	+	+	+	+	
166	137.	<i>Pinus pinea</i> L. syn. <i>Pinus pinea</i> (L.) Neck.	+	+	+	+	
167	138.	<i>Pistacia atlantica</i> Desf.		+	+	+	
168	139.	<i>Pistacia lentiscus</i> L.	+		+	+	
169	140.	<i>Pistacia palaestina</i> Boiss. syn. <i>Pistacia terebinthus</i> L. var. <i>palaestina</i> (Boiss.) Engl.	+	+	+	+	+
170	141.	<i>Pistacia vera</i> L.	+		+		
171	142.	<i>Platanus orientalis</i> L.	+	+	+	+	+
172	143.	<i>Populus alba</i> L.	+	+	+	+	
173	144.	<i>Populus euphratica</i> Oliv.	+	+	+	+	+
174	145.	<i>Portulaca oleracea</i> L.			+		
175	146.	<i>Prunus armeniaca</i> L.	+		+		
176	147.	<i>Prunus dulcis</i> D.A. Webb syn. <i>Amygdalus communis</i> L.	+		+		
177	148.	<i>Pterocarpus santalinus</i> L.	+	+	+	+	+
178	149.	<i>Punica granatum</i> L.	+	+	+	+	+
179	150.*	<i>Quercus calliprinos</i> Webb <i>Quercus coccifera</i> L.	( $\square$ )	+	+	+	+

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		<i>Quercus cocifera</i> var. <i>pseudococcifera</i> (Desf.) Boiss.	+				
180		<i>Quercus ilex</i> L.	+				
181	151.*	<i>Quercus ithaburensis</i> Decne. <i>Quercus aegilops</i> L. = <i>Q.</i> <i>i. subs. macrolepis</i>	(◻) +	+	+	+	+
182		<i>Quercus lusitanica</i> Lam.	+				
183	152.	<i>Ranunculus asiaticus</i> L.	(◻)	+	+	+	+
184	153.	<i>Reichardia tingitana</i> (L.) Roth		+			
185	154.	<i>Retama raetam</i> (Forssk.) Webb	+	+	+	+	+
186	155.	<i>Rhamnus palaestina</i> Boiss.	+		+	+	
187	156.	<i>Ricinus communis</i> L.	+	+	+	+	
188		<i>Roccella tinctoria</i> Lam. & P. DC.	+				
189	157.	<i>Rosa canina</i> L.	+	+	+	+	
190	158.	<i>Rosa phoenicia</i> L.	+	+	+	+	
191	159.	<i>Rubia tinctorum</i> L.	(◻)	+	+	+	
192	160.*	<i>Rubus sanguineus</i> Friv syn. <i>Rubus sanctus</i> Schreb. <i>Rubus ulmifolius</i> Schott	+ +	+	+	+	+
193		<i>Rumex acetosella</i> var. <i>multifidus</i> (L.) P. DC. & Lam.	+				
194		<i>Ruscus aculeatus</i> L.	+				
195	161.*	<i>Ruta chalepensis</i> L. <i>Ruta chalepensis</i> var. <i>latifolia</i> (Salisb.) <i>Ruta graveolens</i> L.	+ +	+	+	+	
196		<i>Saccharum officinarum</i> L.	+				
197	162.	<i>Salicornia fruticosa</i> (L.)	+			+	
198		<i>Salicornia herbacea</i> (L.)	+				
199	163.	<i>Salix acmophylla</i> Boiss.	+	+	+	+	
200	164.	<i>Salix alba</i> L.	+	+	+	+	
201		<i>Salix fragilis</i> L.	+				
202		<i>Salix safsaf</i> Forssk.	+				
203	165.	<i>Salsola inermis</i> Forssk.	+			+	
204	166.	<i>Salsola kali</i> L.	+		+	+	
205	167.	<i>Salvia judaica</i> Boiss.	+		+	+	+
206	168.	<i>Sarcopoterium spinosum</i> (L.) Sp. syn. <i>Poterium spinosum</i> L.		+	+	+	+

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207	169.	<i>Saussurea lappa</i> (Decne.) C.B. Clarke	+		+	+	
208		<i>Scirpus holoschoenus</i> var. <i>linnaei</i> (Reichenb.) Asch. & Graebn.	+				
209	170.	<i>Scirpus lacustris</i> L.	+	+	+	+	
210		<i>Scirpus maritimus</i> Lam.	+				
211	171.	<i>Scolymus hispanicus</i> L.		+		+	
212	172.	<i>Scolymus maculatus</i> L.	+	+	+	+	+
213	173.	<i>Silybum marianum</i> (L.) Gaertn.	+	+	+	+	
214	174.	<i>Sinapis alba</i> L.			+	+	
215	175.	<i>Sinapis arvensis</i> L.	+			+	
216	176.	<i>Solanum incanum</i> L.	+	+	+	+	
217	177.	<i>Sonchus oleraceus</i> L.				+	
	178.*	<i>Sorghum bicolor</i> (L.) Moench		+	+	+	
218		syn. <i>Sorghum vulgare</i> Pers. <i>Sorghum vulgare</i> var. <i>durra</i> (Forssk.) Dinsm.	+		+		
219		<i>Styrax benzoin</i> Dryand	+				
220	179.	<i>Styrax officinalis</i> L.	+	+	+	+	
221	180.	<i>Suaeda palaestina</i> Eig. & Zoh.		+	+		
222	181.	<i>Tamarix aphylla</i> (L.) Karst. syn. <i>Tamarix articulata</i> Vahl	+	+	+	+	
223	182.	<i>Tamarix mannifera</i> (Ehrenb.) Bunge	+			+	
224		<i>Tamarix pentandra</i> Pall.	+				
225		<i>Tamarix tetragyna</i> Ehrenb.	+				
226	183.	<i>Taraxacum officinale</i> Weber	+		+		
227	184.	<i>Tetraclinis articulata</i> (Vahl) Mast.	+		+	+	
228	185.	<i>Thymelaea hirsuta</i> (L.) Endl. syn. <i>Passerina hirsuta</i> L.		+	+	+	+
229	186.	<i>Trigonella foenum-graecum</i> L.	+		+		
230	187.	<i>Triticum aestivum</i> L.	+		+	+	
231		<i>Triticum aestivum</i> var. <i>spelta</i> (L.) L.H. Bailey	+				
232		<i>Triticum compositum</i> L.	+				
233	188.	<i>Triticum dicoccum</i> Schrank	(*)	+	+	+	
234	189.	<i>Triticum durum</i> Desf.	(*)	+	+	+	
235	190.	<i>Triticum turgidum</i> L.	(*)		+		

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236	<b>191.</b>	<b><i>Tulipa montana</i> Lindl.</b>	+	+	+	+	
237	<b>192.</b>	<b><i>Tulipa sharonensis</i> Dinsm.</b>	+		+	+	
238	<b>193.*</b>	<b><i>Typha domingensis</i> (Pers.) Poir. ex Steud.</b>		+	+		
		syn. <i>Typha angustata</i> Bory & Chaub.	+		+		
		<b><i>Typha latifolia</i> L.</b>	(▪)		+		
239	<b>194.</b>	<b><i>Ulmus canescens</i> Melv.</b>		+	+		
240	<b>195.</b>	<b><i>Urginea maritima</i> Baker</b>	+		+	+	+
241		<i>Urtica caudata</i> Vahl	+				
242		<i>Urtica dioica</i> L.	+				
243	<b>196.</b>	<b><i>Urtica pilulifera</i> L.</b>	+	+	+	+	
244	<b>197.</b>	<b><i>Urtica urens</i> L.</b>	+	+	+	+	
245	<b>198.</b>	<b><i>Verbascum sinaiticum</i> Benth.</b>				+	
246	<b>199.</b>	<b><i>Viburnum tinus</i> L.</b>		+			
247	<b>200.</b>	<b><i>Vicia faba</i> L.</b>		+	+		
		syn. <i>Faba vulgaris</i> Moench	+				
248		<i>Vitis orientalis</i> (Lam.) Boiss	+				
249	<b>201.</b>	<b><i>Vitis vinifera</i> L.</b>	+	+	+	+	+
250		<i>Xanthium spinosum</i> L.	+				
251	<b>202.</b>	<b><i>Zilla spinosa</i> (L.) Prantl</b>		+	+	+	
252	<b>203.</b>	<b><i>Ziziphus lotus</i> (L.) Lam.</b>	+	+	+	+	
253	<b>204.</b>	<b><i>Ziziphus spina-christi</i> (L.) Desf.</b>	+	+	+	+	+
254	<b>205.</b>	<b><i>Zostera marina</i> L.</b>	+			+	
255	<b>206.</b>	<b><i>Zygophyllum dumosum</i> Boiss.</b>		+	+	+	
Total			<b>199</b>	<b>144</b>	<b>182</b>	<b>174</b>	<b>51</b>

Not bolded – species listed by the Moldenkes' and rejected by all later researchers; bolded – species accepted by contemporary researchers; synonyms are listed in the same line; (\*) – close related species or varieties describing the same plant in the Bible; (▪) – species listed however not accepted by the Moldenkes', later verified as appearing in the Bible; shaded field – species, the occurrence of which in the bible is proved beyond the doubt.

Table 2. List of bible plant species presented by Zohary (1982) on the basis of similarities between Arabic and Hebrew words

Hebrew name	Arabic name	Name of plant species	Place where appearing in the Bible
<i>halamuth</i>	<i>hubeize</i>	<i>Alcea setosa</i> (Boiss.) Alef.	Job 6,6-7 (hollyhock)
<i>shuni</i>	<i>ushan</i>	<i>Anabasis atriculata</i> (Forssk.) Moq.	Genesis 46 16 - Szuni
<i>adaiah</i>	<i>ada</i>	<i>Haloxylon persicum</i> Bunge	Genesis 4,23 (Adah)
<i>jarmut,</i> <i>jermot,</i> <i>remet</i>	<i>rimth</i>	<i>Hammada salicornica</i> (Moq.) Iljin	Joshua 21,29 (Jarmut); Ezra 10,26 (Jeremot); Joshua 19,21 (Remet)
<i>aroer</i>	<i>arar</i>	<i>Juniperus phoenica</i> L.	Deuteronomy 2,36 (Aroer)
<i>azekah</i>	<i>ausseg</i>	<i>Lycium europaeum</i> L.	1 Samuel 17,1 (Azeka)
<i>tappuah</i>	<i>tuffah</i>	<i>Malus sylvestris</i> Mill.	1 Chronicles 2,43 (Tappuach); Joshua 15,34 (Tappuach)
<i>botnim</i>	<i>butm</i>	<i>Pistacia vera</i> L.	Genesis 43,11 (pistacji)
<i>puah, puvah</i>	<i>fuwwa</i>	<i>Rubia tinctoria</i> L.	Genesis 46,13 (Puwwa); Judges 10,1 (son Puy)
<i>shahor,</i> <i>ashhur,</i> <i>shehariah</i>	<i>suweda,</i> <i>suaid</i>	<i>Suadea</i> sp.	1 Chronicles 4,5 (Aszur); 1 Chronicles 8,26 (Szechariasz)
<i>etnan</i>	<i>mitnan</i>	<i>Thymelaea hirsuta</i> (L.) Endl.	1 Chronicles 4,7 (Etan)
<i>elim</i>	<i>illam</i>	<i>Zygophyllum dumosus</i> Boiss.	Numbers 33,9 (Elim)

## CONCLUSIONS

- There is no single list of plants appearing in the Bible, which could be termed “bible plants” and accepted as indisputable; this list continues to be studied and verified.
- The present state of research allows the listing of 206 species of bible plants of which 95 are recognised by all contemporary researchers of biblical flora.
- The studies and analyses carried out should be regarded as interdisciplinary research enabling correct interpretation of specific botanical and horticultural expressions while translating the Bible, whilst at the same time promoting a better understanding of the context of the words used in the Scripture.
- The current list of plant species referred to in the Scripture may help in designing biblical gardens.



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