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Medicinal plants of the Bible—revisited

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Abstract

Background: Previous lists number from 55 to 176 plant species as “Biblical Medicinal Plants.” Modern studies attest that many names on these lists are no longer valid. This situation arose due to old mistranslations and/or mistakes in botanical identification. Many previously recognized Biblical plants are in no way related to the flora of the Bible lands. Accordingly, the list needs revision.

Methods: We re-examine the list of possible medicinal plants in the Bible based on new studies in Hebrew Biblical philology and etymology, new studies on the Egyptian and Mesopotamian medicinal use of plants, on ethnobotany and on archaeobotany.

Results: In our survey, we suggest reducing this list to 45 plant species. Our contribution comprises 20 “newly” suggested Biblical Medicinal Plants. Only five species are mentioned directly as medicinal plants in the Bible: Fig (*Ficus carica*), Nard (*Nardostachys jatamansi*), Hyssop (*Origanum syriacum*), balm of Gilead (*Commiphora gileadensis*) and Mandrake (*Mandragora officinarum*). No fewer than 18 medicinal plants are mentioned in old Jewish post-Biblical sources, in addition to those in the Bible. Most of these plants (15) are known also in Egypt and Mesopotamia while three are from Egypt only. Seven of our suggested species are not mentioned in the Bible or in the Jewish post-Biblical literature but were recorded as medicinal plants from Egypt, as well as from Mesopotamia. It is quite logical to assume that they can be included as Biblical Medicinal Plants.

Conclusions: All our suggested Biblical Medicinal Plants are known as such in Ancient Egypt and/or Mesopotamia also. Examination of our list shows that all these plants have been in continuous medicinal use in the Middle East down the generations, as well as being used in the Holy Land today. Precisely in King Solomon’s words, “That which has been is what will be, that which is done is what will be done. And there is nothing new under the sun” (Ecclesiastes 1:9).

Keywords: Bible, Medicinal plants

Background

Identification of Biblical plants

Most of the massive research on the identity of Biblical plant names is based on linguistics and philology [1–8 and references therein]. Włodarczyk [9] reviewed “how many plants are mentioned in the Bible” and concluded that the list contains 206 plant names, 95 of which “are recognized by all contemporary researchers of the floras of the Bible.” This discrepancy is not at all surprising since most authors of books on plants of the Bible [4, 10–17 except 3, 5–7] were not familiar with Hebrew and/or the Holy Land flora. For example, Duke [1] enumerates at least 176 species as “Biblical Medicinal Plants” (hence BMPs), while the total number of

recognized plants in the Bible is about 100 [8]. Needless to say, too many species of his list are not related at all to the flora in the region and were never grown or traded in the ancient Middle East. Jacob [2] listed 55 plants (most on a species level but some on a genus level) as BMPs, based on a comparison to Ancient Egyptian and Mesopotamian literature.

Amar [8] revised the flora of the Bible, based particularly on old Jewish post-Biblical sources and their succession down the generations. He arranged all the traditional plant names in several categories according to identification reliability: (a) plant names identified with certainty (40); (b) plant names identified at a high reliability level (11); (c) plant names whose identification is on a high reliability level but not fail-safe (22); (d) plant names that are unidentifiable or whose identification reliability is very low (13); (e) accumulative names and non-species-specific names like “thorn” or “lily”

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(20); (f) names suspected of not being related to plants at all (35). Thus, after Amar's rigorous scrutiny, we have some 75 "valid" plant names, which are regarded with some identification validity. The Mishna and the Talmud mention about 400 plant names [3], 43 of which are mentioned in relation to medicine [18]. In most cases of disagreement among the leading authorities [3–7], we chose to follow Amar's [8] (see the discussion for few exceptions).

Identification of Ancient Mesopotamian and Egyptian plants

Plants are undoubtedly the main source for curing and alleviating diseases in Ancient Mesopotamia and Ancient Egypt. Both civilizations belong to the world of the Old Testament, which explains why a short survey about their knowledge of medicinal plants is included. In the strict sense, Mesopotamia refers to the "land between the rivers," namely the Tigris and Euphrates, but the region includes the area most of now Iraq, eastern Syria and southeastern Turkey. While the first written documents, namely clay tablets, date to the end of the 4th millennium BCE the main information on medicinal plants comes from cuneiform tablets dating to the second and first millennia BCE. Ancient Egypt spans the region of the Nile Valley, reaching areas east and west of it along the Mediterranean coast; to the south, Ancient Egypt stretched deep into the north of modern Sudan. The first hieroglyphic texts on medicine date to the middle of the second millennium BCE. The pharmacopoeia of both cultures included more than 200 plants, most of which cannot be identified. Ethnobotanical studies (e.g. Borchartd [19:190]) often refer to the pioneering work of Campbell Thompson [20] for the identification of Mesopotamian plant terms, or von Deines and Grapow [21] for ancient Egypt; they are unaware of the present, often highly specialized, linguistic and philological discussions in the fields of Assyriology and Egyptology. Philologists such as the Egyptologist Pommerening [22] or the Assyriologist Böck [23] attest to the need to challenge and revise the methodology used so far to identify ancient Egyptian and ancient Mesopotamian plant terms. The *communis opinio* in both fields of research is rather skeptical about the identification of plant terms with actual plants. In fact, revisions comparable to the comprehensive work of Amar [8] on the Biblical flora are still in process. As for ancient Mesopotamia, identifying language terms in Akkadian, the language in which most of the medical cuneiform texts are written, depends heavily on etymological research. This consists of collecting cognate terms in other Semitic languages such as Aramaic or Hebrew and applying identification of the Aramaic or Hebrew term to the Akkadian name. As a result, learning the identity of Akkadian plants depends basically on

studies about the Aramaic and Hebrew terminology of plants (e.g., Löw [3]). These identifications have entered the two basic dictionaries of the Akkadian language [24, 25] but have enjoyed scant discussion and revision.

The use of medicinal plants in the world of the Old Testament

The ample number of medical recipes prescribing various "drug therapies" clearly shows the prominence of ingredients of vegetable origin in ancient Mesopotamia and ancient Egypt (e.g. [26, 27]).

In the Bible, very few cases related to the use of plants for medicine, for example, the use of balm to treat of sores (Jeremiah, 8, 22; 46, 11; 51, 8) and how King Hezekiah was treated with a fig (II Kings 20:7). Very rarely ethnobotanical information may help concerning the medicinal Biblical plants. An exception is the use of *Origanum syriacum* by the Samaritans in exactly the same manner as in Biblical times [28:71-2]. A few archaeological studies illuminate the use of medicinal plants in the Holy Land in Biblical times and even earlier. Written evidence exists from letters of Tel Al Amarna showing that the King of Gezer (Palestine, 14th BCE) asked for myrrh gum (*Commiphora* sp.) from Egypt for healing [29:29]. Langgut et al. [30] found pollen of three medicinal plants (mint, sage type, and myrtle) in human feces from Megiddo (Late Bronze Age, 12–11th centuries BCE). Langgut et al. consider it (30: 382) "the possible use of different types of herbal teas." Weinstein-Evron [31] found myrtle pollen in a stone mortar from Megiddo (Iron Age 12–11th centuries BCE). Preparation of powder from *Myrtus* leaves for medicine is also a practice still used today in Israel [32:210-211]. Koh et al. [33] analyzed the organic residues of wine jars found in a courtyard in the Middle Bronze Age (ca 1900–1600 BCE) in a Canaanite palace at Tel Kabri (13 km north of Haifa, Israel). The additives seem to have included honey, Storax resin (*Liquidambar orientalis*), Terebinth resin (*Pistacia lentiscus/P. palaestina*), Cedar oil (*Cedrus libani*), Cyperus (*Cyperus rotundus*) and Juniper (*Juniperus communis/J. phoenicea*), and perhaps even mint, myrtle, or cinnamon. They concluded that "the plants' materials were used to preserve wine (as resins), as well as a medicine already known from Ancient Egypt" [34]. They also mentioned that "these additives suggest a sophisticated understanding of the botanical landscape and the pharmacopoeic skills necessary to produce a complex beverage that balanced preservation, palatability, and psychoactivity." Namdar et al. [35] found cinnamon residues in old wine flasks from Tel Dor (30 km south of Haifa, Israel). The flasks, originating in Phoenicia, were from the early Iron Age, namely 11th to mid-9th centuries BCE. Kislev et al. [36] studied the remains of flax (*Linum usitatissimum*) from the early Iron Age (12th

century BCE, late 20th dynasty in Egypt) site of Tel Beth-Shean (70 km SE of Haifa, Israel). Like written sources of its uses, they suggest that part of the flax seeds was intended as a food component or for extracting medicinal oil. Weiss and Kislev [37] found one stone of bay laurel (*Laurus nobilis*) in Ashkelon (150 km south of Haifa, Israel 17th century BCE). The plant does not grow in that area, so the plant was probably taken for medicinal purposes.

Magic and medicine in the world of the Old Testament

In the ancient world, there is no clear-cut distinction between ritual/magic and medicinal uses of the same plant (especially incense) [38:12, 37: 39 passim, 40: passim, 41: passim]. Medical practices in Egypt [41: passim] and in Mesopotamia [42: 415-425] involved, in addition to the use of medicinal plants, rituals and incantations.

The Ancient Egyptian and Mesopotamian healing practitioners did not contrast or distinguish magical from pharmaceutical cures—both forms of healing were considered equally effective (for Egypt see 43; for Mesopotamia see 44). The two ancient cultures shared another feature: they did not invent terms that would denote “medicine” or “magic.” Disease and illness could be caused by an array of incidents from natural causes to the supernatural influence of deities and demons or sinful behavior (for Egypt see 41: 96-112, for Mesopotamia see 45: 30-31). The healers seem not to have chosen their cures according to the cause of the disease. It is useful to differentiate healing cures accompanied by incantations from purely exorcist practices. In Mesopotamia, demons were deemed responsible for diseases [44: 179-180, 45: 27-39,] while in Egypt, it was evil spirits [41: 96-112]. Thus, healers also practiced magic and exorcism as part of the healing. In the Bible, magic and exorcism were forbidden [46:517-519]. In Egypt and Mesopotamia, sin was believed to be sanctioned with disease [47: 97-99]. Krymow [48:16] has noted that “The Israelites knew the medical practices of the Egyptians and took this knowledge with them, but the Israelites’ priests taught the people to look to God for help.” A similar view is expressed by Harrison [38:14]: “The religious tradition of the early Biblical period took exception to the idea of trying to cure the diseased body, since it was believed that God alone was the great healer.” Our paper, set out to re-examine the list of possible medicinal plants in the Bible based on new studies in Hebrew Biblical philology and etymology, and on new studies on Egyptian and Mesopotamian medicinal use of plants, ethnobotany, and archaeobotany. Special attention is given to the history and the knowledge of medicinal uses for indigenous flora of the Holy Land and the ancient trade in plants and their products.

This paper does not aim at a detailed catalogue of specific uses for each plant in each civilization. Our study is limited to re-examining questions arising from the list of actual and potential medicinal plants of the Bible.

Methods

Working assumptions and problems in the identification of Biblical plant names:

1. Some problems regarding the identity of Biblical plant names originated from misunderstandings of the original Hebrew version in which many plant names are not clear. A new study of the flora in the Old Testament [8] provides new scope concerning plants mentioned in the Bible, while assessing the reliability of all previously suggested botanical identifications of plant names. Plant names in the New Testament have been revised in recent dictionaries, e.g., Greek-English Biblical dictionaries [49, 50] and translations [e.g., 51]. Similar problems arose over modern references concerned with plants in the Talmud [18, 52, 53].
2. The same plant may have several names even in the same country [32 passim, 44: 132, 54:43, 55:7, 56:51]. The same name of a plant may refer to more than one botanical species and/or genera [55-58: passim]. Plants that are heavily used in medicine and witchcraft tend to have many local names (e.g., Mandrake [57]). Plant names may change down the generations; some old names may be discarded or forgotten even in the same language [58:520].
3. The old translators of the Bible, e.g., King James Version (1611 and others, see 4:7-11), were not familiar with the original Hebrew, nor with the flora of the Holy Land. So, sometimes, they mentioned names from their local floras; this might also have been done deliberately to make the plants more familiar to their own readers.
4. In general, the Bible does not refer directly to plants, most of which are mentioned in passing. The chances that a specific plant would be connected directly with a medicinal use are even lower. Linguistic remains, ethnobotanical as well as archaeobotanical, may help, but they are not evidence of possible specific medicinal uses.
5. When studying plants not mentioned in the Bible but in the Talmud, in a medicinal context, we have to remember that Talmudic medicine may have Hellenistic and Egyptian influences [59: xiii, 53:29-31]. If these plants are also recorded as medicinal plants from Mesopotamia, this may reduce that kind of bias.
6. New works, especially on the identification of Assyrian plant names [24, 56, 44:129-163, 60]

considerably extend the spectrum of validating plant names and changing previous conceptions. All previous works on Biblical plants [e.g., 2, 4, 6–8, 15, 16] were based solely on Campbell-Thompson [20], who had been highly criticized [61:492, 62:3, 63:326]. Jacob [2] was criticized by Geller [63:326] because he “assumes that the existence of a plant is sufficient to identify it within the Egyptian and Akkadian pharmacopeia, entirely ignoring the considerable philological problems in such methodology.”

7. It is logical to assume that plants (or their products such as spices and incense), which had medicinal uses in Egypt and Mesopotamia, were also known in the Holy Land in Biblical times, even if these plants are not mentioned directly in the Bible [2:29, 64:69–70]. Cultivated plants (or their products), which are mentioned in the Talmud as medicinal plants and are also documented in Egypt, Mesopotamia and/or from archaeological evidence, are considered to have been present in the Holy Land in Biblical times. This approach is based on the evidence of intensive ancient use of and trade in medicinal plants all over the Fertile Crescent [19:188, 64:69]. Remember too that some medicinal plants were introduced into Egypt by way of Palestine [64:71]. Manniche [65: 61] pondered how to decide whether or not a certain Egyptian species was really a “medicinal plant.” She concluded: “The actual remains of a plant...must be supported by some indication of the use of plant—ideally—in the Egyptian texts; in texts from contemporary neighboring civilizations” In Palestine, plant remains are quite rare (compared with Egypt); hence, a comparison with other contemporary cultures from the Bible period is of prime importance when considering the medical use of a given plant species”.

Procedures: 1. Checking the validity of the identification of the medicinal plant names in the Bible according to Amar ([8] see above). We discard all previous lists of plant names that were supposedly mentioned in the Bible based on old mistranslations [see 66]. Many of these are not indigenous to the Holy Land at all or were never introduced.

2. Reconstruction of the inventory of potential BMPs was attempted, based on comparative data from Ancient Egypt and Mesopotamia. The medicinal plants of Egypt and Mesopotamia were surveyed, keeping with the recent literature, in an attempt to recognize species, or products thereof, related to Biblical times. We limited ourselves to any literary evidence that a certain species had any medicinal use; we did not set out to compare

the different regions/cultures on the specific uses among them.

3. We also used complementary data from post-Biblical sources: Mishna (3rd century CE) and the Babylonian Talmud (3rd–5th centuries CE). We considered only plants referred to explicitly for medical uses and already known medicinally from Egypt and/or Mesopotamia, and/or from archaeological evidence. Concerning the identification of plants in the Talmud, in cases of disagreement, we followed the most modern commentary of Steinsaltz [67] (whose botanical advisor is the authoritative archaeobotanist and Talmudist M.E. Kislev). As a result, several of the previous identifications [3, 18] are not recognized today.

4. Technically, we divided the surveyed plants into four classes, according to level of certainty as to their possible use as medicinal plants in Biblical times, based on identification reliability according to [8], as well as on subsidiary evidence: plants used or mentioned explicitly as medicinal in the Bible (Table 1); plants mentioned in the Bible and known as medicinal in Ancient Egypt and in Mesopotamia (Table 2); plants not cited in the Bible but mentioned as medicinal in post-Biblical sources and/or Egypt and/or Mesopotamia (Table 3); and various patterns (Table 4).

Results and discussion

Discussion

Only five species (Table 1) are mentioned explicitly as medicinal plants in the Bible: Fig (*Ficus carica*), Nard (*Nardostachys jatamansi*), Hyssop (*Origanum syriacum*), “Balm of Gilead” (*Commiphora* sp.) and Mandrake (*Mandragora officinarum*) (Table 1). Twenty-seven species come under the category “Plants which are mentioned in the Bible and are known as medicinal in Ancient Egypt and Mesopotamia” (Table 2). Thirteen species are included as “Plants which are not cited in the Bible but mentioned as medicinal in the Talmud and/or Egypt and/or in Mesopotamia” (Table 3). Six plants are classified under various patterns (Table 4).

At least 18 medicinal plants (Tables 2–4), in addition to those in the Bible, are mentioned in the Talmud and or Mishna, most of which (15) are known also in Egypt and Mesopotamia, while three are only from Egypt. Since most of the post-Biblical citations are from the Babylonian Talmud, one may consider it as having influenced the local medicine of Babylonia (where this Talmud was written) rather than reflecting Biblical reality. The data indicating that all these species were also known from Egypt, strengthen the idea that the post-Biblical literature was not biased to Mesopotamian plants.

Table 1 Plants used or mentioned explicitly as medicinal in the Bible

Species /English name	Hebrew name /transcription /level of identification reliability	Source of evidence	Botanical status/ Origin/	Additional uses:
<i>Commiphora gileadensis</i> (L.) C. Chr/ (or <i>C. kataf</i> (Forssk.) Engl. / (also <i>C. opobalsamum</i> (L.) Engl.) Balm of Gilead, Balm of Mecca	Tsori C Nataf B	E: [68:85 (C. <i>myrrah</i>); [69 passim (myrrh), [64:77, 70:63]. B: Jeremiah 8:22, 46:11, 51:8 M: [71:193, 72:89,90, 73:5].	D / Im/ Eaf [73a]. Cultivated in the Holy Land at Biblical times [74].	In (Exodus 30:31) / O / P
<i>Ficus carica</i> L.* / Fig	Te'engah A	E: [64:78, 65:102-103, 75:28]. B: II Kings 20:7, Isaiah 38:2. BT: Menachot 64a. M: [44:430,437].	D / In	E
<i>Mandragora officinarum</i> Mill * / Mandrake	Duda'eem A	B: Genesis 30: 14-17. E: [65:118] (possible). M: [71:191, identification not ascertained	In	M / A
<i>Nardostachys jatamansi</i> DC. / Spikenard	Nerd A	NT: Mark 14:3; John 12:3.	EA [76] / Im	O / P
<i>Origanum syriacum</i> L. (=Majorana syriaca (L.) Feinbrun) / Syrian Marjoram / Bible Hyssop	Ezov A	B: Leviticus 14:4, Psalms 51:9. BT: Shabbat 109b, Abodah Zara 29a.	In	R / E

Botanical status: *In*: Indigenous; *Im*: Imported; *D*: Domesticated/cultivated. If there is no specific reference, we followed [143].

Origin: *A*: Arabia; *CEA*: Central East Asia; *E*: Europe; *EAR*: East Arabia; *EA*: East Asia; *Eaf*: East Africa; *M*: Mediterranean; *EM*: East Mediterranean; *NE*: Near East; *SEA*: Southeast Asia; *SEE*: Southeast Europe; *SWA*: Southwest Asia. If there is no specific reference, we followed [143].

Additional uses: *Ap*: Apotropaic; *E*: Edible; *F*: Fibre; *I*: Incense; *M*: Magic; *P*: Perfume/cosmetics; *O*: Ointment; *Oi*: Oil; *R*: Ritual; *S*: Spice, condiment; *Re*: Resin; *T*: Timber; *W*: Wine

*Included in Jacob's [2] list (see text). The categories of the reliability levels of the Biblical plants' identification are according to Amar [8]. See above

Seven of the suggested species (Table 4) are not mentioned in the Bible or in the Talmud but were recorded as medicinal plants from Egypt, as well as from Mesopotamia; it is logical to assume that they can be included as BMPs.

About 60% of our suggested BMPs are foreign species; 40% are indigenous, 60% are imported, 30% are domesticated (each plant can belong to more than one group). The main sources of foreign imported species are East Asia (11%), Southwest Asia (11%), West and South Asia (8%) and Arabia (4%).

The high proportion of imported plants (as medicinal materials) shows indirect evidence of prolific import in Biblical times [101–104]. Our list does not provide any evidence that any species were cultivated/imported solely as medicinal plants; all had some additional use. Most (87%) of the species had at least one additional use: for example, 16 are edible, 8 are used in rituals, 6 serve for perfume and cosmetics, and 5 are used as incense.

Duke [1] enumerated 176 plant species as “Biblical Medicinal Plants,” while Jacob [2] suggested only 55. In our survey, we suggest reducing that number to 45 (Tables 1-4). The overlap between Jacob's list and ours was 29 species in total. Our contribution is 20 “new” suggested BMPs. It is noteworthy that some Biblical names are related to the genus level (e.g., *Artemisia*), or also to two genera as in the case of *Cupressus/Juniperus*.

The discrepancy between Jacob's list and ours is due to the following: (1) At least 22 species in Jacob's list are not recognized today as valid “Biblical plants” at all, or they are not related to any specific plant species or genus [8]. (2) Several identifications from Campbell–Thompson [20], the only Mesopotamian source used by Jacob, are no longer recognized by modern Assyriologists. (3) Several Mesopotamian plants were only recently identified in a medical context. (4) New recent palynological as well archaeological data allow us to corroborate the possibility of Biblical medicinal uses of some plants.

Table 2: Plants mentioned in the Bible and known as medicinal in Ancient Egypt and Mesopotamia

Species / English name	Hebrew name / Transcription / Level of identification reliability	Source of evidence	Botanical status / Origin	Additional uses
<i>Acorus calamus</i> L.* / Sweet reed	Kaneh / Kaneh hatov / Kneh Bosem C	E: [65:68]. M: [20:10].	Im / EA [77].	P
<i>Allium cepa</i> L.* / Onion	Batsal B	E: [64:78, 65:69, 70:85]. MI: Nedarim 9:8. BT: Nedarim 66a. M: [78:386, 79:20].	D (CEA)	E
<i>Allium porrum</i> L.* / <i>A. kurrat</i> L.	Khatsir A	E: [65:70, 69:96]. BT: Yoma 83b, Berachot 44b, Gittin 69ab, Shabbat 110b M: [79:20, 80:234].	D / M- EWA	E
<i>Allium sativum</i> L. / Garlic	Shum A	E: [64:78, 65:70-71, 68:85, 71:38,42,70,80,88, 75:28]. BT: Gittin 69a, Abodah Zara 28b. M: [78: passim, 81:123,127].	D (SWA-CA).	E
<i>Anethum graveolens</i> * Dill	NT: (Matthew 23:23. = Anise (<i>Pimpinella anisum</i> L. in King James Version. Dill (<i>Anethum graveolens</i> L.) in modern translation [51:108].	E: [64:71; 68:85, 70: 99,372,373,375].	D / E	E BT: Abodah Zara 7:72, Niddah 51a
<i>Artemisia</i> sp.	La'anah C	E: [65:80] (A. absinthium). M: [78 passim] (as "wormwood") BT: Abodah Zara 29a.	I	
<i>Boswellia</i> * sp. / Frankincense	Levonah A	E: [68:85, 70:69,373,375 (<i>B. arterii</i>). BT: Sanhedrin 43a. M: [20:344, 82:251] (identification not ascertained).	Im (EA)	I
<i>Capparis spinosa</i> L.	Tsalaf C	E: [65:83]. BT: Shabbat 110a M: [71:191].	In	E
<i>Cedrus libani</i> A. Rich.* / Cedar /	Erez A	E: [64:6, 69:88 75:26]. AR: [33]. M: [81:124] (oil); [71:191,193, 72:89, 73:52, 78:52,78, 80:233,235, 81:121, 83:124] (resin).	Im (Lebanon); B: II Samuel 5:11).	Re
<i>Cinnamomum zeylanicum</i> Nees* and <i>C. cassia</i> Blume \	Kinnamon C	E: [65: 88-91]. AR: [35, 33(?)]. M: [20:189-190].	Im (EA).	S
<i>Citrullus colocynthis</i> (L.) Schrad. / Colocynth,	Paquq'a A	E: [65:91,68:85]. M: [81:122,124, 125].	In	Oil (BT: Sabbath 71:26)

Table 2: Plants mentioned in the Bible and known as medicinal in Ancient Egypt and Mesopotamia (Continued)

Species / English name	Hebrew name / Transcription / Level of identification reliability	Source of evidence	Botanical status / Origin	Additional uses
Bitter gourd <i>Citrus medica</i> L.* /Citron	Pri Ets Hadar A	BT: Shabbat 109b. AR: 5th - 4th centuries BCE, [84, 85]. M: [20:312] (Identification not ascertained).	Im (EA)	R
<i>Commiphora</i> sp. / Myrrah / Myrrh	Mor B	E: King of Gezer (Palestine, 14th BCE) asked for myrrh gum from Egypt for Healing [29:29]. M: [86:156-157].	Im / EAr [73a]	I / R / O / P
<i>Coriandrum sativum</i> L. / <i>Coriander</i>	Gad A	E: [64:71, 65:94-95, 69:42,82]. M: [20:66, 71:192, 73:52, 78:283].	In / D (At the Talmud period: Shabbat 133a, 134a).	S
<i>Crocus sativus</i> * L./ Saffron	Karkom A	E: [75:30, 69:42]. BT: Shabbat 110a, b, Gittin 69a. M: [73:52, 71:191].	Im (SWA)	S / I
<i>Cuminum cyminum</i> L. / Cumin	Kammon A	E: [64:71; 65:96-98]. BT: Shabbat 110a,b, 133a, Gittin 69a,b, Abodah Zara 29a. M: [80:234, 78: Passim, 81:123].	D /SWA	S
<i>Cupressus sempervirens</i> L. * / Cypress <i>Juniperus</i> sp.*/Juniper	Brosh C Ar'ar C	<i>Juniperus:</i> E: [64:29,72, 69:42,71,70,72,81 ,88,80, 75:28] (berry). AR: [31] (<i>J. phoenicea</i> / <i>communis</i>) M: [80:233,234,235, 87:26], (wood) [73:52-, 53, 83:120], (<i>burasu</i>); 68:19, 87:26,27]. <i>Cupressus:</i> M: [80:233] (oil) [68: 191,193].	In / I	
<i>Hordeum</i> * sp. / Barley	Se'orah B	E: [70:140ff, 372, 375]. BT: Gittin 69b, Shabbat 110b, Pesachim 42b, Yoma 83b.	D	E
<i>Linum usitatissimum</i> L. * Flax	Pishta A	E: [65:116, 75:28; 70: 57– 62]. AR: [37] (?). M: [20:113].	D/MED-SEA.	F
<i>Mentha</i> * spp. Mint	NT: Matthew 23:23.	E: [65:120; 75:28,29, 68:85; 69:66,86]. AR: [30 (?); 33(?)]. BT: Sabbath 140a, Gittin 69b, Abodah Zara 29a (as "Ninia"). M: [81:120,126, 78 passim, 89:50].	In / D	S
<i>Myrtus communis</i> L.* / Myrtle	Hadas A	AR: 12-11th century BCE, [30]; 12th-6th centuries BCE [31]. M: [20:300, 73:52, 80:233, 87:26].	In	R /Ap

Table 2: Plants mentioned in the Bible and known as medicinal in Ancient Egypt and Mesopotamia (Continued)

Species / English name	Hebrew name / Transcription / Level of identification reliability	Source of evidence	Botanical status / Origin	Additional uses
<i>Nigella sativa</i> L.* / Black cummin	Ketsakh K	M: [90: 268, 91:223].	D/ SWA	S
<i>Olea europaea</i> L. / Olive	Zay'it A	E: [65:128-129]. BT: Gittin 86a; Shabbat 134a; Abodah Zara 28a, Berachot 36a. M: [79:18].	In.	E / Oil
<i>Phoenix dactylifera</i> L.* / Date Palm	Tamar A Dekel A	E: [68:83,84, 69:41,71,81]. BT: Ketubbot 10b, Gittin 69a, Shabbat 110a.	In (SWA) / D (BT): Ketubbot 10b, Gittin 69b, 70a, Yoma 84a, Sabbath 109b.	E
<i>Punica granatum</i> L.* / Pomegranate	Rimmon A	E: [64:77, 65:183-141, 75:29]. M: [78 passim, 80:235].	D (SWA-SEE)	E / R
<i>Ricinus communis</i> L.* / Castor Bean (see discussion)	Kikkayyon C	E: [64:79, 65:142-143, 69:41,70,71 70:119,122,333, 373, 375]. BT: Gittin 69b (as "Akika"). M: [20:130].	D /Eaf [92] BT: Cultivated at the Talmud period. Sabbath 21:71	Oi
<i>Sinapis alba</i> L. Mustard (Could be also <i>Brassica nigra</i> L.) / Mustard	Khardal	E: [65:148, 68:85(?)]. BT: Berachot 40a M: [70:90, 78:367,368, 93:142].	In / D	E / S
<i>Vitis vinifera</i> L.* / Grape	Geffen A	E: Fruit: [70: 85,372,374]; Wine: [70:91]. BT: Wine: Shabbat 78a, 109ab,110b, Gittin 67b; Ktubot 65b. Vinegar: Erubin 29b; BT: Shabbat 109a M: [79: 28].	D / EM-WA	E / W

Botanical status: *In*: Indigenous; *Im*: Imported; *D*: Domesticated/cultivated. If there is no specific reference, we followed [143].

Origin: *A*: Arabia; *CEA*: Central East Asia; *E*: Europe; *EAR*: East Arabia; *EA*: East Asia; *EAF*: East Africa; *M*: Mediterranean; *EM*: East Mediterranean; *NE*: Near East; *SEA*: Southeast Asia; *SEE*: Southeast Europe; *SWA*: Southwest Asia. If there is no specific reference, we followed [143].

Additional uses: *Ap*: Apotropaic; *E*: Edible; *F*: Fibre; *I*: Incense; *M*: Magic; *P*: Perfume/cosmetics; *O*: Ointment; *Oi*: Oil; *R*: Ritual; *S*: Spice, condiment; *Re*: Resin; *T*: Timber; *W*: Wine

*Included in Jacob's [2] list (see text). The categories of the reliability levels of the Biblical plants' identification are according to Amar [8]. See above

We excluded about 24 plant species from Jacob's list [2] for the following reasons: they are no longer recognized by Amar [8] as plants, or the reliability of identification level is below "low probability of identification" or is an "aggregate name" and not a species-specific plant name (hence, indicated as NR); the identification by Campbell–Thompson is no longer recognized today or cannot be confirmed by any further evidence (NC-P); the plant is unknown to the flora of the Holy Land (NF); no evidence exists of international trading in the plant (NT); identification is obscure and/or non-specific (OB); they are recorded only from Egypt, with no further evidence related to the Holy Land (OE); they are found only in

Mesopotamia (OM), with no data from Egypt and/or Mesopotamia on any medicinal use (EM).

These plants are (1) *Zizyphus vulgaris* Lam. [20: 319: ff; NF], *Z. spina christi* (L.) Wild. 65:158 (OE). (2) *Papaver rhoeas* L. (based on [70:327]). While Manniche [65: 130-132] and Aboelsoud [68:85] mentioned that *P. somniferum* L. was used medicinally in Egypt, Bisset et al. [105] could not corroborate this information. It is also debatable whether *P. somniferum* was known at all in the Holy Land in Biblical times [106-108]. (3) *Nymphaea coerulea* (sic!), *Lotus* L (sic!), based on Germer [70:26, 373, 375] (NF). *Lotus* sp. (NF, NT) appears in Manniche [65: 126-7] under *Nymphaea lotus* (L.) Willd. (See 70:64, 26: 373, 375), (NF, R, NT). (4) *Anemone coronaria* L.

Table 3 Plants not cited in the Bible but mentioned as medicinal in post-Biblical sources and/or in Egypt and/or Mesopotamia

Species / English name	Source of evidence	Botanical status / origin/	Additional uses
<i>Aloe vera</i> L. * Aloe	E: [65:72, 75:25-26, 68:82,83,84,85]. BT: Gittin 69b. M: [20:129, 94:533].	D / Ar [99].	C
<i>Carthamus tinctorius</i> L. / Safflowers	E: [64:79, 65:83-84, 69:79]. BT: Gittin 70a (? As "Morika") M: [96: 544-545].	D / NE [97].	E / Oi
<i>Ferula asa-foetida</i> L. / Asafoetida	E: [65:101-102]. MI: Shabbat 20:3. BT: Shabbat 140a; Gittin 69a (under <i>Helbena</i>) M: [20:355, 73:52, 83:11].	CA [98]	In
<i>Lawsonia inermis</i> L. Henna	Koffler A E: [65:114, 68:85].	Im / EA	D: BT: Shevi'it 7:6. P B: Song of Songs 4:13).
<i>Lepidium sativum</i> L. / Cress	E: [64:71, 65:115]. BT: Shabbat 110a, Yoma 49a, Gittin 69a. M: [72:89,90,91 73:52,53,].	D / SA (perhaps Iran, [99]). BT: Gittin 69a, Shabbat 109a.	E
<i>Piper spp.</i> / Black pepper	E: [64:71, 65:136]. (<i>Piper nigrum</i>). BT: Shabbat, 65a, 90a, 140a]. M: [83:120].	Im / EA [99].	S

Botanical status: *In*: Indigenous; *Im*: Imported; *D*: Domesticated/cultivated. If there is no specific reference, we followed [143].

Origin: *A*: Arabia; *CEA*: Central East Asia; *E*: Europe; *EAR*: East Arabia; *EA*: East Asia; *EAF*: East Africa; *M*: Mediterranean; *EM*: East Mediterranean; *NE*: Near East; *SEA*: Southeast Asia; *SEE*: Southeast Europe; *SWA*: Southwest Asia. If there is no specific reference, we followed [143].

Additional uses: *Ap*: Apotropaic; *E*: Edible; *F*: Fibre; *I*: Incense; *M*: Magic; *P*: Perfume/cosmetics; *O*: Ointment; *Oi*: Oil; *R*: Ritual; *S*: Spice, condiment; *Re*: Resin; *T*: Timber; *W*: Wine

*Included in Jacob's [2] list (see text). The categories of the reliability levels of the Biblical plants' identification are according to Amar [8]. See above

(NR); (5) *Anthemis nobilis* L., not in Egypt [65], mentioned for Mesopotamia [20:117] (NF, NR, NT); (6) *Colchicum autumnale* L., [20: 167] (NR, NF, NT). (7) *Ranunculus* sp., [20: 146, not in 65]. Twenty-four species of *Ranunculus* are known from Israel [109:192-198], not one of which is known locally as a medicinal plant [110, 111]; (8) *Urtica dioica* L., [20: 209], (NR, NF, NT); (9) *Quercus infectoria* Oliv., [20:2470, (NF, NT)]; (10) *Nerium oleander* L. (not in Manniche [65]), mentioned for Mesopotamia [20:322]) (NR, NT); (11) *Lolium temulentum* L./ (Matthew 13:25), Schonfield [51:85] translated it as "weed" and added in note 21 "Wheat-like weeds (Heb. Zunin, Gr. *zizania*), probably darnel." In the King James Version, it appears as "tares," which is identified as *L. temulentum* [4:133-134], mentioned for Mesopotamia [20:148] (OM); (12) *Triticum* sp. (Emmer wheat) [65:152-3], Gittin 69b (EM); (13) *Prunus amygdalus* Batsch (= *Prunus dulcis* (Mill.) A.A. Webb [70:224; 65:138-139], (OE); (14) *Balanites aegyptiaca* (L) Delile, according to Manniche [65:81], "Its use remains somewhat obscure" (NR); (15) *Phragmites communis* (sic!) (the valid synonym of *Phragmites communis* Trin (= *P. australis* (Cav.) Trin. Ex Steud.) based on Germer [70:188,190] not in [65], (OE); (16) *Chrysanthemum cinerariifolium* (Trevir.) Sch. Bip., based on Germer [70:263] not in [65], (NR, NF); (17) *Arundo donax* L. [70:188,191] not in Manniche

[65] (OE, NT); (18) *Nymphaea lotus* L. [70: 26, 373, 375] (NF); (19) *Cucumis melo* L. [70:124,373,375, 65:76] var. *chate* (Hasselq.) Sageret (OE, NT). *Cyperus papyrus* L. [70:138,187,201,373,397, 65: 100] (OE, NT); (20) *Cyperus esculentus* L. [65:98, 70:134,201,207,222,372,375] (OE, NF); (21) *Thymus vulgaris* L. known from Egypt [70:17] (NR); *Thymus* sp. in [65:150] (NR, OE, NF); (22) *Citrus vulgaris* Schrad. [70:266] (OE); (23) *Salix safsaf* Forssk. ex Trautv. [70:106,237,373; 65:145-76; 75:30; 69: 42], willow buds (OE, NF); (24) *Ficus sycomorus* L. [75: 30; 69:41,79, 82] (OE).

The following additional medicinal plant species are known only from Ancient Egypt; at the moment, no sufficient supporting data exist to consider them BMP's: *Glycyrrhiza glabra* L. [65:106]; *Portulaca oleracea* L. [65: 13 7-138]; *Raphanus sativus* L. [65:141-142]; *Rubia tinctoria* Salisb. (= *Rubia tinctorum* L.) [65:144]; *Acacia nilotica* (L.) Delile [68:84; 65:65-67; 69:79, 88, 91, 92, 95, 97]; *Acacia* sp. [69: 39, 41, 42 gum, 88]). *Ocimum basilicum* L. [65:128; 70:84]; *Cannabis sativa* L. [65:82].

Debatable species: "Ohalim / Ohalot". In the Bible "Ohalot" and "Ohalim" are mentioned four times—three of them in relation to perfumes (Proverbs 7:17; Psalms 45: 9 and Song of Songs 4: 14). Amar [8: 156-7] concludes that the old Jewish interpreters agree only on the identification of "Ohalim" cited in Songs of Songs as

Table 4 Various patterns

Species / English Name	Source of evidence	Botanical status / Origin	Additional uses:
<i>Ceratonia siliqua</i> L. * Carob	M: [20:175,180,184,186,284, 100:41].	In / D: BT: Baba Batra 68b.	E
<i>Eruca sativa</i> * Mill. / Rocket See discussion	BT: Yoma 18b, Shabbat 109a, Gittin 69b (under "Gargir"). M: [20: 210].	D, BT: Eruvin 28b, Ma'aserot 48:73.	E
<i>Foeniculum vulgare</i> Mill. C	E: [65:105-106, 75:28, 71:41] M: [73:52, 101: 234-242].	In	E / S
<i>Laurus nobilis</i> L.* / Bay Leaf, Laurel See discussion	AR: [37]. BT: Gittin 69b	In	S
<i>Pistacia lentiscus</i> L.* / Lentisk	E: [70:80]. AR: [33], (<i>P. lentiscus</i> / <i>P. palaestina</i>). MI: Tosefta Shabbat 12:8.	In	R
<i>Sesamum indicum</i> L. Sesame	E: [64:79, 65:147, 68:85]. BT: Gittin 69b. M: [80:233].	D / SEA BT: Very common crop in the Talmud period, Sabbath 89:42, Nedarim 86:49, MI: Machshirin 81:46.	E, BT: Sabbath 82:42, Nedarim 86:49. / Oi
<i>Trigonella foenum -graecum</i> L. / Fenugreek	E: [65:85-87, 68:85]. M: [73:52-53, 78:430].	In /EM-SWA / D	E

Botanical status: *In*: Indigenous; *Im*: Imported; *D*: Domesticated/cultivated. If there is no specific reference, we followed [143].

Origin: *A*: Arabia; *CEA*: Central East Asia; *E*: Europe; *EAR*: East Arabia; *EA*: East Asia; *EAF*: East Africa; *M*: Mediterranean; *EM*: East Mediterranean; *NE*: Near East; *SEA*: Southeast Asia; *SEE*: Southeast Europe; *SWA*: Southwest Asia. If there is no specific reference, we followed [143].

Additional uses: *Ap*: Apotropaic; *E*: Edible; *F*: Fibre; *I*: Incense; *M*: Magic; *P*: Perfume/cosmetics; *O*: Ointment; *Oi*: Oil; *R*: Ritual; *S*: Spice, condiment; *Re*: Resin; *T*: Timber; *W*: Wine

*Included in Jacob's [2] list (see text). The categories of the reliability levels of the Biblical plants' identification are according to Amar [8]. See above

Aquilaria agalocha Roxb. (= *A. malaccensis* Lam.). According to Amar [8:156], this identification is on a level of "high probability but not certain." Felix [6:255] considers all the citations related to "*Aquilaria agallocha*." But Zohary [7:204] considers only the Psalms citations, as well as John (19:309-40), as related to *Aquilaria agallocha* /Aloe vera. In the Talmud (Gittin 69b), "*Illava*" is mentioned as a medicinal plant. It is held to be Aloe vera by most of the old Jewish commentaries [4, I:150].

"*Oren*"—*Pinus* or *Laurus nobilis*? Amar [8:158] takes "*Oren*" (Isa. 44:14-15) to be *Pinus halepensis* Mill., under "A high level of the identification reliability but not sure." Cedar in Akkadian is "*Erenu*" [112: 181-182]. In Campbell–Thompson's view [20:282], "*erini*" or "*erinu*" is used as a general term for the coniferous tree, a view not accepted today. In the Talmud (Gittin 69b), there is a remedy called *Atarafa d'ara'a*" (אטרפא דאראא) against stomach worms; "*tarfa*" means a leaf and "*de'ara'a*" is translated by A. Steinsaltz [67] (in his commentary to Gittin 69b) as *Laurus nobilis*, based on the name of this species in other Semitic languages as "*ar*."

Campbell–Thompson [20:298] mentions "*ēru*" (which he identifies as *L. nobilis*) against "anus troubles"; this identification cannot be confirmed or denied because of the lack of sufficient cuneiform

evidence. Therefore, Feliks's [6:92] and Zohary's [7: 120] acceptance of "*Oren*" as *Laurus* has no solid evidence. It is worth mentioning that, as a rule that Campbell–Thompson's [20] identification is based mainly on Aramaic and Hebrew terms. So, following Campbell–Thompson, to clarify the Biblical plant terms, this might end in a vicious circle!

Ceratonia siliqua. Despite the debate over whether *Ceratonia* is mentioned in the Bible [3, I: 393-407, 4:72-73; 113:passim, 114: passim], the plant clearly was widely distributed in the Holy Land as an indigenous species [115]. The few archaeological findings of *Ceratonia* as: phytolites [116:1259]; wood [113:85; 117:112]; seed and fruits [118:101; 37:4] as well as pollen [119:12,18] indicate its presence in the Holy Land in the Bible period and earlier. All of the authorities agree that it was present here naturally, even if it is not mentioned directly in the Old Testament [113, 114, 116, 117 and references therein]. There is a debate [120: specimen No. 41; 4: 72-73; 7:63 and reference therein] if the "Locust" cited in Matthew 3:4 and the "pods" of Luke 15:16 are really *Ceratonia*. The many Jewish post-Biblical references indicate its high importance as a food plant in the Holy Land [121:203-204; 3, II: 393-407]. Indeed, the presence of the carob in the Holy Land during the Bible period is

quite certain; it is a common medicinal plant in the region [rev. 122].

“*Brosh*”—*Cupressus/Juniperus*: Amar [8:159-161] discusses in detail the different Jewish historical suggestions for the identification of “*brosh*,” and summarizes: “it seems that we are speaking on an aggregate name for both genera *Cupressus* and especially *Juniperus*.” Notably, Löw (*Cupressus*—[3, II:26-33] *Juniperus*—[3, II: 33-38]) and Felix [6: 79-80] have the same view. According to Zohary [7:106], “It probably refers to *Abies cilicica* (Antoine & Kotchy) Carrière. Today, there is general agreement that the Akkadian word “*burashu*” denotes Juniper [112: 180-181]. The Akkadian term for cypress is “*shurmenu*” [112: 184]. Some of the previous ideas on this issue [123–125] are not accepted today.

“*Kikkayyon*”—*Ricinus/Lagenaria*: Amar [8: 178-179] following [126: 352-354] suggests that the identification of the Hebrew “*Kikkayyon*” as *Ricinus communis* is of a “high but not sure level of identification’s reliability” and that it could also be *Lagenaria vulgaris* Ser. (= *L. siceraria* (Molina) Standl.). Although *Lagenaria* is known as a medicinal plant [127], it is not as common a medicinal plant as *Ricinus*. Felix [6:136] mentions the possibility of *Lagenaria* being included, based on some old Jewish sources. He states that “the Talmudic tradition identifies ‘*Kikkayyon*’ as *Ricinus* based on philology and the Geonim (the presidents of the great Babylonian Talmudic schools) evidence that this plant is common in Babylonia.” Zohary [7:193] did not mention the possibility of *Lagenaria* at all. We prefer to relate “*Kikkayyon*” to *Ricinus* because of its wide use as an important medicinal plant in the ancient world since ancient times [rev.128], including the Talmudic period (Shabbat 21a).

“*La’ana*”—*Artemisia*: According to Amar [8:163], the identification of the Biblical *La’ana* (לַעֲנָה) is of “a low probability”. He also noted several other candidates: *Ecballium elaterium* (L.) A. Rich., *Citrullus colocynthis* L., and *Balanites aegyptiaca* (L.) Del.. All of these species are known as important medicinal plants in the ancient Fertile Crescent (*Artemisia* spp. [129,130]); *E. elaterium* [rev. 58]; *C. colocynthis* [131] and *B. aegyptiaca* [132]. Feliks [6:200] opines: “It is common to identify *La’ana* as plants from the genus *Artemisia* which contain bitter juice.” Zohary [7:184] identified two citations (Jeremiah 23:15 and Amos 5:7 as *Artemisia herba-alba* Asso, but “*La’ana*” appears in at least six more citations (Deuteronomy 29:18, Job 30:4, Proverbs 5:4, Lamentations 3:15 and 19, Hosea 10:4, Amos 6:12). The wormwood mentioned in Revelations 8:11 appears as “*Apsinthos*” in the Greek version. Padosch et al. [133] commented: “The Greek equivalent to “*Apsinthos*” is used as a name for a star that fell into the waters and turned them bitter. The Greek word “*Apsinthion*”—undrinkable—is most probably the ancestor of the word “absinthe.” The Talmud (Abodah Zara

30a) mentions preparing a special “*Apsintin wine*,” which is still produced today [133]. Thus, we prefer to treat “*La’ana*” as *Artemisia* spp., especially *A. herba alba*, which is known as a common medicinal plant in the Middle East and North Africa [134–136]. *A. absinthium* L. is also well known as a medicinal plant [139] and the wide use of *A. absinthium* in Egypt and Mesopotamia (Table 1). *B. aegyptiaca* seems confined to rare oases [137] and *E. elaterium* is rarely mentioned in ancient sources from the Holy Land [58].

Conclusions

All our suggested BMPs are known as such also in Ancient Egypt and/or Mesopotamia (Tables 1–4). Explicit evidence for use of medicinal plants is very rare in the Bible as well as in the Jewish post-Biblical writings. The comparison to adjacent ancient civilizations (in time and space) enables us to reconstruct the suggested list of BMP’s. Examination of our list shows that all the plants in our suggested list are in continuous medicinal use in the Middle East down generations [138–139] and are used in the Holy Land today [138–141].

Shakya [142] published a review, “Medicinal plants: future source of new drugs.” His “top 25 bioactive compounds of medicinal plants” include *Ricinus communis*, *Piper nigrum*, *Aloe vera*, *Nigella sativa*, *Artemisia absinthium*, and *Allium sativum*. This list accounts for 24% of our suggested list of Biblical Medicinal Plants. As once spoken by King Solomon, “That which has been is what will be, That which is done is what will be done, And there is nothing new under the sun” (Ecclesiastes 1:9).

Abbreviations

AR: Archaeological evidence from the Holy Land; B: Old Testament; BT: Egypt; M: Mishna; NT: New Testament

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