Classical and Hebrew Sages on Cultivated Biennial Plants
Part II

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Liliaceae

Allium

Theophrastus, with his profound botanical understanding, grouped together the members of the genus *Allium* known to him: onion (*kromnon, A. cepa*), leek (*prason, A. porrum*), garlic (*skordon, A. sativum*), long onion (*gethnon, A. cepa* var.[1]), horn onion (*geteion, A. cepa* var.) and shallot (*kromnon to skhiston, A. ascalonicum*). Moreover, in morphological and developmental aspects he compared the *Allium* species to other monocotyledonous geophytes.[2] Following Theophrastus we deal with them together.

On seed, sowing, germination and vegetative reproduction I:

> Seed does not keep well ... among the more vigorous ones are ... leek ... among the less vigorous are long onion — which will not keep ... (*HP* 7.5.5).
> The second period [of sowing] begins after the winter solstice in the month of Gamelion (January), in which they scatter or plant the seed of leeks, celery, long onion and orach ... Leek and long onion do not take the same time [to germinate], but the former 19 to 20 days, the latter 10 to 12 (*HP* 7.1.2-3). Another thing that makes a difference as to the rapidity with which the seeds germinate is their age; for some herbs come up quicker from fresh seed, as leek, long onion ... (*HP* 7.1.6). All these herbs are propagated from seed, and some also by ... a piece of root ... By root [bulb!] are planted garlic, onion ... and in general such bulbous plants (*HP* 7.2.1).[3]

On their leaves:

> ... in most potherbs [leaves] grow directly from the root, as in onion, garlic, chicory, and also in asphodel, squill and purse-tassels ... It is peculiar to potherbs to have hollow leaves, as in onion and in horn-onion (*HP* 1.10.7-8).[4]

On fruit and seed production, location on the plant and timing:

> Some [potherbs] however bear their fruit not in the same year but in the next, as celery, leek [and] long onion, which plants also last a longer time, and are not annual; for most herbs wither with the ripening of their seed. Generally speaking, all those that push up shoots and mature their fruit reach their perfection of form in having side-shoots

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1 A term used by W. Thiselton-Dyer in the Index of Plants in *Enquiry into Plants*.

2 Such as *Muscari, bolbos* = purse-tassels, *Gladiolus, xiphion, xiphos, phasganon* = corn-flag, and *Arum, aron* = cuckoo-pint.

3 See the Homeric tale on the moly (*Allium nigrum*) in *HP* 9.15.7.

4 'The kind called horn-onion [*gethnon*] has no "head", but has ... a long neck ... it is often cut, like the leek ...' *HP* 7.4.10.

branching from the main stem — except those which have but a single stem, as leek, long onion, onion [and] garlic[5] (*HP* 7.1.7-8).
Of these those with smooth stems have no side shoots, as onion, leek and garlic — the wild, as well as the cultivated forms ... (*HP* 7.8.2).

Vegetative reproduction II:

By root [offsets[6]] are planted garlic, onion, purse-tassels, cuckoo-pint and in general such bulbous plants ... Long onion and leek also make offsets, sending out a 'head' [bulb] below, like the bulb of purse-tassels, from which the leaves spring; but this only takes place when the stem has withered and the seed has been removed.[7] But as the 'heads' of such plants are not useful they do not collect them for storing dry; wherefore also they do not plant them. It may be that somehow these are akin and closely allied to onions, so what has been said is not surprising (*HP* 7.2.1-3).
Again, while the others [potherbs] send out roots at the side, this is not the case with squill and purse-tassels, nor yet with garlic and onion. In general in these plants the roots which are attached to the 'head' [bulb, corm, rhizome, etc.] in the middle appear to be real roots and receive nourishment, and this 'head' is, as it were, an embryo [κῦμα] or fruit; wherefore those who call such plants 'plants which reproduce themselves underground' give a fair account of them (*HP* 1.6.9).
All herbs grow finer and larger if transplanted; for even size of leeks and radishes depends on transplantation. Transplantation is done especially in view of collecting seed ... (*HP* 7.5.3).

Onion and garlic kinds:

There are also various kinds of onion and of garlic; those of onion are the more numerous, for instance, those called after their localities: Sardian, Candian, Samothracian; and again the 'annual,' the 'divided' [making offsets] (shallot), and that of Ascalon. Of these the annual kind is small but very sweet, while the divided and the Ascalonian differ plainly as to their character as well as in respect to their cultivation. For the 'divided' kind they leave untended in winter with its foliage, but in spring they strip off the outside leaves and tend the plant in other ways; when the leaves are stripped off, others grow, and at the same time divisions take place under ground ... Some indeed say that all kinds should be thus treated, in order that the force of the plant may be directed downwards and it may not go to seed. The Ascalonian ... has a ... peculiar character; it is the only kind which does not divide and which does not ... reproduce itself from the root ... wherefore many do not plant these, but raise them from seed ... Some also show differences in colour; thus at Issus are found plants ... which are extremely white ... and they bear ... onions like those of Sardis. Most distinct ... is the character of the Cretan kind, which resembles that of Ascalon ... (*HP* 7.4.7-9).
Garlic is planted a little before or after the [winter] solstice, when it divides into cloves. There are different kinds distinguished as late or early, for there is one kind which matures in sixty days ... There is one kind which excels in size ... which is called Cyprian, which is

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5 'Most garlic cultivars are today sterile and do not set any seeds' (Zohary and Hopf, 2000: 195), and in some, bulbils are formed instead of flowers (M. Zohary, 1978: 603).

6 Side shoots serving for propagation by forming daughter bulbils [bulblets] at their tips (Allen, 1990; Negbi, 1995). In *Allium ampeloprasum* the stolons are of an axial-foliar origin (Galil, 1961).

7 See also *HP* 7.13.4: 'All these bulbs grow in masses, as do onions and garlic; for they make offsets from the root ...'.

> not cooked but used in salads, and, when it is pounded up, it increases wondrously in bulk, making a foaming dressing ... The sweetness of taste and smell and the vigour depends on the position and on cultivation, as with other herbs. Garlic reaches maturity from seed, but slowly, for in the first year it acquires a 'head' which is only as large as that of the leek, but in the next year it divides into cloves, and in the third is fully grown ... The growth of the root in garlic and onion is not the same; in garlic, when the clove has swollen, the whole of it becomes convex; then it increases and divides again into cloves, and becomes several plants instead of one ... (*HP* 7.4.11-12; cf. *CP* 1.4.5 and n. *g*).

Medicinal effect of garlic:

> ... [digging] hellebore [for medicinal use] too soon makes the head heavy, and men cannot go on digging it up for long; wherefore they first eat garlic and take a draught of neat wine therewith (*HP* 9.8.6).

The cultivated *Allium* species described above originated in the Near and Middle East (Zohary and Hopf, 2000: 195-8). Leek varieties (*Allium porrum*) are related and interfertile with the perennial Mediterranean-Irano-Turanian *Allium ampeloprasum* (Feinbrun-Dothan and Danin, 1998: 793) and were cultivated in Egypt and Mesopotamia during the 2nd millennium BCE. Remains of it or of its wild progenitor were found in Early and Middle Bronze Age Jericho (Zohary and Hopf, 2000: 195). Garlic is sterile and reproduced vegetatively by cloves. This prevents cross testing with conceivable wild relatives, such as the Asian *Allium longicuspis*. Nevertheless, it left impressive remains in Tutankhamun's tomb and carbonized cloves in Iraq (Hepper, 1990: 55; Manniche, 1999: 69-70; Zohary and Hopf, 2000: 195-7).

Onion's origin is probably in Central Asia, whence it reached the Near East and the Mediterranean basin. An Egyptian wall carving from the mid-third millennium, showing cultivation of onion, precedes actual onion remains by some 1000 years (Zohary and Hopf, 2000: 197-8).

Pliny deals with the *Allium* species, of the varieties of onion, garlic and shallot, their morphology, and agricultural practices. He says a lot in *NH* 19.101-116. Some of it comes from Theophrastus, but he used some other sources as well. Here are some selected sections:

> XXXII. In Egypt people swear by garlic and onions as deities. Among the Greeks the varieties of onion are the Sardinian, Samothracian, Alsidenian, setanian, the split onion, and the Ascalon onion [perhaps the shallot, translator's note], named for a town in Judaea.[8] In all these the body consists entirely of coats of greasy cartilage; also they all have a smell which makes one's eyes water, especially the Cyprus onions, but least of all those of Cnidos. The smallest of all except the Tuscany onion is the setanian, though it has a sweet taste; but the split onion and the Ascalon onion need flavouring. The split onion is left with its leaves on in winter, these being pulled off in spring, and others grow in their place at the same divisions, from which these onions get their name ... Ascalon onions also have a peculiar nature, being in a manner sterile at the root ... the Greeks have advised growing them from seed ... In our country we have two principal varieties, one the kind ... used for seasoning (the Greek name for which is *getion*-leek and the Latin *pallacana*), which is sown in [spring], and the other onion with a head, which is sown after the autumn equinox or when the west wind blow(s) in the springtime. The varieties of the latter, in order of

8 This list is not identical to that of Theophrastus (*HP* 7.4.7-9; see earlier).

> their ... pungency, are the African, the Gallic, and those of Tusculum, Ascalon and Amiternae ... Onions keep best stored in chaff. The scallion has hardly any head at all, only a long neck, and consequently it all goes to leaf, and it is cut several times, like common leek; ... it also is grown from seed ...
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> XXXIII. It may also be suitable to mention the leek in this family of plants ... It is grown from seed sown just after the autumn equinox; if it is for the purpose of chives, it must be sown rather thickly. It goes on being cut in the same bed till it gives out; and if it is grown to make heads it is always well manured before it is cut. When it is fully grown, it is moved to another bed, after having the points of the leaves above the central part carefully trimmed off and the tips of the coats drawn back from the heads.
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> ... There are two kinds of chives; one with grass-green leaves, with distinct markings on them — this is the chive used by druggists — and another ... with leaves of a yellow colour and rounder ...
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> XXXIV. Garlic is believed to be serviceable for...[country] medicaments ... It is enveloped in a very fine skin in entirely separate layers, and then consists of several kernels [cloves] in a cluster, each of these also having a coat of its own;[9] it has a pungent flavour ... The difference between the various kinds consists of the time they take to ripen — the early kind ripens in 60 days — and also in their size. Ulpicum also comes in this class, the plant called by the Greek Cyprian garlic, or by others antiscorodon; it holds a high rank among the dishes of the country people, particularly in Africa ...

Most other passages of Pliny dealing with this group, and particularly with garlic, are concerned with its medicinal attributes (*NH* 10.157; 13.133; 20. 50-57; 22.140; 27.200; 29.78, 133; 32.128).

Onion, garlic, and a type of leek *skorodoprason* (the omni-Mediterranean *A. descendens*), are described by Dioscorides in *MM* II 151-153 as a cure for alopecia (baldness), though too much onion may cause the hair to fall out (Riddle, 1985: 53, 66). Garlic is also good for viper bites 'as no other thing' (*MM* II 152: Riddle, 1985: 47).

Allium species in Jewish literature:

Onion, garlic and leek have a lot in common, botanically and agriculturally as well as gastronomically. We hear of the linkage among these *Allium* species in the Bible, when the people complained: 'we remember the fish, which we ate in Egypt freely; ... and the leeks, and the onions and the garlic' (Numbers 11:5). Members of this group are also mentioned in the Talmudic sources in various contexts. Leek, onion, and particularly garlic, have a special status, somewhere between an ordinary vegetable and a spice.

Onion: Onions were widespread during the Hellenistic and Roman eras and many details about their cultivation as well as their culinary and gastronomic qualities may be found in Talmudic sources. Onions were often grown in rectangular plots within fields of other vegetables (Mishna *Peah* 3,4). Young onion plantlets were thinned by pulling out some of the plants to provide more space for the remaining ones (*ibid.* 3,3). As summer vegetables, onions had to be watered, but irrigation would be withdrawn toward the end of the growth period to enable their complete maturation and drying (Mishna *Shevi'it* 2,9).

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9 Not a Theophrastian description.

Part of the crop would be harvested and marketed as 'wet' onions, while the rest was left to harvest as dry onions (Mishna *Peah* 3,3).[10] Special pick-axes were used to harvest summer onions from the dry ground (Mishna *Shevi'it* 5,4). Fields were sometimes irrigated to ease the pulling up of the dry onions (Tosephta *Shevi'it* 1,1-2). Onions produce new leaves even during storage and may strike root in baskets or in the ground within the house (Mishna *Ma'asrot* 5,2; Tosephta *Ma'asrot* 3,9). After harvest, onions (and garlic) were bound together and sold in bundles (Mishna *Peah* 6,10; Tosephta, *Ma'asrot* 1,6).

Onions were regarded as popular, inexpensive food: 'Eat onions and stay in the shade and do not ask for goose and chicken', says R. Judah (B. *Pesachim* 114a). Young onion leaves were considered poisonous; the 'snake' of the onion — the inflorescence scape — was believed to be particularly dangerous (B. *'Erubin* 29a). Onions were regarded as bad for the heart, with the exception of the 'Kufri' cultivar (Mishna *Nedarim* 9,8), which may have originated in Cyprus (Feliks 1999: 169, n. 11). Onions have, according to the Mishna (*'Uktzin* 2,4), three peels; the outer, dry one, was removed before bringing the onion to market (Mishna *Ma'asrot*, 1,6).[11]

Garlic: Not much can be found in Talmudic sources about agricultural aspects of garlic. The cultivar Baal-Bechi (Mishna *Ma'asrot* 5,8) was so named because it causes its eater to weep, according to the commentary of Rabbi Obadiah of Bertinoro.[12] A small, wild garlic called 'Shumamit' is also mentioned (Mishna *Kil'ayim* 1,3). Considerable attention has been paid to the medicinal qualities of garlic. Its use was widespread to the extent that Jews were known as 'garlic eaters' (Mishna, *Nedarim* 3,10). A lot has been said in favour of eating garlic: it satiates, warms the body, brightens the face, increases the semen, kills parasites of the intestines and some add that it encourages love and eliminates jealousy (B. *Baba Kama* 82a). Garlic used, therefore, to be eaten on Friday night; a custom attributed to Ezra the Scribe (ca. 450 BCE; *ibid.*). Garlic was an indispensable ingredient in sauces (Mishna *Nedarim* 6,10) and numerous medications.

On the other hand, the odours that follow garlic eating were considered disagreeable. Thus we learn that Rabbi Judah the Prince was teaching his students, smelled an odour of garlic, and so ordered that whoever had eaten garlic should leave (B. *Sanhedrin* 11a). The Roman Emperor Marcus Aurelius puts the Jews to shame because their breath smells of garlic (Amm. Marc, 22,5.5). This aspect of garlic eating was even used as a parable: 'One who has eaten garlic so that his breath smells, should he go back and eat more garlic so that his breath will smell even more!?' (B. *Brachot* 51a; B. *Shabbat* 31b). The outer skin of the garlic clove, which is very thin and light, has also been used as a parable for non-significant things or people, 'as the skin of garlic' (B. *Bechorot* 58a).

Leek: The leek is mentioned under the name חציר (*ḥatzir*) together with its close associates, onion and garlic, among the vegetables eaten in Egypt (Numbers 11:5). The term

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10 Some onion plants were left in the field to flower and produce seed; those were called 'mother onions' (see earlier, and Mishna *Peah* 3,4).

11 Onion, garlic and leek were routinely used, as nowadays, as spicy ingredients of pickled fish and vegetables (Mishna *Terumot* 10,10).

12 Another possibility is that this cultivar originated in the Lebanese town Baalbek (Even-Shoshan, 1969).

חציר was translated according to the context into leek, although it may assume a broader meaning — mostly as grass for cattle (Psalms 104:14).

In the Talmudic sources, two synonymous or slightly overlapping names were used for leek, 'כרשין'[13] and 'קפלוטות' (Mishna *Nedarim* 6,9: Tosephta *Nedarim* 3,6). The term 'כרשין' was probably used whenever the leaves were meant, whereas 'קפלוטות' — derived from the Greek 'kephalaton' — is found when the 'head' of the leek was used (Lieberman, Tosephta, *Terumot*, p. 342), that is, in cooking. The leek is considered an important spice, together with onion and garlic (Tosephta *Terumot* 9,3) and was cooked with fish (Mishna *Ma'aser Sheni* 2,1).

Leeks were not to be sown next to onions, since they adversely affect the latter's taste (Mishna *Baba Batra* 2,10).

Various healing properties were attributed to leek (B. *Pesachim* 116a; B. *Gittin* 69b). Of particular interest is the mentioning of fresh leek leaves as a medicament for someone bitten by a snake (B. *Yoma* 83b).

Discussion

The origin of domesticated biennials and the abandonment of some of them

There are more pictorial and literary records concerning the antiquity of some biennials treated in the present article than archaeological remains of the plants themselves. This is true of the beet, the umbelliferous and cruciferous biennials and lettuce. Lettuce and onion are probably the earliest domesticated biennials. This is evident in an Old Dynastic Egypt (2586-2181 BCE) relief and wall painting depicting planting of the former and watering and the harvesting of both (Hepper, 1990: 51; Manniche, 1999: 112-114; Zohary and Hopf, 2000: 197-8).

Most of the biennial vegetables are treated in *Domestication of Plants in the Old World* (Zohary and Hopf, 2000) and in *Food in Antiquity* (Brothwell and Brothwell, 1998). Vegetable gardens with the biennials beet, cabbage, celery, leek, lettuce, long onion, radish and turnip are described by Alison Burford in *Land and Labor in the Greek World* (1993: especially 133-42) as reflected in the writings of Aristotle, Diodorus, Herodotus, Hesiod, Homer, Plato, Socrates, Theophrastus, Thucydides, Xenophon and in legal and state documents. Only one biennial is described in *Food in Early Greece* (Vickery, 1936) and none were dealt with in a symposium on agriculture in ancient Greece (Wells, 1992), or in Cowan and Watson's (1992) book on the origin of agriculture. Notwithstanding, 'different sorts of cabbage, beets, and turnips, celery, onions and garlic, etc.' are referred to in Isager and Skydsgaard's *Ancient Greek Agriculture* (1992: 43), only because Theophrastus described them in *HP* 7. Similarly, Spurr (1986), in a book on arable cultivation in Roman Italy between 200 BCE and 100 CE, although quoting a great deal from the Roman agricultural treatises, mentions only a single biennial vegetable, the turnip.

This situation is partially explained by the fact that outside Egypt only a few vegetables, including tuber crops, left significant archaeological remains. In Egypt and Nubia, the remains of *Cyperus esculentus* (chufa), garlic, leek, onion, celery, lettuce, melon and watermelon have been recorded (Germer, 1985: 127-30, 137, 173, 185, 191, 193, 194,

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13 Or 'כרתי' (carthi) which is apparently the Aramaic form of 'כרשין'.

245, 246; Hepper, 1990: 9, 14, 55; Hillman, 1989; Manniche, 1999: 76-7; Negbi, 1992; Zohary and Hopf, 2000: 193-8, 202-3).

Nevertheless, a scarcity of archaeological evidence need not discourage a consideration of plant domestication based on taxonomic, ecological and genetic analyses. Some vegetables (radish, lettuce, beet and leek) are mentioned as secondary crops, which occurred first as weeds of other crops and were later domesticated in their own right during the 2nd and 1st millennia (Renfrew, 1995: 192; Chater, 1964). Hedge (1965) described, in Turkey, five wild *Brassica* species of which four were segetal or ruderal. Moreover, he observed that it is difficult in this genus, where some species have been cultivated for centuries and others are established segetals, to distinguish between wild, cultivated and naturalised taxa. This is also true of European *Brassica* species (Heywood, 1964; McNaughton, 1976), seven Asiatic lettuce species (Zohary, 1991) and up to seven ruderal and segetal *Beta* species in Turkey (Aellen, 1967; Ford-Lloyd and Williams, 1975).

In the case of the chenopod beet, that may well have found a niche as a ruderal near human dwellings prior to its cultivation, commensalism may well have preceded domestication. A weedy origin has also been suggested for carrot (Bailey, 1942, 1: 674; Banga, 1976), turnip (Heywood, 1964; Zohary and Hopf, 2000: 199-200) and lettuce (Zohary, 1991).

The biennials described by Theophrastus and Pliny, excluding their close wild allies, were potherbs in their time. One of them, alexanders, is no longer grown. Its cultivation ceased and was replaced by celery (Zeven and Zhukovsky, 1975). Similarly, various cultivated geophytes of antiquity were replaced by more successful ones (Negbi, 1989). On the other hand, beets, carrots and celery that were at incipient domestication during the classical period later became major crops.

Vegetable gardens in the Classical world

Theophrastus' *Historia Plantarum* is not an agricultural handbook, but its seventh book is devoted mainly to the potherbs grown in kitchen gardens, among them several biennial plants treated in this article. He also deals with some wild plants related to the potherbs.

Vegetable gardens in the Greek world were studied by Burford (1993) who dealt with the legal aspects of the land, the size and location of the gardens and their cultivation, including irrigation. In a number of Greek cities taxes were paid on land and on agricultural products (Isager and Skydsgaard, 1992: 135-44; Burford, 1993: 25-6, 78-80). Roman authors contributed directly to the subject of vegetable gardens. Cato says:

> Close to the city be sure to grow all kinds of vegetables, all kinds of flowers for wreaths, grape hyacinths [*Muscari*] ... (*On agriculture* 8.2 cf. Dalby's translation).

Similarly, fenced gardens were found on the outskirts of towns in Mesopotamia (Newman 1932: 88, 106). This practice was carried out for profit, using the same approach as having poultry farms near urban areas in the USA.[14] This was somewhat different in Rome, where:

> ... a garden was in itself a poor man's farm; the lower classes got their market-supplies from a garden — how much more harmless their fare was then! (*NH* 19.52).

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14 Heichelheim et al. (1962: 133, 149-50, 394).

Moreover Pliny says that the garden 'used to be called the woman's responsibility ...' (*NH* 19.57). A similar economic situation in Ptolemaic Egypt is probably the reason why biennial potherbs, and their products like radish-seed oil, are not mentioned in contractual and testimonial documents referred to by Lewis (1986),[15] whereas field crops such as wheat, barley and legumes are.[16] Nevertheless, Pliny says, as we mentioned above, that in Egypt the people are fond of sowing radish since no plant there yields a larger supply of oil and they make more profit from it than from corn and have a smaller tax to pay on it (*NH* 19.79-80).

Vegetable gardens in Jewish literature

A striking feature of vegetable gardens in Jewish sources is their dependence upon water and irrigation. This may have received more attention in Eretz Israel, where water has always been a limiting factor and dry farming was dominant. Thus we find: 'For the land, whither thou goest in to possess it, is not as the land of Egypt, from whence ye come out, where thou sowedst thy seed, and wateredst it with thy foot, as a garden of herbs. But the land whither ye go to possess it, is a land of hills and valleys, and drinketh water of the rain of heaven' (Deuteronomy 11:10-11).

The Talmud (B. *Rosh Hashana* 14a) also differentiates between crops that rely on rainwater and vegetables, which depend upon irrigation. The link between vegetables and irrigation appears in additional references (e.g. B. *Mo'ed Katan* 6b).

On seed storage

Theophrastus and Pliny were aware of the problems of seed storage, seed germination and seedling transplantation. This knowledge was traditionally transmitted from generation to generation and by practical and scholarly contacts between Greece and Rome. The best example of the latter is the abundance of Theophrastian sections in Pliny's *NH* (Morton, 1986).[17]

On seed keeping Theophrastus and Pliny make interesting remarks (*HP* 7.5.5 and *NH* 19.181). They say that some seeds keep better than others, among the more vigorous ones being coriander, beet, leek, cress, mustard, rocket, savory (*Saturea thymbra*) and in general those of pungent taste.[18] Pliny lists the same well-kept seeds, with an interesting opening: *In regard to the deterioration of seeds, some keep longer ...* (*NH* 19.181). Seeds of leek, cress, mustard and rocket are rich in pungent sulphur-containing compounds similar to the garlic's allicin (Glasby, 1979: 26) and the crucifers'

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15 However, Lewis mentioned 'production and distribution of vegetable oils' and 'smuggled olive and castor oil' (1986: 16, 119).

16 Note as well that in Buck's treatise *Agriculture and agricultural practice in Roman law* (1983), vegetables are not mentioned.

17 Whether Pliny affected Roman agriculture (and botany) is difficult to determine. The oldest extant manuscripts of *NH* are from the 8th-9th century (Greene, 1983, 1: 477, n. 71). Moreover, Palladius (4th-5th century), the earliest Roman author on agriculture after Pliny, does not mention him in his *De Agricultura*, though one-third of his book is based on Pliny's contemporary Columella's *On agriculture* (Hornblower and Spawforth, 1996; Rodgers, 1980, 3: 195-9; White, 1970: 30-1).

18 The pungent taste is found in most of these seeds, and in the beet, in the seed-ball.

isothiocyanates (Kjaer, 1976). In the beet seed-balls, where the pungent taste resides, high contents of germination inhibitors have been reported (Bewley and Black, 1982, 2: Chap. 2; Evenari, 1961). Inhibitors of seed germination may also inhibit growth of microorganisms that cause seed deterioration (Evenari, 1949).[19] The ancient scholars' observations lead us to envisage an apparent correlation between high content of inhibitors of microbial and fungal growth and seed longevity. Substantiation, however, requires further inquiry.[20]

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19 Theophrastus also discussed the inhibition of sprouting garlic cloves (*CP* 1.4.5; Evenari, 1980/81: 7-8).

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