

Arthur Schaffer, a Doctoral candidate in the Department of Horticulture, Rutgers University, is working in the field of Plant Breeding and Genetics. He has taught Plant Biology at Yeshiva University and is presently serving as Guest Botanical Curator of the Yeshiva University Museum.

THE AGRICULTURAL AND ECOLOGICAL SYMBOLISM OF THE FOUR SPECIES OF SUKKOT

Jewish rituals in the Torah are usually presented together with their symbolic meaning. For example, unleavened bread is eaten on *Pesah* "for thou camest forth out of the land of Egypt in haste" (Deut. 16:3). Similarly, Jews sit in booths during *Sukkot* "so that your generations may know that I made the children of Israel dwell in booths when I brought them out of the land of Egypt" (Lev. 23:42-3). It is peculiarly striking that there is no symbolic explanation accompanying the prescription for the four species of *Sukkot*. The Torah simply and succinctly states:

And you shall take for yourselves on the first day the fruit of the *hadar* tree, branches of palm trees, and the boughs of thick leaved trees and willows of the brook and you shall rejoice before the Lord your God seven days (Lev. 23:40).

The Torah offers not a shred of meaning, religious, historical or agricultural, about a rite so faithfully and carefully performed to this day.

This silence inspired a great deal of creative exegesis to fill the gap and enhance the ritual with symbolism. However, the majority of post-mishnaic Jews lacked an intimate familiarity with the native flora and plant ecology of Israel. Therefore, the most common and well-accepted symbolisms make minimal use of the four species' botanical characteristics. When these qualities are taken into account, they are interpreted allegorically.

Most of the traditional symbolisms of the four species are recounted in the amoraic midrashic literature. Perhaps the best known is the view

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that the plants represent, by their shapes, the key parts of the human body.

R. Mani opened his discourse with the text, "All my bones shall say: Lord, who is like unto Thee" (Ps. 35:10). This verse was said in allusion to nought else than the *lulav*. The rib of the *lulav* resembles the spine of a man; the myrtle resembles the eye; the willow resembles the mouth; and the *etrog* resembles the heart. David said: There are none among all the limbs greater than these, for they outweigh in importance the whole body. This explains, "All my bones shall say."¹

Another popular interpretation compares the four species to different categories of Jews, symbolizing the necessity for unity amidst diversity.

Another exposition: *The Fruit of the Hadar Tree* symbolizes Israel; just as the *etrog* has taste as well as fragrance, so Israel have among them men who possess learning and good deeds. *Branches of Palm Trees*, too, applies to Israel; as the palm tree has taste but not fragrance, so Israel have among them such as possess learning but not good deeds. *And Boughs of Thick Trees* likewise applies to Israel; just as the myrtle has fragrance but no taste, so Israel have among them such as possess good deeds but not learning. *And Willows of the Brook* also applies to Israel; just as the willow has no taste and no fragrance, so Israel have among them people who possess neither learning nor good deeds. What then does the Holy One, blessed be He, do to them? To destroy them is impossible. But, says the Holy One, blessed be He, let them all be tied together in one band and they will atone one for another. If you have done so (says God), then at that instant I am exalted. Hence it is written, "It is He that buildeth His upper chambers in the heaven" (Amos 9:6). When is He exalted? What time they are made into one band; as it says, "When He hath founded His band upon the earth." Accordingly Moses exhorts Israel: *And Ye Shall Take you on the First Day the Fruit.*²

According to other interpretations the species personify the four matriarchs,³ the three patriarchs and Joseph⁴ and even different aspects of God.⁵

Historical Symbolism

Rituals, particularly festival rituals, often commemorate a significant aspect of Jewish history. Again, the unleavened bread of *Pesah* and the *Sukkot* booths are fine examples. The four species also have historical significance according to Maimonides:⁶

Passover teaches us to remember the miracles which God wrought in Egypt and to perpetuate their memory; the Feast of Tabernacles reminds us of the miracles wrought in the wilderness,

Maimonides continues to elaborate on the four species, but not without first remarking on the value of midrashic interpretations.

As regards the four species. . . . Our Sages gave a reason for their use by way of aggadic interpretation, the method of which is well known to those who are acquainted with the style of the sages. They use the text of the Bible only as a kind of poetical language (for their own ideas), and do not intend thereby to give an interpretation of the text.

After some examples of aggadic interpretation, Maimonides continues,

I believe that the four species are a symbolical expression of our rejoicing that the Israelites changed the wilderness, “no place of seed, or of figs, or of vines, or of pomegranates, or of water to drink” (Num. 20:5), for a country full of fruit trees and rivers. In order to remember this we take the fruit which is the most pleasant of the fruit of the land, branches which smell best, most beautiful leaves, and also the best kind of herbs, that is, the willows of the brook.

Sukkot, states Maimonides, commemorates the wanderings in the wilderness *and* the subsequent entry into the land of Israel. The booth symbolizes the former; the four species, the latter. Disappointingly, though, Maimonides does not attribute much significance to these particular four. They are the most pleasant fruit, beautiful leaves, etc., but their selection was, to some degree, merely practical and utilitarian. He continues:

These four kinds have also these three purposes: First, they were plentiful in those days in Palestine so that everyone could easily get them. Secondly, they have a good appearance, they are green; some of them, namely, the citron and the myrtle, are also excellent as regards their smell, the branches of the palm tree and the willow having neither good nor bad smell. Thirdly, they keep fresh and green for seven days, which is not the case with peaches, pomegranates, asparagus, nuts and the like.

Maimonides, then, believes that the four species were chosen to symbolize the entry into Israel because they were native flora of Israel that excelled in their respective qualities, were easily available, looked or smelled good or both and could remain fresh throughout the festival. Given that reasoning, an asparagus shoot may have replaced the palm and a sweet smelling peach, the citron, all things being equal.

Nogah Hareuveni, the founder of Israel’s botanical garden Neot Kedumim, offers a fascinating commentary on Maimonides’ interpretation.⁷ He considers the four species as symbols borrowed from the world of nature that reenact the desert wanderings and entry into the Promised Land. The date palm represents life in the desert, its natural habitat. The willows of the brook portray the plants that grew along the Jordan River, the entry point into Israel. Upon entering, the Israelites encountered the

forest thickets covering the hill country, symbolized by the myrtle branches whose natural habitat is the hills. After clearing the thickets, the hill country was cultivated and planted with the choicest fruit trees, represented by the citron. The ritual of the four species, according to Hareuveni, is to teach:

You led us through the wilderness in the days of the exodus from Egypt and sheltered us in booths in the shade of the date palms. You set us under the willows of the Jordan, and finally You led us across the Jordan River dryshod and brought us to "the land flowing with milk and honey," to clear the "leafy trees" in its thick forestland in order to turn that land into fruit-bearing groves.

Agricultural Symbolism

All the major holidays have agricultural, as well as religious and historical significance. *Pesah* celebrates the barley harvest, *Shavuot* the wheat harvest and *Sukkot* the harvest of summer crops—fruits and vegetables. The holiday rituals strongly reflect these agricultural realities. During *Pesah* the *omer* offering from the newly harvested barley was presented in the Temple and on *Shavuot* two loaves of bread baked from the freshly harvested wheat were offered. The four species of *Sukkot* have been similarly viewed as four representative species of plant material marking the summer harvest.

If this were true, however, the four species would be made up of cultivated, edible plants that were harvested at the "Festival of the Harvest." The ritual would have been far more meaningful if the commandment was to bring a cluster of dates, a bunch of grapes, two fig leaves and three olive branches. Instead, neither the willow nor the myrtle were used for food (although the myrtle may have served medicinal purposes), the citron was certainly not a major cultivated fruit and the part of the date palm required for the ritual was neither harvested nor edible. In fact, harvested, cultivated fruits are strikingly absent from the *Sukkot* rituals. Other than the picturesque custom of hanging fruits in the *sukkah* and the possibility that the *sukkah* symbolized the booths built at the time of ingathering, the harvest actually plays a surprisingly small role in the celebration of a festival meant to commemorate the "ingathering of the fruits."

There is an additional significance to the time of *Sukkot* besides the summer harvest. *Sukkot* marks the major climatic changes of the year which delimits the end of one agricultural cycle and the anticipated beginning of the next.

The Israeli climate is characterized by only two seasons, a wet cool "winter" and a dry, practically rainless, warm "summer." From ap-

proximately May until September very little rain falls in most portions of the country. The first rains (*yoreh*) generally arrive sometime in September or October and continue through April when the late rains (*malkosh*) end the wet winter season. In Jerusalem, for example, twenty inches of rain may fall between October and May but there may only be one half of an inch throughout the rest of the year.⁸ Similar proportions are the rule throughout most of the country.

Biblical agriculture was determined by this disproportionate climatic pattern. A 10th century B.C.E. agricultural calendar found at Gezer reflects the climate and describes the cycle of sowing and reaping as follows:

His two months of (olive) harvest;
His two months are planting (grain);
His two months are late planting;
His month of hoeing up of flax;
His month is harvest of barley;
His month is harvest and feasting;
His two months are vine tending;
His month is summer fruit.⁹

The calendar begins with the seventh month according to the Hebrew year. Throughout this month and the next, the final harvest of olives and their processing took place. During this period the *yoreh* rains were eagerly awaited to moisten the parched soil after the long dry summer months. Until these first rains fell, the fields could not be plowed and the new cycle of plantings had to be postponed. Too long a delay of the *yoreh* meant agricultural disaster and imminent famine and precipitated national fasting and repentance.¹⁰

The *Yoreh* was followed by planting of grains—wheat, spelt and barley—which was in turn followed by later plantings of vegetables. The *malkosh* came toward the conclusion of the planting season while the dry remainder of the year was occupied by harvests, first of barley, then wheat and finally fruits, concluding with olives.

The ancient agrarians appreciated the significance of God's key blessing, repeated at least twice daily in the Hebrew prayers.

And it shall come to pass, if you hearken diligently to my commandments which I command you this day, to love the Lord your God, and to serve him with all your heart and with all your soul that I will give you the rain of your land in its due season, the early rain (*yoreh*) and the late rain (*malkosh*) that thou mayest gather in thy corn and thy wine and thy oil (Deut. 11:13-14).

They were similarly mindful of the frightening outcome of disobedience.

Take heed to yourselves, that your hearts be not deceived, and you turn aside and serve other gods and worship them; and then the Lord's anger be inflamed against you, and He shut up the heaven that there be no rain and that the land yield not its fruit. . . (Deut. 11:16-17).

In accordance with this agricultural timetable, God's power to deliver rain is invoked in the prayers beginning on *Shemini Atseret*, at the conclusion of *Sukkot*. Actually, the prayer might just as well begin at the start of *Sukkot* but is delayed until all have left their booths and are back in their homes with their waterproof roofs.¹¹ Rain while sitting in a *sukkah* would only be a partial blessing. The invocation ceases at the beginning of *Pesah* since rain that late would fall on the ripening, drying grain in the field causing ruin and waste.¹²

The onset of the rainy season takes on even more significance since biblical Israel depended almost entirely on natural precipitation; irrigation was limited to a small portion of the country. Egypt, in contrast relied mainly on irrigation. The advantages of natural precipitation are pointed out to the generation of Israelites about to enter into the Promised Land.

For the land which you are about to invade and occupy is not like the land of Egypt from which you have come. There the grain you sowed had to be watered by your own labors (irrigation), like a vegetable garden; but the land you are about to cross into and occupy, a land of hills and valleys, soaks up its water from the rains of heaven (Deut. 11:10-11).

The near total dependence of Israel on rain allows only limited mastery and dominion over agriculture. The inhabitants of the land are governed not by their "own labors" but by Divine providence—"the rain of heaven." In the holy land the watchful eye of God, His nurturing care and concern, permits agricultural success; man's labors alone are not sufficient. Accordingly, the contrast to Egypt does not merely point out the physical advantages of nonirrigated agriculture. The fact that Israel is a land that "drinks water from the rain of heaven" underlines the special relationship between God and Israel, the land and people, and bears testimony that Israel is

a land which the Lord thy God cares for: the eyes of the Lord thy God are upon it from the beginning of the year until the end of the year (Deut. 11:12)¹³.

Rain Festival

Sukkot, then, in addition to celebrating the harvest, marks the climatic transition between summer and winter, drought and rain. It was a time for the biblical Israelites to acknowledge and praise God for the

previous year's rain and subsequent abundant harvest of the agricultural year, that was now coming to a close. At the same time, it was a period that evoked their deepest hopes, concerns and fears regarding the expected and awaited rains so necessary for a successful forthcoming agricultural cycle.

In fact, almost all the rituals of *Sukkot*, including those observed only in the Temple, revolve around rain and water; the harvest is conspicuously ignored. In many respects water is the dominant theme of the "Festival of the Harvest."

The Mishnah states that "on *Sukkot* judgment is passed in respect to rain."¹⁴ In light of this it is only fitting that the festival literally overflows with water rituals.

Throughout the year certain sacrifices in the Temple were accompanied by wine libations. During *Sukkot*, however, water libations (*nissukh hamayim*) were added to the daily morning offering¹⁵ and both wine and water were ritually poured along the sides of the altar.

The Mishnah describes the occasion as follows:

How was the water libation [performed]? A golden flagon holding three *logs* was filled from the Siloam. When they arrived at the water gate, they sounded a *teki'ah* (long blast), a *teru'ah* (tremulous note) and again a *teki'ah* (long blast). [The priest then] went up the ascent [of the altar] and turned to his left where there were two silver bowls. R. Judah said, they were of plaster [but they looked silver] because their surfaces were darkened from the wine. They had each a hole like a slender snout, one [hole] being wide and the other narrow so that both emptied themselves together. The one on the west was for water and the one on the east for wine.¹⁶

The significance of the rite is pointed out by Rabbi Akiba.

Why did the Torah enjoin on us to pour out water on Tabernacles? The Holy One, blessed be He, said Pour out water before Me on Tabernacles so that your rains this year may be blessed.¹⁷

Related to the water libations was the *simhat bet ha-shoevah*, the celebration of the water drawing, considered the most joyous event of the year. "Whoever has not seen the rejoicing at the place of the water drawing has never seen rejoicing in his life,"¹⁸ is an indicative mishnaic statement. The purpose of the festivity, which took place each entire evening preceding the water libation, was to joyously celebrate the water drawing and libation of the following morning in fulfillment of "And ye shall draw water with joy" (Isaiah 12:3). The celebration began in the evening and continued until the morning when the water was drawn from the Siloam Pool with much pomp and excitement and returned to the Temple where it was poured at the morning sacrifice.

In addition to the water libations and their accompanying festivities, there was a ritual of the willows, independent of the willows of the four species.

How was the precept of the willow branch [carried out]? There was a place below Jerusalem called Moza. They went down there and gathered thence young willow-branches and then came and fixed them at the sides of the altar so that their tops bent over the altar. They then sounded a *teki'ah* (long blast), a *teru'ah* (tremulous blast) and again a *teki'ah*. Every day they went round the altar once, saying “we beseech thee, O Lord, save now, we beseech thee, O Lord, make us now to prosper.” R. Judah said, [they were saying], “aniwaho, save now,” but on that day¹⁹ they went round the altar seven times. When they departed, what did they say? “Thine, O altar is the beauty! Thine, O altar, is the beauty!” R. Eliezer said, [they were saying,] “To the Lord and to thee, O altar, to the Lord and to thee, O altar.”²⁰

Willow branches, eleven cubits long (*Sukkah* 45a) were used each of the festival days while on the seventh day, *Hoshanah Rabba*, a special detailed ritual was performed.

Willows are the plant world’s symbol of water *par excellence*, the “willows of the brook.” Their natural habitat is banks of rivers and brooks; they thrive in moist, even flooded, soils. Physiologically they are particularly adapted to life in wet, water abundant areas²¹ and this characteristic naturally made them the floral centerpiece on the Temple altar during *Sukkot*.

The reading from the Prophets for the first day of *Sukkot* also bears evidence that water is a major theme of the festival. “And on that day living water (*mayim hayyim*) shall go out from Jerusalem (*Zech.* 14:8).” And further on,

And it shall come to pass that everyone that is left of the nations who came against Jerusalem shall go up from year to year to worship the King, Lord of Hosts, and to keep the Feast of Booths. And whoever does not come up of all the families of the earth to Jerusalem to worship the King, Lord of Hosts, *upon them shall be no rain* (*Zech.* 8:16-17).

Even the custom of staying awake the night of *Hoshanah Rabba* studying Torah is a reflection of the centrality of water to the holiday. Torah study is a human expression of thanks and gratitude to the Almighty. Therefore, twice during the year appreciation is expressed in this manner: on *Shavuot* for the spiritual gift, the Torah itself, and on *Hoshanah Rabbah* for the primary material gift, water.

The rituals of *Sukkot* all point to water as a major, if not the major, theme of the festival. Water libations, the willows, the start of prayers for rain, all serve to underline the tremendous importance and necessity

of rain for the region and help to direct the prayers for the “water of life” to “the giver of life.”

The Four Species

Both the Jerusalem and Babylonian Talmuds refer to the four species as symbols of water.

Said R. Eliezer: Seeing that these four species are intended only to make intercession for water, therefore as these cannot [grow] without water so the world [too] cannot exist without water.²²

The Jerusalem Talmud begins Tractate *Taanit* with the following parallel statement: “The reason of R. Eliezer is that since these four species grow on water therefore they come as intercessors for water.”²³

The Talmuds see, then, the four species as advocates for water at the period that “the world is judged regarding water.”²⁴ But what is unique about the citron, date palm, willow and myrtle? After all, every plant “grows on water” and “cannot grow without water!”

In truth, the four species uniquely and specifically represent water, in a manner that bears uncontested evidence to our ancestors’ intimate familiarity with the native flora and ecology of Israel.

The willow (*Salix* species), as already mentioned, is one of the plant world’s finest symbols of water. Described by the Torah as “willows of the brook,” the Talmud even questions whether willows that have not grown along water are permissible for use in the ritual.²⁵ Post, in his classic, *Flora of Syria, Palestine and Sinai*, describes the *Salix purpurea*, the purple osier willow as growing “by water.” He describes the habitats of the other species of the *Salix* genus as “banks of streams,” “near water or in it,” and “wet places.”²⁶ Michael Zohary, in the definitive work *Flora Palaestina*, similarly describes the willows of Israel as growing “by water.”²⁷

The willows, in general, are water-loving plants that can grow in habitats too wet for other species to survive. In the ritual of the four species they present themselves as advocates for an abundance of rain.

The *lulav* is the as yet unopened date palm frond, or leaf. The palm (*Phoenix dactylifera*) is a sign not merely of the desert but specifically of the oasis in the desert, the island of water in a sea of sand. Where the date is found, water cannot be far away. One of the first stops of the Israelites in the wilderness, after the Exodus, was “Elim and in Elim were twelve fountains of water and seventy palm trees” (Num. 33:9).

Jericho was known as the “city of palms” (Deut. 34:3)—fitting since it, too, is an oasis. Its annual rainfall characterizes it as desert; but because of its springs, it became one of the earliest cities in history

capable of supporting civilization. Josephus describes at length the fountains of Jericho and mentions the characteristic palm trees nourished by them.²⁸

Notwithstanding which, there is a fountain by Jericho, that runs plentifully, and is very fit for watering the ground: it arises near the old city, which Joshua the son of Nun, the general of the Hebrews, took the first of all the cities of Canaan, by right of war. . . . Accordingly, the power of it is so great in watering the ground that if it but once touch a country it affords a sweeter nourishment than other waters do, when they lie so long upon them, till they are satiated with them. For which reason, the advantage gained from other waters, when they flow in great plenty, is but small, while that of this water is great when it even flows in little quantities. Accordingly, it waters a larger space of ground than any other waters do, and passes along a plain of seventy furlongs long, and twenty broad, wherein it affords nourishment to those most excellent gardens that are thick set with trees.

Josephus then continues,

There are in it many sorts of palm trees that are watered by it, different from each other in taste and name; the better sort of them, when they are pressed, yield an excellent source of honey, not much inferior in sweetness to other honey.

An old Arab folk saying attests to the date palm's natural habitat. "Its head should be in the sun and its feet in water."²⁹ The *lulav*, then, functions as the advocate for water even in the driest regions of Israel, the desert wilderness.

The natural habitat of the myrtle (*Myrtus communis*) is the hilly and mountainous areas of Israel in general but, more specifically, "the riverine thickets" according to Michael Zohary³⁰ and the "slopes of stream banks" on "Israel's mountains and hills" as described by Nogah Har-euveni.³¹

The Bible takes for granted the myrtle's hydrophilic characteristic and utilizes the myrtle as a metaphor for an abundance of water.

Isaiah prophesies (41:17-20):

The poor and the needy seek water and there is none and their tongue is parched for thirst; I, the Lord will answer them, I the God of Yisrael will not forsake them. I will open rivers on high places, and fountains in the midst of valleys; I will make the wilderness a pool of water, and the dry land springs of water. I will plant in the wilderness the cedar, the shitta tree, and the myrtle, and the oil tree; I will set in the Arava cypress, maple and box tree together: that they may see and know and consider and understand together that the hand of the Lord has done this, and the holy One of Yisrael has created it.

In response to the cries for water, God will benevolently deliver such an abundance of water that not only will the desert support plant life but even water-loving plants like the myrtle will flourish.³²

Similarly, the prophecy that “in place of the thistle will arise the myrtle” (Isaiah 55:13) does not simply mean that attractive plants will replace obnoxious weeds but rather that God will turn the dry waste from an arid habitat to one with so much water that the myrtle will thrive and naturally replace the thistle.

The myrtle is also mentioned in a complex vision of Zechariah who saw “a man riding upon a red horse, and he stood among the myrtles that were in the *metsulah*” (1:8). There are numerous definitions and interpretations of *metsulah*³³ but one cannot ignore its use in the Song of Moses where the Egyptians are described as drowning in the *metsolot*, the depths of the sea.³⁴

Other than the biblical descriptions of the *Sukkot* festival the sources brought here are the only ones in the Hebrew Bible that mention myrtle.³⁵ Clearly, this plant whose natural habitat is the riverine areas of hills serves as a biblical metaphor for water. Its role in the four species is thus to represent the hills and mountains in the yearly plea for rain.

The citron (*Citrus medica*), too, is a symbol of water. Although not a native, it was the first tree of the citrus family (which includes lemons, oranges and grapefruits) introduced into Israel. There has even been some doubt whether it had been introduced as early as the biblical period. Samuel Tolkowsky, a noted expert on the citrus family, suggested that the citron was not used for the *sukkot* ritual until the Maccabean period, prior to which the “fruit of the goodly tree” was identified as a cedar cone!³⁶ He even pinpoints the introduction of the citron into the ritual to October, 136 B.C.E. on the evidence of Maccabean coins with pictures of citron fruit.

However, there is some archaeological evidence for the presence of the citron in the Middle East in the biblical period³⁷ and Tolkowsky’s arguments are not completely convincing. Even Harold Moldenke, noted American scholar on the botany of the Bible, who in the text of his *Plants of the Bible* does not discuss the citron, adds in an appendix that he believes the citron to be the “fruit of the goodly tree.”³⁸

The citrus family as a whole demands heavy irrigation and the citron, being the first of the citrus in Israel, undoubtedly quickly earned the reputation of being a lover of water. Even today, citron fields in Israel must frequently be irrigated. Rabban Gamliel goes so far as to compare the citron to a vegetable in one respect.³⁹ The Talmud explains:

The nature of a citron is like that of vegetables. Just as it is the nature of vegetables to grow by means of all waters (that is, artificial irrigation), and its tithing is determined by the time when it is gathered; so is it the nature of the citron to grow by means of all waters and therefore its tithing is determined by its gathering.⁴⁰

A powerful corroboration is the talmudic play on words of the phrase *pri ets hadar* (the fruit of the goodly tree).⁴¹

Ben Azzai said, Read not *hadar* but *hydor* for in Greek water is called *hydor*, (hydro, water). Now what fruit is it that grows by all water? Say, of course, it is the citron.

Accordingly, the citron may be called the “fruit of the water tree!” Although this is obviously not the literal interpretation, the statement is indicative of how the citron was viewed: as a water-loving cultivated fruit tree. It represented the hopes for rain mainly on the cultivated plains.

The four species, then, symbolize water in the diverse ecological habitats of Israel: the desert wilderness, the mountains and hills, the cultivated plains, and the river valleys. They are part of a stimulating and thought-provoking ritual of thanking God for the previous year’s rain and, at the same time, serves to direct and concentrate man’s prayers for the rains to come.⁴²

Needless to say, the deemphasis of the agricultural and ecological symbolism of the four species of *Sukkot* is in no small part due to the Jewish people’s temporary separation from the land of Israel. The native flora in their natural habitats regrettably faded from memory; the palms of Jericho turned from reality to hopeful symbols on prayerbook covers. With the modern day return to the land and fulfillment of “Arise, walk through the land in the length of it and the breadth of it” (Gen. 13:17), the natural history of the land of the Bible is being relearned. The land that “the eyes of the Lord thy God are upon” no doubt eagerly awaits this continued rediscovery.⁴³

NOTES

1. *Lev. Rabba* 39:14. Translations from *Midrash Rabba* are taken from the Soncino edition, London, 1939. Biblical translations are generally from the Koren edition, Jerusalem, 1969. Quotations from the Mishnah and Talmud are from the Soncino edition, London, 1938. Other translations, unless indicated, are my own.
2. *Lev. Rabba* 30:12.
3. *Lev. Rabba* 30:10.
4. *Lev. Rabba* 30:10.
5. *Lev. Rabba* 30:9.
6. *Guide for the Perplexed*, tr. by M. Friedlander, 2nd ed., (London, 1904), III: 43.
7. Nogah Hareuveni, *Nature in our Biblical Heritage* (Israel: Neot Kedumim, 1980), p. 78.
8. A. Reifenberg, *The Struggle Between the Desert and the Sown* (Israel, 1955), p. 21.
9. F.W. Albright, “The Gezer Calendar,” in *Bulletin of the American Schools of Oriental Research*, 92 (1943), 16-26.
10. *Mishnah Ta’anit* 1:4-7. Also see D. Sperber, “Drought, Famine and Pestilence in Amoraic Palestine,” in *Journal of the Economic and Social History of the Orient*, 17 (1974), 272-298.

11. *Mishnah Ta'anit* 1:1.
12. *Mishnah Ta'anit* 1:7.
13. Eliezer Schweid, *Moledet ve'Erets Ye'udah* (Tel Aviv, 1979), especially p. 25. I would like to thank Rabbi Shalom Carmy for pointing this important philosopher's work out to me.
14. *Mishnah Sukkah* 1:2.
15. B.T. *Yoma* 26b.
16. *Mishnah Sukkah* 4:9.
17. B.T. *Rosh Hashanah* 16b.
18. *Mishnah Sukkah* 5:1.
19. *Hoshanah Rabbah*.
20. *Mishnah Sukkah* 4:5.
21. R. Crawford, "Tolerance of Anoxia and the Regulation of Glycolysis in Tree Roots," in *Tree Physiology and Yield Improvement*, M.G.R. Cannell and F.T. Last, ed. (New York, 1976).
22. B.T. *Ta'anit* 2b.
23. B.T. *Ta'anit* 2a.
24. *Invu B'mitsvot*, a *piyyut* for the evening service of the second night of *Sukkot* in the diaspora, also refers to the four species as symbols of water.
25. B.T. *Sukkah* 33b.
26. G.E. Post, *Flora of Syria, Palestine and Sinai*, 2nd ed., (Beirut, 1932), Vol. 2, p. 531.
27. Michael Zohary, *Flora Palaestina* (Jerusalem, 1966), Vol. 1, pt. 2, p. 25.
28. *Wars of the Jews*, tr. by W. Whiston (Michigan, 1960), Book IV, Ch. 8, par. 3.
29. H. and A. Moldenke, *Plants of the Bible* (New York, 1952), p. 285.
30. Michael Zohary, *Flora Palaestina*, (Jerusalem, 1972), Vol. 2, pt. 2, p. 371.
31. Michael Zohary, *Flora Palaestina* (Jerusalem, 1966), Vol. 1, pt. 2, p. 84.
32. See commentary of R. Abraham Ibn Ezra to 41:18.
33. F. Brown, F., S.E. Driver and C.A. Briggs, *A Hebrew and English Lexicon of the Old Testament* (Oxford, 1966), pp. 846-7; Koehler, L. and W. Baumgartner, *Lexicon in Veteris Testamenti Libros* (Leiden, 1958), p. 556; *The Interpreter's Bible*, v. 6, p. 1061.
34. Exodus 15:5.
35. Leviticus 23:40 and Neh. 8:15.
36. S. Tolkowsky, "The Meaning of *Pri Ets Hadar*" in *Journal of the Palestine Oriental Society*, 8 (1928), 17-23.
37. E. Isaac, "The Influence of Religion on the Spread of Citrus," in *Science*, 129 (1959), 179-186.
38. H. and A. Moldenke, *Plants of the Bible*, p. 290.
39. *Mishnah Bikkurim* 2:6.
40. B.T. *Kiddushin* 3a.
41. B.T. *Sukkah* 35a. J.T. *Sukkah* 13b and *Leviticus Rabba* 30:8 attribute the comment to Aqilas the proselyte. I would like to thank Dr. Norman Bronznick of Rutgers University Department of Hebraic Studies for pointing out this source to me.
42. Eliyahu Ki-Tov regards, as well, the waving of the four species in the various directions as a sign for the prevention of destructive winds that may accompany the rain. *Sefer Ha-Toda'ah* (Jerusalem, n.d.), p. 92, (commenting on B.T. *Sukkah* 37b).
43. The Society for the Protection of Nature in Israel is responsible for a good part of this reeducation. See, for example, Azariah Alon's *The Natural History of the Land of the Bible*, (New York, 1978).