

# Agriculture of the Old Babylonian Period

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## 1. Introduction

A discussion of agriculture in ancient Mesopotamia must still begin with the consideration advised by F. Hrozný in the introduction to his monograph, *Das Getreide im*

*alten Babylonien* (Wien, 1913), 3:

Aus der zur Zeit schon geradezu unübersehbaren Menge der babylonischen Verwaltungs- und Privaturkunden, die sich mit dem Getreide, dessen Kultur und Verwertung befassen, ersehen wir deutlich, welche gewaltige Rolle die Landwirtschaft in dem zwischen zwei mächtigen Strömen gelegenen, kanalreichen Babylonien spielte. Trotz dieser Fülle von Quellen ist mangels einer Bearbeitung derselben unsere Kenntnis des babylonischen Ackerbaus äußerst gering. Die meisten termini technici sind noch unerklärt.

Bearing Hrozny's remarks in mind, we here deal exclusively with Old Babylonian<sup>1</sup> agricultural techniques as recorded in documents, letters, in *ana ittišu*,<sup>2</sup> and in literary compositions (such as *Georgica Sumerica*, which, according to S. N. Kramer, is dated ca. 1700 B.C.).<sup>3</sup> It should be recognized that this discussion gives only an imperfect picture of agricultural methods since the texts differ in age and provenience.<sup>4</sup>

## 2. Brief Review of the Most Important Literature

W. Schwenzner provided a detailed study of rural conditions in the OB period in "Zum altbabylonischen Wirtschaftsleben," *MVAG* 19/3 (1915), 52–95.<sup>5</sup> He dealt primarily with questions regarding seed input in relation to harvest, as well as with issues concerning the leasing of fields, gardens, and orchards. A fundamental outline of agricultural procedures was given by B. Meissner in *Babylonien und Assyrien I* (Heidelberg, 1920), 184–227. Although he fails to distinguish between periods, Meissner deals with land cultivation and its dependence upon climate, soil quality, and water supply. He mentions methods, agricultural products, and the processing thereof.

B. Landsberger deals extensively with agricultural methods in his commentary on tablet IV of *ana ittišu*. The order of the described methods in *ana ittišu* was partially dictated by the collection of formulae, and the author explains these methods by consulting other OB texts and documents. He also devotes a special section to the date-palm.

J. G. Lautner examined the problems of the hired laborer in his monograph *Altbabylonische Personenmiete und Erntearbeiterverträge* (Leiden, 1936).<sup>6</sup> The original text

1 The OB period is customarily designated as the period from the end of Ur III to the conquest of Babylonia by the Hittite king Muršili I; see D. O. Edzard in E. Cassin, J. Bottéro, J. Vercoutter, eds., *Fischer Weltgeschichte. Die altorientalischen Reiche* (Frankfurt, 1966), 2:165.

2 Text edition and commentary by B. Landsberger, *MSL* 1 (Rome, 1937).

3 S. N. Kramer, *From the Tablets of Sumer* (Chicago, 1959), 66. A translation is found in idem, *The Sumerians* (Chicago, 1963), 340–42, and in A. Salonen, *Agricultura Mesopotamica* (Helsinki, 1968), 202–12.

4 Where possible I have provided date and origin of the texts in parentheses.

5 For an overview of the Sargonic period cf. B. R. Foster, *Mesopotamia* 9 (1982), who deals with land use in the various towns of Sargonic Sumer. For rural conditions in pre-Sargonic Girsu-Lagash, cf. S. Yamamoto, "The Agricultural Year in Pre-Sargonic Girsu-Lagash," *Acta Sumerologica* 1 (1979), 85–97; 2 (1980), 169–87. In his study *The Administration of Rural Production* (Ann Arbor, 1969), H. T. Wright deals with this aspect from an anthropological perspective. For rural conditions in Ur III cf. G. Pettinato, *Untersuchungen zur neusumerischen Landwirtschaft* (Naples, 1967), as well as the article from G. Pettinato and H. Waetzoldt, "Saatgut und Furchenabstand beim Getreideanbau," *St. Or.* 46 (1975), 259–90.

6 For further material see M. Weitemeyer, *Some Aspects of the Hiring of Workers at the Time of Hammurabi* (Copenhagen, 1962).

material, however, allowed for few conclusions about the agricultural methods performed by these workers.

In 1949 Landsberger partially reexamined a few agricultural issues in his article "Jahreszeiten im Sumerisch-Akkadischen," *JNES* 8, 248–97. D. Cocquerillat published an article in *JESHO* 10 (1967), 161–223, dealing mainly with date-palms and their cultivation.<sup>7</sup> In the same year Landsberger's book *The Date Palm and Its By-Products* (= *AfO Beiheft* 10) appeared. In the appendix (pp. 56–61) he reconsidered the terms *šakānu*, *šukunnū*, *šākinu*, *šākinūtu*, and *šakkinu*, which are relevant to the date-palm economy. In 1937 he had treated these terms from a different perspective.

In 1968 A. Salonen published *Agricultura Mesopotamica nach sumerisch-akkadischen Quellen—Eine lexikalische und kulturgeschichtliche Untersuchung* (Helsinki). In the sixth part he presents an overview of agricultural procedures dealing with the seasons and the order of the agricultural tasks: Georgica Sumerica, irrigation, plowing and sowing, harvesting and threshing. In the following section he considers labor, both human and animal.

In her demographic study *Ancient Sippar* (Leiden, 1975), R. Harris discusses the rural worker.

Extensive materials, mainly based on texts from Ur, were published by K. Butz in his articles "Konzentration wirtschaftlicher Macht im Königreich Larsa: Der Nanna-Ningal-Tempelkomplex in Ur," *WZKM* 65/66 (1973/74), 1–58—in which he dealt with sheep- and cattlebreeding, wool and milk production, organization of the herders, and barley production; and "Ur in altbabylonischer Zeit," *Orientalia Lovaniensia Analecta* 5 (1979), 257–409—where he touches on the problem of salinization and where he further mentions sesame, barley, reed, dates, fishing, and cattle-raising.

Scarcely any mention is made of agricultural procedures in the book by M. deJ. Ellis, *Agriculture and the State in Mesopotamia—A Study of Land Tenure* (Philadelphia, 1976).<sup>8</sup> More material is found in N. Yoffee's monograph, *The Economic Role of the Crown in the Old Babylonian Period* (Malibu, 1977 = *Bibliotheca Mesopotamica* 5).<sup>9</sup>

F. Pomponio examined contracts for leasing barley fields in "I contratti di affitto dei campi per la coltivazione di cereali pubblici" in *YOS* 13 (Napoli, 1978).

A general overview of agriculture was given by K. Butz in *RLA* 6 (1983), 470–86. H. Klengel considered the conditions in Mari in his short article, "Das Verhältnis von Bodenbauern und Viehzüchtern in historischer Sicht," *Deutsche Akademie der Wissenschaften zu Berlin, Institut für Orientforschung, Veröffentlichung* 69 (1968), 75–81. And see further the dissertation of C. L. Hamlin, "Cuneiform Archives as Data: Reliability of the Mari Archive for Agricultural Reconstruction" (U. of Michigan, 1976).

### 3. Cultivation of the Land

The most basic requirement for land cultivation is proper soil, the character of which determines the selection and treatment of appropriate crops. The four main components of

7 A year later she published *Palmeraies et cultures de l'Eanna d'Uruk (559–520)* (Berlin, 1968).

8 Cf. the review by F. R. Kraus, "Facetten landwirtschaftlicher Organisation in Altmesopotamien," *Bi. Or.* 34 (1977), 147–53.

9 Cf. the remarks by F. R. Kraus in "Der 'Palast', Produzent und Unternehmer im Königreiche Babylon nach Hammurabi (ca. 1750–1600 v. Chr.)," in *Orientalia Lovaniensia Analecta* 6 (1979), 423–34.

good soil are sand, clay, lime, and humus,<sup>10</sup> and depending on the proportions of these components, the following types of soil can be distinguished: sandy, clay, marly, calcareous, humus, and stony. Regarding soil conditions in Iraq nowadays E. Wirth writes:

Entgegen der weit verbreiteten Annahme, das unterirakische Tiefland bestände ausschliesslich aus schweren Tonen und Lehmen, schwankt die Bodengüte von Latifiya Estate auf engem Raum ziemlich stark: In nächster Nähe des Euphrat sind zwar fruchtbare, schwere Tonböden vorherrschend. In Flussferne finden sich aber auch Lehmböden und lehmige Sandböden, teilweise sogar Kiese mit einer Korngrösse bis zu 1 cm.<sup>11</sup>

The texts of the OB period, however, say very little about soil quality. We find the expressions 'good field' (*eqlum damqum*)<sup>12</sup> or 'where it is good' (*ašar damqu*),<sup>13</sup> 'excellent' (*mādiš damiq*),<sup>14</sup> and 'bad' (*mussukum*).<sup>15</sup> The other terms that are found in connection with a-ša<sup>16</sup> (Akk. *eqlum*)<sup>17</sup> 'field, land' and g<sup>18</sup>kiri<sub>6</sub> (Akk. *kirām*) 'orchard',<sup>18</sup> serve only for localizing and describing the state of cultivation.

### 3.1. Soil Improvement

Land cultivation is achieved to a certain extent by nature alone—water, air, light, warmth, cold, rain. In order to effect necessary soil improvement human technology is required. Soil can be improved by a favorable combination of chemical, physical, and biological relationships, the goal of all land cultivation. Such a condition may be achieved by:<sup>19</sup>

1. loosening the soil
  2. turning
  3. mixing
  4. compacting and smoothing.
- } plowing

The special tasks of land cultivation are:<sup>20</sup>

10 Cf. *Landwirtschaftslehre für Schule und Praxis I* (Stuttgart, 1923–1924), 167–68.

11 E. Wirth, *Agrargeographie des Irak* (Hamburg, 1962), 96. Wirth mentions that according to the investigations of W. L. Powers (1954) 6% of the soil is excellent, 68% is good, and 23% is fair. This was cited by K. Butz, *Orientalia Lovaniensia Analecta* 5 (1979), 262, n.7, according to G. Pettinato, "Due testi inediti di agrimensura neosumerici e il problema delle qualità del suolo agricolo," *Atti dell'Accademia Nazionale dei Lincei. Classe di Scienze morali, storiche e filologiche. Series 8, vol. 32* (1977), 91, n. 14. For soil conditions in the Neo-Sumerian period cf. Pettinato, *ibid.*, 90. One finds the terms sig<sub>5</sub> 'excellent', muru<sub>x</sub> 'good', ħul and ħul-šum 'fair', and murgu<sub>x</sub> 'bad'. For further evaluation of soil quality in the Neo-Sum. period cf. Pettinato, *Untersuchungen*, 2:241–43.

12 *AbB.* 4, 1; 114; *OBTR* 308.

13 *AbB.* 4, 77.

14 *AbB.* 5, 212.

15 *OBTR* 308.

16 For the identity of a-ša and gána cf. M. Powell, *JCS* 25 (1973), 178–84.

17 Normally it was written as a Sumerogram during the OB period. The only phonetic Akkadian writing known to me is that in *AbB.* 8, 108:9.

18 For the list of fields, cf. *MSL* 11, 4–7 (= *Hj* 20), 50–51, 97–101 (NiF), 129–31 (OBF 1), 136–40 (OBF 2–6), 169 (F RS), 170 (F Bo), 171. For the names of fields in the Neo-Sum. period cf. Pettinato, *Untersuchungen*. For field and plot names in OB Sippar cf. R. Harris, *Ancient Sippar* (Leiden, 1975), 371–79.

19 For this meaning, cf. M. Powell, *ZA* 62 (1972), 191 with n. 61.

20 Cf. *Landwirtschaftslehre*, 3.

1. fertilization
2. production of a favorable seed-bed and sowing
3. weeding
4. cultivation during the period of growth.

### 3.2. Irrigation and Drainage

The regulation of the water supply is of great importance in land cultivation since an over- or undersupply of water is harmful. As we can readily learn from Georgica Sumerica, irrigation<sup>21</sup> was a fundamental aspect of land cultivation. We read there that fields should be irrigated three times, and perhaps even a fourth time. Irrigation was produced by a series of canals, which was feasible only by diverting water from the Euphrates.<sup>22</sup> Water was diverted from a major canal (*nārum*, Sum. i<sub>7</sub>)<sup>23</sup> to a smaller one (*atappum*, Sum. pa<sub>5</sub>), which irrigated a whole district or orchard or into an *ikum* (Sum. e), which supplied a field.<sup>24</sup> The fields themselves were watered by irrigation furrows.<sup>25</sup>

The work connected with irrigation and maintenance of the canal system involved primarily cleaning and dredging.<sup>26</sup> This occurred in late summer<sup>27</sup> in order to remove deposits and to insure that enough water was available for the fields at the end of the canals. The canal system could be enlarged to irrigate more surface. This could also be attained by extending old canals or by the addition of new canal branches. It was also necessary to strengthen dikes and dams. The canal workers were mainly hired laborers (Akk. *agrum*, Sum. lú-hun-gá).<sup>28</sup> According to LE §§ 7–11, each earned one shekel (gín) of silver per month or one sila (about one liter)<sup>29</sup> of barley per day. This suggests that the canals were under official control since such matters are often dealt with in the letters of Hammurapi.

Another way to irrigate the land was by drawing water. The term for it in *ana ittišu* is *dilātu*, but in the OB field-renting contracts dated under Samsu-iluna it is *dilum*. Drawing was necessary when the field was higher than the canal.<sup>30</sup>

21 F. Christiansen-Weniger, *Ackerbauformen im Mittelmeerraum und Nahen Osten dargestellt am Beispiel der Türkei* (Frankfurt-am-Main, 1970), 180–83, 269–96; K. Kreeb, *Ökologische Grundlagen der Bewässerungskulturen in den Subtropen. Mit besonderer Berücksichtigung des Vorderen Orients* (Stuttgart, 1964) have occupied themselves with the problems of irrigated fields.

22 The Euphrates can be considered a desert river. The Tigris, on the other hand, is a mountain river. According to Wirth, *Agrargeographie des Irak*, 186, the land along the Tigris can be distinguished from the land along the Euphrates by the following important point: "Die Agrarlandschaften entlang dem Euphrat sind vorwiegend alt, traditionell und gewachsen, die dem Tigris entlang dagegen jung, modern und gegründet. Für den Euphrat sind alte Wasserräder und Göpelschöpfwerke charakteristisch, für den Tigris Motorpumpen."

23 This word also has a double meaning—river/canal—in other Semitic languages.

24 Cf. M. Stol, *RLA* 5 (1980), 356. For the irrigation system in contemporary Iraq, cf. R. Fernea, *Shaykh and Effendi* (Cambridge, 1970), 122. For the texts dealing with the canal system in Mesopotamia, cf. the bibliography in Stol, 362–63. For archaeological finds concerning irrigation cf. H. J. Nissen, *RLA* 5 (1980), 365–68.

25 Cf. Landsberger, *MSL* 1, 157; and for Ur III see Pettinato and Waetzoldt, *Saatgut und Furchenabstand*, 272.

26 Cf. Stol, *RLA* 5 (1980), 360–61.

27 According to M. Kupper, "Le calendrier de Mari," in M. A. Beek et al., eds., *Symbolae Böhl* (Leiden, 1973), 269–70, it occurred during the summer. This is true for Mari because these measures could only be undertaken about two or three months after the Tigris and the Euphrates receded from their highest level.

28 Cf. S. D. Walters, *Water for Larsa* (New Haven, 1970), xix.

29 For the exact capacity of one sila during the different periods, cf. I. J. Gelb, *JAOS* 102 (1982), 588–89.

30 This was probably the case for fields near the Tigris.

Concerning drainage the texts mention nothing. But it must be postulated that it was done in order to prevent salinization. This was also proposed by Russel,<sup>31</sup> though it was then negated by Th. Jacobsen.<sup>32</sup> More recently Jacobsen seems to have accepted this proposal and has gathered the references to draining swamps in the time of Uru-KA-gina and Urnammu.<sup>33</sup> The procedures for draining are draining and leaching. For draining the Old Babylonians probably used irrigation canals, as today.<sup>34</sup> Leaching, which may not have been carried out in Middle and Northern Babylonia because of the lower water level,<sup>35</sup> was, according to Butz, absolutely necessary in the South.<sup>36</sup>

### 3.3. Special Tasks

As mentioned above, fertilization and the production of a favorable seed-bed are necessary for soil improvement. In this study I refer to fertilization, fallowness, and cultivation.

#### 3.3.1. Fertilization

The produce during the OB period may have been about 20 to 30 kor of barley per bur.<sup>37</sup> To produce such yields supplementary soil nutrients were probably necessary.<sup>38</sup> These could have been brought with the flood-waters. But the nutritive value of the Euphrates and the Tigris is not that of the Nile.<sup>39</sup> It is therefore likely that additional mineral fertilizers were used. The procedure of fertilization, which was also postulated for Mesopotamia by Butz,<sup>40</sup> is not attested in the texts. But there are some hints that underline this hypothesis. In support of fertilization one may cite the letters *AbB*. 3:65 and 110 (both from Lagaba) and *AbB*. 7:90, which request that fertilizer be supplied and collected.

Fertilization may also be produced by grazing livestock (see CH §§ 57–58). This may increase the yield of barley shoots. In addition to manuring, one may also consider green

31 Apud Th. Jacobsen, *Science* 21 (1958), 80–81.

32 Loc. cit.

33 Cf. *Bibliotheca Mesopotamica* 14 (1982), 66.

34 Fernea, *Shaykh and Effendi*, 148, writes: "In the past, the canals constructed by the tribesmen did not hold water all year. They were filled by the use of temporary dams in the Daghara, and when the cultivation cycle did not require water the canals were allowed to drain, a vital process for this low-lying soil as it permitted excess water to drain from the land."

35 Cf. Jacobsen, *Bibliotheca Mesopotamica* 14 (1982), 66.

36 Butz, *Orientalia Lovaniensia Analecta* 5 (1979), 269–72. An indication of this may be found in *AbB*. 5, 198:16 a-ša ši-ḫi-ī, if it is derived from *šahātum* as M. Stol, *JEOL* 25 (1977–78), 53, suggests. The term *makārum* must also be taken into consideration; cf. *CAD* M/1, 126b: "The term *makāru* denotes the flooding of an entire field, whereas *šaqū* seems to refer to a method of irrigation which uses small ditches or furrows."

37 These results are to be derived from B. Kienast, *Die altbabylonischen Briefe und Urkunden aus Kisurra* (Wiesbaden, 1978) = *Freiburger Altorientalische Studien* 2, text 97, where the yield was 20 kor; and text 115, where the proportion is 1:1 and 1:2, 5 (pertaining to seed and yield). The same result is found in *TCL* 1, 230. On the reverse of the tablet we find between 22.5 and 29 kor of barley, including rent (there must be a scribal error in line 40). Excluding rent, we have between 18 and 20 kor of barley. I disagree with the conclusions of Butz, *Orientalia Lovaniensia Analecta* 5 (1979), 296–98.

The transcription which is used for measuring volumes and surfaces follows the system used by M. Powell, *ZA* 62 (1972), 165–221: 1 iku = 0; 0.1; 1 ēše = 0; 1.0; 1 būr = 1; 0.0; 1 sila = 0.0.0.1; 1 bān = 0.0.1.0; 1 nigida = 0.1.0.0; 1 gur = 1.0.0.0.

38 Note that in modern Iraq one often does without additional fertilization; cf. Fernea, *Shaykh and Effendi*, 41.

39 Cf. Christiansen-Weniger apud Pettinato and Waetzoldt, *Saatgut und Furchenstand*, 286.

40 Butz, *Orientalia Lovaniensia Analecta* 5 (1979), 305.

fertilization. Planting legumes was probably cheaper than the above-cited methods of fertilization. This is suggested by the sequence: *ana še še-giš-ì ù gú-tur* “for barley, sesame, and chickpeas,” which is found in *esēp-tabāl*<sup>41</sup> documents from Susa. Another important text is *YOS 12,1 (Si)*, describing the receipt of barley and *sahlû*.<sup>42</sup> *Sahlû* must be a legume, used as a preparatory crop for barley.

### 3.3.2. Fallowness

Fallowness is indicated in the OB period by the terms *apītum* (only *AbB. 3:79*, *Lagaba*), *nidītum*, and *terīqtum*.<sup>43</sup> One left land fallow to prevent progressive salinization, to develop nutritive elements, and to destroy weeds. One may distinguish a semantic difference among the terms for fallowness: *apītum* denotes ‘wasteland’; *nidītum* is sometimes attested in connection with sustenance fields, though only in Babylonia proper; and *terīqtum* signifies fallowness.<sup>44</sup> That fields were left fallow is further suggested by the leasing and purchasing of stubble-fields, which was customary in the Isin-Kisurra-Nippur region.

### 3.3.3. Cultivation

The type of cultivation termed *teptītum*, which took between two and three periods of tillage, demands extra effort in order to produce the desired microflora. This was taken into account, and tenants were charged a lower rate of interest or were given an arable field for their own use. To make a field arable required the following steps: construction of new canals, grubbing, grading, and breaking up. These activities are apparently subsumed by the verb *petūm* ‘to open, to develop’.

## 3.4. Techniques

Techniques of soil cultivation have been arranged in the following sequence:<sup>45</sup>

(1) (*majjārī*) *maḥāšum*; (2) (*parākum*)-*marārum*; (3) *šakākum*; (4) *šebērum*; (5) *šalāšum*; (6) *šipram epēšum*; (7) *šir'am (abšennam) šakānum*; and (8) *erēšum*. Items (1) through (6) are activities that precede drill-plowing.<sup>46</sup> Items (7) and (8) are two different expressions for

41 For this type of document, cf. P. Koschaker, *Griechische Rechtsurkunden* (Leipzig, 1931), 90–98. Contrary to the common belief that these are derived from frozen forms of the imperative, I would derive them from the infinitive.

42 *AHw.*, 1009b, suggests “Kresse?,” but according to *AbB. 7*, p. 7 ad note a, this translation is incorrect. Butz, *Orientalia Lovaniensia Analecta 5* (1979), 315, considered it as lentil vetch; but now he would not venture a translation (oral communication). In texts from Boghazkoi *sahlû* (Sum. *zà-aḫ-lišar*) is used in some passages to designate the grass which grows up over ruins and uncultivated fields. It is also used in medical texts, and the seeds are associated with ailments; cf. H. Hoffner, *Alimenta Hethaeorum* (New Haven, 1974) = *AOS 55*, 110–11.

43 According to *AHw.*, 1349a *tēriqtum* is the Akkadian equivalent of Sumerian *KI.KAL*. The term *kankallum* for *KI.KAL* (cf. B. Landsberger, *JNES 8* [1949], 277, n. 92) is in my opinion used for virgin land.

44 Fallowness is not only discussed in the newer literature, as Butz, *Orientalia Lovaniensia Analecta 5* (1979), 317, has maintained. It already appears in Landsberger, *MSL 1*, where Christiansen-Weniger (pp. 151, 159) assumed six months of summer fallowness. Jacobsen wrote: “A yearly fallow gave the fields rest, replenished them, and allowed *shoq* and *agul* to dry them deeply” (*Sumer 14* [1958], 82).

45 This consequence is given partly in *ana ittišu* and was compiled by Landsberger (*MSL 1*, 152, 6). It is added by the author because the expression *šipram epēšum* includes activities (1) through (5). This can be seen by comparing *CH §§ 43–44* to §§ 62–63 and various documents; cf. Landsberger, *MSL 1*, 160. For example, in the letter *PBS 7*, 103 *erēšum* occurs following *šipram epēšum*.

46 Cf. Landsberger, *MSL 1*, 153.

drill-plowing.

### 3.4.1. *majjārī maḥāšum* ‘to deep-plow’

Deep-plowing was performed in the fall<sup>47</sup> with the *ḥarbu*-plow or the *majjārū*-plow (Sum. *apin-šu-gur<sub>10</sub>*).<sup>48</sup> We do not know the distance between furrows nor the depth of the plowing.<sup>49</sup> Texts indicate that this plow required twice as many oxen as the seed-plow.<sup>50</sup> For stealing a *ḥarbu*-plow one had to pay three shekels of silver (CH §260) instead of the five silver shekels one would have to pay for stealing a seed-plow (ibid. §259). We may explain this in two ways: first, the *ḥarbu*-plow was very heavy and was more difficult to steal; second, its construction was simpler than that of the seed-plow.

The term *majjārī maḥāšum* is also mentioned in CH § 44 in a passage concerning the non-cultivation of virgin land: *ina rebūtīm šattim eqlam majjārī imahḥaš imarrar u išakkak* “In the fourth cultivation period<sup>51</sup> he (the tenant) will deep-plow, break up, and harrow.” The text does not limit the procedure to virgin land.<sup>52</sup> It is simply some sort of cultivation: the plants receive more nutritious aliments; root development is improved; the soil absorbs more rain; weeding is easier; and the soil can be more intensively fertilized. This procedure meant more intense use of the soil and accordingly demanded a higher investment (such as the renting of a span of oxen plus laborers).

### 3.4.2. *parākum/marārum* ‘to cross-plow/to break up’

After the act of *majjārī maḥāšum* ‘to deep-plow’ follows the act *parākum* ‘to cross plow’—that is, one plows perpendicular to the preceding furrows. Only texts from Larsa<sup>53</sup> mention this method. The operation was identical to deep-plowing.<sup>54</sup> Another term that describes the act following *majjārī maḥāšum* is *marārum*. Until now there are only two references to this from North Babylonia, CH § 44 and *LFDB* 10. The meaning of *marārum* is not yet clear (see *AHW.* and *CAD*, s.v.), but *marārum* must denote the same procedure as *parākum*, that is, breaking up. The difference between the two may be that *parākum* was done with a plow, while *marārum*—because of the location of the field—was performed

47 Cf. Landsberger, *JNES* 8 (1949), 279, n. 104.

48 Cf. *MSL* 5, 16:123–24 (= *Ḫh* 7). According to Landsberger (*MSL* 1, 161), the only equivalent of *giš-apin-šu-gur<sub>10</sub>* is *ḥarbu*, since *majjārū* appears in OB only in the phrase *majjārī maḥāšum* or *inūt majjārī*; for references, see the dictionaries. In *Georgica Sumerica* 1. 31, however, a *giš-bardil* is mentioned before *giš-<sup>l</sup>apin<sup>1</sup>-[šu-gur<sub>10</sub>]*, which equals *majjārū* according to *Ḫh* 5, 107 (= *MSL* 6, 15). A *ḥarbu*-plow was constructed with a peg and a plowshare; cf. Salonen, *Agricultura Mesopotamica*, 65.

49 The text *PBS* 8/2, 134 (Si, Nippur) gives the measurements for length, width, and area. After this follows *apin-šu-gur<sub>10</sub>* (ll. 5, 26, 28, 29), but I cannot draw any conclusions from it.

50 Cf. *LFDB* 7, 10, 15; and *Georgica Sumerica* 1. 23.

51 The translation results from the recognition that by renting a field one has to think of one year of cultivation and one year of fallowness. For Pre-Sargonic times this was demonstrated by S. Yamamoto, *Acta Sumerologica* 2 (1980), 176. For the NA period it is proved by the texts themselves; see the references in *CAD* K, 206f., s.v. *karaphu*. This practice can be found even nowadays in central Anatolia; of this Christiansen-Weniger writes: “In manchen Gegenden wird der Pachtberechnung nicht das Kalender-, sondern das Erntejahr zugrunde gelegt, man fasst also Brache-Anbau zu einem Doppeljahr zusammen für das die Pacht zu entrichten ist” (*Ackerbauformen*, 316).

52 Cf. Salonen, *Agricultura Mesopotamica*, 68.

53 *AbB.* 4, 68 (*Ḫammurapi* to *Šamaš-ḥašir*); *Riftin*, *SVAJD* 53 (R.-S., Larsa); *TCL* 11, 236 (undated, Larsa); *YOS* 12, 560 (Si, possibly Larsa).

54 This is shown by *Riftin*, *SVAJD*, 53:11: 15.0.0.0 *gur ša-gal 2 giš-apin-gu<sub>4</sub> ša ma<sup>1</sup>-a-a-ri im-ḥa-šū<sup>2</sup>ū<sup>3</sup>ip-ri-ku* “15 kor of fodder for two plow-oxen, who plowed deep and across.”

with a hand implement.

### 3.4.3. *šakākum* ‘to harrow’

After the plow has loosened, mixed, and turned the soil, the harrow smooths and levels it. The harrow itself consisted of several sections;<sup>55</sup> it had 66 teeth, according to *YOS* 2:4,<sup>56</sup> and a tongue.<sup>57</sup> It was drawn by a span of yoked oxen. A field worked in this manner was called *šikkatum*.

This procedure, which is found in the lexical lists<sup>58</sup> and *Georgica Sumerica* 1. 32, is always mentioned before *šebērum* and *šalāšum*. This connection occurs quite seldom in the texts.<sup>59</sup> The association of *šakākum* and *šebērum* is more frequent, and *šakākum* is attested more often than *šebērum*. This might suggest that *šebērum* was not an absolutely essential procedure before seed-plowing.

### 3.4.4. *šebērum* ‘to break up’

Landsberger<sup>60</sup> deduces from *TCL* 11:149 (Ḫa, Larsa; see above) that the activity of breaking up clods could be dispensed with. The breaking up could, however, be identified as the rolling that was performed (Ḫ 5:109–90) with implements bearing the Akkadian names *buduššu* and *argugu*. The texts mention nothing of this procedure.

### 3.4.5. *šalāšum* ‘to harrow’

This procedure, which is very seldom mentioned (see 3.4.3. above), means literally ‘to do for a third time’. With respect to soil cultivation, it refers to a second harrowing.

### 3.4.6. *šipram epēšum* ‘to fulfill the work’

All the above-mentioned techniques are included by the expression *šipram epēšum*.<sup>61</sup> In addition, it could denote completion of the remaining work, as in contracts and letters—though not in lists—no more than three procedures are mentioned. Whether it might encompass sowing, too, is an open question. Curiously, sowing is not found explicitly in texts in which *šipram epēšum* occurs.

### 3.4.7. *šir’am šakānum* ‘to drill’

Once the field has been prepared, seed furrows are made. The procedure is called *šir’am šakānum* (Sum. ab-sin gar) and also means ‘sowing’. The expression *šir’am šakānum* was used only until the time of Samsu-iluna and was apparently not employed in the regions of Sippar, Dilbat, and Kiš. Furrows for the winter seeding were made in the months from Elūl to Araḫšamna (the sixth to eighth months).<sup>62</sup> For the summer crop the furrows were

55 *MKJ* 9:13: 3 giš-am-giš-gán-ūr.

56 *CAD* M/1, 368, gives the further reference *UCP* 10, 141, no. 70:22, but its reading is incorrect (see *AHw.*, 628).

57 The term *emšum* (*BE* 6/2, 137, undated, Nippur), lit. ‘abdomen’, refers to the front of the harrow (so Salonen, *Agricultura Mesopotamica*, 108).

58 Cf. *ana ittišu* tablet 4, i:35–38; *SLT* 211, iii:15–17.

59 *BIN* 7, 56; *TCL* 1, 174 (implies gardening); *YOS* 2, 151 (Larsa), *šalāšum* is always used in the D-stem.

60 *MSL* 1, 163–64.

61 Sometimes *epēšum* is used without *šipram*; e.g., *AbB.* 4, 154 Ḫa; *OBTR* 297, 309.

62 From the sixth to the seventh month: *VS* 13, 69 (R.-S., Uruk); *OECT* 8, 15 (Ḫa, Larsa); *TCL* 11, 152 (Ḫa, Larsa); *YOS* 12, 332 (Si), 336 (Si), 530 (Si). In the seventh month: *TCL* 11, 188 (Ḫa, Larsa). From the sixth to the eighth month: *YOS* 12, 176 (Si). *AbB.* 4, 154 may apply to the eighth month.

tilled following the winter harvest,<sup>63</sup> a practice still in use in modern Iraq.<sup>64</sup>

Seeding was done with a seed-plow. Furrows were usually 75 cm apart,<sup>65</sup> and one-sixtieth of the seed was used per nindan x ab-sín, according to *PBS* 8/2, 134 (Si, Nippur).<sup>66</sup>

### 3.4.8. *erēšum* 'to seed-plow'

In contrast to the other Semitic languages, the stem *h-r-t*<sup>67</sup> in Akkadian has the special sense 'to seed-plow'. Akkadian has no special word for 'sowing'.<sup>68</sup> The use of *erēšum* to specify seed-plowing—a technique that minimizes seed loss—reflects the advanced state of Mesopotamian agriculture. The period of seed-plowing ended by the eighth month (*giš-apin-du<sub>8</sub>-a*), according to the month-name in the Nippur calendar.<sup>69</sup> It was to begin in the sixth month, and, according to *BIN* 7, 192, two spans of oxen were to be supplied no later than the tenth of the seventh month. By contrast, *TCL* 17, 5 (Tell Sifr) says that seed-plowing should be finished during the eighth month, while *TCL* 18, 78 (Tell Sifr) says that it should not be finished before the twentieth of the ninth month.

The same plow that was used to plow a seed furrow (*epinum*, Sum. *apin*)<sup>70</sup> served for seed-plowing. Following the description of Christiansen-Weniger,<sup>71</sup> it consisted of a plow-beam, earth-boards, handles, and a seed-funnel. It was drawn by a span of oxen, and its operation required three persons—one for the plow, one for the oxen, and one for filling the funnel.<sup>72</sup> According to *TCL* 1, 230 (*Aš<sup>2</sup>*, North Babylonia) and 239, a hectare took about 85 liters of seed (*zērum*,<sup>73</sup> Sum. *še-numun*).<sup>74</sup>

## 3.5. The Growing Period

Sowing was mainly performed in the fall. The summer, when spotted barley (*šegunum*, Sum. *še-gu-nu*) was probably sown, figured less importantly with respect to sowing.<sup>75</sup> Otherwise barley (*še'um*, Sum. *še*) with flat heads was sown. This type was less productive

63 *AbB.* 6, 173, in connection with *petūm* 'to open'.

64 Cf. R. McC. Adams, *Land Behind Baghdad* (Chicago, 1965), 16.

65 For the distance between seed-furrows in the Neo-Sumerian period cf. Pettinato and Waetzoldt, *Saatgut und Furchenabstand*, 159–90.

66 Cf. B. Landsberger, *OLZ* 29 (1926), 764.

67 Cf. J. Aro, *ZDMG* 113 (1964), 475. He defines *hrt* as 'to plow' and Akk. *erēšum* 'to use the seed-plow' or 'to sow'. Cf. P. Fronzaroli, "Studi sul lessico commune semitico," *Rendiconti delle sedute dell'Accademia Nazionale dei Lincei* (1969), 293, 310.

68 Cf. Aro, loc. cit. He explains that in Akkadian it coincides with the word 'to winnow', *zarūm*; cf. *CAD Z*, 71b. He thinks that in all Semitic languages 'to sow' and 'to seed' derive from a similar, but not identical, root. Fronzaroli, *Studi sul lessico*, 310, distinguishes between a root *dra* 'to sow' and *dar* 'to seed'; cf. *ibid.*, 293–94, 317.

69 Cf. H. Hunger, *RLA* 5 (1979), 297–303. In Elam the second month is called *iti a-ša dingir-ra erēšim* and third *iti šēri (ša) erēši*; cf. E. Reiner, *Afo* 24 (1973), 97–99.

70 G. Conti, *Rapporti tra egiziano e semitico nel lessico egiziano dell'agricoltura* (Firenze, 1978), 75, explains that *apin* denoted a 'break-up plow' until Ur III; thereafter it meant 'seed-plow'.

71 F. Christiansen-Weniger, *Archäologischer Anzeiger* 10 (1970), 156–62.

72 Pettinato and Waetzoldt, *Saatgut und Furchenabstand*, 270–71 with n. 18.

73 In contrast, *zērānu* according to *CAD Z*, 87b means "fee paid by a tenant for (additional) seeding."

74 Cf. W. Schwenzner, *MVAG* 19/3 (1914), 61. Landsberger was skeptical about this calculation because he thought it was the amount of seed for each of several persons, rather than the amount for one person.

75 Cf. Landsberger, *JNES* 8 (1949), 285.

than barley with round heads, but it had larger grains.<sup>76</sup> Barley was the most common grain because it was much more resistant than spelt (*kunāšum*, Sum. *zíz*) and nude wheat (*kibtum*, Sum. *gíg*).<sup>77</sup> The seed (*zērum*, Sum. *še-numun*) either was produced by the tenants themselves—that is, they took it from the crop yield—or it was purchased by them. This additional purchased seed is termed *zērānu*, which is attested for barley, sesame, chickpeas, and—once—*saḫlu*.<sup>78</sup> The texts do not say whether the grain was treated in any special manner prior to seeding. It might, for example, have been prepared against the Samana-disease, blight.

The following operations were performed during the growing period. They were reconstructed by Landsberger, *MSL* 1, 165, according to *ana ittišu*, tablet 4, i:26–34; *TCL* 1, 174 (As); and the letter *VS* 16, 179 (= *AbB.* 6, 179):

1. *pī šer'i ussupu* 'to hill' (?)
2. *ekī esēpu* 'to hill' (?)
3. *kirbanna laqātu* 'to pick up clods'
4. *kadara lamū* 'to fence in'
5. *šabīta kuššudu, eriba dekū* 'to drive away the gazelle, to shoo away the locust'<sup>79</sup>
6. *šibāra dekū* 'to drive off the sparrow(?)'<sup>80</sup>
7. *mē šaqū/dalū* 'to water/draw water'

Landsberger interpreted the first procedure (*MSL* 1, 166) as 'to heap up', that is, to hill. This gives support to the plant, loosens the soil during the growing period, assists radication, and also eliminates weeds. The second task, which is only found in *TCL* 1, 174, concerns work connected with the irrigation system: 2 *erēn e-si-ip e<sup>ni-a</sup>*(1. 3).<sup>81</sup> The third procedure, according to Landsberger (*ibid.*, 167), prescribes that big clods remaining on the fields be carried away by hand, by hired men<sup>82</sup> or boys.<sup>83</sup> An alternate method of removing big clods is to break them up with a pick (*hepūm*; *TIM* 4, 40; *CT* 48, 15). The tool (*akkullum*, Sum. *giš-níg-gul*) was used mainly in Ur III and at Nuzi, though it is mentioned in OB, too.<sup>84</sup> The fourth task is only mentioned in *ana ittišu*. It is followed by the extermination of pests (items 5 and 6). *Ana ittišu* also represents this stage by reference to Sum. *buru*, and Akk. *eribum*<sup>85</sup> 'raven, crow' (also *TCL* 1, 174) and *iššūrātu* 'birds'. In *YOS* 2, 115 (Larsa) we find in this context the cricket (*šāširum*) and in *ana ittišu* the sparrow. The

76 For the problem of two- and more part-headed barley and for the development of the six-part heads from the two-part heads, cf. H. Helbaek, *Iraq* 22 (1960), 188–91, 196.

77 Cf. F. Hrozný, *Das Getreide im alten Babylonien* (Vienna, 1913), 59, 97; Helbaek, *Iraq* 22 (1960), 195.

78 *CAD* Z, 88a, mentions 'oil' as additional seed—which must refer to an oil plant. The text (Riftin, *SVAJD* 11, Sd, 1. 1) probably reads: 1 1/3 i-[še]-giš, which could have been an orthographic variant for še-giš-i. *YOS* 12, 145 (Si) must be a scribal error.

79 According to *ana ittišu* tablet 4, i:26–34. In lines 48–52, however, we read: *iššūrāti kuššudu* 'to drive off birds'. *TCL* 1, 174:5 reads: 10 *erēn ma-ša-ar e-re-bu<sup>mušen</sup>* "10 watchmen for the ravens." Similarly *AbB.* 6, 179:11: *ina la ma-aš-ša-ar mušen qā-qé-emeš*.

80 Landsberger, *MSL* 1, 54 translates it with "Unkraut jäten"; but cf. *MSL* 8/2, 146.

81 W. Leemans, *Legal and Economic Records from the Kingdom of Larsa* (Leiden, 1954), 66, translates: "to pile up small dams for irrigation purposes." For the use of *esēpum* instead of *šapākum*, cf. Landsberger, *MSL* 1, 167.

82 *TCL* 1, 174; *TLB* 1, 46.

83 *AbB.* 6, 179.

84 *CT* 6, 20b. Cf. Salonen, *Agricultura Mesopotamica*, 158.

85 *A/eribu* cannot always be clearly distinguished from the form *erbū* 'locust'; cf. *AHw.*, 68a.

weeding procedure is mentioned only in letters and leasing contracts. The last task, watering, needs no comment.

### 3.6. Harvest and Storing

The various procedures for harvesting have been compiled by Landsberger in *MSL* 1, 169–70.<sup>86</sup> OB has three different expressions for ‘harvest’. The most general term is *ebūrum* (Sum. *buru<sub>1,4</sub>*) which, according to its use in *AbB*. 6, 173, refers to the harvest of the winter grain. From a statistical point of view, the next term is *ešēdum* ‘cutting harvest’ (see *ARDēr* 80), and the third *hurpu* ‘early harvest’, that is, the harvest that took place before the grain was completely ripe. Sometimes we find a special type of crop—sesame or barley—in connection with *ebūrum*.

The first harvest event is cutting (*ešēdum*) with the sickle (*uru<sub>du</sub>šu-gur<sub>10</sub>*).<sup>87</sup> Afterwards stalks of grain were collected (*hamāmum*) into sheaves.<sup>88</sup> Once the sheaves were bound (*rukkusum*, an expression found only in lexical texts), they were piled in loose stacks.<sup>89</sup> The stalks were dried naturally and spread on the threshing floor (*ana maškani šulû/tabāku*) by the *zābilum*. OB references to this activity are known only from the time of Samsu-iluna. The sheaves were then untied (*petûm*)<sup>90</sup> and threshed. Threshing was accomplished by trampling (*dāšum*) and flailing (*narpasu*). Salonen had thought it might have been done with a threshing sledge, but Landsberger had already refuted that possibility.<sup>91</sup> Threshing separated the grain from the chaff, which is termed either *zukkûm* or *zarûm*. Because Sum. *še-lá* or *al-(lá)-è* is equated with *zarûm*, *še-lá* must mean to winnow (with a fork). After winnowing the grain lay separate from the chaff (*ina marri šubalkutu* ‘to winnow with a shovel’). A further cleaning operation could be performed by sieving (*nahālum*). What procedures are indicated by *ana haṭṭi šunūlu* ‘to lay out with a stick’ and *pašārum* ‘to separate’ is unknown.<sup>92</sup> The final harvest activity was the storing of the grain in bins (*ana našpaki šulû/šapāku*).

The harvest was a time of economic boom, as the increased number of contracts for harvest workers suggests.<sup>93</sup>

86 At harvest time the loans had to be repaid.

87 For sickle texts, cf. N. Yoffee, *The Economic Role of the Crown* (Malibu, 1977), 38–42.

88 Cf. Salonen, *Agricultura Mesopotamica*, 268, for the sheave binder—which is poorly documented in the texts.

89 Salonen, loc. cit., notes the further labors as *tab, še kar tab* “Garben gegeneinander (zum) Trocknen aufstellen,” *šu ūr* “nivillieren,” *še ri(-rig)* “Ähren sammeln,” *še il, še gá(-gá)/zabālu* “Gerstegarben tragen,” *še má-a gíd/sadādu* “Gerstegarben mit dem Boot (auf die Tenne) schleppen,” *maškana dummuqu* “die Tenne in Dreschordnung bringen.”

90 Salonen, loc. cit., inserts before *še a-ta du<sub>8</sub>* “Gerste vom Wasser befreien.” The conclusions of Landsberger, *MSL* 1, 137, are irrelevant because the opening relates to the sheaves and not to the ears.

91 Landsberger, *MSL* 1, 171.

92 Landsberger, *ibid.*, 173–75 considers these expressions but can give them no plausible definitions.

93 Cf. J. G. Lautner, *Altbabylonische Personenmiete und Erntearbeiterverträge* (Leiden, 1936) and Weitemeyer, *Some Aspects of the Hiring of Workers*.

## 4. Special Fields and Their Produce

### 4.1. Field Produce

#### 4.1.1. Grain<sup>94</sup>

First among field produce are the cereals, which belong to the family of grasses. Because of its strong resistance to salt the most frequently cultivated cereal was barley (*še'um*, Sum. *še*; see above). Rare subspecies of barley are also found: *šegunnûm* 'spotted barley',<sup>95</sup> *šeguššum*, a kind of barley,<sup>96</sup> and *šaḥḥarum* 'speckled barley'.<sup>97</sup> We also have terms for specific types of grain in addition to the general *uṭtetum*: *kibtum* (Sum. *gíg*) 'wheat' and *kunāšum* (Sum. *zíz-an-na*) 'spelt', for example. The meaning of *burrum*<sup>98</sup> and *napšartum* is not clear. Besides this, there was a distinction between early and late grain, *hurpum* and *uplētum* respectively.

Grain was also cultivated for fodder, if the definition of *tabrium* as "Futtergerste"<sup>99</sup> is correct.<sup>100</sup>

The procedures for cultivating grain have been delineated above.

#### 4.1.2. Legumes

About the cultivation of legumes we have no information. The texts mention only some of the varieties of legume: *kakkûm* (Sum. *gú-tur*) 'lentil' or 'small bean' and *ḥallurum* (Sum. *gú-gal*) 'chickpea', which are attested in texts from Elam together with barley and sesame.

#### 4.1.3. Fodder Plants

Little can be said about the cultivation of fodder plants. Only *laptum* 'turnip'<sup>101</sup> and *numun šambalītim* 'fenugreek'<sup>102</sup> are mentioned. *Adamatum*<sup>103</sup> and *kunāšum*<sup>104</sup> are glossed as "(blood-colored) plant." For *tabrium*, see above.

#### 4.1.4. Oil Seeds

Oil was extracted mainly from sesame (*šamaššammum*, Sum. *še-giš-ì*)<sup>105</sup> and, at Mari, from olive trees (*serdum*)<sup>106</sup> as well.

The cultivation of sesame was treated by F. R. Kraus in *JAOS* 88 (1968), 116–18. The steps in its cultivation are:

1. *maḥāḥum* 'to soak'

94 Hrozný dealt with this theme extensively in *Das Getreide*.

95 Cf. Landsberger, *JNES* 8 (1949), 280–81.

96 Cf. *AHW*, 1209a.

97 F. R. Kraus, *AbB.* 1, 122, 24.

98 Cf. *AHW*, 140a; *CAD* B, 330b.

99 *AHW*, 1299b.

100 According to *CAD* B, 337a, this word refers to a kind of meadow.

101 *AbB.* 3, 11; *TCL* 18, 87.

102 *OBTR*, 38.

103 *TCL* 10, 100.

104 *RA* 15, 135.

105 Kraus, *JAOS* 88 (1968), 114, does not accept the translation "linseed."

106 The incomplete text *TCL* 17, 62 from Larsa hardly supports von Soden's reading [*s*]e<sup>?</sup>-er!<sup>?</sup>-da!<sup>?</sup>-am (l. 18); cf. *AHW*, 1037a.

2. *sapānum* 'to smooth down'
3. *nasāḥum* 'to pluck out'
4. *majjāri maḥāṣum* 'to deep-plow'
5. *napāsum* 'to beat out'
6. *šumqutum/maqātum* 'to allow to fall out/to fall out'
7. *nuššubum* 'to blow out'

Before sowing, the seed was soaked. According to *AbB.* 3, 65 this should not be done before the appearance of Sirius.<sup>107</sup> After sowing, the sesame field was leveled. Even in texts dealing directly with sesame there is no information giving planting instructions.<sup>108</sup> The harvest procedure is termed *nasāḥum* 'to pull out'. We do not know the degree to which the sesame was left to ripen. Afterwards, the field was deep-plowed. Procedures 5–7 above comprise the steps taken after the harvest. The list omits hoeing (*rapāqum*), but it is attested in *CHJ:HE* 123 (Si, Larsa).

About sesame yield we have no information,<sup>109</sup> but the steps in producing sesame oil are delineated in *CT* 8, 8e (Ad) and 36c (Ad).

#### 4.2. Pasture Land

The expressions that seem to designate a field of grass or herbs are, for 'meadow', *dīšum* (*YOS* 10, 9), which at Mari (*ARM* 6, 23) refers to pasturing, and possibly *ušallum*,<sup>110</sup> which is sometimes translated as a river meadow. More precisely, it refers to the fertile strip along a river or canal.

Pasture-land proper is designated by *rītum* and perhaps *laskum*,<sup>111</sup> and *nawûm* is the name for an enclosed pasture.<sup>112</sup>

### 5. Fruit and Vegetable Growing

#### 5.1. Fruit

Fruit growing is almost exclusively limited to the cultivation of the date-palm (see below). The texts sometimes mention other fruit-bearing trees, such as *ḥašḥurum* 'apple' (*TCL* 18, 87); *kamiššarum* 'pear' (*ARM* 4, 42); *armannum* 'apricot' (*OBTR* 33; *ARM* 12, 201); *ḥaḥḥum*<sup>113</sup> 'plum'; and *tittum* 'fig' (*AbB.* 7, 187; *ARM* 9, 282; 12, 573, 738; *OBTR* 146). The texts go into much greater detail concerning the planting and cultivation of date-palms.<sup>114</sup> These are listed not only in *ana ittišu* (tablet 4, iii:18–56) but also in *CH* §§ 64–66.

107 This would not have been before July 12th; cf. Kraus, *JAOS* 88 (1968), 118 with n. 44.

108 Five to ten kg. of sesame seed are required per ha.

109 Cf. Kraus, *JAOS* 88 (1968), 119.

110 For references, cf. K. R. Veenhof in M. A. Beek et al., eds., *Symbolae Böhl*, 371–73.

111 Cf. D. O. Edzard, *ZA* 53 (1959), 170, n. 8.

112 Cf. *ibid.*, 168–73; F. R. Kraus, *RA* 70 (1976), 172–79; V. H. Matthews, *Pastoral Nomadism in the Mari Kingdom* (Cambridge, 1978), esp. 59–63, 77 n. 88.

113 *TLB* 1, 80:33 *gišḥa-ḥe?!-e?*.

114 Cf. Schwenzner, *MVAG* 19/3 (1914), 90–95; Landsberger, *MSL* 1, 196–212; *Afo* Beiheft 17 (1967); Cocquerillat, *JESHO* 10 (1967), 162–223.

According to *ana ittišu* (tablet 4, iii:22–24), a gardener (*nukaribbum*, Sum. nu-<sup>gi</sup>s<sub>6</sub>kiri<sub>6</sub>) or garden supervisor (*šandanakkum*, Sum. šandan) was allotted three years to oversee the planting and care of a new grove of date-palms. During this time the palm shoot (*ligimū*; *TCL* 11, 158), which had grown for three years on the mother tree, was planted.<sup>115</sup> Nothing is said about the interval between the planted shoots. The grove had to be enclosed by a mud wall and watered. Then the gardener had to arrange for their cross-pollination. He was also responsible to protect the trees. The yield of dates was initially unpredictable and depended upon the percentage of fertile (female) palms in the grove.

Little is known about harvest procedures.<sup>116</sup> The time of the harvest is given as u<sub>4</sub>-buru<sub>14</sub>-zú-lum “at the time of the date harvest” and took place in the North in the fifth and sixth months and in the South during the seventh and eighth months. After the harvest came drying.

The harvested dates had the following designations: *suluppum* (Sum. zú-lum) ‘date’ in general; *kimri* ‘green, bitter, immature, inedible’; *ḫalal* ‘(lit.) sour, yellow, reddish, already mature’; *raṭab* ‘full of sap, brown’; *tamar* ‘dry’ (the quality familiar to us).<sup>117</sup>

## 5.2. Vegetables

The terminus technicus for vegetable cultivation is either *mūšarī*<sup>118</sup> *šakānum* or *šikin mūšarī*; the activity was performed by a gardener.<sup>119</sup> The following vegetables were cultivated: *šūmun* ‘garlic’; *šamaškillum*<sup>120</sup> ‘onion’; *geršānum* ‘a kind of leek’; *karasum* ‘leek’; *qiššum* ‘cucumber’. The meanings of *samimum*, *nagappum*, *ezizzum*, *naḫutum*, *sahlūm* (see above), and *zarzarum* are not quite clear.

According to *ana ittišu* and *TCL* 1, 174, the procedures of vegetable cultivation are as follows:<sup>121</sup>

<i>ana ittišu</i>	<i>TCL</i> 1,174
1. <i>rapāqum</i>	---
2. <i>šakākum</i>	<i>maḫāḫum</i>
3. <i>pašārum</i>	<i>pašārum</i>
4. ---	<i>šullušum</i>
5. <i>erēšum</i>	<i>ḫarāšum</i> + <i>zarūm</i>
6. <i>šaḳūm</i>	---
7. <i>dalūm</i>	<i>dalūm</i>

The first step, *rapāqum*,<sup>122</sup> is performed with the *allu*-hoe.<sup>123</sup> The harrowing could have been done with the *maškakātum*-harrow, which was used in other field work. Next came soaking down (*maḫāḫum*) the garden and loosening the soil with the *naḫšarum*, which was also perhaps a kind of harrow. Like the fields, the garden, too, could be leveled a third

115 Cf. Landsberger, *MSL* 1, 193.

116 For *VS* 7,27 (Si, Dilbat) and *VS* 13, 18 (Ḫa, Sippar?), cf. Cocquerillat, *JESHO* 10 (1967), 220.

117 Cf. Landsberger, *MSL* 1, 201.

118 M. Powell, *ZA* 62 (1972), 191 with n. 62, considers *šar/mūšarū* as a garden plot or vegetable garden.

119 Cf. *CAD* M/2, 262a.

120 In accordance with J. Bottéro, *RLA* 3, 342, and contrary to *AHW*.

121 Cf. Landsberger, *MSL* 1, 186.

122 For further references to *rapāqum* cf. W. H. von Soldt and M. Stol, *JEOL* 25 (1977/78), 54.

123 For a description of this hoe, cf. C. Wilke, *RLA* 4, 33.

time. Seed-furrows were then made, sometimes with the *maḥraṣum*, apparently a planting stick. The expressions *erēšum* and *ḥarāṣum* both clearly show that certain vegetables had to be sown and others planted. In this connection *zarûm* means 'to sow'; for its use 'to winnow', see above. Finally, when the seed-bed was completed it had to be provided with an adequate supply of water. No other procedures of garden work are mentioned.

## 6. Summary

In this article I have tried to show how agriculture, excluding the breeding of livestock, was performed in the Old Babylonian period. After presenting an overview of the most important literature on the subject, I turned to the cultivation of the land. Beginning with the tasks which a farmer/tenant had to fulfill before he was able to proceed with the cultivation itself, I delineated the practical techniques and labors that a farmer would perform during the growing period and at harvest time. In the course of discussion, I took account of the cultivation of the best-known plants and fruits and vegetables.