Chapter-3

(Food and Food Production)
FOOD AND FOOD PRODUCTION

Of the three primary needs of an individual, food, clothing and shelter, food occupies the most important place. In the early stage of civilization man was essentially a food gatherer and lived on the flesh of animals he killed and roots of wild plants, fruits and flowers which he gathered. But later, making use of his superior intelligence, he began to tame wild animals and raise crops. This was a great step forward in solving the problems of food. This food was the same throughout the ages irrespective of political and social changes. To know the food and food production habits of the people of the period under study, the archaeological findings and the literature are the best sources, which throw a flood of light on this aspect of man's life.

Vegetarian Diet: Vegetarian food seems to have been quite popular among the people. The cereals (Table No.1) which were most commonly consumed by the people of the period under study are wheat (godhuma), rice (vrihi), barley (yava) and millet (kangu). These are testified by archaeological findings and supported by literature of the period concerned. Names such as hayana\(^1\) (redhusk paddy), krsnavrihi\(^2\) (black paddy), suklavrihi\(^3\)

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\(^1\) Satapatha Brahmana, V.3.3.6.
\(^2\) Taittiriya Samhita, I.8.10.
\(^3\) Jaiminiya Brahmana, I.43.
## Siteswise Distribution of the Grains Between c. 600 – 320 B.C.

<table>
<thead>
<tr>
<th>Names of the Grains</th>
<th>Important Sites</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Atranjikhera</td>
</tr>
<tr>
<td>Barley</td>
<td>✓</td>
</tr>
<tr>
<td>Rice</td>
<td>✓</td>
</tr>
<tr>
<td>Wheat</td>
<td>✓</td>
</tr>
<tr>
<td>Kondon millet</td>
<td></td>
</tr>
<tr>
<td>Finger millet</td>
<td></td>
</tr>
<tr>
<td>Pulses:</td>
<td></td>
</tr>
<tr>
<td>Common pea</td>
<td>✓</td>
</tr>
<tr>
<td>Horse Gram</td>
<td>✓</td>
</tr>
<tr>
<td>Black Gram</td>
<td>✓</td>
</tr>
<tr>
<td>Green Gram</td>
<td></td>
</tr>
<tr>
<td>Chick pea</td>
<td></td>
</tr>
<tr>
<td>Green pea</td>
<td>✓</td>
</tr>
<tr>
<td>Grass pea</td>
<td>✓</td>
</tr>
<tr>
<td>Lentil</td>
<td></td>
</tr>
<tr>
<td>Oil Seeds: Mustard</td>
<td></td>
</tr>
<tr>
<td>Sesamum</td>
<td>✓</td>
</tr>
<tr>
<td>Cotton</td>
<td>✓</td>
</tr>
</tbody>
</table>

Table No. 1
(white paddy), mahavrihi⁴ etc are found in Sanskrit literature kalamasali⁵, raktasali, maliasali and gandhasali⁶ in Jaina canonical literature and sali, vihi and tandula are mentioned in pali Nikayas⁷ and Jatakas⁸.

The Jatakas contain approximately seventy references to rice, which dominated the dietary pattern of the people as rice powder, boiled rice, rice-gruel, parched rice etc⁹. The different names and varieties of the same grain (rice) certainly reflect to its popularity among the people, as well as their large scale production. The accompanying chart shows the wide distribution of rice. Importance of rice may be assessed on the basis of the fact that rice was used for the purpose of barter, i.e., goods¹⁰. It was also the medium of paying tax¹¹ and became a status symbol as the Jataka would make us believe.¹² The cultivation of barley and wheat are quite commonly known from the Sankhayana Srautasutra.¹³ About cotton, early Pali texts¹⁴ suggest that cotton came into general use in the age of Buddha, though its earliest use anti-dates to the period of the Harappan civilization.

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⁴ Taittirya Samhita, I 8 10, III 15 2
⁵ Uvasagadasao, I P 8
⁶ Brhat Kalpa, 2 3301,3397
⁷ Majhima Nikaya, I 57, III 90
⁸ Jatakas, I 429,484, II 110,135,378, III 383, IV 276, V p 405-G,262, VI 367
⁹ Jataka, vol I no 75
¹⁰ Jataka, vol III no 388
¹¹ Jataka, vol II no 276
¹² Jataka, vol VI no 546
¹³ XIV, 40,6-9, XIV, 41, 6-8
¹⁴ Sharma, R S , 1983, Material Culture and Social formation in Ancient India, New Delhi p 126
About the different types of pulses, the literary sources correlate the archaeological finds Panini\(^{15}\) and Kautiliya\(^{16}\) mention about the pulses, viz. Urad (black gram) as mudga and moong (green gram) as masha. The two similar names occur in the list of Vajasaneyi Samihita\(^{17}\) and Apastamba Srautasutra \(^{18}\) But about Kulti (horse gram) Panini says that it was popularly known as Kulathi\(^{19}\)

Kautiliya\(^{20}\) says that sesameum and mustard were known as tila and Sarsapa, respectively. They were used for the purpose of oil from the extracted seeds and the extracted liquid oil were used in cooking, medicine and religious ceremonies and also to light lamps. The terracotta miniature bowls\(^{21}\) with lip having a single or multi channel have been reported from the different sites of the period, which proves that these bowls were used as lamp for lighting most probably with the help of mustard oil.

On the basis of combined testimony of archaeological records and literary sources, we may say that the people now possibly had a better knowledge of season than the people of later Vedic period. Crops were generally raised twice a year.

\(^{15}\) IV 2.28, V 1.7, V 2.4
\(^{16}\) Kautiliya's Arthasastra tr. By Shamasstry, R 1967 Mysore p 131
\(^{17}\) XVIII 13
\(^{18}\) XVI 19, 13-14
\(^{19}\) IV 2.4
\(^{20}\) Shamasstry R, op cit
\(^{21}\) Ghosh, A. (ed) 1989 An Encyclopaedia of Indian Archaeology Vol I ICHR New Delhi pp 181 & 182
Rice, millet, sesame, *moong* and *urad* were the important *kharif* crops, sown during the rains and harvested in autumn, whereas the *rabi* crops which included wheat, barley, peas and mustard were sown in autumn and harvested in spring as mentioned in the *Manava Srautasutra*\(^{22}\) and the *Manava Grihyasutra*.\(^{23}\) Vegetables like pumpkins and cucumber and fruit like mango were also included in the diet of the people.\(^{24}\)

People had also the knowledge of the sources of manuring. Cow dung\(^{25}\) was used to recharge the productive capacity of the earth. Interestingly enough, pulses, which were grown by people, not only gave them food but it also improved the productive quality of the land with nitrogen.\(^{26}\)

**Non-Vegetarian Diet:** The discovery of large quantity of bones\(^{27}\) of different animals bearing cut marks, suggested that they were slaughtered. It proves that non-vegetarian food supplemented their dietary requirements. We find numerous references in the literature about hunting and eating of the meat of the killed animals. *Majjhima Nikaya*\(^{28}\) mentioned about butcher, who earned their livelihood by killing various animals in the slaughter house.

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\(^{22}\) Il 3 10 12  
\(^{23}\) Il 6 4 1-5  
\(^{24}\) Jataka, V V, p 37, Ashtadhyayi, IV 1 42, IV 3 165, VII, 4 5  
\(^{25}\) Il 1 1 7  
\(^{27}\) Roy T N , 1986, *A Study of Northern black Polished Ware Culture*, New Delhi, p 182  
\(^{28}\) I 364, Il 193
The animals whose meat\textsuperscript{29} was generally accepted by the society were the dear of all species, oxen, pigs, sheep, goat etc along with birds like pigeons, peacock, crows, cocks etc.

Besides grains and flesh of animals, milk and milk products like curd, butter and ghee were largely used as food.\textsuperscript{30} Drinking of wine was fairly common. Kautilya\textsuperscript{31} in his 'Arthasastra' has made references to the use and method of its preparation.

**METHODS OF AGRICULTURE**

The significance of agriculture to archaeological studies was first emphasized by Childe, in 1942. He described the introduction of agriculture in Neolithic society as a revolutionary change, as the agriculture advanced production system from the level of subsistence to a higher level of surplus production.

Agriculture is among the three principal vocations mentioned in the literature besides cattle tending and trade. Its importance can be realized by the fact that Kautilya used the word *krish* (agriculture) under the title of *varatta*. He puts *varatta* in the category of *vidyas* (science) with three other sciences i.e., philosophy, the three Vedas and the science of politics.\textsuperscript{32} Panini mentions agriculture as *Krishi* derived from the word *Krish* (to

\textsuperscript{29} Ramaka Jataka, No 277, Nanguttha Jataka, No 144, Punnandi Jataka, No 214
\textsuperscript{30} Anguttara Nikaya, II 95
\textsuperscript{31} Ramayana, III 47 23
\textsuperscript{32} Panini's *Arthasastra*, trs. By Kangle, R P., I 4 1
plough), although the term was not restricted to mere ploughing. Patanjali have an interesting discussion that *Krishi* denotes not only the process of ploughing, but includes collectively all other operations of agriculture, such as supply of seeds, implements and human labour.

Agriculture as the main source of people's livelihood witnessed further progress during the period ranging between c. 600-320 B.C. More better methods of cultivation were used and new devices were introduced for the irrigation. As a consequence, vast areas were brought under cultivation. This is borne out by literary sources of the period under discussion. They make references to the ploughing and fencing of the fields, irrigating them, weeding, reaping, arranging the crops in bundle, getting them trodden, picking up of the straw, removing the chaff, winnowing and garnering of harvest as various successive stages of the agriculture process.

**Method:** It is also worthy of note that the agricultural operations were arranged systematically. Method of agricultural operations are neatly, summed up in the *Satapatha Brahmana* viz., ploughing, sowing, reaping, and threshing. In the *Ashtadhayi* also all these stages are distinctly mentioned.

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[^34]: *Mahabhashya*, III.1.26, II.33.
[^35]: *The book of gradual saying*, I.209, 221; *Anguttara Nikaya*, IV, 2378; *Jataka* No 36
[^36]: I.6.1.3
Ploughing: The system of cultivating the soil in the period under discussion was as distinct as at present. The fields were ploughed twice or thrice. The lands were divided according to crops on the basis of the nature of soil. Thus field of barley was called yavya and for beans it was tilya.

We notice that the plough, which were used to make furrows in the soil were made of wood and iron. The ploughshares made of iron are reported from Atranjikhera, Ganwaria, Jakhera, Kausambi, Ropar and Raghuasoi (Vaisali). One thing is noteworthy that more than 500 sites of this period had been excavated and explored, but we could find only seven ploughs (Table No 3) made of iron from the entire northern India. It gives us an idea that probably the majority of the plough, the people used during the period under discussion were made of wood, which could not be traced in excavations due to its perishable nature. After the repeated ploughing, clods of earth were broken and soil, were turned with the help of

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38 V 4 58
39 V 1 7
40 Gaur, R. C., 1983, Excavations at Atranjikhera, New Delhi, p. 425
41 Singh, Purushottam, 1996, Excavation at Piprahwa and Ganwara, Memoires of Archaeological Survey of India, No 94, New Delhi, pp253-257
42 Sahi, M. D. N., 'New light on the life of PGW people as Revealed from Excavation at Jakhera, Man and Environment, vol II, pp 104-105
43 Sharma, G. R., 1960, The Excavations at Kausambi, Allahabad, p. 95
44 Indian Archaeological Review (IAR), 1965-66, p 90
45 Sharma, R. S., op cit., p 95
46 Jataka vol II p 59

* The debate over the iron will be discussed in the sub chapter related with iron objects
spade (Kudala). Such spades have been found at Chirand and Ujjain. In the process of ploughing, generally, two oxen were yoked. However, there are some evidences, which indicate that more than two bullocks were yoked to the plough. References to plough drawn by six, eight, twelve, or sometimes even twenty four are available to us since the later Vedic period. It has been suggested by Chakrabarti that the ploughs had been drawn by so many oxen at a time because the plough share were made of iron. According to him the introduction of iron tools for agricultural in the Gangetic valley and Indo Gangetic divide is around 800 B.C. However, we do not find more than two or three sickles in the name of iron agricultural tools preceding the period under discussion, and the evidence of first iron plough are not earlier than c. 600 B.C from any part of the Indian subcontinent. Secondly, the shape and weight of the iron plough recovered in excavation hardly supports Chakravarti's hypothesis. Even today, farmers with iron plough hardly need more than a pair of oxen. Any one who is familiar with the country side can realise the unrealistic nature of the argument.

48 IAR, 1971-72, p.6
49 Banerjee, N. R, 1965, Iron Age of India, New Delhi, p 5
50 Atharva Veda, VII.
51 Taittiriya Samhita, I.8.7; V.2.5.2
52 Maitrayani Samhita II 6.2.
53 Kathaka Samhita, 15.2
The best explanation in this regard has been given by Thakur\textsuperscript{55} that with the expansion of agriculture and the growing emphasis on the cultivation of rice, cotton and sugarcane, the agrarian scenario started changing rapidly. It was very difficult to break the hard soil with the simple wooden plough. The new crops required deep ploughing, which could hardly be achieved with the available plough made of wood. A multi-oxen yoked plough technique was adopted to break the hard soil and prepare it for the cultivation of new crops. As iron plough share was very little in use, the wooden plough had to be made heavier in order to break the hard soil. This gains support from the Samykutta Nikaya\textsuperscript{56}.

This multi-oxen practices has interesting historical parallel even outside India. The ancient Germans, as pointed out by Childe, have also evolved a unique system of tillage for the heavy clay lands of north European forests. They went for deep ploughing in the region by yoking eight oxen to a plough\textsuperscript{57}.

**Sowing:** After the soil was prepared by ploughing, it was fit to be sown\textsuperscript{58}. The number of grains reported from excavations from various sites may have been used as seeds during the period under study. Kautilya gives certain suggestion for the preparation of the seeds before it is sown. In case of seeds of grains he suggested, soaking in dew by night and drying in the heat by day.

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\textsuperscript{55} Thakur, V K., “Social Implication of Technology: A study of iron in pre-c. 200 B C India’ Archaeometallurgy in India, ed V Tripathi, Delhi, 1993, pp 359-385

\textsuperscript{56} Pantins Ashtadhayi, III 1 126

\textsuperscript{57} Childe, V G., 1942 What Happened in History, Harmondsworth p 242

\textsuperscript{58} Panini’s Ashadhayin, III 1 126
for full seven days and nights, while in the case of pulses he recommends the same treatment for three days and nights.\footnote{Kautilya’s Arthasastra, by R Shamasstry, op cit}

With respect to the first half of the first millennium B.C. literary\footnote{Sharma, R S , op cit, p 96} evidence suggests the practice of transplantation of paddy. Later classical Greek writer, Aristoboulos also makes mention of it.\footnote{Pun, B N , 1963, India in Classical Greek Writings, Ahmadabad, p 116 & 117} Agrawal\footnote{Agrawala, V S , 1969, Pannikalin Bharat Varsha (in Hindi), Varanasi, p 204} differentiates between Vedic term \textit{vrihi} and post Vedic \textit{sali}

According to him \textit{vrihi} was grown without transplanting, and \textit{Sali} was grown by means of transplantation. In this regard the \textit{Prakrit} phrase \textit{Ukkhaya-nihae} literally, ‘uprooted and planted’ is used in a Svetambara Jain text called \textit{Nayadhammakahao} or \textit{Jnatadharma katha} to indicate paddy transplantation.\footnote{V 4 58} According to Panini\footnote{Agrawala, V S , 1953, op cit, p 200} in some cases ploughing was done in a field with the seed already scattered. Interestingly this is still being practiced in India. The multi-crop agriculture was also known.\footnote{Nayadhamma Kahao, ed, by Vaidya, N V , Poona, 1940, p 8} Patanjali\footnote{\textit{Arthasastra}, by R Shamasastry, op cit} states that sesameum was sown along with the beans. Not surprisingly even today mustard is being grown with wheat or peas and sugarcane with lentil or gram or maize etc.
Religion also seems to play a significant role in agricultural activities. Religious celebrations related with agriculture were performed with great pomp and show in different seasons on special days. In course of the celebration, religious sacrifices were made. This clearly indicated that cultivators wanted to please the Divine Powers by undertaking rituals in the hope of getting great returns at the time of harvest. Panini confirms that during one of the auspicious full moon day of the month of Agrahayana, people used to celebrate the sowing. He further adds the Sarat-purnima is the brightest and clearest moonlit night in the whole year and is still considered auspicious for the operations connected with agriculture and plantation.

Reaping: The next step after sowing was reaping or cutting the standing crop with the help of sickle, mentioned in Sanskrit literature as datra. This curved and tanged iron agricultural tool in this period has been found at Jakhera, Daulatpur (Kurukshetra), Kotia (Allahabad), Nadner (Sehore, M.P), Taradih, Atranjikhera, Narhan (Gorakhpur), Ganwaria (Siddharth Nagar) etc.

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66 ibid. p.201.
67 Ashtadhayayi, III.2, 182 & 184.
68 IAR, 1975-76, p.50.
69 IAR, 1977-78, p.23.
70 IAR, 1963-64, p.41.
71 IAR, 1986-87, p.56.
72 IAR, 1985-86, p.40 & 41.
73 Gaur, R. C., op. cit.
75 Singh Purushottam, 1996, op. cit.
Panini uses the verb *upaskirti*\(^{76}\) to denote the special method of reaping in which the cutting of the crop was not systematic (i.e. perhaps, it was not started from one particular end and finished at the other). The above mentioned system of reaping is still practiced in states like Kashmir and Punjab.

**Threshing:** After the cutting of standing crop, the produce was stored on the threshing floor. A plot was set apart for the purpose of threshing floor, which was known as *Khalya*\(^{77}\) (meaning "good as threshing floor"). It was situated near the agricultural field as Kautilya tells us. Perhaps the modern vernacular term *Khalehan* is the equivalent of *Khalya* available in our sources. The limited nature of our excavations has failed to bring to light the archaeological evidence for the presence of any such threshing floor.

The threshing was proceeded by winnowing with the help of winnowing fan known as *surpa*\(^{78}\), which was used in accordance with the direction of wind, for the purpose of separating the grain from chaff\(^{79}\). The method is still in practice. In parts of Bihar and eastern U.P, this winnowing fan is today known as *supa*.

**Sources Of Irrigation:** The *Jatakas* suggest rainfall as a natural aid to agriculture. Failure and success of the crops in the fields

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\(^{76}\) *Panini's Ashtadhayayi*, V.1.140.

\(^{77}\) *Panini's Ashtadhayayi*, V.1.7.

\(^{78}\) *Panini's Ashtadhayayi*, V.1.26, Kantiliya's *Arthasastra*, trs by Kangle, R P., part II, Bombay, 1972 II 15.62

\(^{79}\) *Ashtadhayayi*, III 3 48
were decided to a large extent by the rainfall \(^{80}\) Pavarna festival\(^{81}\) and chanting of rain songs\(^{62}\) indicate its importance among common people. However, in archaeological excavations during the period, with which we are concerned, the artificial sources of water such as digging of well, tanks and canals are available to us. The Kachha wells (i.e., wells without lining) belonging to this period have been reported at Jakhera and Atranjikhera.\(^{63}\) Where as tanks and wells have been discovered at Ujjain and Vaisali.\(^{84}\) A moat-like channel has also been found at Jakhera which according to Sahi\(^{85}\) “may have been used for irrigation.” Existence of two water channels has also been confirmed on the western slope at Jakhera. The outer one, discovered in 1992-93, running north to south was traced to a length of 60 mts. The second channel of later date was found running in a circular manner and was traced up to a length of 80 mts on the western and southern slope.\(^{86}\) It might have been used by people of Jakhera for drinking as well as irrigational purposes.

Most of the pre and post 600 B.C. settlement were situated closer and along the river banks where water played a great role in several ways. This is also testified by the statement of Panini.

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\(^{80}\) Jataka, vol I no 75
\(^{81}\) Jatakas, vol I nos 36, 71, III No 400
\(^{62}\) Jataka vol I, no 75
\(^{63}\) Sahi, M D N., 1982, ‘Agricultural Production During the Early Iron Age in Northern India’, Proceeding on Indian History Congress, pp 95-101
\(^{64}\) Jain, K C., 1974, Lord Mahavira and His Times Delhi p 282
\(^{86}\) Sahi, M D N., 1994, Aspects of Indian Archaeology Jaipur p 147
that the major cities were flourishing near the banks of different rivers such as Sindhu (Indus), Sarayu, Vipasa (Beas), Chandrabhaga (Chenab), Suvatu and Varnu. These rivers were used as source of irrigation. Yet we have the evidences that, some settlements were located away from the perennial source of water. Existence of such settlements would have not been possible unless artificial sources of water are tapped not only for the daily needs of the people but also for agriculture. Sahi pointed out Dhansari, to be one such site in Aligarh district, situated about 5 km away from the nearest bed of the river Nim, a tributary of the Kalinadi. In the district of Kanpur as well, out of 23 sites explored pertaining to this period, two single culture sites were found located away from the rivers. In and around Aligarh and Kanpur we have evidences of big ponds and low swampy areas. These were used possibly, for drinking and irrigational purposes.

The Brahmanical, the Buddhist and the Jaina literature refer different types of canals and channels, used for irrigation. With the development of agricultural land, which increases the resources of the state, serious attempts were made by the kings.

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87 IV 3 32-33
88 IV 4 174
89 IV 2 74
90 IV 1 45
91 IV 2 77
92 IV 2 103
93 Sahi, M D N, 1982, op cit
94 Lal, Makkhan 1981, Settlement Pattern of the Painted Grey Ware Culture in the Valley: a paper presented at Indo pacific pre-history conference held at Poona 19-21 Dec
towards the construction of canals. Such attempts were clearly referred to in the Sakiya-koliya episode. The Sakyas and the Koliya had made a canal over the river Rohini (Cunningham identifies it with a modern Rowai or Rohwaini, a small stream which join the Rapti at Gorakhpur) and they cultivated their crops making use of water of this river. We have at least two definite evidences of state's interest in extending irrigation facility obviously to boost agriculture and consequently the state's economy. These are: (1) the construction of canal by a Nandaraja (The Nanda king of the 4th century B.C.) which finds record in the Hathigumpha inscription of king Kharvela of c. 1st century B.C. (2) the construction and perfection of the Sudarsan lake by the two Mauryan kings Chandragupta and Asoka, respectively. The same lake even later with the personal interest of the Saka ruler Rudradaman was restored for effective use when it had become damaged due to storm. These are the examples, which might have been followed by others elsewhere too.

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95 Dhammapada, 80, Theragatha, 19 877.
96 Kunala Jalaka, No 536, Theragatha, V 529, p 56
97 Jataka, V 219 ff.
98 Epigraphica Indica, V VIII, (1905-1906), Archaeological Survey of India, New Delhi, 1981, pp 40 – 41