In this chapter, it is proposed to deal with agricultural conditions and the system of irrigation of the times. Such problems, as the size of Holding, its subdivision and fragmentation, land-types or types of Soil, Crop-pattern and practices, if any, will be examined first, under agriculture, mainly with reference to inscriptions. The second aspect, the basic factor for the development of agriculture, namely, the system of irrigation will be taken up and studied under some heads such as, construction, maintenance, types and so on.

1. (a) Holding: A study of the problem of 'Holding' will, naturally, involve the consideration of its size, primarily, and secondarily, that of its subdivision and fragmentation. The study of the first, namely, the size of the 'Holding', is difficult, for the reason that, except for 'Kodagis' or gifts made to individuals, by way of recognition for some service, or for regular attendance or work at the temples in the shape of maintenance allowance, there are few inscriptions which throw adequate light on the actual
size of 'Holding', much less the size of 'Economic Holding'.

But there are innumerable grants of land made to temples, for carrying out worship etc., which at least, speak of the size of a 'plot', evidently, constituting part of 'Holding' and from which one can conclude roughly about the size of 'Holding'. Another point, which becomes clear from a study of the inscriptions is that the size varied, according as, whether it was a garden, wet or dry-land. There is very little to be said about sub-division also, for there are not many instances of actual division of property brought to our notice from inscriptions. But there are many instances of fragmentation, for the grants of land made by individuals to temples are found located, invariably, in more than one place and scattered about, a good evidence of fragmentation. In the following pages, an attempt will be made to assess the size of the plot and wherever possible, of 'Holding', in the different zones. The study is based on a district-wise 'Tabular Analysis' of minimum and maximum sizes of 'Plot' or 'Holding', granted under each category of land, worked out from the different land-grants.

1. Some of the inscriptions referring to joint-holdings and the sharing or distribution of land offer some evidence of remote sub-division. See Supra Chapter II Section 5(E)(b) under forms of tenure. There are strong instances of division of property between claimants, but not very helpful.
Zone IV: First, to take the area covered by the Fourth Zone. The inscriptions throw some light on the minimum and maximum area of land donated under each variety in different districts. For instance, in Shimoga district, wet-lands donated, have varied from 4 Kammas or Kambhas to 500 Kammas or roughly, 5 Matters. Wet-lands have been donated in units of 5, 10, 25, 30, 40, 50 and 60 Kammas, rising suddenly, to 150 and 400 Kammas. Sometimes, odd figures, such as 58 occur. It means that, here, for wet-land cultivation, plots were more often than not, below one Matter and, very rarely, above one matter, 5 Matters, being the rarest. The situation in other districts like Hassan, Tumkur and Mysore did not differ much. In Kadur, it oscillated between 42 and 160 Kammas. The inscriptions, from Hassan, give the measurements, also, in Salage and Kolaga. Speaking in terms of salage, the plots donated varied between 1 and 2 salages; in Kolaga, from 5 to 15; in Kammas, from 10 to 160 (i.e., 16 Matters), below 100 Kammas, being the normal unit of a plot. As regards Tumkur, one of the areas examined, 1 to 2 salages or 5 to 15 Kolagas are the normal. Lastly, taking Mysore district, 1 to 4 Salages, 200 Kammas, 10 Kolagas, in units of salage, Kammas and Kolaga, respectively are a normal feature, while sometimes, 2 Khandugas, in terms of Khanduga are indicated. The Khanduga and Kolaga measurements refer to the sowing

1. South-Western, South-Western, Central-West and Central-South Zone.
2. 100 Kammas = 1 Matter.
capacity of land and not to the area. Taking the above samples, one may conclude thus about the position of the wet-land in the zone under study. On an average, wet-lands were cut up into small-sized plots (i.e., below 1 matter), more so in Shimoga region than in others. Next, importance was given to areas between 1 and 2 matters, nearest being the area above 2 matters, 16 matters being an exception.

If we take dry-lands, the plots donated, varied between 1 and 12 matters, 3, 3 and 6 matters, being normal, 1 matter being an ordinary feature. The few samples from the above mentioned districts lead to the same conclusion. The examples, from Hassan, show that, on an average, the plots varied between 265 and 5500 karnas (i.e., 26 matters to 55 matters), areas below 50 karnas (i.e., 20, 30) being exceptions. Lands in Tenkure district varied between 150 and 170 karnas. Taking the fourth zone (specified) as a whole, dry lands are found generally in larger units, the average being anywhere between 3 and 6 matters, below 1 matter, being a rare thing.

As regards lands utilised for garden-crops, other than arecanut, the garden-lands are found generally, in smaller units, varying between 15 and 100 karnas, 25, 30, 40 and 50 being the usual size. Of the examples taken, only in one case, it is 140 karnas. Garden-lands, therefore, are found normally in sizes, small, in fact, the position being worse than in the case of wet-lands. Areca-nut gardens are found mentioned in units of adm asny trees,
the number varying between 2000 and 6000 and in terms of areas, 15 to 20 Kanvas, rising to, as high as 2 murtas.

There are certain unclassified lands. But there is no radical or appreciable alteration, that can be thought of, from the conclusions already drawn. Though some plots with fairly large dimensions are noticed, in any case, it can be said, that such lands, are to be searched for.

Some land-grants give an idea of the size of the 'Holding'. Thus a stone-mason was given for his maintenance 5 Kolagas in one place and 10 Kolagas, in another. Similarly, a grant from Kolar refers to a gift of 12,000 Bulis of wet-land and 24 Khandugas of dry-lands to 12 dancing girls at the rate of 1000 Bulis of wet-land and two Khandugas of dry-land each.

Zone III: Looking at the entire picture of growth of plots on the taluka-wise basis of analysis, the inscriptions from Hadagalli taluk indicate variation between 2 and 8 murtas or 200 to 800 Kanvas of wet-lands.

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1. 1400, 2800, 2110, 7600 and 2885 Kanvas; 10 Khandugas & 124 Khandugas.
2. E G, VI, Ed, No. 137.
4. Central North (i.e., Bellary District)
while those of Harepanahalli and Bellary Taluksa show variations between 100 and 500 Kumas. There are some instances of plots measuring below 100 Kumas, say in units of 20 and 50. But, compared to Shimoga and other districts of Mysore State, (Zone IV) outlined before, the position seems to be definitely better. We can, at least, think of larger areas of wet-land here. We are less fortunate regarding the border-district of Anantpur. As regards dry-lands, while, in Hadagalil taluk, the dimension of the area is as low as 3 mattara, and as high as 24 mattara, normally fluctuating between 8 and 15 mattara, Harepan-halli boasts of areas between 12 and 50 mattara. Areas measuring upto 24 mattara are found in Anantapur district. Here again, the position appears definitely better than before, because, normally, areas are large ones. There are large-sized garden-lands upto 12 mattara while the normal size varies, on an average, between 120 and 500 Kumas. Garden-lands, below 100 Kumas (i.e., 40, 45 and 50) are, of course, there. Areca-gardens, with trees varying between 150 and 670 Kumas, or to speak in terms of the number of trees, upto a capacity of 500 trees (roughly corresponding to 5 mattara) as also 100 betel-croppers, are found. Sometimes donations of, as few trees, as 2 or 3, are found. There are many unclassified lands, but the conclusion is similar.
A word about the size of the holding. A couple of inscriptions speak of grants of lands to individuals in Bellary district. Thus, a stone-mason, according to an inscription, got 50 kologas, while another obtained 10 kologas. A consideration of the other inscriptions shows that the size of holding granted to individuals varied between 2 and 12 mattsars. Thus, according to an inscription quoted before, in a temple-establishment, the dancer gets 12 mattsars, musicians - 12 mattsars, flute-player - 5 mattsars, garland-makers - 3 mattsars, and potter 2 mattsars. Those, on the higher cadre, a little more, ranging between 10 and 30 mattsars, the highest (i.e., 30 mattsars) being given to one who imparted education.

Zone I and II: Of the inscriptions studied, only some of them give us an idea of the size of plots, gifted away. Taking into consideration the districts of Belgaum, Bijapur and Dharwar, the variation in wet-lands is between 5 and 500 kumas, though it is not possible to say with certainty whether below 100 kumas was a normal feature. Sometimes, areas, with as high an acreage as 12 mattsars are heard of. As regards the dry-lands, of which the information is somewhat more, in some districts, like Dharwar, it varies between 1 and 50 mattsars, the normal area being 10, 12, 20, 24 and 30 mattsars. Garden-lands are, normally between, 1 and 4 mattsars, and occasionally, of higher quantity. For

instance, areas of 44 and 64 mattras are heard of. Of
the Second Zone, Kukkeriur in Koppal has a record mention
of 400 mattras.

There are a number of inscriptions which throw
light on the size of holding, individually, in areas
under study. For instance, an inscription from Bankapur
of Kadamba Someshvara, dated 1075, makes the following allot­
ment of land: - Gaudas: 12½ mattras; Manager
of property of God: 12 mattras; drummer: 10 mattras;
musician: 6 mattras; Manager of Estates: 6 mattras;
Priestly Official: 6 mattras; Group of 6 public women: 24 mattras; Keeper of public women: 5 mattras; Dancing Master: 5 mattras. Another inscription from Hungund (Bijapur District) registers grant of the following
pieces of dry land to various servants: - Möröja: 50
mattras; Dövöje: 40 mattras; Piper: 10 mattras; 2 Song-
stresses: 15 mattras each; 2 actresses: 48 mattras;
Public women (4) = 76 mattras; Garland-makers: 15 mattras.
A third inscription from Bharwar has a separate mode of

2. S I I, IX(i), No. 133, P. 186.

3. Zone I - North-west - Bharwar, Bijapur and Belgaum
   districts.
   Zone II - North-East-Bidar, Raichur and Gulbarga.


2. S I I, XI(i), No. 105, P. 99-102; ibid., No. 80; K I, II, No. 34 of 1940-41, ibid., No. 10 of 1940-41,
distribution, Peshāra: 10 mattars; Kambada nālvarge (4 dancers of the columns): 22 mattars; Ōlagada nīla (6 dancers of the court in temple): 24 mattars; Śilāvalame (spears of dancers): 5 mattars; Kalvasaaga (Sculptor) 1: 5 mattars.

A Copper-Plate inscription from Kolhapur speaks of the allotment of land made among the village-servants thus:

- Washerwoman: 6 mattars;
- Village watchman: 6 mattars;
- Carpenter: 4 mattars;
- Blacksmith: 4 mattars;
- Goldsmith: 4 mattars;
- Village headman: 10 mattars;
- Sānabōva: 6 mattars;

Conclusion:—From the above study regarding the size of holdings we can conclude as follows:

1. There was no uniformity in the size of holdings.
2. Generally the wet-lands and garden-lands were found granted in smaller units than dry-lands.

(3) Inscriptions do not help us much in assessing about the subdivisions of lands or property.

(4) But the inheritance laws as revealed in the works of Siritikāras and commentators did promote subdivisions.

(b) Fragmentation :- The next question that remains to be tackled is the extent of fragmentation. The main point to be considered here is whether the 'Holding' of an individual or an institution was concentrated in one region or divided between different regions. Here again, the gifts made to temples give a clue to the study of the problem. It would not be far wrong to state, at the outset, that gifts made to temples invariably are found scattered either between the areas of the same village, or between different villages and that the temples did contribute in a substantial measure to the fragmentation of 'Holdings'. Probably, the next factor was the formation of the agrahāras. While it is true that whenever common-ownership prevailed, based on the principle of sharing of produce, subdivision or fragmentation was not promoted, the same is not true of those, based on the principle of separation or land distributions. When all categories of lands were pooled together and divided actually on the principle of equal distribution, a share-holder, naturally, got his holding of distributed between
different places. As these were passed on from generation to generation, each inheritor claimed to his lot a part of every quality of land, according to the existing rules of distribution. Naturally, this would lead, in the first instance, to subdivision, for a person might be survived by a number of claimants, among whom the share was to be redistributed. Each one of the claimants to the joint-family property claimed and secured a plot from out of the land of each quality, leading in turn to fragmentation. A further factor leading to fragmentation may be stated. When land were granted to individuals for services, they were not given in one bit but made up of wet and dry-lands, situated in different places, leading to fragmentation. Lastly, succession laws of the time, to which a detailed reference will be made in the appendix, was really inimical to consolidation of holdings and encouraged separatist tendencies. Though the Joint-family system, as also the restrictions as land-sale or mortgage, did compensate to some extent, the absence of the law of primogeniture, negated keeping together of holdings.

1. In fact some of the agreements entered into between the residents of a place or a village, promoted such fragmentation. See for instances, E C, III, Sr. 54 and E C, V, Gn. No. 170.

2. See E I, XXX, No. 15, Pp. 51-77; E C, VI, Tn. No. 55, P. 444 ff., (Text); E G, XV, Sr. No. 112, P. 141(Text), P. 126 (Trans); See Supra Chapter II, Section 5B(b) for a detailed discussion of the above instances.
We may quote below one or two instances to show how the grants made to temples helped to bring out fragment-
mentation of land. The lands granted to a basadi of Mandali tirtha in Shimoga district were located in the following places.

<table>
<thead>
<tr>
<th>Near Mandali Hill</th>
<th>Wet-land 3 matts</th>
<th>Dry-land 6 matts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ardratali</td>
<td>1 &quot;</td>
<td>2 &quot;</td>
</tr>
<tr>
<td>Siriyur</td>
<td>1 &quot;</td>
<td>2 &quot;</td>
</tr>
<tr>
<td>Harlahere</td>
<td>1 &quot;</td>
<td>2 &quot;</td>
</tr>
<tr>
<td>Hegging's</td>
<td>2 &quot;</td>
<td>1 &quot;</td>
</tr>
</tbody>
</table>

How agraharas could contribute to fragmentation becomes clear from an inscription of 1198, which states, that the lands given to 67 Brahmins were situated in at least 4 villages. A second instance from Belgavatti relates to land distribution between 22 Brahmins who secured 30 Kambhas each, under Hossagere. Some of them got 10 Kambhas each, or even 5 Kambhas in other places.

1. E 0, VII, Sh. No. 4. For similar instances see ibid., Cl. No. 61 and No. 73; ibid., Ht. 108; (note the very small plots granted - varying from 4 Kambhas to 15 Kambhas); ibid., No. 78; E 0, V(1), Ak. No. 142, P. 333 (Text)(1), P. 142 (Trans); E I, XXVIII, No. 18; S I I, XX, No. 232, P. 276-298.
2. E 0, VII(1), Sh. No. 117, P. 84 (trans), P. 214, ff., (Text).
3. E 0, VII(1), Ht. No. 45, P. 300 (Text).
4. E 0, XV, Ak. No. 217, P. 29 (Text); see E 0, XI, TH. No. 27, P. 72-73; S I I, IX(1), No. 174.
The examination of the other record of 1232 (E.C. XV, Ak. No. 217), from Bendekere also shows how land-sale also can lead to fragmentation. Plots, found in different areas came to be sold in the same fragmented situation.

By way of conclusion, it can be said that

(a) lands stood subdivided and fragmented in spite of agreements and restrictions sometimes to the contrary;

(b) inheritance and succession lands, the non-regulated manner in which gifts to individuals and temples were made, and the land-sales, sometimes, to make such a gift, helped to bring about subdivision and fragmentation.

2. Land or Soil types

Broadly speaking, lands could be classified as under:

(a) wet

(b) dry

(c) garden and

(d) other types of land, under which, may be included forests, grasslands and waste lands.
Similarly, soils varied from barren and brackish to fertile-red, black-pebble and sandy-soils. Each type of land or soil can now be studied with reference to varieties and regional distribution.

(a) Gadde or Wet-lands

Varieties:

Some of the varieties of paddy-fields or gadde found mentioned in the inscriptions are the following:

1. (i) Kërągradde
2. (ii) Hüıngadde
3. (iii) Mırmanı or Mırına
4. (iv) Mıssidde manı or gadde
5. (v) Guıya bıvalıı gadde
6. (vi) Manalı Kadalu Sasara gadde

1. E C, I, No. 32, P. 88 (Text), Këră here means hard where thick variety of rice is grown as in coastal-tracts of North Kannara. Its equivalent in Tamil is Părăngalani, the word Părănan derived from Părăl or rock - E C, 68, P. 177.

2. It may really mean flower-garden because sometimes the word gadde is used indiscriminately.

3. E C, IV(11), M. No. 20, ibid., M. No. 100, P. 818 (Text), P. 79 (Trans). It means paddy-fields or wet-lands.


5. E C, V(11), Ak. No. 74-75.

6. ibid., No. 38 and 39, P. 44-51 (Text), (1), P. 146 (Trans). The word manalu stands for sandy and kadalu for a place where people are transported across a river.
1. R G. V(iii), Bl. No. 171, P. 297 (Text), P. 100 (Trans).
2. R G. V(iii), Ak. No. 106. Mäyinagadde again stands for mango-grove or garden and not wet lands. Or in some cases, there are mango-groves interspersed with or by paddy-fields. The mango trees are planted along the borders. It may refer to such areas as well.
3. ibid., No. 109. Reclaimed or replenished land.
4. ibid., No. 146. According to Kittel, it stands for rice land above the level of valley that is to be watered and produces a crop of luxuriant growth.
5. R G. V(ii), Ak. No. 11. It may refer to wet-land mixed with lime and etc.
6. ibid., No. 34.
7. ibid., No. 16.
8. ibid., No. 39. 'Sandy'.
11. ibid., Ak. No. 56.
12. ibid., No. 58.
13. R G. V. Tr. No. 23, P. 468 (Text).
14. R G. V. Tr. No. 54, P. 56. Here 'grey' means dark soil or dark red or dark brown, dusty, or soil of dark colour meant for growth of paddy.
Distribution: - While some of the above-mentioned types of "set-land are rare, found mentioned in the inscriptions of some regions only, the others are quite common. For instance, Kāruva gadde is found to have existed commonly in districts of Coorg, Hassan, Kadur and North Kanara.

1. S I I, XV, No. 74, P. 104-105.
2. E I, XIV, No. 154, P. 251-278 - ground suitable for cultivation.
4. E I, XIII, No. 38, Pp. 157-165. Similar to Kāruva gadde, it refers to set-lands where certain trees of jackfruits are planted.
5. Ibid.,
6. Ibid.,
7. Ibid.,
9. Rice sown in May-June ripening in December-January - a white rice grown in deep water.
11. M A R, 1941, No. 9, P. 141 (Br); E C, V(11), Hn. No. 89-90, P. 80, fr., - because of salt water tank there.
Similarly, such varieties as *Batta* (paddy) and *Neemarnapu gadde* (wet lands) are noticed, generally, to have spread over the districts of Mysore, Hassan, Kadur, Bangalore, Shimoga, Chitradurga and Tumkur. So also, this variety is referred to in the records of the districts of Bellary, Raichur, Bijapur, Dharwar and Belgaum.

Sandy-soil, suitable for paddy cultivation is noticed in the inscriptions from some parts of Hassan, Kadur, Shimoga, Chitradurga, and Bellary districts.

*Melumakki gadde* (wet lands on the slopes of the valley) finds frequent mention in the records of Hassan, Kadur and Bellary regions. The other types are found to be more or less localised and confined to particular regions as follows:

1. Gundalpet (e.g., IV, Ch. 14); Yelmadur (ibid., VI, 61) and Bagamangala (ibid., VI, 62).
2. Chamarayapatna (e.g., V, 8(1), Ch. 28) — *uktiniśītavāti māduva gadde*.
3. Kadur (e.g., VI, Ch. No. 60, P. 58-59).
4. Nelamangala (e.g., IX, Ch. No. 67); Anakal (ibid., An. No. 68).
5. Shikaripur, Komalli and Chamarajapura taluks.
6. Areakere and Chamarayapatna.
7. Kaḍur and Tarikere.
8. Komalli.
10. Belur, Chamarayapatna and Hassan.

11. See for cross-references Supra under varieties. There are other rarer types mentioned such as *Kadubana gadde, Nāsārin gadde, Dārīvya gadde, Chintāmani gadde* and *Bārīvya gadde*. 
(i) Gudiyar bhejly gadde - Hassan (Arakere)
(ii) Tidalisda gadde - "
(iii) Halubina gadde - Hassan & Kadur
(iv) Bawina gadde - Hassan
(v) Tidalisda gadde - "
(vi) Sompharelu gadde - "
(vi) Kodangi gadde - "
(vii) Madingi gadde - "
(ix) Adana gadde - " (Belur)
(x) Kala gadde - " (Hassan)
(xi) Hade gadde - " ( )
(xii) Bajju Maktiya gadde - Hassan (Mn)
(xiii) Holi Harelu gadde - Kadur
(xiv) Kreyu gadde - Tumkur
(xv) Kettu gadde - Bellary
(xvi) Karuva gadde - Bijapur
(xvii) Nebgadde - Dharwar
(xviii) Kolasina gadde )
( Kappase gadde )
( Birkalu gadde )
( Kaluva gadde )

North Kanara
Varieties: 1
1. Moge beddalu mattaru (dry-land by irrigation)
2. Karala beddalu
3. Soorpu beddalu
4. Eyaya Keri mattaru (black-soil)
5. Kari nele (black-soil)
6. Tekilu mattaru (unploughed land)
7. Kadu mattaru (brackish or marine)
8. Haile Kellu muda vela (dry-land unsuitable for cultivation)
9. Kisu mattaru (red or dark-red soil)
10. Menala pore (sandy or gravel)
11. Haralu mattaru (pebble or stone)
12. Hakkalu mattaru
13. Bede gadda (dry-lands temporarily used as wet-lands)
Distribution: Dry-land or Beddalu proper is found to be common in most parts of Karnataka. References are made to such lands in the inscriptions coming from the districts of Coorg, Mysore, Hassan, Kadur, Shimoga, Kolar, Bengaluru, Chitradurga, Tumkur and Bellary.

Similarly, Srovanabelgola records repeat.

The other types of dry-land are found either scattered or confined to particular regions. To state them in order:

(1) Noge Beddalu Matter - Shimoga (Honnalli), Beliary, Bijapur

(11) Korela Beddalu - Hassan (Arsikere)

1. Actually some parts of the region came to be named after such soil - Kisu Kady.

2. E.G., I, No. 22.
3. Nsg-nangala (E.G., IV, Ng. No. 20)
4. Hassan (E.G., V, Bn. 3 and 55)
5. Belur (Ibid., Bl. 176)
   Arskere (Ibid., Ak. 1, 9, 14, 16, 34)
6. Shimoga (E.G., VII, Sh. No. 99)
   Shikarpur (Ibid., Sh. No. 292)
   Honnalli (Ibid., Sh. No. 14)
   Chattagiri (Ibid., Sh. No. 52)
7. E.G., X, Sh. No. 10 and 41.
8. E.G., IX, Sh. No. 10, P. 7 ff., Text.
9. E.G., XI, Sh. No. 51, P. 142-4
10. Tiptur (E.G., XII, Tp. No. 158)
    Gabbi (Ibid., Sh. No. 51)
11. E.G., II, No. 355, P. 142-4
12. E.G., VII(i), Sh. No. 25
13. S I I, IX(i), No. 96.
14. S I I, XX, No. 500
15. E.G., XV, Ak. No. 217
(iii) Savya Beddalu - Hassan (Arakkere)

(iv) Ereyar Kaai matar

Ereyar Ranti or

Ereyar Beddalu

Haasan (Arslkerej

(Ghannaryatna),

Shimoga (connnal),

Chitrudurg, Tumkur,

Bollary, Bijapur,

Belgaum.

(v) Karpinda - Shimoga (S), Bollary, Salchur,

(Lingasur and Kalaugi), Bijapur

and Dharwar (Ron).

(vi) Tekkilur Kattar - Bollary and parts of

North-west Mysore.

(vii) Soula matter - Bollary.

(viii) Raja Kaliu Mudevola - Bollary.

(ix) Kisa matter - Bollary.

(x) Manjalpore - Kadur (Tarakere and Kadur) and

Bollary.

(xi) Hakkala matter - Parts of North-west Mysore

and Shimoga.

1. E C, XV, Ak. No. 34.
3. E C, VII(I), H1. No. 25, P. 379 (Text).
4. E C, XI, Og. No. 6/; ibid., Dg. No. 61.
5. E C, XII, Tg. No. 128.
6. S I I, XX, No. 300.
7. E C, XII(I), Sk. No. 123, P. 91 (Trans), P. 22f ff.,

(Text).
8. E I, XXX(I), No. 2.
10. S I I, XV, No. 12, P. 10-11.
11. E I, XIV, No. 19A.
12. Ibid.
13. Ibid.
14. Ibid.
16. E I, XIV, No. 19A.
The question of various plantation or garden-crops will be taken up and studied under the section on crops. But here it is sufficient to notice the regional distribution of gardens. Grants of garden-lands are available from almost every part of Karnataka. As seen below, gardens seemed to be a normal feature of almost every district of South-East, South-west, Central-South and central-western parts of Mysore (i.e., Zone IV).

2. E C, IV(ii), Hs. No. 95, P.92.
3. Ibid., Gd. No. 79
4. Ibid., Hg. No. 100, P.218 (Text)
6. E C, XV, Ak. No. 217. The phrase used is "mavina-gond".
8. Ibid., No. 3, P. 4 (Text).
9. E C., VI, Ed. No. 66, P. 60 (Text); P. 12 (Trans); also see Ibid., No. 96, P. 97 (Text).
10. Ibid., Tr. No. 85, P. 468 (Text) "Malumukkipéta".
11. Ibid., Cm. No. 104, P. 49 (Trans).
12. E C., VII(1)F No.20(a), 125, 134 and 137.
13. Ibid., Hl. Nos. 5, 66 and 115.
15. Ibid., Cl. Nos. 38, 58, 52 and 61.
16. Ibid., Sh. No. 97.
(vi) Kolar - Kolar
(vii) Chitradurga - Davanagere
(viii) Tumkur - Tiptur

Even in the remaining Zones, the districts of Belligar, Bijapur, Dharwar and Belgaum (particularly Saundatti) are noticed to be equally known for gardens.

(d) Other types :-

(1) Forests -

Varieties -

Forest-lands, have been variously, referred to in the inscriptions, as kāḍu, vena, kadubu and so on. These may mean forests of natural growth which yielded only forest products, or areas where shrubs only grew, but where cultivation, either of dry or garden-crops was occasionally carried on. Thus for example, we have "Kummari nēlē" or lands which at one

1. F.C, X(1), Kl. No. 124(a), P. 46.
4. S I, XIV, No. 19A.
time were forests, but reclaimed for cultivation only for
two years by cutting down the forests. Similarly, there
are Takkilu (unploughed) lands, were a kind of shrub
or tree grew. But, as the records mention the grant of
such lands, evidently they were taken up for cultivation.

References to Kismokdu meant red forest-land consisting
of wild forest, subsequently, cut down and brought under
cultivation. Notices to forests, which varied from tall
trees to shrubs, can be classified as under:

(I) Kāmu or natural forests
(II) Bandanavana or pleasure-grove
(III) Pombalākādu
(IV) Kummari or Kamari land
(V) Vrindāvana
(VI) Kangādu and etc.

Distribution: Natural forests were a

nature: feature, for the inscriptions make a frequent
mention and describe elaborately innumerable trees and
plants, considered elsewhere (see under crops). We hear
of such forests from the districts of Mysore, Hassan,
Shimoga and Bengalore. The region-wise distribution of
other categories of forest lands is as follows:

1. A large shrub - Clossodendron phialoides
2. Sesbania aegyptiaca rara
3. E.C. III(1), Md. 70
4. E.C. V(1), Bl. No. 86
5. E.C. VII(1), Sk. No. 76; ibid., Cl. No. 21 - speaks
of terrible forests; ibid., Sk. No. 317;
(i) Nandanavana - Mysore (Gundalpet), Shimoga
(Honnali and Channagiri), Bellary and Bijapur.

(ii) Sunwari - Hassan (Belur and Aralikere).

(iii) Pombalakadu - Mysore (H.D.Kote)

(iv) Vrindavana

Tejivana - Hassan (Belur and Hassan)

Deviavana and Shimoga.

Pugavana

(v) Kondadi or Kisukadu - Kadur (Kadur and Tarikere), Chitradurga
(Navanegere and Chitradurga), Raichur, Bijapur and Dharwar.

1. R.C., IV(ii), Ch. No. 64.
2. R.O., VII(i), Sk. No. 108, P. 80 ff., Ibid., Ch. No.61.
4. R.O., V(ii), Ak. No. 79, P. 441 (Text); Ibid., No. 1, P. 350 (Text); Ibid., Bl. No. 137.
5. R.C., IV(ii), Hg. No. 100.
6. R.C., V(ii), Bl. No. 155; Ibid., En. No. 55.
8. R.C., XI, Od. No. 36; Ibid., Dg. No. 61.
9. E.I., XXX(i), No. 2.
10. S.I.I., XV, No. 68.
Waste-lands:

References are found made to a number of other types of land whose names end with phrases such as the following:

(i) bayalu
(ii) Kaju
(iii) Paju
(iv) Haju (either prefixed or suffixed) and (v) Maduva

Regarding the appearance of bayalu, we hear of areliya haju bayalu, Manaliya bayalu, Kaja bayalu, Brähmanara bayalu and Haraju bayalu from inscriptions of Hassan district. Similarly, inscriptions of Shimoga district refer to Taliya bayalu, Pulieya bayalu and Hiriya Sampigeya bayalu. Records from Chitradurga speak of Mannla bayalu, Hattiya bayalu and Ponna bayalu.

From a close study of the above usages, it appears that

1. E C, VII(i), Ak. No. 118.
2. Ibid., No. 100.
4. E C, VII(i), Ak. No. 71.
6. R C, VII(i), Sk No. 114.
7. Ibid., No. 134.
8. E C, VIII(ii), Sb No. 86.
10. Ibid.,
11. Ibid., No. 165.
a bayalu stood for a plain land used for various purposes such as pasture growth, plantation-crops, cotton, flowers and thick varieties of paddy. Sometimes the soil content was either sandy or strewn with pobbles.

3 Kaduho, the next type of waste land, is a word generally associated with names of lands from Hassan district, such as Mulligana Kaduho and Manapalya Kaduho. Similarly, there are references to Dëvina Kaduho and Nërîla Kaduho in the inscriptions of Kadur and Tumkur districts respectively.

Bagu, such as Araliya bagu, Mullu m bagu, Akupi- seya bagu, found mention in the inscriptions of Bellary district and Târiya bagu from those of Hassan district, illustrate the use to which these lands were put. The word Bagu, which invariably stands for un cultivable lands, is found associated with Elyuda bagu and Këndalira Bagu, in the records of Hassan district while the inscriptions

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1. According to Fleet, Bailur bayalu refers to a kind of rice-land in South Kanara, i.e., the lower part of the valley, watered by small streams from where canals are dug to convey water to the fields which by this irrigation are able to grow annually two crops. - See I.A. IV, S & C Ins. No. I, Fp. 179-181.

2. For pasture-land, the terms used are Hulamani Këvalu (E.G., XI, Cl. No. 35), Mullu vala (Bharwar) and Hul Hësage (Belgum).

3. See Murthy, K S S A, P. 567 fn. 40, for the meaning of the term Kaquhu or Kaduho. According to him, it stands for a place where people cross a river by means of barges. It cannot be said with certainty whether the word can be used in the same sense here. It is quite possible here that the word Kaduho is derived from Këdu.
of Kadur, Chitradurga and Bellary districts speak of Haleya Hāle Keyl (old wasteland), Hāle keyiøre mattaru and Hāle kallu múge vōla respectively.

We also hear of Kallattiya maduvu, Banjaru or barren-land, Huliyare mattaru, Kanneya mattaru and Tuyyalu mattaru.

3: Agricultural production:

It is planned to consider here such problems as the following:

- A. Agricultural practices
- B. Situation of agricultural lands
- C. Yield
- D. Imposts
- E. Enemies of agriculture
- F. Reclamation
- G. Livestock.

and used in a general sense to mean a forest or waste land.

5(e). E C, VI, K2, No. 117.
7. E C, V(11), Ak. No. 34.
8. Ibid., No. 109.
9. Ibid., No. 1.
2. E C, XI, Od. No. 64.
5. Acidity or Sourness.
7. Cultivated moist land.
At the outset, it should be mentioned that, while the inscriptions do not throw adequate light on some of the issues, a number of literary works of the period written by eminent poets who lived in the region of Karnataka, have been found quite useful in preparing this section.

A. Agricultural practices:

That the people of Karnataka were familiar with a number of agricultural practices becomes clear from a perusal of two important Kannada works, Lokāpakāra and Ratnacatāma. The former, written by Chāvundarāya, in 1025, and the latter by Ratnā, in about 1300, incorporated some of the practices, prevalent then and as revealed in some of the inscriptions. They served as very important guide to prospective agriculturists, more so, because the authors were natives of Karnataka. Ratnā hailed from Talakād, and Chāvundarāya belonged to Mudgal. It is proposed to summarise below some of the agricultural practices followed by the people based on the inscriptions and the writings of the above-mentioned authors.

(1) Sizing, Levelling and etc.-

The Kōkātnār inscription of Yādava Singhaṇa, dated 1335, speaks of a grant of land after making it even on various sides, by excluding ten (tappadi - perhaps wrong surveying) measures of land. It is therefore

evident, that for purposes of cultivation, the lands or plots were reduced to a uniform size and shape. Again, as the lands were not generally enclosed or fenced and open-field system existed, the paddy-fields were marked out by ridges or ēru, to distinguish one plot from the other.

Especially in areas, where tank irrigation was followed, levelling of the ground was invariably done before a tank was newly established or sluice fixed, to enable the easy flow of water to lands situated below. In some cases, where water had to be secured from a nearby river, evidently, at a lower level than that of the land, the problem was solved by digging wells, as clear from an inscription of Shimoga district. Areas depending on tank irrigation had to face also the problem of submerging of lands or flooding of standing crop, as evident from some of the inscriptions. Sometimes, the parties agreed to have such areas exchanged for lands elsewhere, especially when new channels were made.

1. See Pulkuri Somanath, Sōmaśāvaru Setuka, Bangalore, 1949, P. 14, St. 29 - "bēli holamallam mēdode" (i.e., if the fencing eats away the crops of the field).
2. P I, V, No. 3A, Pp. 9-23. Fleet translates 'bittēru' as ridge. Ēru as distinguished from tagga or hāllē means raised area and all around the plots such ridges were laid. Besides preventing lands from being eroded away, such ridges helped proper distribution and retention of water quite necessary for paddy-fields. Ridges were also there for dry lands. Even now, in our country this practice is common.
It is common knowledge that a successful agriculturist is one who can have at his finger-tips weather intelligence. The importance of rains to crops is brought out by the author of Rattamarah thus:

"adarim dhânyachayam belevudanarivođe
maleyanaridu pâlâvudu mattam".

Again, the fact that, when the earth is broken up by penetrating rays of the Sun, it is rainfall which provides a cool atmosphere, necessary for the growth of crops, is represented thus:

"Kharakarana tâpadindam dharanitalam bâde
bîptu tâpadolam bör saredu male kale (gu) yê vishvam
bhare belagum manâke banda dhânya vrajanam ..."

3. E C, X(1), St. No. 30, P. 248. A second instance from the same area refers to two tanks, one of which, pallavakettu still exists in ruins. The construction appears to have been made by levelling the garden - E C, V, No. 25, Pp. 206-208.

4. E C, VII(i), H. No. 87, P. 175.

5. E C, IV(ii), Ng. No. 48; See also E C, V(ii), Bl.No.154.

1. Rattasimha, Rottamatom, Madras 1950, P. 5, St. 30. Also see Yayassena, Dharmaritañ, I, P.10 st. 46: "maleyam para dhañkârâna" (i.e., will the land yield by mere fed water without rain); (maleyam pârva okkaligânta) (i.e., like an agriculturist who anticipates rain) - ibid., P. 32, passage 160.

2. Rattasimha, Rottamatom, P. 5, St. 32.
The people, by themselves or with the help of learned men in the locality, used to make a forecast of rains-coming, the intensity and so on. Though one may regard these methods as crude and unscientific, reference is found made to वायु चakra or weather forecast device which consisted a piece of cloth of particular dimensions to be tied to a stick as banner and firmly implanted on earth, with whose help rain could be forecast, by studying the direction from which the wind blows. It seems from a study of inscriptions that crops were raised with the help of tanks, wells and rivers.

(iii) Crop forecast:

Hingāru and Mungāru or Sabi and Kariff crop forecasts were made as scientifically as one could imagine. Similarly, it was believed that if certain trees like banyan, baco, ippe, neril, cashew and etc., blossom and put forth in abundance, flowers and fruits, corresponding increase in the yield of certain crops like rice, grams, wheat, till-seeds, pulses, and jawar crops could be anticipated.

1. ibid., See stanzas 37 to 44 for the way in which intelligent or learned men could forecast rain by studying the attributes of the messenger seeking information, the spot of enquiry and his physical movements. So also, by the behaviour of nature and the animal world.

2. See ibid., stanza 1, page 46 for the text. See also stanzas 2 to 8 and further for other methods.

3. S I I, XIII(1), 47; S I I, XX, No. 55; S I I, XV, No. 201; K I, II, No. 20; E G, XII, Tp. No. 2.

4. Rachamadhav, P. 15, St. 18.
It seems clear from inscriptions that two crops were raised and during the time of cropping, a strict watch was kept by having a watchman for whom a watch-house was provided.

(iv) Sowing:

Seeds were sown at proper times according to astronomical calculations. Certain stars, such as hāste, pushya, makha, revati, uttara, mūla, viśāke and anirūda were considered as best for sowing crops while shravāna, dhanishtha, satabisha, ṣādhviṇi, agunvarvasu and madhyaṣa and bharani, kvirikke and chitte as inferior. The last group, if utilised for sowing crops, may lead to their destruction by wild animals; or crops, get deceased, pilfered or burnt, according as the star, in which they are sown. There were particular stars considered good for sowing particular seeds. It was also necessary to perform what was called kuriga pūja before actually preparing the soil for sowing. According to Lōkāpākara, seeds, which have fallen from the fruits of their own accord, are considered most suitable for sowing. They are to be sown after a long processing in the

5. ibid., P. 14, Sts. 10 to 20.
7. E O, V, Bl. No. 140; E O, XI, Dg. No. 11
8. Retnamatam, Chapter 9, P. 90, Sts. 22 and 23; see Lōkāpa-
9. kara, P. 86, St. 2.
10. ibid., P. 88, St. 11.
11. ibid., Sts. 7 to 10.
12. ibid., P. 89, Sts. 31-32-33
13. ibid., Ps. 47, St. 25, 26
14. ibid., Ps. 47, St. 6 and 7
fields are ready manured for the purpose, and on auspicious days. Literary references are found to the use of a kind of plank called for ploughing and sometimes human labour was drafted for drawing the plough. Another passage from the same work explains the process adopted for preparing the land for sowing, as follows:

"bhūmiyamattu kaaśman kaledu bithi běliyanikki"

Also, proper sowing hinted at into phrase, "pedanaridu bittida bela". Some of the inscriptions of the time referred to ploughing and sowing of lands with seeds and seedlings of garden-crops and etc.

(v) Protection :

Next to sowing, nursing, watering and protection of plants against pests, were receiving their proper attention. Watering every summer evening and in other seasons proportionately, removing of grass and other weeds, protecting the young plants against hailstorms, thunder, heat, fire, worms and crows and damages to twigs and etc., during the very first year, for which a procedure, laid

1. ibid., P. 85, St. 3.
2. ibid., P. 6, ff., St. 5-11.
3. Rāghavānka Harischandrakārya, P. 114, St. 13.
4. Dhammārītām, I, P. 76, pa. 146, "āgaṅglu uḷuvātange nāgālaṃ kottarambante".
5. ibid., P. 313, pa. 75.
6. ibid., II, P. 71, pa. 48. ibid., II, P. 106, pa. 180, regarding the back last wet crops were grown in muddy lands and dry crops in plains.
down, constitute a very important aspect of nursing. The
farmers were accustomed to attend to their lands from
morning till evening. Wood was carried to them by
women-folk in the noon.

(vi) Transplantation:

Transplantation was known and practised.
Lōkōpākāra specifies different seasons for transplanting.
Thus, if the tree is just blossoming, hēmonta (mārgaśīra
and pusya), tree with flowers and fruits in varṣākāra
(urāvāra and bhāḍrapada) and tender trees, got up by
sowing, in sisirā (māgha and phalguna), are to be trans­
planted by uprooting them according to a specified proce­
ss and after worshipping them.

(vii) Productivity:

The luxurious growth of plants was ensured
by the application of certain compounds to the roots of
the plants composed of animal-fat, honey and etc. Some­
times, by a special procedure plants could be made to
yield quality products. Fruit trees and plants such as

7. B.C, IV(11), Ng. No. 15; B.C, IX, Cm. No. 33; E. I.XX, No. 21;
Pm. 328-334; S.I.I, IX(1), No. 107; B.C, VI, Tr. No.16;
B.C, XV, Ak. No. 510; B.C, V, Bl. No.155; E. O, IV;
Hs. No. 93.
8. Lōkōpākāra, P. 87, St. 8.
1. Ibid., P. 87, Sts. 9 to 16.
mangoes, plantains, jack, coconuts, oranges, pomegranates, and grapes may be made to yield fruits of big and tasty varieties. Also, in the case of those which are barren, they could be made to bear fruits in abundance, as also seedless ones.

Even as in the case of fruits, flowers of newer variety were produced in abundance by cross-fertilisation or by hybridising, such as nāgasampige, sampige, kēdage, meliga, jėji and etc. The colour of red ḍāsavāla flower could be changed to white or plants producing flowers of bad smell, to give sweet-smelling ones, by a special procedure. It was believed that if boole ladies touched the plants with their feet, the plants would bear flowers.

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2. See Dharmarātam II, P. 241-42, Pa.129. Sometimes due to rains, passages became muddy and cut off communications making it difficult to carry food at the proper time.
3. Loko, P. 90, St. 17; see ibid., St. 18 for procedure.
4. Loko, P. 90, St. 19.
1. ibid., P. 92, Sts. 25 to 27 for making trees yield sweet and aromatic mangoes.
2. ibid., P. 92, Sts. 28-30
3. ibid., St. 31.
4. ibid., St. 32.
5. ibid., St. 33.
6. ibid., Sts. 34-35.
7. ibid., P. 98, St. 53.
8. ibid., P. 95, St. 39.
9. ibid., P. 96, St. 44, & 99, St. 56.
10. ibid., P. 98, St. 44.
11. ibid., St. 45.
12. ibid., P. 97, St. 47.
13. ibid., St. 48.
14. ibid., St. 49.
15. ibid., Sts. 50 and 51.
16. such as ketaka, aśoka, vakula, punnāga and champaka. see ibid., P. 96, St. 42.
Similarly, the variety of vegetable-yield itself could be changed by a special procedure. Certain plants could be made to yield at all seasons. It was also possible to interchange the smell of flowers.

(viii) Grafting:

Particularly for growing better and finer varieties of fruits and vegetables, the procedure of grafting was recommended and followed. Thus, branches of any two trees of different varieties or seeds brought together could give different fruits afterwards, though they grew as one. So also branches of pomegranate trees, jack, neri, asoka as also twigs of pādri, jasmine and seedlings of plantain, if cut and planted will grow and yield fruits. So also, the roots of water lilies like kumudā and Kamaś, if cut and joined, the same branch will yield both flowers.

(ix) Prohibition:

The planting of certain trees, such as margosa, tamarind, tāra, mango, thorny-plants, arali, atti, plī, kelli and jack, near the houses was prohibited. They were regarded as griha sālyas. They were to be grown in temple-yards only.

1. Loko., P. 98, St. 55.
2. ibid., P. 99, St. 57.
3. ibid., P. 91, St. 22.
4. ibid., St. 21.
5. ibid., P. 50, St. 9.
(x) Processing and marketing of crops:—

References in the inscriptions to kalavatta or threshing-floor show that, after harvesting, grains were separated from hay by the usual method, as is adopted today. Human labour as well as bullocks were employed for the purpose. Grains were stored in the granaries or warehouses, constructed for the purpose and hay stacked on the lands. Granaries were located far away from the fields, either in antha or temples to which they have to be carried in carts, sometimes under escort. Grains were also carried to the fairs and sold there.

B. Situation:—

The lands were generally situated below the tanks. They were either gardens, wet or dry-lands. Sometimes, they were on either side or along the channel leading from the sluice (tubu) of the tank, the tanks having sluices on all the sides. Sometimes, wet-lands were situated at the very end of the flow from the tank's sluice.

1. E.O. V(i), Sk. No. 141
2. E.O. X(i), E1. No. 149(a)
3. S.I., XXI, No. 2; E.O. IV(ii), E.g. No. 70
4. E.O. VIII, Sb. No. 502. The transport of grains was risky. Sometimes, waylaid and robbed. See also progress of karnada research in Bombay State (EM47-52), P. 6.
Though there is no way of assessing the actual yield per unit of land, at least two crops were raised—summer and winter crops. No wastage was allowed either in the yield or processed products except under severe penalty. References are made to standing crops and to lands, fertile to produce all manner of fruits, extensively. At the same time, fears have also been expressed about the nature of the yield and the owners' or governments' shares fixed were conditional. The farmers were expected to remit shares depending upon the situation.

If, under famine conditions, they grew the crops, they

5. E.C., XIV, Md. No. Th. 78, P. 221; a.C., IX, Kn. No. o.; S.I.I., XX, No. 175. Either at the point of lifting or delivery, certain deductions, such as, damagolage, pungolage or jikageolage were made. See E.C., IV, Ch. No. 65.


9. ibid., E.C., XII, Ok. No. 16—"hiriya kereya nudama kodi yim veduvulu beddalu"; E.C., XI, Dg. No. 84; ibid., No. 90; "hiriya kereya paduvagodiya chikka tubina modala gadde"—E.C., V(11), Ak. No. 106.

10. E.C., XI, Dg. No. 77—"hiriya kereya tenkana tubina tudiyu gadde".

1. E.C., IX, Nl. No. 5—"animulam"; E.C., III(1), Th. No. 48; E.C., X, Kl. No. 28 —"karti gai".


3. E.C., VII(1), Sk. No. 10.
could proportionately reduce payments. Under conditions of prosperity they were expected to make correspondingly larger remittances. The sowing-capacity of land, generally given in inscriptions, either in terms of kolaga or kanduga, help us in having some rough idea about production.

D. Imposts:

A perusal of the list of taxes will clearly show that the agriculturists had to pay one tax or the other, right from sowing to harvesting, and marketing of produce, including the one on his livestock. Though all these taxes were not imposed all at once, or in one place, it was almost a real burden for him to tolerate. A second thought on these will show that from an economic point of view, the levy of water-rate and tax on produce from irrigated land or bitthu vatta was reasonable. For, besides maintaining the existing tanks in a good condition, the need for excavating new ones or widening the present ones has to be met, naturally, by the producer.

2. An acre of land, it is learnt, with a sowing-capacity up to 4 kolagas of paddy can produce 150 to 240 kolagas. As regards kanduga, however, there is no definiteness about its capacity. In some areas it stands for about 50 kolagas while in others it is equal to 1,200 kolagas. If a kanduga is understood in the sense of productive capacity, 5 to 8 acres of land can produce about 1 kanduga (1,200 kolagas). If it is understood in the sense of sowing capacity, the land required to sow one kanduga will be about 500 acres. It is highly improbable that such large land-grants were ever made individually.
or cultivator to a certain extent, as it improves his condition. Otherwise, it would be difficult even to imagine the existence of so many thousands of tanks and that too, in a fairly good condition, during the period. While making full allowance for philanthropic motives of the people which impelled them to make grants to tanks, an imposition like those discussed above was justified. Similarly, a river-toll or transit duty on carts of paddy was proper because there was the question of safeguarding public highways, and in the case of the rivers, the King's Government provided the required boats and canoes. But taxes on fodder, grazing, manuś-pits, bullocks, bulls, buffaloes, cattleshed and cow, forced-labour and etc., by no stretch of imagination, could find justification except that they added to King's revenue. Those were the basic requirements for an agriculturist to carry on proper cultivation and to improve the position of land and of himself. For instance, a good bull, cow, or buffalo was evidently an asset, to bring out better strains of cattle or to take to dairy farming on sound and economic lands. It is quite possible that these were nominal dues and not heavy impositions. Similarly, the taxes on paddy-fields and gardens caused considerable hardship to the agriculturists.

3. For a detailed list of taxes and imposts see annexure to the chapter on taxation (V).

4. For correct meaning of the term see Supra Chapter II, subsection on forms of tenure.
Besides the above things, agriculture suffered seriously from other handicaps. There are some records which throw light on this aspect of the question. Excluding political aggrandisement which involved crossing and recrossing of boundaries resulting in considerable damage to property, nature also played its part in this act of destruction. There are references made in the inscriptions to the sad effects of climatic changes on young plants, flowers and fruits. References are found to floods in Kaveri which must have caused considerable damage to crops. Forest-fires (*kāṇūgañca), cyclones (*bhūgaṇi), thunder and lightning (*sidilu) are some of the other destructive acts of nature referred to in the literature of the time. Similarly, crop failures and damages due to invades of wild tribe and acts of God and wild beasts, such as boar, insects, birds and bandicoots were quite common. An inscription from Shimoga district refers to the fact that wild elephants enter and destroy the sugarcane plantations. Land-erosion due to floods and

1. B.C., II, No. 75; B.C., VII, Sh. No. 4. Also see Murthy, K.S.S.A., P. 357.
2. See Rāghavaṇka Hariśchandra Kāvya, P. 111 - St. 1, P. 112, St. 5.
3. B.C., V(iii), Gn. No. 170 - "daiva karate vikarabhāde".
4. See Rāghavaṇka Hariśchandra Kāvya, P. 40, Sts. 63 & 64. Also Meyersc, Dharmaśīla, K., P. 60, Fa. 71 - "kabina tōtemm nri pokkante" i.e., like a fox entering sugarcane plantation.
5. B.C., VIII, Sh. No. 175; see also Murthy, K.S.S.A., P. 365 and fn. 20.
6. B.C., VII(i), Sk., No. 123.
similar other causes, destruction caused to channels and other sources of water by regular local conflicts, as referred to in the inscriptions of the time, sum up the handicap.

F. Reclamation:

Though it would be difficult to assess the density of population on lands and to judge whether population was pressing on land, reclamation of land was a continuous process, going on in the periods. The paucity of evidence and the fact that the inscriptions make more than necessary mention of forests suggests that population was not so much pressing on lands as it is today. But the idea that the lands should not be allowed to lie fallow and kept in a continuous state of cultivation did go deep into the minds of the people. Some of the inscriptions relating to the temple lands insist on productivity. If in a particular year there was no yield, the parties concerned had to make good the temple-share. At least in the interest of carrying on continuous worship, this was done. The underlying motive for reclamation was as much religious as economic.

1. E.G., VI, Cm. No. 15.
2. E.G., VII, Sk. No. 247; E.G., VI, Cm., No. 70; E.G., V(ii) BM. No. 82; ibid., An. Nos. 34 and 42.
Karnataka did not have much erosion problem (because of the sparing references in the inscriptions also) except where the lands were situated near the riverbeds. Similarly, there was little of the problem of Khar-land or lands with saline content. Its lands were reclaimed generally by deforestation. An inscription from Soreb Taluk, Shimoga district, records that one Deveya Setti, having had a new tank built, cut down the forest under the tank and formed new rice-fields. Similarly, another Rama-krisna Devaru, also called Rama-krishna Prabhu, cleared the land, previously covered with jungle, of all trees and brought it under cultivation. For this act, he was suitably rewarded with a piece of land. It is not clear in this case whether it was turned into a paddy-field. Some of these reclamations were brought about voluntarily. An inscription from Kolar states that one Narayana reclaimed 300 Kulis of land at a place after clearing the jungle at the instance of the zamunda of the village. There are also instances of the entire village,

3. Of course, the futility of reclaiming saline land has been mentioned in one or two places. For instance, Nayeema in Dharma-ratan, points out in one of the passages, that by ploughing lands with acidity (saal) and nursing the crop in such lands with much efforts would not bring yield equal to that of fertile (are) tracts. See ibid., P.I, P. 315 passage 76 for the text.

2. N.A.R, 1936, No. 17, P. 82 (Bl).
being cleared off, of the jungle at one's own expense.
One Jayengonda Chōla gave Mudēvar, the village of Ilavān-
gali, after clearing the jungle, and building it at his
own expense. Reclamation was therefore undertaken, not
merely for cultivation but also for building villages.

One of the inscriptions from Bangalore district states
that the Superintendent of the western portion of Masandi-
neēnu, village gāmundas, and other inhabitants of the nādu,
having cleared the jungle in the tract of land adjoining
Peru - emmeru, called the ground, built a village and
constructed a tank there by removing sand and named the
village Vēchhiddēva-puram. In another instance, forests
were cut down to build tanks. Sometimes, lands which
had fallen into disuse for a long time, were also resumed
for cultivation.

(i) Dairy-farming (Live-Stock)

It is not clear whether dairy-farming was
followed seriously as a profession. But references
to such things as cowshed, goravagēri, milk and milk pro-
ducts like butter, ghee and curds (also butter-milk), as
part of offerings to God are an indication. Temples

1. E C, X(i), Mr. No. 33.
2. E C, IX, En. No. 135.
3. S I I, XI(ii), No. 158.
4. IN K E, No. 22(b).
5. S I I, XI(ii), No. 191.
7. IN K E, No. 13.
8. S I I, IX(i), No. 245.
offered an attraction and gifts to God, of variety of bulls, oxen, buffaloes and cows, neither old nor young but of good quality, were always welcome. The temples, being ideal landlords, took great care of them and did not allow them to become weak and useless. It was a part of the whole concept of gift-making that good cattle should always be given as gift and not barren ones. It was equally the responsibility of the donee to maintain and enjoy the gift. Today, we have inherited a rich but not strong bovine population. But it is doubtful whether Mediaeval Karnataka could be blamed for this sad state of affairs. Separate grazing-lands were provided in each village besides, adequate water facilities. Sufficient quantity of fodder was stocked for lean months and in the fields. A good bovine population could naturally be expected to grow out of these favourable factors. In fact, frequent mention is made of a good bull, cow or buffalo in the inscriptions, being gifted again to temples. Similarly, the fact that separate grants of 2 lands were made for maintaining cattle indicates the

9. S I I, IX(1), No. 245.
10. K I, VII(1), Sl. No. 16.
1. S I I, IX(1), No. 549 - Nallavu
2. K I, II(11), No. 16 of 1940-41. Literary references are found made to livestock, milkmaids, separate cattle sheds and the milking of cattle. See Hemachandra, Lilaavati Prabandham, Ed. by K. Venkataramappa and Jaware Goud, Mysore 1966, Ch. V, Sls. 104-106 regarding milking of cows by milkmaids, and churning of milk (ibid., Sls. 109-112). The milkmaids used to sell ghee and curds the whole day in the traditional way (ibid., Sls. 99-100).
interest by the people in livestock. Livestock was put to different uses. Besides using them for ploughing the fields and drawing water, cattle and other animals were used for transport purpose. There was also sheep rearing practised, as evident from one of the inscriptions.

4: Crops:

The varieties of crops grown and plantations made during the period under study may be classified as follows:

A. Wet
B. Garden
C. Forests
D. Dry
E. Unclassified and unnoticed

The inscriptions which refer to them frequently form the main source of study, while casual notices in the literary works of the period are either corroborative or supplementary. Though dry crops were raised, it is the other three varieties which obviously received the poet or scribe's attention constantly. Similarly, the inscriptions claim for every region the growth of almost every crop, an obvious limitation in arriving at proper conclusions, which have to remain somewhat approximate. The study will be confined to a classification and

regionwise distribution of various crops to be accompanied by a consideration of the economic importance of each one of them, to be followed by a general note on the uses to which they were put.

A. Wet Crops:

3. Paddy or Rice - Oryza Sativa (a F I)

The most frequently used variety was Gendasāli or sweet-smelling rice. An inscription from Munirābad of the 13th year of Chāluśya Vikramāditya VI refers to a superior variety of rice known as Rājaṁās aśki. Khar paddy, slightly inferior was grown on saline lands. An inscription speaks of the growth of both black and white varieties of paddy which evidently meant that people grew both superior and inferior qualities depending upon the fertility of the soil.

1. See Maheswari, P and Umrao Singh, Dictionary of Economic plants in India, Delhi 1965, and also Jain S.K., Medicinal plants, Delhi 1968, for the economic importance of different varieties of crops and plants.

2. The regional, English and technical names of each one of the crops will be first mentioned, its uses indicated by either one or more of the following symbols - M (medical), F (food), I (industrial) and A (fuel and carpentry). Explanation wherever necessary will be given in the footnotes.

3. See Maheswari, P., Dictionary, P. 116, for current use as food-crop, its straw for straw-boards, paper and mats; Rice-bran oil for soaps and cosmetics. Cf. Sōmēśwara Mānasāliśa I, Vīm. 33 Sl. 960-40 for its use as aranāha or Kanīra (made from fermentation of boiled rice) in the preparation of Khali, a kind of soap-like ointment, designed to remove grease out of the body.

Regional distribution:

The areas included in the North-west and North-east Zones of Mysore were rich in paddy-fields. Particularly of *gandhāsāḷi* variety. Some inscriptions actually speak of *sāḷī vane* or *nāṇā vidha gandhāsāḷi vane*.

Rice of (*gandhāsāḷi*) was grown in the districts of Bijapur, Dharwar, and Belgaum. The district of North Kanara in Western Zone grew varieties of rice, particularly *khēr* variety. Inscriptions from Koppal, Yezur, and Abballār (in Alandé), roughly in North-east Zone grew varieties of *gandhāsāḷi*.

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5. *H A S*, No. 5, published 1928 read with fn. 4 above, we can say that this is the same as *gandhāsāḷi*.


8. Some inscriptions merely refer to the fact that finest rice was grown — *E I*, XII, No. 32(B). Also see *E C*, IV, Kr. No. 78, P. 365 for a reference to *kādakki*, the variety of forest rice. See Rāghavānka Harishandra Kevy, P. 31, St. 53 and P. 72, St. 54 for reference to *bidirekki*, again another kind of forest rice used by hunters.

1. *E I*, XIX, 38(B) - "polanallam gandhāsāḷi prakara pari-vritam"; *E I*, XV, No. 6(C), Pp. 106-122.

2. *I H K E*, No. 17.


6. *K I*, II, No. 6 of 1940-41. Here the reference is to the fields of Nāgalāvi. Also see *E I*, XV, No. 6 (G) for paddy fields of Śēdi.


9. *E I*, XII, No. 32.

10. *E I*, V, No. 25(G) - "Adu nāṇā vidha gandhāsāḷi varādīma
See *"also *A P G A S*, No. 9, Ths. No. 13-14 - Chinna-mallī
There are a number of inscriptions from Sellary district which refer to wet crops of the region. Gandhasāli variety was again a popular kind in the district as clear from several inscriptions. For instance, Kurugōdu and Kōlūr inscriptions covered by the region of Ballakunda. So also, inscriptions from Hadagalli and Kūligi taluks speak of patches of gandhasāli crops.

Every part of IV Zone could boast of different kinds of rice, especially of gandhasāli type. Inscriptions from Berilkere, Honnavalli, Kottagere, Kaidā, Madagere, all in Tumkur district, speak of the luxuriant growth of gandhasāli. Inscriptions from Chitradurga district especially Harihar refer to paddy fields.

inscriptions, Gulbarga district; ibid., No. 18-19 Kundarki inscription of Gulbarga district; R A S, XVII, S O I (Karnata districts), No. 17 - Kendal, Lingpegar, Malhar district.

1. B I, XIV, 19A; S I I, IX, (I), No. 297.
2. ibid., No. 249.
3. ibid., Nos. 264 and 371.
4. ibid., No. 343.
5. ibid., XII, Ch. No. 11.
6. ibid., To. No. 122.
7. ibid., Eg. No. 1.
10. B O, XI, Dg. Nos. 20 and 55. Reference is made to gandhasāli of Nagerkhanda 70.
Similarly, those from Kolar and Bangalore districts contain some references to paddy, though it cannot be asserted with certainty that the districts were rich paddy-growing areas. Inscriptions from Shikarpur, Sorab and Honnali taluks of Shimoga district speak exactly of the fertile rice-growing tract of the region. For instance, Helvetti in Honnali taluk was regarded as the excellent rice-producing agrahára of the region; so also Lannagundur in Shikarpur taluk. Sorab taluk, especially Jiduválige-nád in it, with rows of rice-fields from town to town, in which were included agraháras of uddháre and Kappattur, appears to have been the granary of Banavásinád. Elsewhere, Banavásinád, besides Nágarkanda and siambulli are described as composed of "báledoppuva gandhasáli". Paddy-fields formed a part of the regions of Kadur district though gandhasáli crop is not found mentioned in the instances studied.

Bansí district, again, like Shimoga, was not merely a rich rice-growing area but also held the place of pride in so many other crops, so much so, it brought forth an interesting remark about Muttana Bósévúr, an agrahára in 7 Aresikero taluk. Again, another agrahára, Kalakatta in the
same taluk was famous for sweet-smelling rice. So was 1 Sivara equally famous. Sometimes, as in the case of Mudavadiyur, new tanks were constructed and rice-fields 2 made afresh. Talur agrahara grew the same superior 3 variety of rice. Hassan and Belur taluks, however, grew the karti variety of paddy. To summarise, every part of Hassan district, especially the taluks of Arasikere, Belur, Halebid and Chamarnayapattna grew superior and inferior varieties of rice. So also, to some extent, 4 Mysore district.

B. Garden Crops:—

Varieties:

Garden crops can be classified as under:—

(i) Fruits

(ii) Flowers

(iii) Plantations

(1) Fruits grown:—

(a) Banas, Kadali, Biplo and mocha

(Bananas or plantain), musa paradisiaca or musa sapientum (F.I.)

2. Ibid., Ak. No. 150.
3. Ibid., No. 197.
5. S I I, IX(1), No. 249.
7. See Mangaraja, Bhagavata Manidarmana, Mysore, 1942, P. 52, St. 85 for the harmful effects or poisonous qualities of bananas and removing them. The author uses the word visa in a very loose sense.
(b) Amra, Chûta, or mûkanda (Mango), Mangifera indica or Anacardiaceae, (F.I.).

(c) Kalmu or panasù, (Jack-fruit), Artocarpus integrifolia or A. heterophyllus (F.I., N).

(d) Kâlava, Kajivi or Kavale, (black-berries), Carissa carandas, (F.W.).

(e) Kânowî, (A kind of lime or bitter sour orange), (M.I.F.).

(f) Dûäma, (Pomegranates), Punica granatum or punicea, (H.I.F.).

(g) Mûril, or Mûrîly, (jambu), Eugenia jambolana. L.m or Syzygium cumini, (H.I.F.W.).

1. See Sömëswara, Mûnasölës II, S. 948 for the use of its seeds in preparing pullings, an ointment applied to the body; also Mûnarâjâ, Khagëndra, P. 31, St. 80 for the poisonous effects and remedies. See P. Mahëswari Dictionary, P. 101 for its importance.

2. See Mûnarâjâ, Khagëndra, P. 32, St. 84 for poisons due to jackfruit; also P. Mahëswari Dictionary, P. 15-16.

3. S I E, IX(1), No. 158; See P. Mahëswari Dictionary, P. 34 for its uses.

4. See Mûnarâjâ, Khagëndra, P. 35, St. 91 for the poisonous qualities of Mûnda as also for its medicinal properties, ibid., P. 50, St. 179. According to Sömëswara, Mûnasöl'asr, mûnda leaves were made use of in the manufacture of an ointment applied at the time of bath. See ibid., II, S. 936. Cf. its use today as oil, and in the manufacture of confectionary pharmaceuticals and toilet preparations - See P. Mahëswari Dictionary, P. 43.

5. See Mûnarâjâ, P. 10, St. 82 for reference to it as medicine and poisonous effects, ibid., P. 35, St. 90. See P. Mahëswari Dictionary, P. 131 for its medicinal uses and varieties.
1 (h) Karanga (Orange), Citrus, reticulata Blanco.
(synon C. nobilis Andrew), (M.I.F.)

2 (i) Kharjüre or cinda Kharjüre (date tree),
Phoenix dactylifera, (M.I.F.)

3 (j) Biea (Elephant apple), Feronia limonia, (M.I.F.)

4 (k) Dīva drākṣa (Fox-grapes), Vitis labrusca, (L)
(M.F.T.)

5 (l) Mātelungar, Citrus Medica. L (F).

6. According to Sānśāwara, the seeds and tender leaves were used in the preparation of pulīnaṇa, an ointment and in tūmbuḷa preparations - Mānasollāsa 11, St. 97e and 993. See Mangarāja Khagāṇḍra, P. 25, Pa. 40, P. 24, Sts. 45-46, P. 25, St. 47, P. 28, St. 53 & 54, P. 32, St. 81 for its toxic and anti-toxical properties. Cf. its present use - P. Maheswari Dictionary, P. 152 and Jain, Medicinal plants, No. 71, P. 138 ff.

1. According to Sānśāwara, Mānasollāsa, it was used in the preparation of sandhyā, a kind of ointment used after bath. Cf. its use as food and in the manufacture of oil, toiles and etc. - Maheswari Dictionary, P. 43.

2. See Mangarāja Khagāṇḍra, P. 130, St. 17 for its use in preparing Anjena or the ointment for the eyes. See P. Maheswari Dictionary, P. 122 for its current uses.

3. S.L., IX(1), No. 46. See Mangarāja Khagāṇḍra, P. 29, St. 68 for the use of the root in removing toxic property of abhyṭa or Mica. Cf. Jain, Medicinal plants, No. 5, p. 74-75 for its modern uses.

4. See Chevuntu Loka., P. 137, St. 10 for its use as specific for bilis. See Mangarāja Khagāṇḍra, P. 40, St. 124 for its poisonous effects.
(11) Flowers:

(a) Nūgo samāliga (a kind of champak flower),
Mesor Ferrea, (1).

(b) Nūgo Mallīge (a kind of jasmine), Abnanscenthus commutis Nees. (For decoration)

(c) Abja (lotus), Nymphaea sceulenta, N.
noobalī, N. 33alī, (1)

(d) Samāliga (Champaka), Michelia Champaka, (I.6)

(e) Mallīke, Mallīka or Mallige (jasmine),
Jasminum Smona, (I).

1. See Chāvunda. Loku., Ch. 7, P. 101, ff., for the use of various flowers in the preparation of scents, oils, ointments and etc.

2. See Sūsāvar, Mānasollāsa II, Sl. 939 for its use in preparing ointment. See also Gayamana, Mahāgarita, P. 68, St. 115. Cf. P. Māheśwari Dictionary, P. 105 for the current use.

3. See Sūsāvar, Mānasollāsa II, Sl. 939 and 986 for the use of the roots of blue lotus and its fibre, for preparing Sandhyā and other ointments.

4. See ibid., Sl. 931 and 925 for its use in the extraction of oil and ointment. See Mangarāja Khaņgānda, P. 18, St. 69 for the use of Sūrvi Champaka in removing toxic effects of snake-bites. See also Loku., (Chāvunda), P. 105, Sl. 16-17 for the preparation of Champak oil - procedure. Cf. P. Māheśwari Dictionary, P. 105-106 for its use in the manufacture of perfumes, by obtaining oil from it.

5. See Sūsāvar, Mānasollāsa II, Sl. 981, 987 and 987 for the use of Jādi, a variety of Mallige in the manufacture of oil and its seeds in the making of Sandhyā and other ointments. See also Chāvunda Loku., P. 105, St. 21 for the process in preparing Mallīka tila. Also see Mangarāja, Khaņgānda, P. 128, St. 96 for the use of Torumallige in removing toxicinic effects of snake-bites. 3 I I XX, No. 80.
(f) Ketaki, Kédage or Kédige (an ornamental shrub or small tree), Pandanus tectorius (I).

(g) Malli, (a kind of jasmine), Jasminum multiflorum, (M).

(h) Suraj, (Name of tree with fragrant-flowers), ornamental.

(i) Pádari, Stereospermum persicum, (I).

(j) Párite, (Indian coral tree), Brythrina indica, ornamental.

(k) Páta (Trumpet flower), Bignonia capreolata or P. Crisse, (I).

(l) Kába (Red Kanigole or wild Tulsi).

(m) Mándho (Sorling-flower)

1. S I L, IX(1), No. 205. See Sömáswara, Kánsidhála, Sl. 950 and 987 for the use of the flower in the making of oil and Sandhyá. See P. Maheswari Dictionary, P. 117 for similar use today.


3. Ibid., P. 150-51.

4. Ibid., P. 89.

5. See Sömáswara, Nánsödlá, Sl. 987 for the use of the flower in the making of Sandhyá. See also Chávunda, Loko., P. 105, St. 18 for Páta (Kála). Cf. P. Maheswari Dictionary, P. 22, for its current uses and varieties.
1. See Mangarāj, Khagendra, P. 143, St. 47 for its medicinal properties; see Patna Maheswarī, Dictionary, P. 100, for its current use as food and in preparing mulsāri attāvar.

2. See Sūnāswār, dānapālāsā, for its use in making scented oil and handhā. Also see Rayasāma, Usumānīmrita II, P. 165, St. 13 and Mangarāj, Khagendra, P. 132, St. 95 for its anti-toxic properties. See Hanthara, Basavaraśevarasale, P. 14, ll. 81-30. 939 &

3. See Sūnāswār, dānapālāsā II, Sl. 83c for the use of its flowers in making handhā and other cintás. See Chvunda, Lōkā, P. 101, St. 8 for the use of kāgokśāva in preparing lavender.

4. S I, XI(1), No.103. See Mahes warī Dictionary, P.112 for its use as hedge-plant.

5. See Mangarāj, Khagendra, P. 22, St. 54 for its poisonous qualities and ibid., P. 123, St. 104 for its anti-toxic properties in removing effects of snake-bite. See Patna Maheswarī, Dictionary, P. 40, for its use as wood for boat-building and its medicinal properties.
(r) Davana or Javana (fragrant leafy-shrub),
Artemisia Indica (I).

(s) Maruga (herb), Majorana Portensia Moench.
(M.F.I.)

(t) Kosagu or Karnikore (a tree commonly found),
Corospermum sacrifolium (M.I.I.)

(u) Kōrake - unidentifiable.

(v) Ādimutte or sthikuta Pusrathrum indicum

(w) Gojījē or Śventi

1. S I I, XI(i), No.108. See Chavunda, Lōko, P.108, st.27 and 28 for its use with Maruga in extracting sugandha varti tails.

2. S I I, XI(i), No.108. See P. Maheswari, Dictionary, 7, 100 and 101 for its food value and medicinal properties.

3. S I I, XI, No.80. See Mangaraja, Abhāndra, P. 124, St.112 for the reference to Ārūkarnike and its antitoxicin properties. See also Chavunda, Loko, P. 100, St. 44, for the use of its flowers in getting ghee of superior quality. Cf. P. Maheswari, Dictionary, P. 131, for its current use.

3(a) S C, VIII, Sq. 109; Pempa, Adipurāna 11, 105. C Stolz, F.P. No. 462, P. 156-57

3(b) E K, I, Port II, 155; A black-flower according to Pempa; See Herihara, Bāsvarājadāvaramāla, P. 14, 19. 21-30 for reference to Śventi.
(iii) **Plantation Crops** :-

1. (a) *Puga* (Areca), *Areca catechu*, (M.F.I.)
2. (b) *Betel-leaves*, (M.F.)
3. (c) *Levengopatti* (the bark of cinnamon), *Cinnamomum zeylanicum* Blume, (M.F.I.)
4. (d) *Kerbu* (sugar cane), *Saccharum officinarum* (F.I.)
5. (e) *Levanga* (clove), *Syzygium aromaticum*, (M.I.F.)
6. (f) *Tengu* (coconut), *Cocos nucifera*, (F.I.)

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1. See Someswara Mañcasollasa II, Tumbalavarga for details. See also Mangaraja, Khagendra, P. 50, st. 175 for its toxicin properties.

2. See Someswara Mañcasollasa II, Tumbula section, 31. 96b for reference to Nagavalli and Karpavalli, the two black and white varieties respectively. See Mangaraja, Khagendra, P. 50, st. 176 for its medicinal properties.


4. S.I.I, IX(1), No. 333; See P. Maheshwari Dictionary, P. 140 for the use of its stem for cane syrup.

5. See Someswara Mañcasollasa II, St. 938, for its use in the making of ointment applied at the time of bath. Also see Chavunda, Loko, for its use along with cinnamon Nagakosara pepper in preparing certain food-products out of curds. (See ibid., P. 131, St. 54). Cf. Jain, Medicinal plants, P. 140 for the use of its dried flowers, buds as spices and medicinally as stimulant.

6. See Chavunda Loko, P. 131, St. 4c for preparing coconut juice. See P. Maheshwari Dictionary, P. 45 for details of its use today.
1. See Manasollasa II, Sls. 971, 981 and 984 for the varied uses of camphor in the making of ungents and etc., for instance, in the preparation of Yakshakardama, Sandhyā and mlīnga and other ointments. See also Chavundu, Lōke, P. 107, St. 85 for camphor oil. Cf. Jain medicinal plants, P. 48 for its use in making oil and perfume.

2. See ibid., No. 55, P. 110. E.G., VII(11), Sa. 109.

3. See Chavunda, Lōke, P. 140, St. 20 and Mangarāja, Ahagāra, P. 80, St. 85 for its medicinal and anti-toxic properties. Cf. Jain medicinal plants, No. 24, P. 51-52 for its use in preparing colours and etc. Cf. Stein, FIP, No. 10, P 8


5. See Sōneswara, Manasollasa II, Sl. 967 & 982 for the use of its seeds in the making of Yaksha-kardama and other ointments and also see ibid., 973 and 976 in preparing Tāmbūla or betel; see also Chavunda, Lōke, P. 102, St. 10 for the use of Jājipalām (fruits) and Jājipatra (petals) in preparing scents. Cf. Maheswari, Dictionary, P. 110 for its use to-day, as spice, oil etc. Since it was so widely used, the plant was probably grown as a plantation crop in the coastal area (North Kanara) then as new.
Regionwise distribution:

(a) Northwest Zone: Inscriptions from Bijapur district speak of the growth of a number of flowers like tāvare, kosam, sampige, mallige, molle and fruits like mangoes. Another refers to vegetables such as brinjals, etc., a very rare mention. Inscriptions from Dharwar district, particularly belonging to Hangal, Lakkavalli, Gadag and Kalaghatgi taluks, as also from Dambal, Rosur and Mundargipētha refer to the existence of innumerable gardens. In most of the above areas, areca and coconuts were common.

An inscription from Dambal, Mundargipētha, speaks of the growth of many plantation crops and fruits. So also, a record of Kalghatgi. Another inscription from Mundargi refers to a number of flowers like sampige, Kōdige and musukunde (muhukunde). Of the records from

1. S I I, XX, No.80. See also I N A K, No. 17.
2. S I I, XX, No.561.
4. S I I, XVI, Pp.31-35.
5. S I I, XV, No. 73.
6. ibid., 101.
7. S I I, XV, No.87. - "tengu,kavungu, nāri nāri lu mávuna nira māranga levanga ele vāle navātali mātalunga bhūja-langali vādiyāgi". See also ibid., XI(i), No. 178.
8. S I I, XX, No.101- "pūtōtavali bāleya banadinda nörpe tengu kavungadi tu kava mohelu".
9. S I I, XI(i), No. 178.
Gadag Taluk, besides those which refer to growth of 1
mallee and fruits, Yalisirur's greatness as the centre of betel-leaves and flowers is also brought out in others.
References are also made to Kapigala, Davana and maraga in one of the inscriptions from Chinohili Kshetra, Gadag Taluk. Nombal or nambalal in Gadag Hubbarw district was known for a balanced distribution of flowers, fruits and plantation crops.

The greatness of Sogal in Belgaun district, as a place which with a forest of sāl trees, resplendent with masses of lotus, flowering-lakes of water lilies, with budding mangoes, with blossom-bearing trees named kosa, meryl, plants/śūra, aśīka and etc., is brought out by one of the Śūdi inscriptions. An inscription from Munindra-vaḷaśi refers in much greater detail to some of the fruits and flowers for which the area was rightly famous.

Töragal 300, included in Belgaun was known for its arecānut

1. S I I, X(XI), No.136.
2. ibid., No.167.
3. ibid., Part I, No.108.
4. S I I, XV, No.79 - "baladora girda kayvolada karvina tōtada pāgoṣike borpaligala pūta samūgaya kartalē-
dengina panta māvimukalikēya manta kēgāleya pokkalapota kavunginoppe ..... " For further details see S I I, XX, Nos. 45 and 571. K I, XVI, No. 26; S I I, XX, No. 118 for a description of Daunsh. See for a picture description of the grandeur of the district, Nāyasaṇā Pahāṣeṭtvarā Ṛ, p. 106.
5. S I I, XVI, No. 1 for the text. See also K I, XV, No.8 S I I, XX, No. 248, K I, I, No. 51 of 1938-40, p.71 ff.
6. See for the text, K I, 1, No.50 of 1939-40.
garden, betel creepers, groves of mango trees and plantations of egaru also called raktachandana. It will be seen from the above extracts that different districts of Northwest Zone were rich in garden-crops especially areca coconut, mango and sweet-scented flowers.

**North-East Zone** :- A number of inscriptions covered by the Kannada districts of the Zone give us an idea of the richness of those areas in flowers, fruits and other garden-crops. Inscriptions from Kukkanur, Sīswārū speak of betel-nut, sugar-cane plantations, mango, oranges and plantains grown in the districts, besides flowers. A recently-published Nimbarge inscriptions of Cūlukya Sāsēvara III, dated 1134, covering the area of Cūlbarga district brings out the richness of the place thus :-

"Jīrge karbu saṃpige valitstelavālī kavungu
tengu penk bruha ulla dalda hosmallige pārari
bāle ṭe khuja rum ... nimberge dāve urakkane-
yāgu tumagum"

**Central-North (Bellary District) :-** Inscriptions from almost every part of Bellary district speak of the richness of the area in fruits, flowers and plantation

2. Ṣ P, Top:1 Taluk, Nos 6 & 52.
3. Ṣ I, XII, No. 32B.
4. Ā P G A S, No. 9, Ins. no. 25. See also K Ā S (0 0 1 of Kannada districts) 18, Ins. no. 17 for the greatness of Kudgal, Raichur District.
crops. An inscription describing Ballalimunda 398 and in it Rolluru and Kurugodu recounts at great length the crops grown in the area. The interior of the area was known for luxuriant growth of crops. Kurugodu, particularly, was acquainted with camphor or cheemasayaka, a rare growth in the area. Madagalli taluk corresponding to Kogulimadu in Nammavadi and the agrahara of puvinaravigale could equally boast of scented-flowers (Sukanthapushpa), always blossoming areca (niranthara vesedarpa puuna yanadim) areca, cheemaka (navadinava cheemaka), the areca being of black variety. Another inscription refers to the cultivation of a number of fruits like jaco, mango and flowers like nagalata, mallika koraka and mallika. An inscription from Rennekallu in Kogulimadu refers to almost every type of crop grown in the region. Maliguli, a well-known agrahara in were times was richly endowed with all varieties of garden-crops. It may therefore be concluded that Bellary district as also Ananthapur district, the former particularly, was a fertile tract which could produce many of the major crops then, while today it is not so rich.

1. S I I, IX(i), Nos. 249, 295 and 297 for the texts.
2. S I I, XIV, No. 19A for the text.
3. S I I, IX(i), Nos. 163 and 371.
4. ibid., No. 118.
5. ibid., No. 543.
6. ibid., No. 267.
7. ibid., No. 273.
Inscriptions distributed all over the fourth zone testify to the existence of gardens. For instance, inscriptions of Mysore district, coming from the taluks of Nágamangala, Yelandūr, Nāmarū and Mandya refer to the growth of plantation-crops and fruit trees. Sravanabelagola inscriptions contain references to the growth of plantation crops, such as coconut, lotus, jasmine and sugar-cane.

Of all the taluks of Hassan district, which could boast of rich garden-crops, Aresikere was the most prominent. One of the inscriptions referring to Aresikere says "with sweet mango trees like the tree of plenty, with botal-vines like the celestial vines.. Aresikere, outshone, Anorepara". A second inscription speaks of the goods of Aresikere full of fruits (phalabharitavanesa) gardens full of flowers (pūta ṛjōta), lotus covered with bees (nātahranγhōriça), with groves filled with parrots and cuckoos (śukavika vividōdhyaṇa sansṁaṇa), with tanks overflowing (Apūrya tatāka), perfumed with gandhāśāli rice filled with flowers, sugar-cane and wells (Gandhāśāli varimala kālikam uṣākṣaṇa pundrākṣaḥ...).
Though śrīgandha and camphor were used, it is not clear whether they were actually grown, but all other important crops, particularly coconut, areca, mango, sugar-cane and lotus were grown. Besides Muttana Hosevur, a lotus-eaters' land, it is clear from references that areca nut was largely grown at Bhumkere, Kallikatte, Sarvajnapura (Arakere), Tālīvūr, Bendekere, Mudavādiyūr, all in Arslkere taluk. Similarly references are made to growth of mango-groves, plantations and sugar-cane in some of the areas. Bānāvūr (Bānāvar) was also a place of many crops though merely general reference is made to its richness. Inscriptions from Chennarāyapāṭa taluk, Hassan district, gives clue to the crops grown in at least two places Śīvara and Bāgīyur, from which we can conclude that it was rich in coconut and areca besides growing some new ones like lavanga (pūta) and flowers like Sampige (niṣṣampige) and padari, madali. Śīvara also grew areca, bananas, coconut, lavanga, tamūla etc.

3. ibid., No. 108.
4. ibid., No. 172.
5. ibid., No. 48.
6. ibid., No. 82.
7. ibid., No. 130.
11. Undigehsila, ibid., No. 20.
13. ibid., No. 22.
Though Belur inscriptions refer to such flower-shrubs and creepers as Kanikara, Champaka, Safflower and plantation-crops like areca, bananas and sugarcanes, it is not clear whether all of them were grown in the area. Areca-gardens are heard of in Hassan taluk as well.

Kadur district again, was rich in areca-gardens for references are made to gardens of 4,000 trees of Brahmasomdra, where mango plantations and coconut were also grown. Similarly mention is made of 4,000 areca trees of Keralagatta or Brahmalipura and to 3,000 areca seedlings of Vishnusomdra (Santekerehalli). An inscription from Chickmagalur taluk refers to the existence of areca, coconut and flower-gardens of the place. So also, it is learnt from Madigere inscription that Tarikere taluk was no exception to the growth of areca.

The areas of Banavasina and Nagarkhand as 70, largely covered by inscriptions of Shimoga district, could easily be placed with other rich crop growing
districts of the region under consideration. In fact, it will not be out of place to mention here that the author of Mānasālīśa, Sāsēswara regarded Banavāśī or as "Nāgara rāja" where the best varieties of betel-leaves were grown and which also supplied equally fresh areca nut. The richness of Banavāśī was also brought out in one of the inscriptions of Balligāvē. A more detailed description of crops is contained in an inscription from Soraṭ Taluk.

The capital of Banavāśī in Chālukya and later times, Balligāvē, was a place rich in mango, areca and flowers such as māga, pātesa, betel-vines, mukhakunda, and sāvantīga. Tālagūnda or Tāpāgūnda, one of the agrahāras was also a place of several crops particularly lotus, fresh areca, creepers, betel-leaves, fruits like red variety of coconut (Chandansphāla), nāranga, mango (madhuvaṇa), plantain and others like lavanga, mātalunga, champaka, bakuṇa, asoka, pūna, pummaga, nāgalaṇa, nājikāra and agaru. The reference here to nāgalaṇa or nāra elsewhere does not seem to be to any separate kind of flower-plant, but only another kind of betel-creepers.

1. See Sāsēswara Mānasālīśa II, Tābulavarga, 866-861 for a description of the two varieties of betel-leaves, pājavalli and kāroravalli and to areca nut which according to him was procured with great effort. It also appears that the nuts grown there were much in demand.

called nagavalli. Babur, another agrobhara in Shikarpur taluk, was known for both areca and betel.

Another very important and popular division described in the inscriptions of Sorab and Shikarpur talukas was Nagarranda and equally known for garden-crops. Of the various inscriptions, one of them says that every village in the division had creepers and betel-vines. Pandavapura and Kappattur grew besides forests, flowers like nagalatika, patale and fruits like narikela.

Jidduligenad in Bamvasi was occupied by flower-gardens "filled with fragrance of areca, punnaga, naga, vakula, champa, jasmine, screwpine, sandal, white rose, areca, plantain, jack, mango, rose-apple with darkly shaded gardens of betel leaves and plantations of sugar-cane prickling with juice." Uddhara and Nagavalli, agrobhara, were equally well-known for many of the above crops. In one of the inscriptions, there is a clue given to the fact that elephants constituted a menace to sugar-cane plantations.

Various crops grown in Santaliga 1,000 are referred to in the inscriptions from Sagar taluk. It is learnt

1. E.C., VII(11), Sr. No. 225.
2. ibid., No. 255; ibid., VIII(11), Sb. No. 262 & 276.
4. ibid., No. 175.
from them that the area was rich in citrus fruits, plants, flowers and trees. The inscription quoted gives clue to the fact that the area specially grew tender areca (yeleyadake), pepper, large ones and wild ones (melaśiva perbelam adivya belasu), turmeric, cardamom, lavanga, jādi or nutmeg.

A few inscriptions from Chitradurga district refer to betel-vines of Koḍagamir, sugarcane cultivation of Honmakund and also of Sōmanāţapura. References were also found to the growth of flowers like Champa, Māli-ge and Māḍhavī at Honmakunde and to mangoes at Sōmanāţapura. Tumkur district particularly, Tiptur taluka, was quite famous for areca and coconuts in those days. The centre of garden-crops appears to have been Honnavallī in the first instance. Honnavallī richly deserved the following description:

"Nōnavā 'Kengalam' tanipūvagada pārgere ...

Kaungu Konḍāduva dēvabhōga phala santati-yindoje mayyalādi tūgāduva tengu tanagdi-galām bhēlēdira sughandhasāli ... Honnavallī-

"
Besides Amarapura in Sira taluk, which could boast of areca, Juguir in Gubbi taluk had betel-vines, coconuts and areca. Maidal in Tumkur taluk had cultivation of mangoes and flowers.

C. Forests:

While references are made to a number of trees grown in forests of Karnataka, it cannot be said with certainty whether all of them formed a part of natural vegetation or planted by human effort. It is necessary to catalogue them first and notice their economic importance particularly to the people of the times, before working out their regional distribution. It is only for the sake of convenience and clarity that this division has been adopted. It by no means implies that the forests formed a separate section of the village agricultural planning or pattern. It is quite possible that plantation-crops and forests were intermixed, the one contributing substantially to the growth of the other. For instance, manure, by way of green leaves, picked up from neighbouring forests was required for areca and other garden-crops. The following were the constituents of the forest wealth of Karnataka.

1. R.C, XII, SI, No. 38.
2. Ibid., Gubbi, No. 34.
3. R.C, XII, To, No. 9.
Varieties:

1. (a) Muttadamara, (Flame of the forest), Bates monosperma (M.I.W.)
(b) Khe or Kimsaka (palmyra) Boresus flabelifer (F.I.M.)
(c) Basari or basari (waved leaved fig tree), Ficus tujakala (I.F.)
(d) Hanisee (Tamarind), Tomarindus indica (M.I.F.)
(e) Ad (benian), Ficus bengalensis (M.W.)
(f) Tulsi (Sacred basil), Ocimum Sanctum (M.I.)

5. See Kangara, Khesendra, P. 116, St. 55 for anti-toxinic properties.

2. See Sanasayéllës Í, St. 938 for the use of its bark in preparing ointment; see also Mangarâjë, Kusûndra, P.15, St. 16 for its anti-toxinic properties. Cf. Jain, *medicinal plants*, No.17, P.13b.


4. See P. Maheshwari, P. 146 for its various uses.


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1. (o) Jalmali (silk-cotton tree), Bombax Ceiba (F.I)
   (p) Chandana (sandal), pterocarpus santalum
   (i.e., red sandal), Santalum album (white
   sandal) (M.I.F.W.)
   (q) Horae. Pongamia elabra

Regional distribution:

The areas included in the fourth zone contain

inscriptions from all over the region referring to forests.

For instance, evidence point to the growth, in abundance,

of tulsi almost everywhere, bamboo-forests, sandal trees,

1. References in Somanawa's Mānasollasa to various types
   of bed indicate that this was largely made use of
   besides cotton for stuffing purpose. Cf. P. Mahes-
   wari, Dictionary, P. 23.

2. See Somanawa, Mānasollasa II, Sl. 933, 931, 934, 939,
   931, 1,004 for the use of sandalwood in the preparation
   of ointments like Yāskhākardana and sandīs. It was
   also used in the form of a paste in making Tamba -
   ibid., Sl. 975. See also Nayaka, Charuvarita, I,
   p. 74, St. 145 for reference to Marichanda. Cf. Jair,
   Medicinal plants, No. 65, P. 123 and P. Maheswari,
   Dictionary, P. 130 for its use as oil, wood, cosmetics,
   and fruits of edible qualities.

3. S.I.I, IX(1), 145, C Stela, FLP, No 496, P. 169

4. K.C., VI, Om. No. 76.

5. M.A.R, 1926, No. 21 (Om; K.C., II, No. 341)

screw-pine, Mādāli, silk-cotton tree, vīlva as also tāla, tāmēla and aśoka. Sometimes, the word forest is also used in a general sense, impenetrable and tāmībe which might cover up all types of trees, some yielding, valuable forest-products, while others gave firewood.

Northwest Myseor, covering the districts of Belgaum, Dharwar and Bijapur had some centres of forest wealth. Particularly the region around Sāgāl, Belgaum district, was resplendent with sāl and aśoka vrikshas.

Elsewhere were found trees of basuri, bāla, tamarind, mētāunga, tāla and aśīgandha.

An inscription from Kurugōdūi describing the natural beauties of Ballakunde, refers to the growth of tīlaka, tāmēla, tālā, pāliya, silk-cotton trees and so on.

D. Dry crops :-

Of the dry crops grown, the inscriptions refer to the growth of javar, till seeds, navane or kambhu. Mānasōllāsa refers to some of the dry crops like

1. E. J. VIII(11), Sb. No.138.
5. E. C. XII, Q. No. 83.
8. S. I. I, IX, No. 848.
kunabi, sesamum (sarehapa) and others whose seeds were used in the preparation of ointment. Similarly, a number of commodities, to which reference will be made in due course, entered the commerce of the time and are mentioned as traded commodities. Though it is incorrect to say that all of them were imported, it is doubtful whether they were grown in large quantities to attract the scribe to make a mention in the inscriptions. Of the literary references to dry crops, Mangaraja’s Bhagendra Manidara G 3 4 5 6 vara refers to rūgi, navara, kambu, wheat, kadale (Bengal gram), hasara (green-gram), uddu (black-gram), avare, 9 10 alosando, togarli (pulsa) and horse-gram. Similarly, 11 Rattanatam refers to some of the above dry crops.

11. S I I, XI(11), No. 126.
16. E C, VI(1), RN. No. 63. Also see Haribara, Basavarāja-devaragale, P. 64, ll. 50-52.
1. Śomēśvara, Mūnesōllūṣa II, Sl. No. 337.
2. Mangaraja, Bhagendra, P. 46, St. 156.
3-5. ibid., P. 47, Sls. 157, 160 & 161, respectively.
6. ibid., P. 48, St. 163. Also Haribara Basavarāja- devaragale, P. 94, ll. 50-52.
8-10. ibid., P. 49, Sts. 168-170 respectively. See also Haribara, Basavarāja-devaragale, P. 84, ll. 50-52.
It is necessary to consider below varieties of plants, trees and herbs to which frequent references are made in the literature of the time, but not noticed in the inscriptions. Though mention is made of innumerable species of plants and etc., of medicinal and non-medicinal value, only such of them as could be identified or are popularly known, are taken up for discussion here.

Of the varieties quoted in the inscriptions used in the preparation of several ointments, perfumes and scented oils the following are identifiable ones.

3
(a) Koštum, Sansewera Lappa Clarke (M.I.), grown in Kashmir region.
4
(b) Tagara, Valeriana Jatamani (I), more abundant in Himalayan region, a variety of Valeriana officinalis.

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1. See Mangarjia, Khagendra, Chs. 2, 3 & 14; Chāvunda Lokā, Chs. 6-8.
2. See Śomēśwara Mānasālīkṣa II, for varieties of roots, leaves, seeds, barks in the preparation of ointments and betel. (ibid., Nos. 934-938, 941-942, 973, 974, 982, 990 and 999).
3. See Chāvunda Lokā, F. 106, St. 51 for reference and use in preparation of scented-oils. The Sanskrit name is Huṣṭa or Agrā and the Tamil, Telugu and Kannada equivalent is Koštum. Evidently, Śomēśwara incorporated the local names. Cf. Jain medicinal plants, No.65,
1 (a) Himba, (Margossa), Azadirachta Indica A. Juss (beva) (F.I.F.).

(b) Bakuchiol (Urdu), dugaadhateantak (Skt), Psear- 
lea corylifolia L (I).

(c) Saralam (Pine) or Jawalgaon (Sengali) and 
Smaidädără (Temil), pinus honburshii 
Sargent (I).

(d) Maduna perhaps Madhuka or Varanaprastha with 
scorlike qualities Maduca Indica, (I).

4. See *ibid.*, No. 79, P. 155.

1. See Mangaraja, *Kshetra*, P. 31, St. 76 and P. 54, St. 93 for its anti-toxic properties. A variety, melabăru, referred below appears to have been more popular in 
the medical world. See Gavunda, *Lōkō*, r.12o, St. 25 for the procedure to remove its bitter taste. See 
Jain Medicinal Plants, No. 12, P. 25.

2. Smaśvāra seems to have used Udu equivalent, a name 
introduced by traders or travellers from Muslim coun-
tries. Growth throughtout India. See Jain Medicinal 
plants, P. 115.

3. Evidently, a kind of teak whose bark was used in 
preparing ointment. See Jain Medicinal plants, No. 54 
P. 109.

4. *ibid.*, No. 45, P. 93.
1. Also known as Karaya occurs in South India. See Jain, Medicinal plants, No. 63, P. 136.

2. The Gujarathi name is Kadu, perhaps derived from Sanskrit equivalent Katu, bitter. See Jain Medicinal plants, No. 55, P. 107.

3. Most of the writers - Nayasena (Dhammik佃m, Chavunda, Loko, Haribha, Basavarajadvaragale, Raghavanka, Harishandra, Kavya, Rattasimha, Rattamatas) and Manggal, Khagendra, being natives of Karnataka evidently refer to plants grown around them in the region. For it is to be remembered that they were writing medicinal works useful to the common man to make such plants easily available to them.

4. See Chavunda, Loko, P. 137, St. 9 for its use as specific for bilious. See Jain Medicinal plants, No. 18, P. 40.

5. See Chavunda Loko, P. 137, St. 11 for its use in curing jaundice. See Jain Medicinal plants, 4, P. 11 ff.

6. See Chavunda, Loko, P. 137, St. 11; Mangaraj Khagendra, P. 23, St. 40 for anti-toxic property. See Jain Medicinal plants, No. 30, P. 74.
1. See Chavunda, Loka, P. 139, St. 17; see Jain Medicinal plants, No. 17, P. 31 ff.
2. See Chavunda, Loka, P. 140, St. 19 and Mangaraja, Khasendra, P. 139-140, 56, St. 5; see Jain Medicinal plants, No. 8, P. 20-21.
3. Chavunda, Loka, P. 140, St. 20; Mangaraja, Khasendra, P. 56, St. 5; see Jain Medicinal plants, No. 8, P. 20.
4. Mangaraja, Khasendra, P. 19, St. 16; Jain Medicinal plants, No. 8, P. 155.
5. Mangaraja, Khasendra, P. 96, St. 58; see Jain Medicinal plants, No. 80, P. 155.
6. Mangaraja, Khasendra, P. 118, St. 75; see Jain Medicinal plants, No. 80, P. 142.
7. Mangaraja, Khasendra, P. 142, St. 41; see Jain Medicinal plants, No. 80, P. 116.
8. Mangaraja, Khasendra, P. 150, St. 41; see Jain Medicinal plants, No. 80, P. 98.
9. Chavunda, Loka, P. 139, St. 18; cf. Jain Medicinal plants, No. 73, P. 143.
Varieties popularly known :-

1. Tare Terminilia bellirica
2. Ekke kalli Calotropis gigantea
3. Senatu or senamba Grotolaria juncea
4. Bellavitta Aegle marmelos
5. Kanchira or kanobi Trewia nudiflora
6. Pāvu Hekke a kind of Broniya Caliosa
7. Başavāla Hibiscus rosa sinensis
8. Maddukunike Datura species
9. Gērhadura Anacardium occidentale
10. Ankōle Alangium decapetalum
11. Manguravalli Cissus quadrangularis
12. Irruvantige Solanum stramoniae folium Jacq
13. Namdāvarti Tabernaemontana coronaria

1. Chāvunda Lōkē, P. 140, St. 20; Mangarāja Khagāndra, P. 34,
   2. Nayasena Dharmārītim II, P. 810, Pa. 4; C.Stolz, FIP
   3. No.246, P.82-83
2. Mangarāja Khagāndra, P.25, St. 31; see C.Stolz, FIP No.58,P.20
3. ibid., P.150, No.445; Mangarāja, Khagāndra, No.45
4. Chāvunda, Lōkē, P.105, St.11; C.Stolz, FIP No.563, P.123.
5. Nayasena, Dharmārītim I, P.82, St. 184; C.Stolz, FIP No.68,P.24
6. ibid., FIP No. 327, P.112,112; Rāghavānka, Harischandra Kāvyā,
   7. St. 16; Kṛttakatām P. 14, St. 12.
7. Nayasena, Dharmārītim I, P. 876, P.64; C.Stolz FIP No.405,P.137
8. ibid., No.264, P.90; Chāvunda, Lōkē, P.77, St. 50.
10. ibid., No.311, P.71-72; Mangarāja, Khagāndra, P.35, St.101.
11. ibid., P.39, St. 20; See Stolz FIP No.1, P.1.
12. ibid., No.459, P. 149; Mangarāja, Khagāndra, P.40, St. 123.
Conclusion:

(1) Though it would be farfetched to think of a crop-planting as such, no one can dispute the fact that there was a balanced distribution of various types of crops. No one region suffered from the lack of particular crop. Thus, almost every region, we have considered so far, could boast of a little wet-lands, garden and forest.

(2) While it would not be too correct to make a comparative study of today's region-wise distribution with the conditions that prevailed then, for topographical and other factors have not remained the same throughout, certain areas, which today, are considered as barren tracts, were, at one time, centres of great agricultural wealth. For instance, certain parts of Bellary, Hassan and Kadur districts.

1. Ramasastam, P. 15, St. 15; C. Stols FIP No. 361, P. 119.
3. Chavunda Lokö, P. 36, St. 9; C. Stols FIP No. 14, P. 15-16.
(3) While wet-lands and even garden-lands had commercial value and therefore were objects of sale, it is doubtful whether the forests were so considered. The forest did produce valuable products, but evidently belonged to the community as a whole. For, we do not hear of any sale of forests.

(4) As observed under each category, almost every plant was put to some economic use or the other. Plants were either useful as medicine, food or for industrial purposes. If not for anything else, at least as wood. There are however no known instances, either from the literature or inscriptions, of forest being cut for wood. There was deforestation, but for purposes of cultivation.

5: Irrigation Works :-

It is proposed to consider in this section all important problems connected mainly with the tanks, namely their name-endings, types, construction or excavation of new ones, repairs or maintenance of existing ones and cost as well as their planning. The part played by tanks

5. See Map 2 annexed to the Chapter, showing distribution of agricultural crops.
in the development of agriculture was quite considerable. For, most of the lands, either wet, dry or garden, were invariably situated below the tanks or sometimes channels taken from them. It is not clear as to how many tanks could have survived, for few of them were river-fed or stream-fed. The only surmise that can be made is that besides their regular maintenance, forest being in plenty the rain-fall was fairly above the edge to keep them overflowing. Further, defects of construction were carefully avoided by paying particular attention to levels, depths, size and etc. The best evidence of the art of tank construction is available from Kattegur. The tanks, besides providing water facilities for agricultural improvements helped to retain equitable climate in the area round about, avoiding extremities. They also helped development of fisheries.

(A) Name :-

The inscriptions generally refer to tanks by several appellations, which might also suggest their importance, size and etc.

1. See below for separate section on fisheries.
The tanks had the following name-endings:

1. (1) Rere
2. (2) Semudra
3. (3) Keri (independently or in association)
4. (4) Kette
5. (5) Kola
6. (6) Mutna or Mutne
7. (7) Sarvora
8. (8) Tirtha
9. (9) Tataka
10. (10) Done

2. E.C., XII, Tp. No. 3 - Somadhara semudra, visrnu samudra.
3. E.C., II, No. 545; S.I.I., XX, No. 82; E.C., V(ii), Ak. 105
   Bhadegoreya eri.
4. E.C., VII(i), Sk. No. 130, Porgatta, Asaganskatte; E.C.,
   V(ii), Sk. No. 147.
5. E.C., VII(i), Sk. No. 4, Morasa samudra.
7. S.I.I., IX(i), No. 121 - Vavikumte; APGA 8, 9, ins.
   nos. 18-19 - Ro'surikuato.
10. E.C., V, Ak. No. 71 - not very popular, sometimes sahā
    tākka used - danti samudra mahātākka.
The names of the tanks, sometimes, are an indication either of the purpose for which they were built, or the parties which were interested in their construction. For instance, Asagara Hatte referred to before was evidently meant for the washermen of the village, while dāya koḷaḷa or kūpana tīrtha could be used for God's ablutions. It is a matter of common knowledge that every temple in ancient or in mediæval times had a uṣkarni or kalyāṇi for sacred bath. Similarly, kumbhaḍagāre, was either a construction of the potters, for which there is very little clue, or that they were exclusively meant for potters' use. Perhaps, the latter is correct, for the tanks meant for the use of particular communities especially the orthodox ones, was the order of the day. The tanks were either named after important dynasties like Ṣaṭṭa-saṁudra, Gangesaṁudra, Chālu-ya-saṁudra, or after rulers like Bithi-saṁudra, Vishpa-saṁudra and Sāntisamudra, named after Sāntaladevi, wife of Śōchiraja. Sometimes, they are merely referred to in a general sense names of tanks like 'arasiyakere'.

1. Similarly Telligankere, E O, V(11), Ak. No. 117 or Bubaberg; S I I, XX, No. 2087 or Banajigankere; E O, VII, Sk. No. 47.
2. E O, No. XVIII, No. 188.
3. E O, VII(1), Sk. No. 5.
1. or 'Abbeyakere'. Also tanks were named after deities or gods such as 'Perumalessmudra', or Dévigere, or after persons in whose name they were constructed, or bore the names of those who built them. To give instances, we have references to Bimbisettiyakere, Birajjanakere, pațanasettyyakere, Tomnadiyakere, Maḥisamudrakere.

Sometimes they were designated after the names of villages or prominent trees or merely as 'Kirlya' or 'Kiriyakere' or Heggera, of course indicating their size. Sometimes, they are indicative of the plan of the tank. Thus we have Pṛggattedēri or the tank of the large flight of steps at Balligāve. Also, the name Upṇiṁrakere evidently meant the saline quality of water. Of course, the water could have been of very little practical use except for the growth of rough or kér variety of paddy.

Sometimes, the word Suleyakere is also found used, which might suggest one of the many things. For instance, it may mean a tank, the income of which obtained by the supply of water to agricultural lands is to be used for the maintenance of temple-women, or a tank built after...
some dams or public-woman maintained by the king or
fendatory chief, who chose to remain anonymous. Since
the inscription referring to the tank is found at
Kellengore, in Arsikere taluk, Hassan district, it is
not improbable that one of the Hoysala rulers, Hoysa-
sala Narasimha, in 1174, thought it fit to have a tank
excavated after one of his favourite women. This is
also probable for our study, the term has not been used
too frequently to justify the first interpretation.
The sparing use of the term rachaer confirms our sur-
mise regarding its correct use. It is equally interest-
ing for us to know that many places are named after
the tanks which existed about the time. It is sur-
mised that the name of the present village Lingsour in
Raichur district is after a big tank Lingasagar, of
1

(8) Types :-

The next point to be considered refers to
the various types of irrigational facilities availa-
ble. One thing which becomes clear from a study of
inscriptions, is that tanks were not built of uniform
size and that all of them were not built. Some of them
were natural formations and required very little of

11, M.C., V(11), Ak. No. 112.

1. RAS, No. 18, COI in Kamada district of Hyderabad
human labour. There were wells to which frequent references are made; water being drawn by the pisotta. Sometimes channels were dug to bring river water for irrigation purposes. We are told of one Aditya Bhatta, of the village Puliga, modern Munirabad, who had so wonderfully planned out the construction of an irrigation channel from Tungabhadra river with a mesh-work of sub-channels, that they looked like cutting a under of a stalk of lotus and drawing out its fibrous threads.

Leaving such isolated instances, there is need to consider the difference between various types of tanks themselves. As seen before, the following terms usually are associated with tanks—semudra, kere, öri, kotte, kola, kante, tirtha, tatāke and gippa while ambudi is not generally found. Of these expressions, the real problem is to carefully distinguish between semudra, kere, öri, and öri, in the first instance. For it appears from a study of inscriptions that these three were closely inter-connected. Thus for instance, öri is invariably referred to as part of kere and evidently being fed by the kere. As seen before,

1. See Murthy, K.S.S.A.P., 367; E.G. V, Rn. 130 and Ajitapurāṇa (4,55) for a discussion on the use and mechanism of Ghatīyaṇṭra.
2. HA S, No. 6, 1922.
mūlasthāraḍa kavya modalēri in one of the inscriptions clearly suggests that ēri was a smaller formation and received its water, or water was let into it from kēra, evidently a larger formation. The real difficulty lies in distinguishing between a saṃudra and kēra. An attempt made by Hultzsch to dismiss references to saṃudra as hyperbolic seems to be not very accurate. A study of some inscriptions shows that the term saṃudra or sāgara was applied to very big water-formations occurring at a place higher than a kēra or ēri. To quote some instances - an inscription dated 1263 from Surusvēkēra refers in one and the same context to sēmanātha saṃudra, Ādavahaliya kēra and Nēqala kēra of Sarvaṃśa Īśvarjiya sūrya-pūrṇa, evidently on the magnitude of the size of each one of them. Another inscription refers to viśnu-saṃudra, its channels, weir and the kausākēra, to which it led. Generally as in the case of Sānti-saṃudra built by Sāntaladevi, wife of Mēcharāja, saṃudra was known as Mahātatake, an appellation, not usually associated with an ordinary tank. All these evidently lead to the conclusion that saṃudra, kēra and ēri were

1. E.C., V(ii), Ak. No.105; see also ibid., No. 166.
2. E.C., IV, P. 226, fn. No.4. He is inclined to treat as synonymous saṃudra, ēri, kēra, charuvi. This seems to be an inaccurate description. For instance, does suggest differences.
different types of tanks, varying in size and economic importance. As regards katte, the term was generally associated with washerman's ghat or asagghatla and was evidently one provided with katte or flight of steps for the washermen to wash the clothes and people to bathe. It cannot be asserted with certainty whether it compared favourably with a tank, gari or kere or merely a collection of water which overflowed the tank or was allowed to run out, through a weir. Even today washerman's ghats are provided in a similar way. The others like the koia or tirthe appear to have been more natural formations or ponds, rather than being regular constructions undertaken for irrigational purposes. Usually, koias are referred to with lotus evidently an area of stagnant water, little used for irrigation. Sometimes inscriptions from Hyderabad Karnatakarefer to what are called Diggige kere. For instance an inscription from Marnvi, Raichur district, dated 1052, records the grant of 13 mattras of black soil for the local tank i.e., Diggige gera. P. B. Desai has interpreted the expression to mean 'pond inside the locality, intended for the household use of its inhabitants as contrasted with big tanks for irrigational purposes. Perhaps

1. n. 9, v(ii), sn. no. 67.
2. h.a.s. no. 18, col. no. 5, p. 45-46; see ibid., intrd. p. 34.
those are similar to ūrumba kero or bhāyika in other parts of Karāṇṭaka.

(d) Construction:

While it would be neither desirable nor practicable to make a catalogue of all new constructions undertaken during the period of study, it would be worthwhile to consider the following:

(i) Cost (ii) Purpose (iii) Parties (iv) Execution.

(i) Cost: Some inscriptions of the period throw light on the cost of construction of tanks, though no correct estimate based on the dimensions of the tank can be made at this distance of time. An inscription dated 1102 from Bastihalli near HaṭṬīlī records the construction of a tank at an expense of 20 ponnu. Another from Kodagunḍa, dated 1269, records that Kollakumandan expended 500 pon and caused a tank to be constructed. A third from Dallassamudra, dated 1287, states that one Honnā Māre Gowda spent 1,200 gadyāṇas in building a tank. Lastly, it is recorded in an inscription of

1. B C, V(II), Ak. No. 57 - "ūrumbaka Bhāyika".
2. See Map. 2 for a regional distribution of tanks.
5. B C, XII, Te. No. 35. At the rate of 8325 per gadyāṇa, it works out to 9,912 rupees.
Hassan, dated 1314, that Māheya spent 3 to 4,000 honas in building a tank in memory of his mother, Māyakka.

A similar amount of 3,000 honas was expended in building Rāmasandra tank in 1340 in Bangalore district.

(ii) Purpose:— While economic and other motives also were behind such constructions, it was to some extent the religious purpose which led to such large-scale excavation of tanks, though, at the same time, it served an economic cause, namely, improvement of agriculture. Economic motive is also seen in some cases. For, many grants, relating to agrahāras laid special emphasis on excavation of tanks from the point of view of agricultural improvement and even granted incentives to individuals to undertake them. Actually, forests were cut and tanks built for promotion of agriculture. To give instances of pious motives, Māheya Danjanāyaka spent nearly 3 to 4,000 honas to construct a tank for the beatitude of his mother, who probably had died. Sometimes, installation of a deity was followed by construction of a tank, of course, at individual expense. At times, tanks were built as a part of creation or establishment of agrahāras.

4. E C, X(i), Mh. No. 245. For instance see E C, V(ii), Cn. No. 220 and 257.
It is recorded that one Amrita dandanāyaka, of Okkalagere, his birth-place, carried out such large-scale works in 1203. Tanks were often, built for the mere prosperity of the Kingdom, obviously, from a spiritual motive.

Thus, Viravya Dandanāyaka, for the prosperity of the kingdom of Vīraballāla, constructed Ṛdrasamudra, Ganga-samudra, Achyuta samudra and Vīra samudra at Vīraballālapura, which ho himself had established after cutting down the forests. It was sometimes out of love and affection for somebody that tanks were built. We have thus the instance of Areyanga's crowned-queen Mahādevi, who full of affection for her husband, caused to be built the tank of Mattana ṭosevūr, which is highly praised. The religious heads also took interest in such constructions out of pious motives. Thus, we have the instance of Gunasēṇapitadvēśa who caused to be dug the nāga well’s dharma for the town. There is the curious instance of a tank being constructed in the name of one's wife, as a sort of return obligation. It is said that the great minister Madigidēva dandanāyaka procured for the Mahājanas of Kunchigon the remission of certain taxes from the king, and that (perhaps) as a token of gratitude, a tank was built in the name of his wife Māyidevi dandanāyakī. In memory of paternal aunt, one Kāduvetti alias Araiyan UnṇuvaṇaPerumāl of Ferumangalām granted as dēvadāna Kanakatti, built by his father. It was sometimes

1. K.O., VI, Ki. No. 36.
2. K.O., V(ii), EL. No. 175.
purely to heighten one’s position and prestige that

... tanks were built. Thus Dāsi ṛṛjā’s son Kāma had a tank

... built, constructed the sluice and repaired the temple

... of Kalinātha and made his office of pāravada illustrious.

Making provision for the maintenance of god’s worshippers or devotees led to such constructions. Thus,

the Mahāmandirāḷgware Tribhuvanamalla, having made Kalai-

nām-allān into a tank under the name of Nandīsamudra,

granted it along with lands to 32 Brāhmīns under cer-

tain conditions. Beautification of the village, some-
times, was behind the construction of tanks and roads.

Very often, renovation played its part in tank construc-
tions. It is recorded that the great minister Tama

Singya dandamāyaka and inhabitants of puliyyūr-nādu

granted Dāmōdara Sāmiyār certain lands for having built

... the Karkirai, tank in puliyyūr-nādu which had been bree-

ched and gone to ruins.

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4. 3G, XV, Hn. No. 59.
5. 3G, X(i), Kl. No. 234.
1. 3G, VIII(12), Sb. No. 300.
2. 3G, IX, Dw. No. 28.
3. 3G, X(i), Wd. No. 193.
4. 3G, IX, Ht. No. 139.
(iii) Parties: Generally, tanka were constructed or caused to be constructed by the following persons:

1. King, queen or the members of the royal family.
2. Officers of the imperial household.
3. Superintendents and local officers like the Gaudo, pattanavāni, nārgāda and pērgāda.
4. Members of the various professions — goldsmiths, blacksmiths, merchants and landlords.
5. Corporations, such as to families.
7. Inhabitants.
8. All the members in the family either individually or collectively.
10. Religious heads like jīvas, panditas.
11. Elephant-drivers or mahuts.
13. Lay disciples, and

1. B C, V(ii), Bl. No. 2.
2. Ibid., No. 102, A; M A R, 1940, No. 8.
3. B C, V(ii), Ak. No. 189; Ibid., Cn. No. 244.
5. B C, XII, Ok. No. 310; B C, IX, Ht. No. 142.
6. B C, IV(ii), Ng. No. 70.
7. B C, VII(1), Cn. No. 64.
8. B C, III(1), Md. No. 78.
(iv) **Execution** :- Though no technical details are made available, some inscriptions of the period throw light on the execution of the works. It is on record that the inhabitants of Vibhūtipura along with the superintendence of the western portion of Māndānī, having cleared the jungle in the tract of the land adjoining Permūmūr, levelled the ground, built a village and constructed a tank by removing sand. In another instance, a tank was made after clearing out the silt. Evidently, in the latter case, from it was just renovation of a tank, gone out of use. It is clear from another record that construction of a tank did involve several stages, such as fixing the sluice, after construction, and levelling of the ground, which must have demanded technical skill of a specified nature. Normally, tanks were built or wells dug in places where there was no other source of water. For, otherwise, channels were

10. S G, VII(i), Ht. No. 54.
11. S G, IV(ii), Ht. No. 70; S I, XX, No. 116.
14. S I, XII(i), No. 74.
15. S G, IX, Ht. No. 140A.
17. S G, III(i), Sr. No. 119; S G, IX, An. No. 94.
19. S G, V(ii), Ak. No. 150
22. S G, XII, Si. No. 33.
3. S G, X(i), Ct. No. 3.
dug and taken to fields from river-bed. In certain cases, as in the case under examination, river water proved useless due to level deficiencies. It is said, allowing according to a record of 1160, that the Hobbaruva of Kolliganaghaṭṭa Śādiya Dandaṇavāyaka Dēva-pa having found it too high for Tungabhadrā to be brought to the fields of Māvinkōṭe, had a well dug at Kolliganaghaṭṭa.

(v) Maintenance: It is a matter of great relief to learn that the people during the period under study gave as much attention to maintenance as to construction of tanks. There are two aspects of the question and probably a third. One refers to immediate attention, particularly when a breach takes place and second, adequate provision for carrying out necessary repairs. A third point is payment of adequate compensation. It is gratifying to note that all these aspects were attended to scrupulously. Each of these aspects will be considered with reference to inscriptions.

Repairs: Normally, tank breach was a common complaint, promptly attended to. In one instance, the breach was got repaired by an important minister. In another instance, Pritvi Ravisetti, who repaired a breach

1. M.C., VII(1), Pl. No. 87.
2. M.C., V(11), Ak. No. 8.
to the big tank at Sebbari was rewarded with 1/0 of fixed rent and certain allowances of paddy. 2

The case of complaint was leakage, generally alleged 3

and, once repairs, carried out before 1631, 4

at Ansanakot is on record. Similarly, the case of a 5

tank which had given way was promptly repaired and 6

eased.

Of a more serious nature are breaches, exhausted 7

d for a longtime, but restored in a sound manner. 8

Sluice built, by the great minister 9

Sondhipati, the senior general Sokhimayya, whose 10

encamped at Mangali. A second instance of a tank 11

had breached and gone to ruin with times from public use, 12

and it is recorded that one Damodara Sanyayya actually 13

built the tank for which he was granted 14

by the inhabitants and great ministers.

Drying up of the tank was also a common disaster. 15

A record of 1012 refers to a tank which had dried up 16

at Saliyar due to non-availability of water. It is 17

said that one Kesimayya's son sent for Mochimayya, the 18

husband of his elder daughter who expended whatever
money was necessary and restored the work of merit. Apart from such repairs, enlargement or increasing the area of a tank was also undertaken. Sometimes, steps were provided to the existing ones at the request of the inhabitants of the place.

(ii) The second aspect refers to the question of making adequate financial provision. More often than not, adequate funds were provided for the maintenance of a tank at the time of its construction or sometimes, incidentally, donations were made side by side with these, for the temple. It is sufficient if an attempt is made to trace in what ways such grants were made.

(a) Lands: The most usual and common way was to donate lands and the yield from the land was to be utilized for maintaining the tank and its wards, the Mahājānas being held responsible for their upkeep. Sometimes, grants were made for maintaining charitable pīṭṭa, as is clear from an inscription dated 1174, belonging to Kāḷachūrī Rāyamurūrī Sūvidēvā.

1. E. C., VII(6), Sk. No. 287.
2. E. C., VIII(ii), Bl. No. 188.
4. E. C., VI, Rd., No. 136; E. U., V(ii), On. No. 289; S.I., XII(ii), '75; ibid (i), No. 98; S.I., IX(i), No. 151 (12 matters for a well); A.R. (12), 1930-31, No. 69; A.R. (12), 1945-46, No.291; S.I., XIV, No.53; S.I., XIV, No.166; S.I., IX(ii), No.100, 281; S.I., XIV, No. 10a.
In this case, a land and house-site were granted by Nāgadeva Nāyaka. It is not, however, clear as to what is involved in maintaining a piscota as to warrant such a costly gift, unless we include the livestock generally required to pull it. A grant of land of 5 masters was made, in another connection, for maintaining the sluice of a tank. Sometimes properties of those dying sonless or without heirs were assigned to tanks for maintenance. For instance, it is learnt from a record dated 1275 of Vādava Bāmachandra that all the property of those who died without heirs in the village of their first settlement was to be given to the tank of the place.

(b) Money Contributions: Contribution in lumpsum or on pro-rata basis were made for the tanks. The tanks were to be maintained out of such deposits of money. There are some inscriptions which invariably

3. S.G. XI, Dg. No.70.
5. Ibid., Hl.No.62.
6. S.G. VI, Ed. No.92. The inscription refers to grant of 200 gadyana from the interest of which at 1 Bole, 300 gadyanas should be applied to the tank-sluisé and channel-mouth. This gives us some idea of the cost of maintenance of tank. Working out the ration, in terms of modern coinage, (at the ratio of 1 gadyana = 8.26 rupees), 30 x 8.26 = Rs.247.80.
refer to cart maintenance for the tank, for which also, monetary contributions were made. It is likely that money contributions for the cart were made periodically. Some inscriptions are more specific. An inscription of 1294 refers to the presentation of cart and provision for the livelihood of cart-driver and grain for the bullock and buffalo. There is a curious record which states that the gift of 12 gadyānas were to be collected annually out of the contract amount (kāmi) for maintaining charitable picottas at Nagarthavi.

(c) Taxes and fines: A number of taxes were specifically levied with a view to maintain tanks, carts and etc. For instance, water-rate or tank-cess was a frequent levy. In some cases, taxes either wholesale or in part were assigned for the upkeep of tanks, such as income from river-tolls, perijunks, pannāyas, toll-

1. E C, VI, Ed. No. 19 - "koyey bandīwa teivu bhanu".
3. S I I, XV, No. 209. This gives us an idea of the maintenance cost of a picotta. In terms of modern rupees, as seen above, it works out to the following: At the rate of 1 gadyāna = Rs.226; 12 x 226 = Rs. 99.12.
4. E C,V(ii), Ak. No. 152; ibid., No222.
5. M A R, 1951, No. 1; Also see E C, II, Dg. No.139.
6. E C,III(1), Sr. No. 15. A sum of 64 gadyanas from river-tolls, assigned to Brahminas of TondiarP provide annual repairs.
8. S I I, IX(1), No. 173; ibid., XV, No.57.
revenues on every load of merchandise at a specified rate, Bammigadera and tax on betel-leaves. Sometimes fines were collected. For instance, a fine of 50 kalangus of gold, a very heavy sum indeed, was imposed upon those obstructed them to have lands irrigated.

(d) Other sources of revenue: There are no recorded inscriptions of the period showing that the tanks were either constructed or maintained out of fishery revenue. But, literary references made in some of the works lead one to the conclusion that the business of fishing fishes in irrigation tanks was regular and formed a very important source of revenue for maintaining tanks in good condition. While in the beginning, it was not so and natural fishing allowed, the practice of leasing out tanks for fishing either for sport or to fishermen against lease-money brought in considerable revenue to maintain the tanks. Similarly, it is quite possible that the tank-cart donated by plow donors, to which references are made in this section, was also used for transporting goods on hire and the income realised, utilised for maintaining the tank.

1. S I I, IX(i), No. 170 and 192.
2. S I I, XV, No. 132.
5. See Someswara, Mānasīllāśa, Matsyavinnōdini abation, and Bāghavanka, Harischandrakāya, to which detailed reference will be made below.
Planning: A solitary inscription from Kattegiri, dated 1066-97, of western chalukya Vikramadiya Tribhuvanamalla and the irrigational remains of the place give us an idea as to how the system worked. The inscription refers to puṣṭa pārṣāgare of the place, and the setting apart of the proceeds of imposts that belonged to them, by the 500 for the purpose of maintaining the tank. The Editor of the inscription, in trying to locate the position of the tank referred to in the inscription, says that there must have been at least 5 tanks, one above the other, situated at intervals and of different sizes. First, the smallest, recently reconstructed in 1877 (as a famine-relief work) at the lowest level, second the larger at a slightly higher one and the third about a 1/4 mile away. The last one must have been the nirīya pārṣāgare or the larger great tank, indicated by the remains of a large embankment, now breached and quite useless, which formed a tank of considerable area. The principle involved in the above series, must have been adopted elsewhere as well, for inscriptions referring

6. The reference in one of the inscriptions (M A R, 1932, P. 200, C.600 A.D., quoted by Murthy, K S S A, P. 234), to Minangore, leads to the suspicion that the name of the place was after a tank where fish was reared.

7. See Hors Sunderlal "Maintenance of Irrigation tanks through fishery revenue in ancient India", J S A S B, XVII, No. 1, 1951, 41-50, for detailed discussions on the section on fisheries below.

1. I A, VI, No. 32, P. 137-38.
to tanks invariably speak of samudra, kere and ūri -
in one context, the largest being samudra and the
smallest ūri.

A tank had as its parts the following:

1. (a) Sluice, more than one serving indifferent
directions.
(b) Weir or Kōdi which evidently was either
built or natural and in all directions.
(c) Agāl or iron-rod or Hivottu for controlling
water supply.
(d) Halle or Āluve into which water was led
from the tank through the Kōdi.

(2) Number and Size: Lastly, an idea of
the number and size of the tanks. Frequent and innumera-
bale poetic references to tanks in the various inscrip-
tions of the period undoubtedly leads one to the con-

1. E C, VII(1), Sk. No. 256; E C, XI, Dg. No. 11. The
sluice was sometimes big; for references are found
to Hiriya tābā - E C, III, Mysore (1), Md., No. 100,
the Kōdi or weir being connected below -"Hiriya
Kereya tābānā modagadde mūde gōdi" - E C, V(11),
Ak. No. 150; sometimes the sluice was directly connected
with another tank below -"Hiriya kereya kiriya
tābānā modalēri" - E C, V(11), Ak. No. 41.
2. E C, XI, Dg. No. 11.
3. Ibid., No. 3.
4. E C, III, Or. No. 81.
5. Ibid., "badagama kōdiyinda, harida halle"; see also
E C, III, B, No. 108 -"Hilma samudra mūdana
kōdiyali Āluveya ūri."
elusion that tank irrigation was very popular in most parts of Karnataka. If a sample survey is taken of the references, Kadur, Hassan and Tumkur districts were thickly dotted with innumerable tanks unlike as in other parts with certain exceptions. For instance, one of the inscriptions from Areikeru speaks of a village as a place full of chain of tanks filled with water. The inscriptions of Northwest Mysore make occasional references to them. References, indirectly are made to size of tanks. Thus an inscription of Yadava Singara speaks of Niugere or large tank. Even expressions like HiriyaKere or KiriyaKere throw some light on the size of the tank.

**Conclusion:**

1. Tanks have played a very vital and leading role in the agricultural economy of the times.
2. Systematic construction of tanks of different sizes was undertaken by the rulers, their subordinates of various classes of people and according to certain well-thought out plans based on sound Hydraulic principles.

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1. M A R, 1930, N, 1, Ak. "Balasida pura tatākavali-
yūm.
2. E I, XIX, No. 299; See also E I, V(11), Ak. No. 90 "Sāgarama pūlī tatākangaliṁ".
Equal attention was paid to maintenance or repairs of tanks, adequate financial provision being made, the burden being shared equally by all classes of people. We hear of frequent breaches, evidently because of floods which must have been an important problem then even as now. In fact, the construction of a chain of tanks interconnected at different levels was perhaps to lessen or arrest the force of streams, specially when flooded.

The construction of tanks was also undertaken with a missionary zeal.

Innumerable and detailed references in some literary works of the time and of a technical nature lead one to the conclusion that the people had developed a fairly accurate knowledge of finding water, digging wells at the appropriate places, if necessary, by blasting rocks. Also they knew how to construct and maintain such wells, throughout, as a perennial source of water-supply.

1. See 'Ujavana Loka', Ch. 5, P. 75, St. 9-4 regarding finding water; P. 84, St. 37, 38, 39 for blasting rocks; P. 84, St. 40 for sharpening implements. Also see Hathakaum, Ch. 11, P. 96, 97 and 98 for more detailed references to finding water; P. 104, St. 61, P. 105, St. 63 for keeping well-water pure and sweet.
The detailed references made to varieties of fishes, fishing-nets, by Rāghavānka in Harischandra-kāvya and a detailed section on angling or fishing as a sport by Sāmasvāra in Mānasālīśā, stray references to fishes as manure to plants by Čāvundārṣya in Lōṭikekāra and to fisherfolk lead one to the conclusion about the considerable importance given to fishing in the literature of the times. But, unfortunately, inscriptions are somewhat silent though references to river-tol s, ferry-crossing and etc., are there. One reason seems to be that during the early days, fishing was regarded as a sport confined to Royal circles, without being taken up as a profession by the ordinary people, to deserve the attention of the Government, for revenue purposes, or of the temple authorities, to expect a donation from fishermen as such. It is also doubtful whether strict orthodox rules of the Aṣṭabhyṣa even encouraged such callings, more so, because of the lack of demand. But, it seems that, by about 13th century, it

1. See Rāghavānka, Harischandra-kāvya, P. 75, St. 44,45, 46, for varieties and P. 65, St.8 for fishing-nets. These will be considered in the Annexure in detail.


3. See Lōṭikekāra, P. 87,St. 10 and P.94, St. 34.
had already become an important profession, as seen from references to different kinds of nets and varieties of fishes, which still popular. Another reason for the paucity seems to be that the political powers which ruled over Kārṇāṭaka were more or less land-powers unlike the dhōlas and pāndyas who had seen much of the sea to take a liking to fishing. More so, as the people lived above the ghats acquainted with tanks and rivers and not along the coast, except the Tuluvas.

While references to different varieties of fishes and their identification will be made elsewhere, here such questions as the (a) art or method of fishing, (b) habitat, (c) care or feeding, (d) economic importance or utilization and (e) development will be considered in a general way.

(a) Art or Method of Fishing:— Of the two motives or purposes, namely as a profession and sport, references made by Rāghavānka clearly indicate that nets were cast to catch them by fishermen who took to it as a calling. Rāghavānka mentions a number of nets such as the following:

- **Tadike vale** (bamboo net), **tatti vale** (net

1. Even now coastal fishing is more flourishing and lucrative in Kārṇāṭaka and supplies the internal demand than fishing in the interior in tanks and rivers. Fish-eating population also comes from the coastal-tracts.
mode of bamboo), hasu vale (not to be spread, evidently of fibre), hāsu vale (not to be cast), kodati vale (anvil), kōlu vale (perhaps similar to rod used in the other type), talli vale (one in to which fish was pushed), balil vale (one of fibre), tojaku vale (obstruction net) and so on.

It is likely that some of those were used depending upon the place, whether rivulet, river, lake or sea and with effect. In one place, RāgHAVāNkA says that the fisher-men just gathered several varieties (Sadgaidarau). This indicates the abundance.

Sōmāśwara gives a detailed picture of the equipment used while fishing for spē, evidently in tanks and by rulers. According to him, the fishing cords should consist of strong fibres preferably drawn from mūrva (popular bow-string hemp) and the bow made of bamboo or a branch of māda tree. Similarly, fishing-hook curved like a goad or hoof of a horse and made of iron. It is also gratifying to note, that, according

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1. A muster of others such as jāruvale (slipping), tōru vale, tōttī vale (pond), kannivale (with eyes), gātuvale, kāluvale, sidivale (breaks) are mentioned. See Harisobhrdrakāvya, P. 65, St. 8.
2. The expression used is bāderu which actually it should have been beataru or mālaugara. Sometimes the word jālagāra is found used.
to Hora, the choice of fibre, much valued in Europe for preparing roses, hook and the technique of baiting during Soméswara's time, had been better developed than at the present day. Though the use of reel was unknown, the method or technique of fishing explained by the Royal author is comprehensive, and the hints given, repeated today, inspite of the advance in this respect.

5. See Soméswara, Mánasollása, Sts. 1410-15 and Hora "knowledge of ancient Hindus concerning fish and fisheries of India", J H A Sp. XVI(14) No. 2, 1951, 154-55 (Trans) regarding the other varieties of string, size, thickness, length and other details.

4. See further Soméswara, Mánasollása II, Sts. 1418-20 and Hora quoted above, P.155 (Trans).

5. See Soméswara, Mánasollása II, Sts. 1420-30 and Hora further. Also for the specifications regarding tying hook to the rod, peacock-feather bait and the method of tackling while fishing. Rághavánsaka's reference to bowstring and rod in the extract "niladára nírkám bígáda nilukambinám", and probably songs to attract fishes (gówri), and bait (gála), medicines (máddu) or explosives (even now used), to get them in a lot, is significant. (See Harischandrákavya, P. 75, St.44.)

1. See Hora, article quoted above, P.164.

2. Ibid., P. 167 and 168.
(b) Habitat: A detailed study of the varieties mentioned by Śomēśvara and Rāghavānka shows that the authors were familiar with several types of fishes which survived in the sea, river-estuaries, pools and lakes and those which spent part of their time in sea and part in rivers. It is said by Śomēśvara that pools are the best places for angling or sporting for some of the sea-fishes travel up the rivers, 6 to 7 yojanas and reside in such pools. Even Rāghavānka, whose travels must have included certain coastal areas along Gokarn coast shows his equal acquaintance with marine as well as riverine fishes, as clear from the varieties referred to.

(c) Food: Śomēśvara gives a very detailed account of feeding of the fishes both in the morning and evening, to be done by experts. While some of them were to be fed on allis and cakes of sesame seeds, powdered or parched rice and flour of parched gram mixed with cooked rice, the others required meat, sometimes foul-smelling or of crabs, roasted meat of mice etc.

1. Śomēśvara, Maṇasollāsa II, St. 1381-99 and Hose quoted above, P. 151-53.
2. Rāghavānka, Harischandra-kāvyā, P. 75, St. 45-46.
3. Śomēśvara, Maṇasollāsa II, St. 1394-95.
4. "..... Holevaliya mingalima", Rāghavānka Harischandra-kāvyā, P. 85, St. 46.
5. See Maṇasollāsa II, St. 1400, ff.
(d) Economic importance and utilization: - Besides being a source of food, it also provided a lucrative profession, though to begin with, it was considered sinful. Fishes also served as a source of manure to plants, which grew to luxurious heights. It is not clear whether they were used industrially for extracting oil.

(e) Development: - Though one cannot imagine at this distance of time whether any deliberate attempt was made to encourage fishing and fishing-industry, references in the literature and the existence of boats, boatmen and fishermen point to certain definite things. At least from the fiscal point of view, development of fisheries brought in some income to the state. The maintenance of the tanks, an absolute necessity, was perhaps met by giving sufficient encouragement to fishing and fishing-industry. Much however could not be done because of popular beliefs, sentiments and rules of orthodoxy.

2. See ibid., Pp.65-67 for fishes which should not be eaten either because they are mis-shaped or otherwise. Some of them were poisonous or carnivorous.
3. See ibid., P. 69 for the view of the śrāvitikāras that the sin incurred by a fisherman in a year is incurred in a day by a farmer, who ploughs with an iron ploughshare.
4. See article quoted above for the concluding remarks.
### Table showing the varieties of Fishes in Literature & Their Identification

<table>
<thead>
<tr>
<th>Sl.No.</th>
<th>Name of the fish</th>
<th>Modern Equivalent</th>
<th>Technical Name</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.</td>
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<tr>
<td>1.</td>
<td>Pethinga</td>
<td>Wallace attu</td>
<td>J.A.S.B.XVII No. 2 1951, p.157</td>
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<td></td>
<td></td>
<td></td>
<td>SL.5; Harischandra kavya p.8-81 St.57</td>
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<td>B.</td>
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</tr>
<tr>
<td>1.</td>
<td>Karmika</td>
<td>Kobichota, Veli.</td>
<td>Sbruna, svavana</td>
<td>Chitt 4 Viloch</td>
</tr>
<tr>
<td>2.</td>
<td>Pancha</td>
<td>Neckvol</td>
<td>Scomber, scomberus</td>
<td>-</td>
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<tr>
<td>3.</td>
<td>Pemulung</td>
<td>-</td>
<td>Anguilla, kerma</td>
<td>-</td>
</tr>
<tr>
<td>4.</td>
<td>Jalchela</td>
<td>Flying fish</td>
<td>Exocoetra, exocoetra</td>
<td>-</td>
</tr>
</tbody>
</table>

1. See for text, Sūrāśvara Mūnaseśvara - Matsya vimāṇini or chapter on angling - Chap.XIV, Vm. 4 & for translation & comment Hora "Knowledge of Ancient Hindu concerning fish & fisheries of India" J.A.S.B. Vol.XVII, No. 2, 1951 p.145-160; see Raghavanka, Harischandra kavya, athais 5, p.75, stanzas 44-46. The analysis is divided into 3 sections: A. Varieties found mentioned in both works & identified, B. Varieties mentioned in Harischandra kavya only & identified, C. Others mentioned in Harischandra kavya & not identified. As regards varieties solely mentioned in Mūnaseśvara, see Hora's article quoted above, Raghavanka, Harischandra kavya, p.75, st.46.


5. Raghavanka, Harischandra kavya, p.75, st.45-46.
<table>
<thead>
<tr>
<th>Sl.No.</th>
<th>Name of Fish</th>
<th>Modern Equivalent</th>
<th>Technical Name</th>
<th>Equivalent in Manasa-Lekha</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>Kuridolega</td>
<td>Arius</td>
<td></td>
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<tr>
<td>6</td>
<td>Malqi</td>
<td></td>
<td>Barbus moosal</td>
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<td>7</td>
<td>Kaconde</td>
<td></td>
<td>Xenoptodon</td>
<td>Gondara</td>
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<td></td>
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<td></td>
<td>concila</td>
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<tr>
<td>8</td>
<td>Bilicho</td>
<td>Belva or jelly fish</td>
<td>Trygon varanak</td>
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<tr>
<td>9</td>
<td>Kujichu</td>
<td></td>
<td>Lates cal</td>
<td>Panjimada</td>
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<td></td>
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<td>11 carifer</td>
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<td>10</td>
<td>Eepu</td>
<td></td>
<td>Barbula</td>
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<td></td>
<td></td>
<td></td>
<td>24 Harpopus</td>
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<td></td>
<td></td>
<td></td>
<td>Phokrus</td>
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<tr>
<td>11</td>
<td>Liyambo</td>
<td>Asbel</td>
<td>Diploprion</td>
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<tr>
<td></td>
<td></td>
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<td>bifasciata</td>
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<tr>
<td>12</td>
<td>Mangal</td>
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<td>Silago</td>
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<td></td>
<td></td>
<td></td>
<td>gibona</td>
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</tbody>
</table>

Note: The names mentioned under the heading Modern Equivalents are based on the local names in Kannada & Konkan, obtained from the region of North Kanara district.

6. Perhaps also Bangade, in which case, the technical name is Rastrelliger Benedire.  
C. **Variation found mentioned in Rāghavānka's Hariśchandra-kāvya and not identified**

<table>
<thead>
<tr>
<th>No.</th>
<th>Name</th>
<th>Meaning</th>
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<tbody>
<tr>
<td>1.</td>
<td>Āvaraṇa</td>
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<td>3.</td>
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<tr>
<td>4.</td>
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<td>5.</td>
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<td>6.</td>
<td>Giriḷu</td>
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<td>7.</td>
<td>Gīdaḷe</td>
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<tr>
<td>8.</td>
<td>Gokrakaṇḍa</td>
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<tr>
<td>9.</td>
<td>Chīpula</td>
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<tr>
<td>10.</td>
<td>Pēllara</td>
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<tr>
<td>11.</td>
<td>Nirīḷu</td>
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<tr>
<td>12.</td>
<td>Pījīvāna</td>
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<tr>
<td>13.</td>
<td>Ḍīta</td>
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<tr>
<td>14.</td>
<td>Ruka</td>
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<tr>
<td>15.</td>
<td>Gopacana</td>
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<tr>
<td>16.</td>
<td>Shādusekkaṇa</td>
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<tr>
<td>17.</td>
<td>Sīgīḷu</td>
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<td>18.</td>
<td>Rūgalaṇḍe</td>
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<td>19.</td>
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<tr>
<td>20.</td>
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<td>24.</td>
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<tr>
<td>25.</td>
<td>Naulīṇu</td>
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</table>

The abbreviation, C.N.H. used above refers to the following work:-

"Cambridge Natural History".
