History of Indian Agriculture.

(Continued from page 77.)

III. The Modern Period 1200 A. D. onwards.

This again comprises the Muhammadan and British periods.

On the Muhammadan period we have a number of historical works, based on the records left by Muhammadan and Hindu writers at different times, and on the large number of inscriptions discovered. But we gather from them no more than a general idea of the condition of Agriculture, except perhaps from the portions based on the Aini-Akbari. The numerous Prabandhas, Kavyas and other literary works of the age are equally poor in details regarding the agriculture of the age. Nor have we any scientific works of the age except the manuscript of fragments of two treatises on Agriculture, the Balaramakrishisastram and the Krishisastram of Basava secured through a local pundit. Neither the date of composition nor the authorship of these works is known but from the occurrance of the names of crops, such as chillies and tobacco which are introductions during this period, these works in their present form appear to be composition of the 16th or the 17h century, though they might have had for their basis some older works. The original author of the former according to the work itself was Balarama (brother of Srikrishna) who had also the title of Haladhwaja (one who had the plough on his banner). The other work is said to have been written by Basava, probably the author of the famous medical work Basava Rajiyam or some one else, initiated by the moon.

116. The language and arrangement of both the works reveal that they have been much mutilated and interpolated. We, however, find in them a systematic attempt at the treatment of the subject and many scientific truths beautifully expressed. Complete originals of these, if found, will throw immense light on oriental agricultural science.

117. Of the British period we have regular records to show the general condition of the country at different times; of the condition of agriculture in particular we have one valuable record by Dr. Voelcker which, though a recent one, may be taken to represent the condition of Indian Agriculture during the British period.

118. Since the advent of Muhammadans into India the country did not enjoy continuous peace, which in spite of many political and religious changes, marked the periods. Some of the rulers, Muhammad Bin Taglak[80] for instance, levied heavy taxes on the cultivators. This combined with bad seasons, ruined many of the cultivators. There were, however, some even among the early Muhammadan rulers who had the welfare of the people at heart, and got many new tanks, anicuts and canals constructed.[81] It was not till the time of Akbar, however, that the administration was systematised and something like good government established by the Muhammadan (Mogul) rulers.

119. During Akbar's time the old units of measurement of land were abandoned and a resurvey made with the yard as the unit of length and a bigha consisting of 3, 600 Sq. yds as the unit of area.

120. Cultivated lands were divided for purposes of assessment into three classes, rich, medium and poor and the rate was fixed at one third of the produce, an average of 19 years having been struck. Payment might be made in grain or its equivalent in money.

121. The ryot had as before an occupancy right over the land.

122. Simlar taxation prevailed in the Deccan also where Malik Ambar (1600 A. D.,) is said to have copied the system adopted by Akbar in the North.

80. (1324-1351 A. D).

81. Feroz Toglak (1351-1358 A. D).

123. A little later Sivaji also adopted a similar system. Both money and grain rents prevailed, and when grain rents were collected two fifths of the produce was the maximum proportion of the assessment.

124. Takavi advances and remissions were also given by several rulers to encourage the creation of irrigation sources and other improvements to land.

125. The system of giving away large tracts as 'Ijara' or 'Mustajar' for collection of rent was in vogue at this time, but good administrators like Akbar or Sivaji discouraged the practice.

126. The British Government based their taxation on the systems in vogue in the different parts of the country at the time they passed into their hands. It is unnecessary to enter into the details of the land Revenue Policy of this Government. The 'Mustajar' system gave rise to the Zamindaris, which in some provinces were permanently settled. The ryotwari system prevailed in some provinces, and in Madras the assessment has been periodically (every 30 years) fixed at about half the net produce, which amounted to about one sixth to one third of the gross produce. The acre has taken the place of the bigha and other units of area.

127. According to the Balaramakrishisastra agriculture consisted not only of the production of food grains, sugar etc. through crops, but also of flowers and fruits from trees, of thread and cloth from cotton etc., of milk and ghee from cattle, of rugs etc. from wool, of silk from the silk-worm, and even of salt from the sea and of precious stones from the earth. This definition gives agriculture a wider scope than it has according to modern ideas on agriculture during these times.

128. Basava, author of another work[82] on agriculture, classified soils in different ways. According to colour there were black,

82. This is also a M. S. Sanskrit work of this age secured through a local pandit.

white, red and yellow soils. Distinction was also made between clayey, loamy, sandy, stony soils and also between low, medium and high lands. Three kinds of saline soils were mentioned, viz., Usarakshetra, Lavanakshetra and Rajakshetra decreasing in their salinity from the first to the last. Ill drained soils were 'Dravakshetra.' At the present day we have a large number of vernacular names for different soils on the same basis, and show that even very minute differences are recognised.

129. Paddy, sugar-cane, plantains and opium, according to Basava, grew well on low-lying lands as also bengal-gram, hemp, green-gram, wheat, mustard and gingelly[83]. The higher lands were said to suit gingelly, castor, black-gram, horsegram, red-gram cow-gram and lablab, cholam, tenai and chillies. Cotton and Gogu (Bimlipatam Jute), were said to suit both high and low lands.

130. Taking the colour into consideration, black soils could grow most crops well. The yellow soils suited the chilly family. On white soils (probably whitish clays) wheat, bengal-gram, barley, mustard, lentils, opium, paddy and sugarcane grew well; also cardamum, cloves and camphor[84] etc.

131. According to texture again clay soils were considered suitable to cholam, red gram and cotton etc. Fine sandy soils (loams) suited castor, and root crops such as the elephant foot yam.

132. In general the black soils were said to be good yielders, while the sandy soils were of medium fertility. The saline and ill-drained soils were ill-suited for all crops, though coconut, arecanut, betelvine could with difficulty be grown on the three kinds of saline soils respectively.

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83. There is probably a mistake here. These latter are probably intended to apply to medium soils of which there is an omission.

84. This again appears to be a multilation.

133. The effect of different soils on the same crop was also discussed in the Balaramakrishisastra. In the case of sugarcane black soils were said to produce hard jaggery, while that produced on red and white soils would be clean, and that on sandy soils granular.

134. Basava dealt with the improvement of soils also in some detail. Sandy and stony soils could be improved by the addition of silt and decayed vegetable and animal matter, red and yellow soils by the excreta of animals, and clay soils by the addition of sand. Saline soils, it was stated, could be improved by the addition of sand, ashes of kodo millet and other straws, neem and other oil cakes, and green manure such as indigo, sunn-hemp etc.

135. The cultivator's practices at the present day mostly conform to the above.

136. Besides the crops referred to above, cholam, linseed, long pepper, ginger and tobacco also find mention. Both tobacco and chillies are considered to be introductions by the Portuguese maize; and groundnut which were later introductions do not find mention in the works referred to above.

137. The cropping seasons were also fully detailed. The year was divided into 27 periods known as 'Karthis,' and the crops to be sown in each mentioned. Space does not permit of entering into details. Fourreen Karthis—Aswani to Hastha form the main sowing season, but in the month of Makara (Jan-Feb) what are known as 'Utharasasya' or subsequent crops, viz., gingelly, green-gram, short duration paddy, indigo and cotton were sown. The present practices conform to the above.

138. Special attention appears to have been paid in this period to the methods of forecasting rain. Astronomically, of course, there were means of doing this, but popular though empirical methods were also evolved. One work, Sasyanandam, a Telugu

translation (manscript) of which in verse has been secured, is entirely devoted to such methods. Besides the methods based on the positions of the planets and stars, other signs of prospective rain were studied. Relation was established between the number of well developed seed found in the pods of a Butea Frondosa tree and the rainfall in the succeeding season. Of the three seeds usually found in a pod the development of the first, second and third seeds indicated good rain at the beginning, middle and end of the rainy season respectively, and a full pod indicated a uniformly good season. Similarly rainfall was considered to have relation to the flowering of certain trees. Relation was also established between the flowering and bearing of certain trees and the yield of crops in the following season. The advent of certain insects such as the dragon fly and many other signs of rain were also believed in.

139. The object of tillage according to Basava was to remove the phena, (probably hard crust), stones and roots in the soil and to remove infertility by exposing the earth to the rays of the sun, moon and air. Ploughing to a depth of one Ratni about (14 inches) was ordinarily considered sufficient, but the land if ploughed $1\frac{1}{2}$ Ratnis deep was said to yield excellent crops. In general, the rule was the more the land was ploughed the more the yield.

140. The plough was said to be of three kinds. One made wholly of iron was considered best, and one of wood the worst, and one made of both was of medium quality. Balaramakrishisastram makes mention of ploughs made of bronze and copper also, the latter being supposed to destroy insects.

141. Not only bullocks but also buffaloes, horses, elephants, camels and goats were used as draft animals.

142. It is doubtful, however, whether the use of horses, elephants and camels, of iron, bronze and copper ploughs and tillage to a depth of 14" to 21" was ever a feature of the modern period. Basava might have based his writings on a work of an older age when they might have been in use.

143. Among other implements of tillage were the levelling board, (samadandakam) and the scraper (Akarshikam). Besides 'Khanithra' the spade, known from the Vedic time, the khanitham, khanithrakam and kutthalikam are other digging tools mentioned and are probably different forms of hand-hoes. It is strange that the variety of implements and tools now in use in the Ceded Districts and other tracts which should have been in use for a long time do not find a mention. We have at the present day a good many implements, tools and machinery of foreign origin, such as, improved ploughs, cultivators, pumping plants, pick-axes, forks &., the use of some of which the Indian cultivator and cooly are getting familiar with.

144. The best time for the commencement of tillage was according to Basava, the winter (Hemantharthu) and its value decreased as it was postponed to the spring (Vasantharthu) and summer (Grishmarthu). Ploughing just before sowing was very much deprecated.

145. The subject of manures and manuring was also discussed at great length. The excreta of cattle and other animals, solid as well as liquid, oil cakes, green-manure, silt from tanks, canals etc., sand, ashes, and charcoal were the chief manures recommended. In general all rotten vegetable or animal matter was known to make good manure. The recuperative nature of certain crops appears to have been recognised, for while prescribing various manures for different crops, Balaramakrishisastram notes that red-gram required no manure but only deep tillage.

146. The usual methods of propagation were all mentioned by Basava. Seed, it was said, should not be sown in too moist or too dry a seed bed. The method of sowing seed in dry earth in case the rains are late—a common practice even now—was however mentioned. We hear of the drill (Vapikam) for the first time in Basava's work. Paddy, samai, chillies and tobacco were sown in a nursery and transplanted and such crops were termed 'Dwivaraka.' The manner of raising seedlings in a tobacco nursery was clearly described in the Balaramakrishisastram.

147. Basava, while dealing with soils, crops, tillage, manures etc. in such detail, closes his work abruptly without a word about the subsequent operations.

148. The value of irrigation was no doubt recognised by the people as well as the rulers throughout this period also and in spite of the internal peace of the country having been constantly disturbed, efforts at the improvement of irrigation sources were not wanting. Pherozesha, Shersha, Akbar, among the Muhammadan rulers, as well as Hindu kings like Prathaparudra and Krishnadevaraya had numberous irrigation works constructed during their reigns. The progress, however, could not keep pace with the growing needs of the population. The British Government also set themselves to remedy the defect and constructed a large number of irrigation works such as are seen in the Deltas of the Godavari, Kistna and Kavery, but even now the majority of Indian cultivators are not yet sufficiently insured by irrigation facilities against bad seasons such as we had recently experienced.

149. The water lifts now in use are probably all inherited from the previous period. Their efficiency taken along with their simplicity and cheapness is noteworthy and efforts to improve them met with little success. They are, however, much behind the times and labour saving appliances are a desideratum. The introduction of power driven pumps, of late, is an advance in the right direction.

150. Though we have no reference to inter-culturing or other operations, which go under the head of 'after cultivation', the operations which are now widely known in many tracts should have been in vogue during the Muhammadan period also. The way in which the propping up, wrapping, draining &c., of sugarcane, in or in which the betel-vine is trained on agathi plants or on posts fixed under cover of huge pandals which resemble modern conservatories, speaks high of the skill of the Indian agriculturist even of the present day, traditional though his methods may be.

151. We have no information as to crop pests and diseases prevalent during this period or the methods of treating them. Certain

practices such as the application of margosa cake when the paddy crop is affected by the caseworm, or the sprinkling of ashes when certain plants were attacked by catterpillars or plant lice, or using margosa or Bodatharam leaves in the preservation of seed, but in the generality of cases nature was the only cure. The researches of Entomologists and Mycologists of the present day, it is hoped, will in due course result in the discovery of efficient methods within easy reach of the ryots.

152. The methods of harvesting and threshing now in vogue are more or less the same as those of the Vedic times. Modern (western) machinery, however, promises to come into use and will no doubt play ere long an important part in Indian agriculture. Though the agricultural practices of this period have been, as we see from the details referred to above, on the whole rational, the cultivators owing to their methods having been merely copied down from generation to generation have lost all knowledge of the principles on which they were originally based, and owing to this ignorance they could not improve or even maintain the fertility of the soil or the yield of their crops at the level they attained previously; there was thus a gradual deterioration. At the present day, while agriculturists in other countries have been by the aid of scientific methods realising steadily increasing profits from their lands, the Indian agriculturist has become an ignorant, custom-bound creature, forced to content himself with his lot.

153. Horticulture flourished during the Muhammadan period chiefly through the interest taken by some of the rulers. Krishnadevaraya among the Hindu kings and Aurangazeb among the Muhammadans were famous for having several new gardens laid out during their times. To the Portuguese we owe the improvement in mango cultivation. Grafting with the object of preserving quality, appears to have come into vogue at this time and the art has since developed largely. Batavian oranges which are a chief feature of the Palacole tract of the Kistna District appears to have been introduced by the Dutch. The rose was an introduction from the North West during the Muhammadan period. Muhammadans took

delight in perfumery and the art flourished under their rule. Almost all the vegetables now under cultivation are mentioned by Basava. The potato appears to have been introduced by the Portuguese. During the latter part of the British period horticulture entered a new phase of life by the establishment of horticultural societies; flower shows began to be held, and owing to the impetus a large number of new species of plants of all classes were introduced. It should, however, be noted that the water-hyacinth and Lantana which are now great pests were at the beginning imported horticultural rarities.

154. Cattle fared poorly during the modern period, partly owing to the gradual decrease in the area available for grazing and partly owing to the indifference of the people. Muhammadans did not hesitate to kill cows, an act of no little discouragement to cattle breeding. It is noteworthy, however, that certain sets of circumstances, tended towards the preservation of certain breeds of cattle such as the Mysores or Nellores. Now again the subject of improvement of cattle has attracted the Government which has not only organised a Veterinary department in each province but also employed cattle breeding experts in some, for the speedy investigation of problems connected with the subject.

155. In spite of the rough political weather that prevailed during the greater part of this period, the village organisation survived and greatly helped the people in tiding over the times. In times of war the combatants mostly confined themseves to the rich cities and towns which were plundered, and the villagers were generally unaffected. The inhabitants of each village managed their own affairs and sent the rents payable by the villagers usually in a lump sum. They made arangements among themselves to protect the village from thieves and robbers. Disputes were settled by Panchayats and the village was self-contained in every way.

156. This arrangement, however, gave way later on and it has been our painful experience that a war, thousands of miles away

in Europe, affected the peasant in the remotest corner of India, for the villager was no more self-contained and the whole of India became more or less one unit, either to suffer or to enjoy[85].

157. From the religious and social point of view there is a good deal of further deterioration in the community since the Puranic age. The spiritual side of the teachings of the great sages who set up different schools of religion was marked and based on the symbolical customs adopted by each school, different sects and subsects arose out of the four castes, which no longer fulfilled their duties originally prescribed for the welfare of the whole community. Early marriage became the rule, no doubt largely due to the fear of Muhammadan atrocities. There was a general deterioration in the physique of the people. Education even among the higher classes became rarer, and in the lower classes there has been nothing at all. Neither science nor art could make much progress. The life of the people was more or less guided by tradition and custom. Agriculture under the circumstances could not improve or even retain its old position. Though for a time fairly good yields were obtained under the old methods of cultivation, there was gradually a fall. To meet the demands of the country larger and larger areas had to be taken up for cultivation, and in course of time all fairly good lands were taken up and only useless lands remained. The cultivator was unable to find any means of maintaining or of improving the yield and has therefore gradually become poorer and poorer. And this poverty now stands in the way of his improving again, even if better methods of cultivation are discovered and placed before him.

158. Such in brief has been the course of agriculture during this (modern) period. The agricultural practices of this period were and are still full of common sense, derived from the previous ages, but in the present days of world-wide competition and struggle

85. Hindudesa Kadhasangraham Part II P. 82.

for existence they are of no avail, and unless the people rise to the level of the other forward nations in point of education, scientific knowledge, co-operation, and industry, there is no salvation for Indian agriculture or the Indian agriculturist.

159. This investigation into the history of Indian agriculture leads us to the following conclusions.

1. Even in the early Vedic times agriculture was far above the primitive stage and probably not far below the present one.

2. During the latter part of the ancient period (the epic and sutra ages) it developed gradually and probably reached the highest point during the close of this or the beginning of the next period.

3. The agricultural practices in vogue, when the art was at its best, may, considering the naturally rich condition of the land and the availability of fresh areas, be said to have attained a pretty high degree of development, though they may not stand a comparison to the recently developed western methods.

4. Agriculture was treated more as an art than as a science, but the various branches of natural science on which agriculture had a bearing, had a fair amount of development and should have greatly helped this art.

5. Progress ceased towards the latter part of the medieval period, but the art remained in a good condition till the end of this period.

6. During the early part of the modern period also agriculture could, owing to the extension of the cultivation to new areas, keep the cultivator fairly prosperous, but latterly, owing to the areas that could be freshly taken up being limited and the deterioration of the lands already under cultivation, the inability of the cultivator to find means of improving the yield and competition made the condition of the cultivator unsatisfactory.

7. Horticulture was also known from the earliest times; it was developed during the epic times and has been in a more or less flourishing condition chiefly under the patronage of the rulers, but the scientific aspect of it which was much in evidence during the early part of the British period, was gradually lost.

8. Cattle were paid great attention to in the ancient period and the early part of the medieval period, but there was a gradual decline.

9. The causes for the decline, in general, were, (a) the degeneration of the social organisation, which at first tended towards progress and peace, into its present much divided unworkable form which resulted in the moral and physical deterioration and absence of unity in the nation and consequently in the country being subject to internal dissensions and latterly to foreign domination.

10. The remedy lay chiefly in the people raising by strenuous efforts to the level of other forward nations in point of education, scientific knowledge, co-operation and industry.

(Concluded)

G. Jogi Raju.

Review.

A Fruit Growing Industry for the Madras Presidency.

Under this title Sir F. A. Nicholson, K. C. I. E., I, C. S. has issued a leaflet, urging the more extensive cultivation of fruit trees in the future. The leaflet shows an intimate knowledge of men and country and is full of facts based on personal knowledge.

He regrets the lack of good fruits in our presidency and says, that the fruits ordinarily consumed, are poor in quality and inadequate in amount. The prices of good fruits are high and are often beyond the means of the man in the street. He makes mention of their high dietetic value, their cooling and refreshing qualities and the physical enjoyment afforded by tasty and well-grown fruits.