

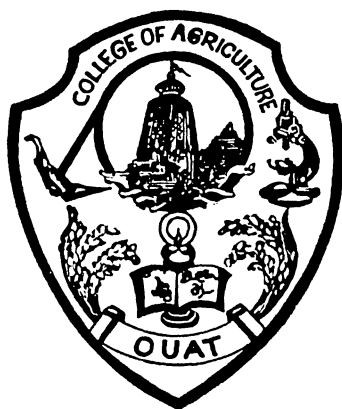
SURVEY, EVALUATION AND SELECTION OF LOCAL ELITES OF MANGO IN CUTTACK DISTRICT OF ORISSA

**A THESIS SUBMITTED TO
THE ORISSA UNIVERSITY OF AGRICULTURE AND TECHNOLOGY, BHUBANESWAR
IN PARTIAL FULFILMENT OF THE REQUIREMENTS
FOR THE DEGREE OF**

**MASTER OF SCIENCE IN AGRICULTURE
(HORTICULTURE)**

BY

Rabindranath Behera

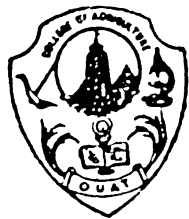


**Department of Horticulture
COLLEGE OF AGRICULTURE
BHUBANESWAR
1988**

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DEDICATED TO
MY BELOVED PARENTS



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CERTIFICATE

Certified that the thesis entitled "SURVEY, EVALUATION AND SELECTION OF LOCAL ELITES OF MANGO IN CUTTACK DISTRICT OF ORISSA" submitted for partial fulfilment of the requirements for the award of the degree of MASTER OF SCIENCE IN AGRICULTURE (HORTICULTURE) of the Orissa University of Agriculture and Technology, Bhubaneswar, is a faithful record of bonafide research work carried out by Sri Rabindranath Behera, under my guidance and supervision. No part of this thesis has been submitted for any other degree or diploma or published in any other form.

It is further certified that the help and assistance received by him during the course of investigation have been duly acknowledged.

Forwarded
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 15.6.89

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I pay my regards and heartfelt devotion to my late grandfather for his blessings in disguise which guided me in every step of my life.

Lastly, words run short to express my profound gratitude and obligations to my beloved parents, grandmother etc. whose blessings have made me to be so to-day.

Rabindranath Behera
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Dated, the 14th June, 1989.

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CHAPTER I

INTRODUCTION

INTRODUCTION

Mango is the most popular fruit of India grown from time immemorial. In India, the acreage is 0.977 million hectares having total average production of 8.925 million tonnes (Anonymous, 1979). The Orissa contributes 10.35% of total production of the country and the area under mango in the State is 90,498 hectares with an annual production of 8,50,681 M.T. It is very rich in nutrients and some varieties contain over 20% of T.S.S. It is also a rich source of Vitamin A and Vitamin C, apart from normal minerals and other Vitamins. It is said that the mango provides two and half times more calories than wheat. Kernels of mango contain over 80% of protein, equal proportion of fat and carbohydrates.

Mango fruit is consumed as an article of food at various ways. Out of the total produce in the country, about a quarter is used in preparation of different products, such as, making of slices in brine, canned mango in syrup, mango juice, pulp, nectar, flour, jam, dried slices, pickles, chutneys etc. There is considerable scope for export of mango products. Mango and its products are exported to nearby fortytwo countries of the

world. About 26,000 tonnes of processed fruit valued at Rs.6 crores are exported annually. The USSR was the major buyer and recently West Asia, U.S., Saudi Arabia showing more interest for taking the products. Fresh fruits to the tune of 4,000 metric tonnes are also exported of which 75% goes to West Asia, and 10% to U.K. Export to U.S.A. is limited due to embargo on stone weevil and spongy tissue development inside the fresh fruits.

In spite of its supremacy in acreage, the bearing potentiality per tree tends to be very low. Variation in production from orchard to orchard is also very high. Mango orchards exhibit lower orchard efficiency as compared to many other fruit crops, giving an average yield of 8 to 10 tonnes per hectare as against 20 to 40 tonnes per hectares obtained from an average crop of banana and guava. The agro-climate conditions of the State is very much favourable for mango cultivation. Studies in the tribal belts and other areas of the State indicate that Orissa is very rich in local indigenous mango varieties, in which some of them are superior and comparable with standard commercial varieties of the country.

In Orissa, out of 2,10,648 hectares grown under fruits, mango occupies 90,498 hectares with total production of 8,50,681 metric tonnes. Cuttack district alone contributes 19,571 hectares towards mango cultivation

with total production of 1,83,822 metric tonnes. The area of the mango has been increased very steadily from 57,762 to 90,498 hectares and production from 7,68,989 metric tonnes to 8,50,681 metric tonnes during the last twenty years.

Despite the enormous wealth of mango varieties available, an ideal variety is yet to be developed with desirable characteristics in the State. Most of the cultivars are in lack of important characteristics like precocity, dwarfness, prolificity, regularity of bearing, self-fruitfulness and resistant to pests and diseases, transportability, post ripe longevity, etc. These characteristics are of vital importance in developing commercial orchards and also for increasing fruiting potentiality per unit area. Combining all these desirable characters in a single variety is difficult.

It is interesting to note that most of the commercial varieties have their origin in chance seedlings. Dashehari, an important commercial variety of Northern India originated from a seedling tree in the village of Maliahbad near Lucknow in Uttar Pradesh. Langra came from Hajipur in Bihar and Alphanso from Goa. Thus, these mango varieties are a result of the selection of chance seedling by fruit lovers and their perpetuation by them through vegetative propagation. There is a lot of confusion about their names. The famous North Indian variety,

Langra, for example, is known by not less than fourteen other synonyms in different States.

A search for newer varieties has assumed importance in recent times. Two other aspects to be kept in view for meeting the demand of mango industry: (i) Exploitation of chance seedling of mango to build up a genetically diverse varietal stock for breeding varieties resistant to maladies, other pests and diseases, to breed varieties with a regular bearing habit - a problem so vital to our present days mango industry - and to find out a suitable root stock with uniform behaviour through the exploitation of polyembryonic varieties which will help in standardising the clonal progenies; and (ii) developing suitable types for canning (both juice concentrates and pulp products) and fresh juice made into ready-to-serve beverage, the former now becoming a good earner of foreign exchange. Therefore, it becomes necessary to select out the most important, delicious, high yielding, dwarf, regular bearing elite mango germplasm from the State, so that, these can be protected and could be maintained through vegetative propagation for future use.

The investigation was carried out in most of the districts of the State and about five hundred and forty eight local elites were collected and screened from the thousands of available local elite types in the State. Out of five hundred and fortyeight local elites of Orissa,

Cuttack district alone contributes sixtyeight local elites of mango. The promising local varieties such as Mahua, Manda, Bhelua, Kakudia, Kadalia, Silapua, Rajbhog, Kan-chasuadi, Kalei, Nakei, Sundari, Mangalmunda, Krishna - Ballav etc. were identified from the Cuttack district. The similar type of informations also reported by Das et al. (1977) and Parida and Rao (1985). Orissa being the State meeting the North and South, both North and South India types of mango are grown in the State. All these promising varieties were isolated on the basis of their yield behaviour, fruit characters as well as of their superior fruit quality. Fruit characters include size, shape, weight, appearance, internal morphology and stone characters. The locations of the mother plant of the elite varieties have also been earmarked in order to facilitate selection of bud sticks for future multiplication and study on the aspect. -

Above all, mangoes are much valued in Orissa. Besides, being a delicious fruit to others, it has a special value to the tribal people who constitute one fourth of the State's population and who live for months on this fruit, using the pulp and the kernel as a food. The proper selection of varieties provides the keystone of success in commercial fruit farming which can never be over emphasized. It is of considerable economic importance to the grower to be able to identify not only the ripe fruits of mango varieties, but also the trees thereof in nursery and orchard. Such knowledge

would enable the growers to determine whether the trees are true to name is invaluable before or at the time of purchase of trees.

The studies described in this work have been primarily undertaken to provide an insight into the problem of variety selection based on an accurate recognition of the important varietal characteristics. In this effect, these studies form only the first step in the line of providing a basis for the identification of varieties and for their proper nomenclature and classification. For effecting a final solution to the vexed question of mango nomenclature and classification a comprehensive nation wide measures appears necessary. But it has to be necessarily preceded by a thorough and accurate description of the varieties all over India.

CHAPTER II

REVIEW OF LITERATURE

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The various attempts made in the past for describing and classifying mangoes have generally suffered from the adoption of unstandardized or ununiform methods. Wester (1920) described that mango classification worked out in India is entirely artificial. This is mainly due to the dissimilar degree of importance accorded to various characters by different workers. Wester (1920), Burns and Frayag (1921) and Popance (1927) had also no difficulty in bringing out the existing anomaly in mango nomenclature while Popance (1927) and Richards (1943) have emphasized the wide spread Indian practice of coining new names to varieties. So to the average mango grower distinctness has been the working definition of a variety.

The ready recognition of a variety by its tree size, tree shape, form and size of leaf, fruit size, fruit shape, fruit flavour, rind (skin), pulp colour and its aroma is the main working basis. For careful survey and systematic studies of local varieties, the following characters are

to be taken into consideration.

1. Vegetative character
2. Floral character
3. Fruit character
4. Varieties
5. Origin
6. Basis of nomenclature and system of classification.

1. VEGETATIVE CHARACTERS

(1) Tree character - Grub (1922), Upshall (1924) found that the epidermis colour of the young shoots or the colour of the bases of spines to be useful characters in classifying fruit varieties.

Popence (1927) described that in mango, the habit and nature of growth have been utilised to some extent in describing and classifying varieties.

Thomson (1932) was of the opinion that the winter wood characters such as the epidermis colour, epidermis scaling, the internode length and the nature of the buds also possess considerable taxonomic importance.

Nicholaisen (1933) reported about the immense importance of habit of the tree and nature of growth. He has also adduced evidence to show that the weight of the individual plant and the water content of the leaves possess certain amount of varietal importance.

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(ii) Leaf characters - Jogiraju (1918) reported the importance of some leaf characters in mango but he has not employed these for varietal classification.

Bunyard (1934) reported that shoot leaves are more constant in character than spur leaves.

Crane and Lewis (1940) reported that the leaf characters usually intergrade and are not sharply definable. They reported that since the discontinuity of characters is a prerequisite for any workable system of classification, it is not improbable when approached through genetical analysis that leaf and shoot characters would be found more satisfactory than those of the fruit.

The various aspect of leaf characters are as follows -

(a) Orientation: Blake and Connors (1936) postulated that the angle formed by the leaves with the spur varies with the growth status of plant. While orientation is certainly found to be a useful character for diagnosing varieties in mangoes, it is inapplicable for grouping of varieties because of the fact that only few varieties, i.e. Himayuddin, Alampur Baheshan, Chinnarasam and Peddarasam etc. exhibit distinct differences in respect of having upheld leaf orientation.

(b) Shape: Shaw (1914) pointed out that the size of the leaf blade varies with its position on the tree in relation to light.

Upshall (1924) and Alderman and Shoemaker (1925) and Winter (1930) have stressed the importance of the shape of the leaf or size of the leaf in rapid identification of varieties and according to them these characters are constant.

Bunyard (1934) described that the shoot leaves are more constant than spur leaves.

Lott (1937) reported the shape of the leaflets to be varietal character.

(c) Waviness, folding etc. : Shaw (1922) indicated that though the intensity of folding is variable according to condition of weather and season, it is nevertheless a most valuable character in the identification of varieties. Thomson (1932) described that the flat or folding nature of leaves, the reflexion or crinkling nature and waviness are of diagnostic value in varietal classification.

Daly (1925) described that the spiral turn of leaves and leaf tip are outstanding characters for identification of varieties.

(d) Leaf tip and margins: Shaw (1914) and Daly (1925) have described the taxonomic importance of the shape of the leaf base and leaf tip. Alderman and Shoemaker (1925) reported the leaf tip in mangoes has been found to be very distinctive and provide a very easy and useful diagnostic feature.

(e) Colour of the foliage: Shaw (1914) concluded that the leaf colour is not helpful in recognising varieties as the shade of the green depends on the vigour of the trees.

Upshall (1924) has employed the scarcity and abundance of yellow pigments in the leaves for varietal identification.

Drain (1925) pointed out that though the colour of the leaves is constant in varieties, its utility in taxonomic studies is limited due to the want of suitable characters.

Winter (1925) described that the relative intensity of the colour of foliage is helpful in identification of varieties.

2. FLORAL CHARACTERS

Monceau (1768) have emphasized the value of flower characters for identification of fruit varieties. Farrel (1917) found that the length and stoutness of the pedicel are helpful for varietal identification. Hedrick (1925) pointed out that the inflorescence characters are the least variable and are more constant than any other characters even under varying conditions. He found that the two distinct arrangement of styles, namely, united in a column half their normal length and division of styles to the base and the stigma adherence to the apex of the fruit to be of diagnostic value.

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Thomson (1932) have emphasized the value of flower characters for identification of fruit varieties. He described that the laxity or the stiffness of pedicel is characteristic of varieties.

Branscheidt (1933) reported the set of anther and the multiplicity of styles are reliable varietal characters. Bunyard (1934) have observed that flowers were important diagnostic features. He has given considerable attention to the relative lengths of stamens and pistil or stamen and style in this studies.

Krumholz (1939) pointed out that the system based upon the flower characters is more satisfactory than that based on characters of the vegetative organ or of the fruits. He described that the shape, size, colour and texture of the sepals, structure of calyx, nature of receptacles, variation in the shape of petals, nature of margin of petals and the relation between the size of petals and sepals are important features that provide clues in varietal identification.

Considering the value of all these floral characters, it may be concluded that the shape of the inflorescence is the only character that can help in the group of varieties.

3. FRUIT CHARACTERS

Monceau (1768) and Hedrick (1925) described that the fruit characters should be extremely importance to provide description of mango varieties.

(a) Shape: Burns and Prayag (1915 and 1921) pointed out that the results of an arbitrary classification based upon fruit characters may lead a little towards determining ancestral type from which the present varieties have sprung and may also be of practical importance in producing new forms.

Hedrick and Drain (1925) pointed out that the shape of the fruit is best of all the characters for identification. Drain (1925) and Babone (1932) described the importance of fruit characters such as shape, colour, size, outline of transverse section of the fruit or length and breadth. Sefick and Blake (1936) stated that the fruit are found to vary in form according to climatic factors and therefore, suggested that the fruit forms for New Jersey may not be characteristic in all details for the same varieties grown elsewhere.

(b) Colour: Wenter (1920) described that the skin colour of mango varieties varies according to race.

Hedrick (1925) reported bloom is highly characteristic of drupe fruits.

Drain (1925), Wiets (1933) and Boswel et al. (1933) described the importance of the colour of skin or rind in the systematic description of fruit.

Boswel et al. (1933) reported that the colour of immature fruit is also helpful in identifying varieties.

(c) Bases: The nature and shape of the stem and shape of the depression are important for varietal classification. Hedrick (1925) reported that the study of cavity enhances the description. He has also stressed importance regarding base of fruit and shape of apex in identification. Compared with the form of fruits, the base, cavity and insertion of stalk are found to be of minor value in mango classification. On the other hand, shape of shoulder and nature of sinus vary between varieties to an extent as to provide useful tertiary characters in grouping of this fruit.

(d) Internal character: Durham (1920) pointed out that the organoleptic character of the taste is useful in classification. Hedrick (1925) pointed out that the demarcation of quality is the most unreliable part of the description. Babone (1932 and 1934) emphasized the importance of weight, volume, length, breadth with the correlation between last two, the straightness and the curvature of the two longitudinal axis and stone in varietal classification.

Bunyard (1934) reported that while quality is open to serious objection as a diagnostic feature, stone characters such as the venation, extent and nature of fibre are found in mangoes to afford tertiary characters of value.

4. VARIETIES

There are many varieties of mango, each with distinct fruit characters of its own.

Webber (1903) described that Horticultural varieties are more strictly designated as clones, since they are derived from a single individual by vegetative propagation and therefore, considered as part of the same individual.

Popenoe (1920) reported that all varieties of mango can be classified under two categories; the seedling races, both wild and cultivated ones and the horticultural varieties which are propagated asexually.

Wester (1920) described that seedling races were polyembryonic type. They reproduce the characteristic of the parent by seed and have been called varieties. He also reported that on the basis of appearance, texture, flavour and aroma, they are distinguished from the fruits of other trees of the same species. Some of the morphological characters of these trees may also be different from those of others. Further, trees of a single horticultural variety have been the same genetic constitution because of their descent from the same ancestral source.

Mukherjee (1948) reported that the seedling races are not so well known as the grafted varieties which are grown successfully on a commercial scale over large tracts in India.

Webber (1948) described a variety as a group of individuals propagated asexually from a single parent. Such a group plants produces fruits of distinctive appearance, texture, flavour and aroma. Seedling trees growing all over the world can be conveniently divided under two headings; those which are polyembryonic and produce from their seed offspring true to the type and those which are monoembryonic and produce gametic seedlings of great genetic variability.

Frost (1948) described that propagation from such a seedling gives a new horticultural variety. Mukherjee (1949) reported that the wild races occur almost throughout India in the forests of the Chittagong Hill tracts (near Burma border), Assam, Orissa, Chhotanagpur, at the foot of the Himalayas and in the Western ghats. They grow upto an elevation of 3000 ft. and are commonly found on sloping hill sides in raviness and by hill streams. These trees attain an immense height varying from 100 to 150 ft. The fruits of these wild types are usually smaller but under favourable conditions they sometimes attain almost the same size as those of grafted trees.

5. ORIGIN

Some source of origin of some famous cultivated varieties are as follows -

Lahiri (1895) reported that originally two varieties were existing in Marshidabad, the Maldah ^{and} the Choonakhali.

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Later most of the famous Murshidabad mangoes resulted from the crosspollination of these two varieties.

Popenoe (1920) reported that the variety Combodiana was originated at Miami, Florida, from a seed introduced in 1902 from Saigon, Cochinchina. Popenoe (1920) described that variety Haden, originated as a seedling of the famous Indian variety Mulgoba at coconut grove of Florida, U.S.A. Similarly, Dashehari is said to have originated from an unknown seedling tree in the village Dasbehari in the Lucknow district of Uttar Pradesh.

Samar Bahisht Chausa: The original home of this variety was the village Chausa near Malihabad, Lucknow of Uttar Pradesh. The parent tree was an unknown seedling type and the urdu expression means 'fruit of Paradise'. Rataul is said to have originated as a seedling of the variety Safeda Gola at Rataul (Meerut, Uttar Pradesh). Langra is said to have originated from Hajipur in the district of Muzaffarpur almost due north of Patna of Bihar, across the river Ganga. This name was given to the fruit because a lame (langra) hermit (Fakir) used to live at the foot of the huge seedling tree from which the variety langra was multiplied by grafting and disseminated among different regions.

Since mango is a highly heterozygous fruit and, therefore, the seedlings exhibit a wide range of variation

which aids in the selection of desirable types. Ultimately such selection are named and new varieties are multiplied. Thus all the improved cultivated varieties of the mango originated from seedling and were multiplied and distributed by grafting or such other means of vegetative propagation.

Mukherjee (1949) described that because of the cultivation of the mango over a long period and the selection of superior strains by man according to his taste, a great range of variation has been produced, as a result of which about a thousands of varieties have been evolved in India alone.

Mukherjee (1950) reported that intervarietal hybridization in nature has been perhaps another important factor in the production of new varieties.

6. BASIS OF NOMENCLATURE AND SYSTEM OF CLASSIFICATION;

Although the mango had become well established as one of the best fruits in India in the age of the Sanhitees (centuries before Chirst), the first systematic record available about the Indian varieties is from the account of this fruit given in the Ain-i-Akbari (1950).

Maries (1901-02) reported that the first attempt to describe mango varieties scientifically was made in the beginning of the twentieth century when about five hundred

varieties were reported to have been collected.

Wood house (1909) reported that forty mango varieties of Bhagalpur of Bihar were described and a system of classification mainly based on fruit characters were suggested. The varieties were classified in three broad groups - (1) round fruited, (2) Bombay type and (3) long, oval or rectangular fruit. Hartless (1913) reported that the importance of floral characters in classifying mango varieties was used for the first time when, besides the colour of the flowers and of the flower stalk, special emphasis was laid on the length of the panicle. According to him, the varieties were consequently divided in three main groups - (1) short paniced, 4 to 8 inches, (2) medium paniced, 8 to 16 inches and (3) long paniced, about 16 inches. There is a varietal difference in the length of inflorescence bed, this being a quantitative character, there is a lot of variation in the length of panicles depending upon a number of factors.

The mangoes grown in florida were classified into a number of distinct groups, recognisable by characters of the fruit, habit of the tree and the stone.

Rolphs (1915) reported that the varieties were grouped into nine main groups (1) Turpentine group, (2) Elcanor group, (3) Pineapple group, (4) Number eleven group, (5) Bombay group, (6) Cambodiana group, (7) Sandersha

group, (8) Mulgoba group, (9) Gola group.

Wester (1920) reported that to make the system of classification comprehensive and enduring, it was suggested that it should include mangoes not only from India but also from all the mango growing regions of the world. Popenoe (1920) described that the varieties were classified in a natural way on the basis of fruit characters, colouration of the panicle axis, laterals and pubescence of the panicle branches and the numbers of embryos in the seed. According to him, the varieties were classified into four main groups based on natural resemblance - (1) Mulgoba group, (2) Alphonse group, (3) Sandersha group and (4) Cambodiana group.

Burns and Prayag (1921) described that eithytynine varieties found in Bombay State were classified and divided into three principal classes - (1) round fruited, (2) long fruited and (3) indefinite.

Bhat (1944) described that as a result of grafting features like low branching and tree vigour area likely to be influenced by the root stock and hence a full and natural description of any variety may only be obtained from the original seedling tree. So according to this view only morphological characters may serve as the criteria in building up a system of classification from mangoes. Again root stock also influence scion, but due

to lack of its standardization in mango culture, its subsequent effects have to be ignored at present in classifying and describing mango varieties. Moreover, fruit characters, being the most stable, should be given more importance than vegetative ones. It would be almost impossible to get at the original parent seedling trees of most of the better known horticultural varieties.

Mukherjee (1948) described that hairiness of inflorescence to be an important factor while selection is done. He also reported that seventytwo varieties of the mango found in Bengal have been classified and divided in three broad groups, taking fruit shape as the main criterion. Apart from fruit characters, the colour of emerging leaves, colour of the panicle axis and laterals, size of flowers and intensity of pubescence of panicle branches, the nature of bracts and the length of inflorescence were also taken into account.

In Uttar Pradesh all varieties except the Baranasi have been deciduous bracts. Hence, bracts alone do not seem to be of importance in differentiating one variety from another size of flower and intensity of pubescence also do not appear to be of much consequence for classification work. Naik and Gangolly (1950) reported three hundred and thirtyfive varieties of South India mangoes have also been described and classified based on a system

which seems to be most natural. Although fruit characters formed the main basis for the varietal identification and classification, other characters selected in order of importance are -

I. Primary characters

- (a) Form of the fruit
- (b) Form of the beak

II. Secondary characters

- (a) Form of the leaf tip
- (b) Folding of leaves

III. Tertiary characters

- (a) Shape of the inflorescence
- (b) Shape of the leaves
- (c) Nature of the venation of the stone
- (d) Fibre and its nature
- (e) Shape of the shoulders
- (f) Nature of sinus
- (g) Coloration of the emerging leaves.

Naik and Gangolly (1950) described that special stress has also been laid on the nature and course of the stone veins of a particular variety.

Singh and Singh (1956) reported that the survey, the venation of the stone has for the first time been assigned a secondary place in mango classification. They also classified and described one hundred and fifty varieties of mango of Uttar Pradesh more recently. The method of classification is almost on the same line as given above. In this

classification, however, the characters of secondary and tertiary importance used are altogether different. Nature of venation of stones and the panicle colour have been considered to be of more immediate importance than the form of the apex and the folding of leaves which are used as secondary characters by Naik and Gangolly. Leaf characters such as, leaf tip or apex and folding of leaves have been placed as characters of tertiary importance. Besides these characters, basal sinus, nature of apical sinus and shape of the leaves have also been taken as characters of the fourth grade for distinguishing one variety from another.

Work on identification of mango varieties has already been done by many scientists of India for different regions of the country and three monographs on mango have been published.

Mukherjee (1974) observed that several wild forms are present in the hills of Orissa.

Das and Hota (1977) have evaluated many varieties and screened about twenty elite varieties based on the qualitative and quantitative characters of the fruit.

It is found that slight variation in the taste and flavour of the fruit of the same variety may occur because of difference in soil and climate or because of variable root stocks used in mango cultivation. Hence, a description of any variety may not be exactly applicable to the same variety when grown at places wide apart.

Therefore, by careful survey and systematic studies, elite varieties should be isolated and maintained for exploitation of breeding work and overall improvement of mango industry in the country.

CHAPTER III

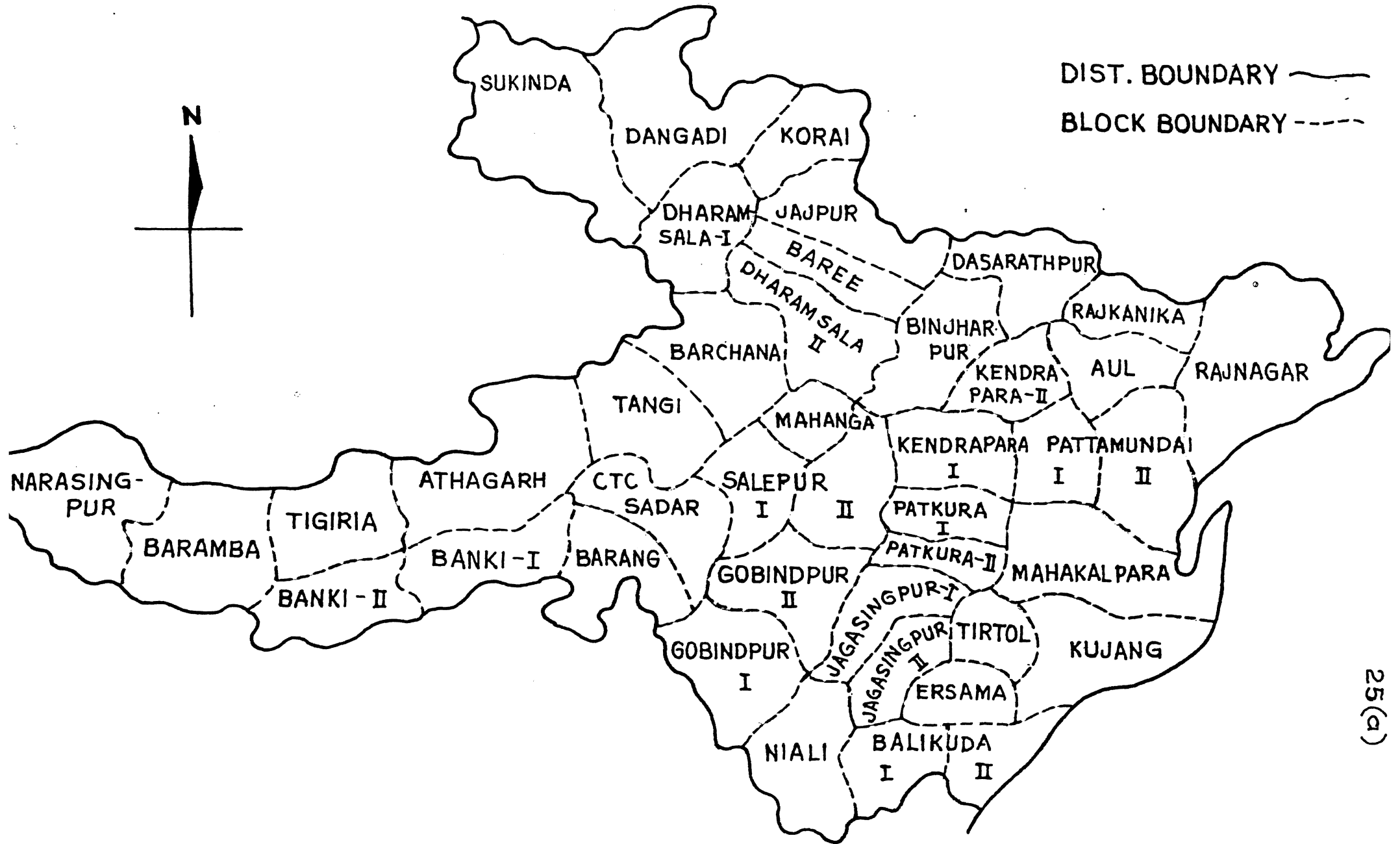
MATERIALS AND METHODS

MATERIAL AND METHODS

The work of description of local elites of mango in Cuttack district of Orissa was undertaken during 1987-88 and 1988-89 (map is enclosed). Out of 90,498 hectares of mango orchards in Orissa, Cuttack district alone contributes 19,572 hectares. Regarding production, out of total production of 850,681 metric tonnes, Cuttack district alone contributes 1,83,822 metric tonnes annually. In Orissa, Cuttack is the only coastal district having large amount of local elites of mango. In the present studies, a series of tours to all the leading producing centre of Cuttack district was organised during the growing, flowering and fruiting periods and collected sixtyeight promising types of local elites from the available stock from Cuttack district.

In every case as far as possible, healthy bearing condition of selected elite variety was first selected. Then the twelve representative fruits of each variety were taken randomly from the four compass sides of the trees from different growing regions, wherever possible in order to gather an idea on the variations associated with

MAP OF CUTTACK DISTRICT SHOWING BLOCKS



different environments. Sixtyeight types of local elite fruits were collected from the whole of Cuttack district for the present study and details as regards collections are mentioned in Table 1. These varieties were evaluated on the basis of fruit characters such as size, colour, flavour, pulp quality, T.S.S. etc. in the Department of Horticulture, Orissa University of Agriculture and Technology. Out of above, twelve varieties were selected finally on the basis of fruit characters these are par with prominent commercial varieties of the country.

Then the diagnostic value of each character has been discussed in detail. It, however, seems appropriate to set out below the terminology selected for the purpose of the present studies as well as the methods adopted for selecting the specimen.

1. Selection of specimens:

After selection of the typical tree in normal growth and health and of adult bearing age of each variety and in each representative region was carried out; the selection of fruits from such trees was undertaken for detailed study.

For recording fruit descriptions, a dozen tree matured typical fruits were selected at random from all exposed compass sides of each of the selected trees. Out of these dozen fruits, only four fruits have been ultimately selected for final detailed systematic description and qualitative analysis.

Table 1. -- Details of collection of local elites of mango fruits from different parts of Cuttack district

Sl. No. Sub-division	Address of the cultivator from whom it is collected	Name of the varieties selected
1. Cuttack	Smt. Ichhamani Devi Nischintakoili	SUNDARI
2. Cuttack	Sri R. C. Sahu Nischintakoili	KALI
3. Cuttack	Sri B. C. Mallik, Nischintakoili	NANGALKANTIA
4. Cuttack	Sri Shyam Sundar Das, Nischintakoili	MANDA
5. Cuttack	Sri R. N. Jena, Salepur	MANDA
6. Cuttack	Sri Kashi nath Sahu, Tangi, Choudwar	LAKEI
7. Cuttack	Sri Bidya Naik, Telenga penha	NAKEI
8. Cuttack	Sri Udayanath Parida, Niali, Cuttack	SILPUA
9. Cuttack	Sri Udayanath Parida, Niali	KADALIA
10. Cuttack	Sri Ramesh Ch. Biswal, Kantapara	RAJBHOG
11. Cuttack	Sri Narayan Dixit, Kantapara	SILPUA
12. Cuttack	Sri Rama Ch. Swain, Niali	NAKEI
13. Cuttack	Sri Digambar Sahu, Kusuma	CHERUA
14. Cuttack	Sri Chittaranjan Barik, Kusuma.	NAKEI
15. Cuttack	Sri Prahallad Panda, Nachhipur.	MANDA

contd.....

Sl. No.	Sub-division	Address of the Cultivator from whom it is collected.	Name of the Varieties selected.
16.	Cuttack	Sri Sukadev Panda, Nachhipur	KAKUDIA
17.	Cuttack	Sri Nityananda Ojha Adaspur	KALI
18.	Cuttack	Sri Bholanath Nath Salepur	ASADHUA
19.	Cuttack	Sri R. C. Biswal Kantapara	KADALIA
20.	Cuttack	Sri K. C. Mallik Nischintakoili	MAHUA
21.	Cuttack	Sri Kshetrabasi Nayak Nischintakoili	KALEI
22.	Cuttack	Sri R. C. Biswal Kantapara	ASADHI
23.	Cuttack	Sri Suryamani Rout Barda	SUNDARI
24.	Jagatsinghpur	Sri Susant Kumar Dash Kanpur	KADALIA
25.	Jagatsinghpur	Sri Rajkishore Sahu Balikuda	GURUDI
26.	Jagatsinghpur	Sri Kanduri Ch. Sethi Alanahat	KANCHASUADI
27.	Jagatsinghpur	Sri Prhalled Parida Biridi	SUNDARI
28.	Jagatsinghpur	Sri Babaji Mallik Biridi	CHEPETI
29.	Jagatsinghpur	Sri Rajkishore Sahu Balikuda	KANCHAMITHA
30.	Jagatsinghpur	Sri Hari Moharana Naugaon	CHEKEI

Contd.....

Sl. No.	Sub-division	Address of the cultivator from whom it is collected	Name of the varieties selected
31.	Jagatsinghpur	Sri Nrusingh Ch. Behera Naugaon	ASADHUA
32.	Jagatsinghpur	Sri Brahmananda Panda Balikuda	SILDARI
33.	Jagatsinghpur	Sri Bansidhar Parida Biridi	TOTAMEDIA
34.	Jagatsinghpur	Sri Dhaleswar Parida Biridi	ASADHUA
35.	Jagatsinghpur	Sri Kunananda Sahu Naugaon	BELEIMUDI
36.	Jagatsinghpur	Sri Achutananda Sahu Manda Sahi	NANGALMUDA
37.	Jagatsinghpur	Sri Premananda Acharya Chandigaon	SILPUA
38.	Jagatsinghpur	Sri Sathu Das Deobhaga	MANDA
39.	Tirtol	Sri B. D. Lenka Nuspada	S JAKHIA
40.	Tirtol	Sri B. D. Lenka Nuspada	SILPUA
41.	Athgarh	Sri Promod Tarasia Badamba	BELA
42.	Athgarh	Sri Budhi Nayak Narsinghpur	NAKEI
43.	Athgarh	Sri Trilochan Barik Narsinghpur	NANGALMUDA
44.	Athgarh	Sri Krushna Ch. Mangaraj Badamba	RAGHUNATHBALLAV
45.	Athgarh	Sri Manguli Rout Chakawunda	GAJAPANUNGA
46.	Athgarh	Sri Krushna Ch. Samal Badamba	GOPALO

Contd.....

Sl. No.	Sub-division	Address of the cultivator from whom it is collected	Name of the varieties selected
47.	Athgarh	Sri Manguli Rout Chakamunda	KAKUDIA
48.	Athgarh	Sri Sagar Ranjan Pradhan, Narsinghpur.	BAHAGAJA
49.	Athgarh	Sri Dagar Ranjan Pradhan, Narsinghpur.	RASABALI
50.	Athgarh	Sri Satrugna Rout, Narsinghpur.	GAJA
51.	Athgarh	Sri Krushna Ch. Mohanny, Narsinghpur.	BAUSUNI
52.	Athgarh	Sri Sagar Ranjan Rout, Narsinghpur.	KANHEI
53.	Athgarh	Sri Niranjan Dehruri, Narsinghpur.	KAKEI
54.	Athgarh	Sri Budhi Naik, Badamba.	SUNDARI
55.	Athgarh	Sri Budhi Naik, Badamba.	GETTI
56.	Athgarh	Sri Promod Tarasia, Badamba.	TINI TACHHIA
57.	Athgarh	Sri Promod Tarasia, Badamba.	GAJADANTA
58.	Athgarh	Sri Satyaranjan Pradhan, Narsinghpur.	HATIDANTA
59.	Athgarh	Sri Promod Tarasin, Badamba.	KRISHNABALLAV
60.	Athgarh	Sri Hort. Nursery, Narsinghpur.	SWARNALATA
61.	Athgarh	Sri Baksab Rout, Narsinghpur.	BALIAAMBA
62.	Athgarh	Sri Chintamani Babu, Bagdharis, Sagar.	CHANDRAMA

SL. No.	Sub-division	Address of the cultivator from whom it is collected	Name of the varieties selected.
63.	Athgarh	Sri Chintamani Babu, Bagdharin, Sagar.	KALIAGAJA
64.	Jajpur	Sri Krushna Ch. Pradhan, Dhar asala.	MANISANKI
65.	Jajpur	Sri Harihar Pradhan, Champa Talia.	NAKOI
66.	Jajpur	Sri Ratnakar Pradhan, Dasarathpur.	BHELUA
67.	Jajpur	Sri Narayana Swain, Sasanda Arei.	KALAPAHARA
68.	Jajpur	Sri Govind Dash, Binjharpur.	MAHJA

2. Terminology employed

In each variety the descriptions were recorded under the head of fruit character. The various aspect of fruit on the basis of which the fruit characters are described by referring Naik and Gangolly (1950) are given below.

Proforma of Fruit characters

1. Length
 2. Width
 3. Weight
 4. Shape - Oblong/round/oval/elliptical/symmetrical/assymetic
 5. Fruit surface at stalk attachment - elevated/levelled/depressed
 6. Basal sinus - Present/absent/slight/shallow/deep
 7. Dorsal shoulder - abruptly falling/moderately falling/level
 8. Ventral - rising/level/falling
 9. Back - flat/round/curved
 10. Sinus - marked/slight/absent
 11. Beak - prominent/missing/slight
 12. Apex - acute/obtuse/round
 13. Fruit surface - smooth/undulating
 14. Ground colour of the skin - green/green yellow/bright yellow/pink
 15. Skin toughness - thin/intermediate/tough
- PULP CHARACTER
16. Skin adhesive - Easily separating/intermediate adheres
 17. Colour - Pale lemon yellow/deep yellow to orange
 18. Texture - Melting/soft/intermediate/firm
 19. Amount of fibre - None to scanty/intermediate/abundant
 20. Relative texture of fibre - Fine/intermediate/course
 21. Relative length of fibre - Short/intermediate/long
 22. Fruit aroma - Weak/medium/repungent
 23. Fruit taste - Sweet/spicy/acid/resinous

24. Fruit flavour - Turpentine/luscious/pleasant
25. Juice - Scanty/medium/abundant
26. General quality rating of fruit - Excellent/good/fair/poor
27. T. S. S.
28. Skin weight
29. Pulp weight

STONE CHARACTERS

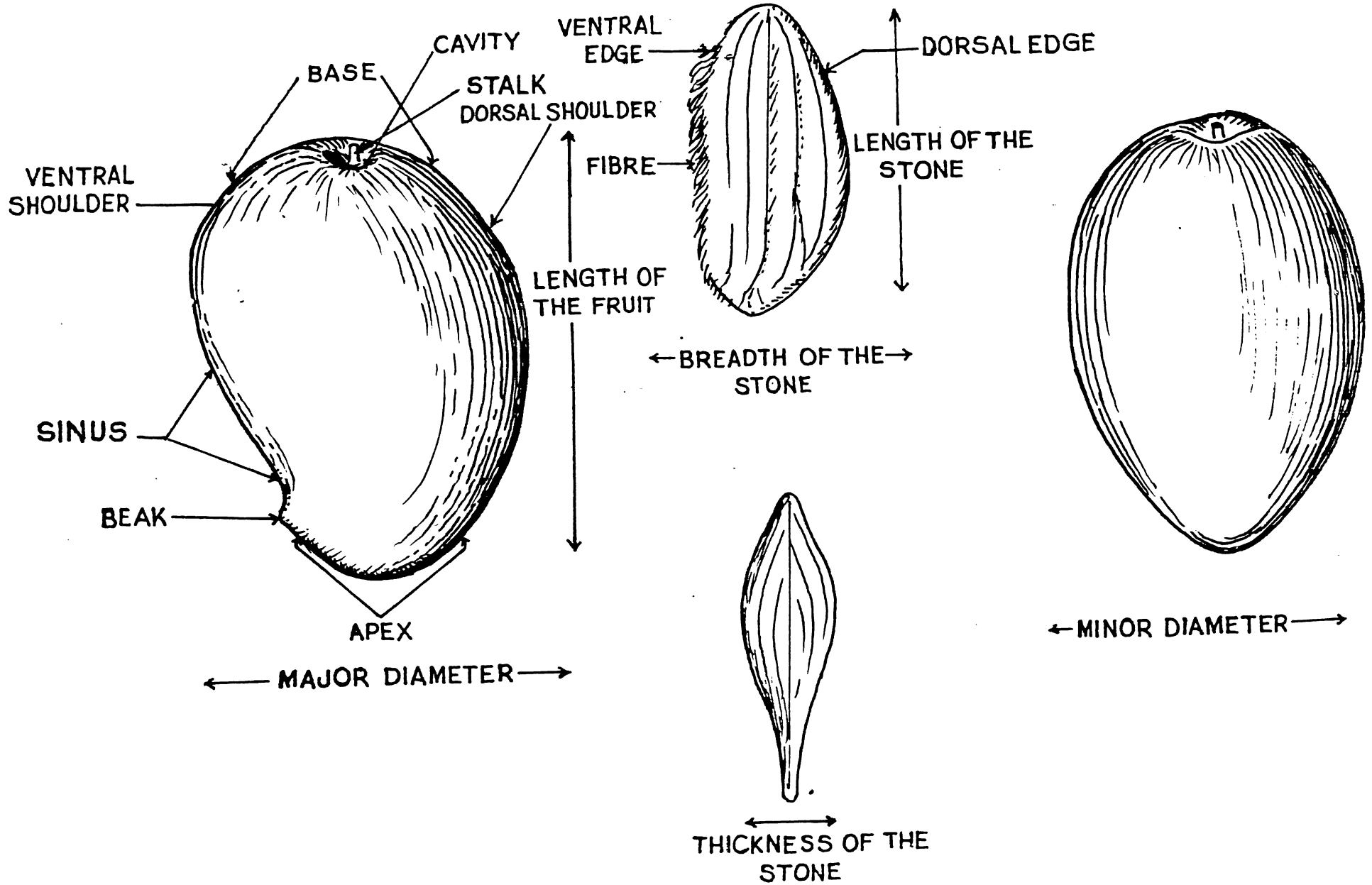
30. Shape
 31. Length
 32. Width
 33. Stone weight
-

Fruit characters have received the greatest attention in the past and are also those which have appealed most to the growers and nurserymen and consequently have formed the main basis for varietal identification and classification.

From a reference to the literature and on consideration of the terminology applied for the different parts of the fruit, it seems appropriate to adopt the following conventional methods of recording fruit descriptions mentioned in the form of figures in subsequent pages for reference.

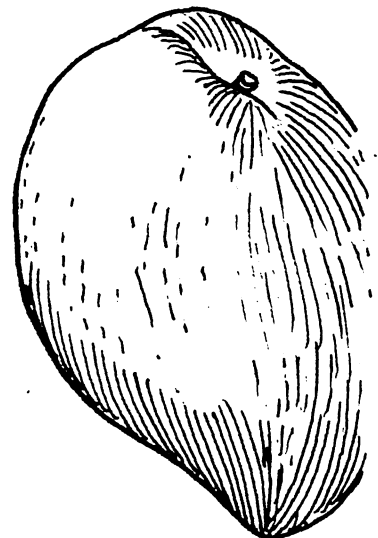
The fruit is held in its natural position, i.e. as it would be while hanging on the tree. The stalk end is called the base and the opposite end is the apex end. The beak or the mark of insertion of the style is termed the 'Nak' by some workers. The left lobe which is

PARTS OF THE FRUIT

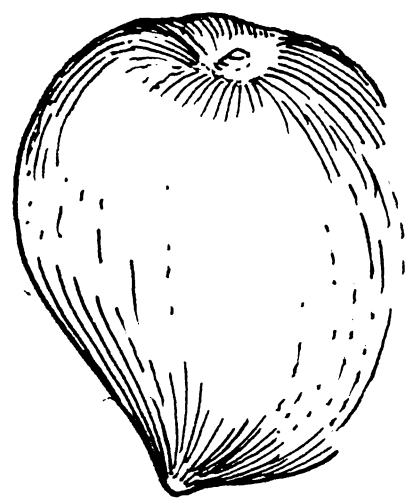


generally larger in most varieties is designated as the left or the ventral shoulder and the opposite one is the right or dorsal shoulder. The size and the nature of the stalk in which it attaches the fruit to the tree as well as the nature of insertion of the stalk to the fruit are given some prominence. The depression that is often present near the point of attachment of the stalk of the fruit is commonly termed as the cavity. The cavity which lies a little above the beak or 'Nak' is known as the sinus. The distance from the point of attachment to the extremity at the distal end is termed as the length of the fruit. The maximum distance between the two shoulder is recorded as the major diameter. The minor diameter is obtained by placing the fruit on a smooth surface in its natural position or measuring the depth or the greatest height from the surface on which the fruit rests to the highest point on the fruit. The form of the fruit affords the most prominent varietal character and has accordingly been employed largely in mango classification in the past. Except in subnormal or malformed fruits, this character seems to be the least variable under various diverse environmental conditions. Symmetrical fruits are those which can be divided into two equal halves so as to have the shoulders equal or almost equal and well balanced. When such an imaginary cut is not possible, the fruit is termed as asymmetrical. The fruit in which the shoulders are very unbalanced, one markedly higher than the other,

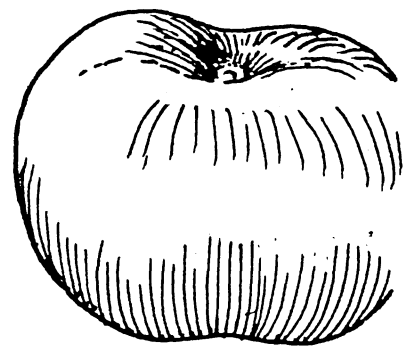
FORMS OF THE SHOULDER



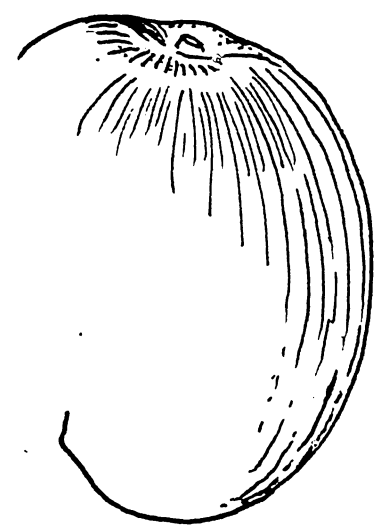
RISING AND THEN ROUNDED



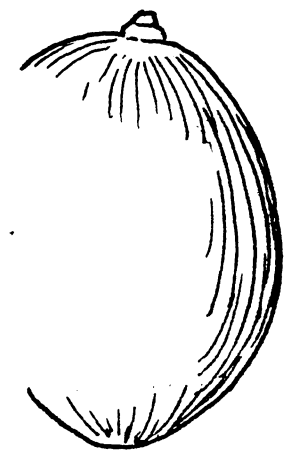
ROUNDED



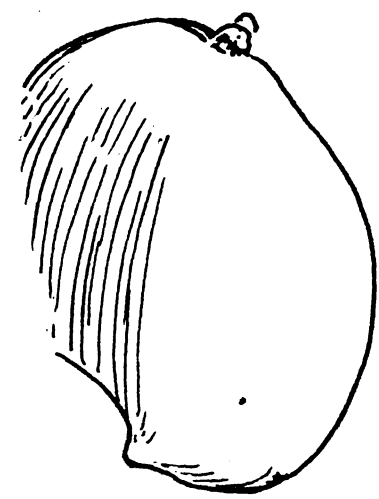
BROADLY ROUNDED



ENDING IN A MODERATE CURVE



ENDING IN A LONG CURVE



SLOPING



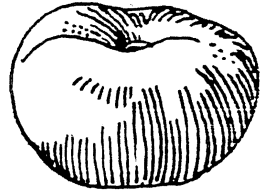
FALLING ABRUPTLY

such fruits are classed as oblique shaped. The commonest fruit shapes in mango are roundish, ovate, oval, oblong, elliptic, cordate, reniform etc. with a number of shapes intermediate between these.

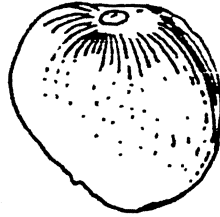
The size of mango is described as small, medium and large size. The fruits which are less than hundred grams in weight are termed as small in size, fruits which are more than hundred and less than one hundred and fifty grams are termed as small to medium in size; fruits which are more than one hundred fifty grams and less than two hundred grams are termed as medium size and fruits which are more than two hundred grams in weight are termed as large size fruit. In case of stone character, the stone which are less than twenty grams are termed as small, stone which are between twenty and fifty grams are considered as medium and stone which are more than fifty grams are considered as large size stone.

Some sort of fleshy protuberance near the insertion of the stalk forming a sort of extension of the base is found in fruits of certain varieties and this requires to be included in any complete description and has accordingly been done in these studies. The basal end of the mango may be rounded, slightly flattened, obliquely flattened, necked or obliquely rounded etc. The basal sinus may be present, absent, slight, shallow or deep. The back may be flat in some varieties, round or curved in others.

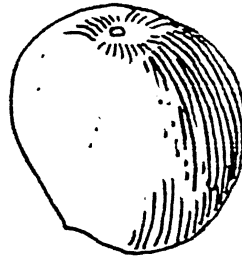
FORMS OF THE FRUIT.



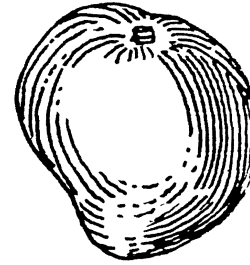
PEENTO.



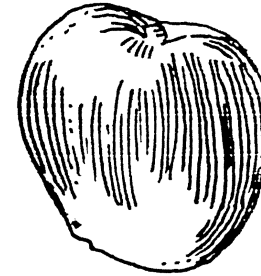
CORDATE.



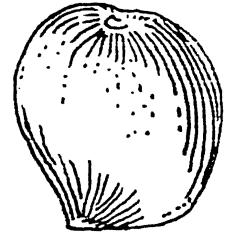
ROUNDISH.



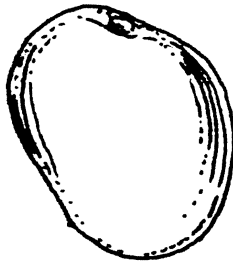
ROUNDISH OBLIQUE.



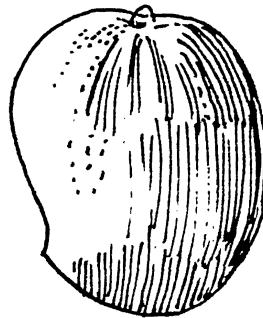
OVATE ROUNDISH.



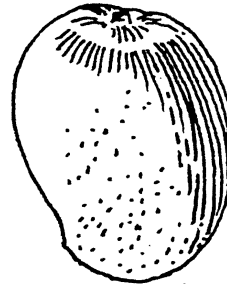
OVATE.



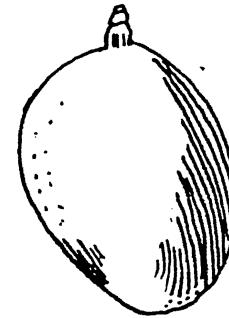
OVATE OBLIQUE.



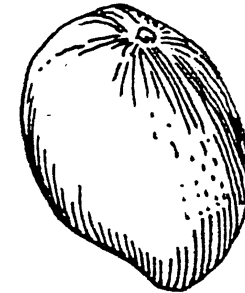
OVATE RENIFORM.



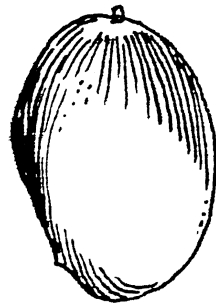
OVATE OBLONG.



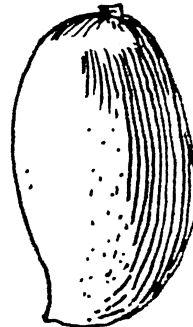
OVAL.



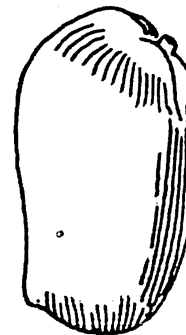
OBLIQUELY OVAL.



OBLONG OVAL.



OBLONG.



OBLONG OBLIQUE.



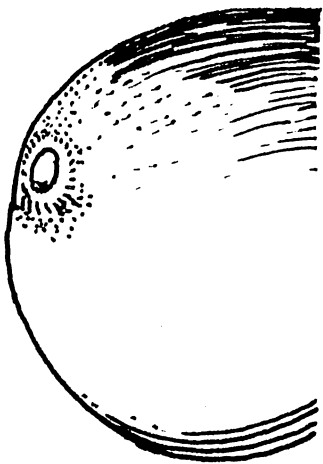
OBLONG RENIFORM.



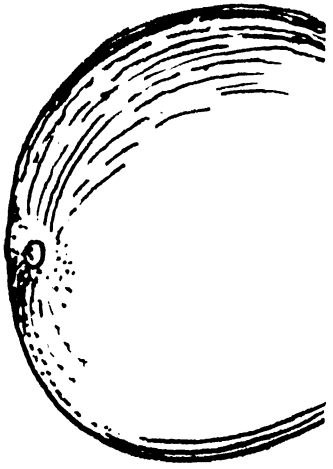
OBLONG ELLIPTIC.

FORMS OF THE CAVITY AND INSERTION OF THE STALK

CAVITY

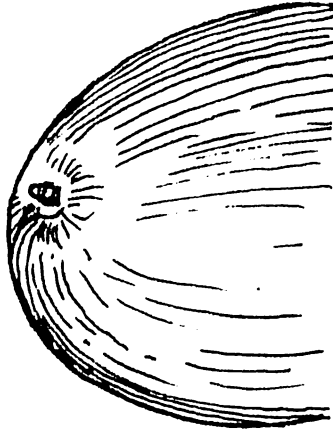


ABSENT

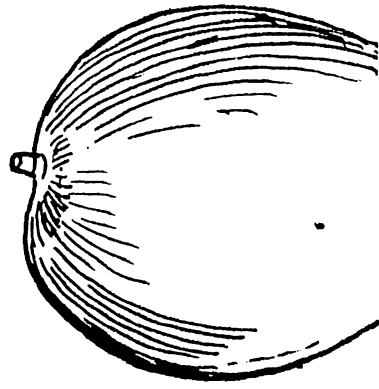


SLIGHT

STALK



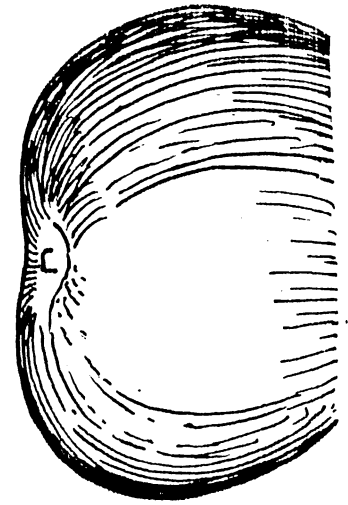
OBLIQUE



SQUARE

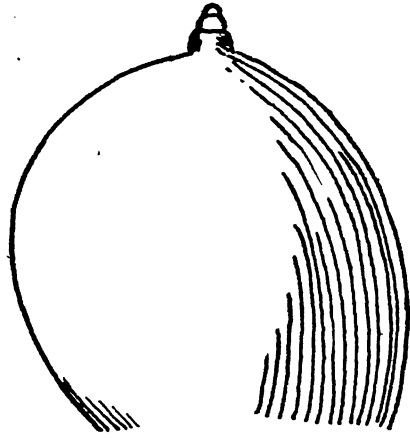


DEEP

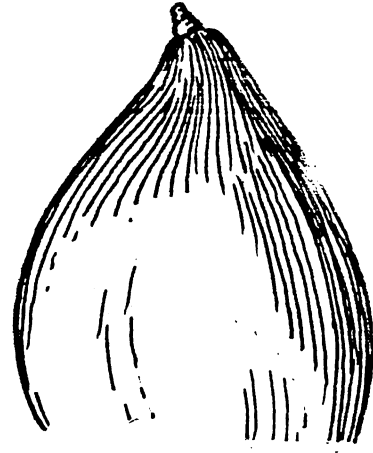


SHALLOW

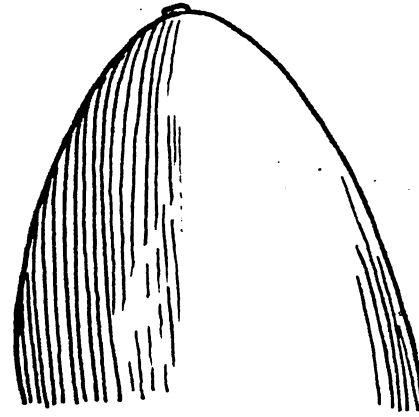
FORMS OF THE BASE.



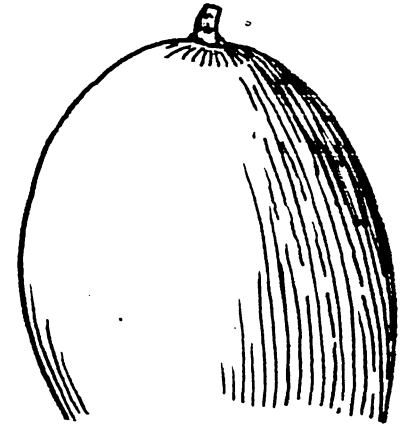
EXTENDED



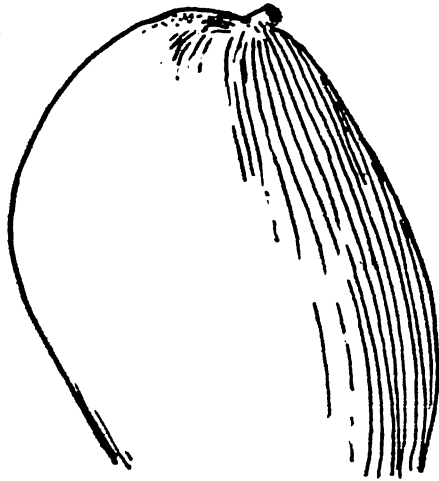
NECKED



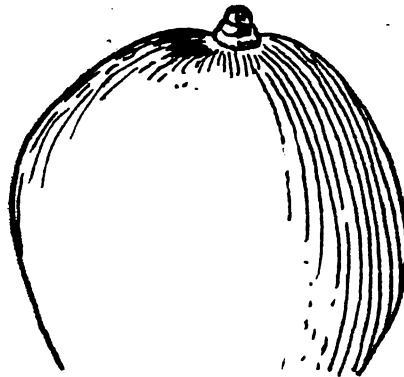
TAPERING



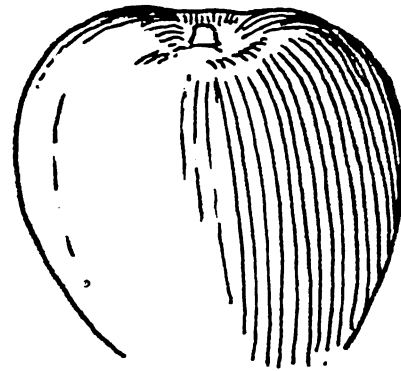
ROUNDED



OBLIQUELY ROUNDED



SLIGHTLY FLATTEND



FLATTENED

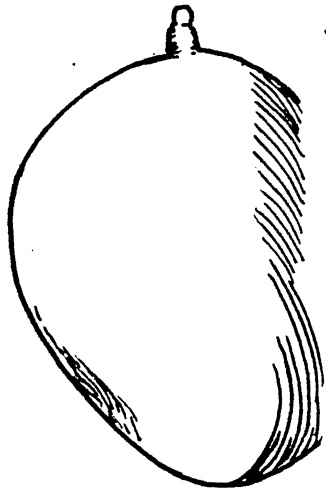


OBLIQUELY FLATTENED

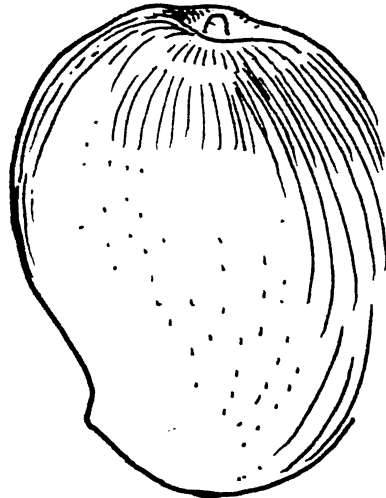
FORMS OF THE SINUS AND THE APEX.

SINUS

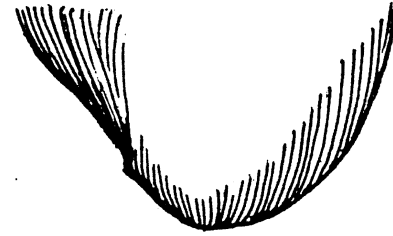
APEX



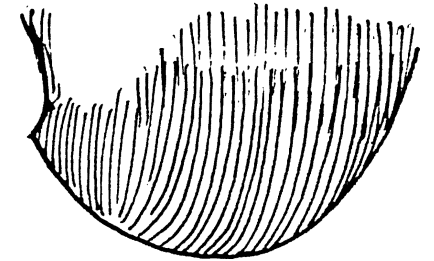
ABSENT



SLIGHT



BROADLY POINTED



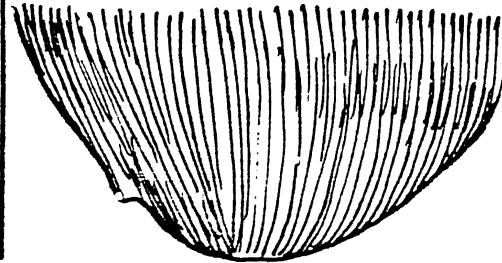
ROUNDED



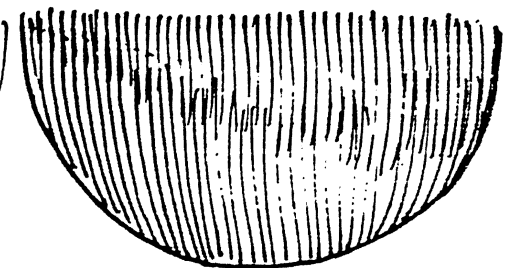
SHALLOW



DEEP



BROADLY ROUNDED



FLATTENED

The size, shape and prominence of the beak is an easily noticeable and characteristic feature in mangoes. While it is missing or absent in some varieties, in others it may end in a point, be slight but distinct, be slightly prominent, prominent or mammiform or beaked or again may be straight, hooked or curved.

Colour of the fruit with all the various shades and tints affords a useful distinguishing character and is the most difficult for accurate description. By colour is meant only the ground colour of the fruit skin and not that of the dots or blush.

The lenticels popularly known as dots in horticultural parlance are usually subcutaneous. They vary in size between varieties as also in the manner of distribution. The lenticel may be thin in some varieties, while intermediate or thick in others.

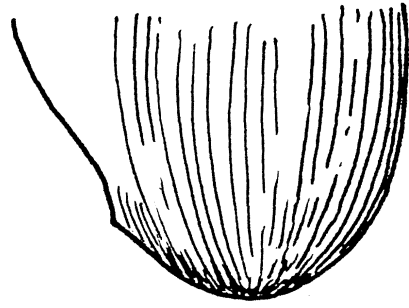
Similar relative terminology is employed while describing the thickness of the skin. With regard to nature of the skin, it is found necessary to apply such terms as membranous, leathery or tough or tenacious to feel.

The flesh is described as soft, medium or firm and they are accompanied by relative but sufficiently expressive terms. The flavour of fruit is described as pleasant, turpentine or luscious. The general quality rating of

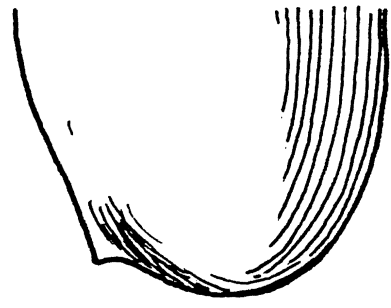
FORM OF THE BEAK



ABSENT



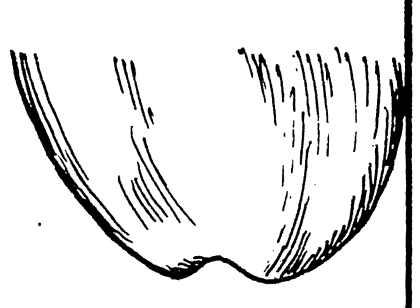
A POINT



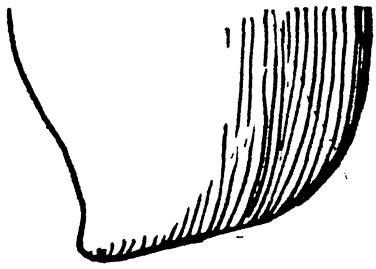
SLIGHT BUT DISTINCT



SLIGHTLY
PROMINENT



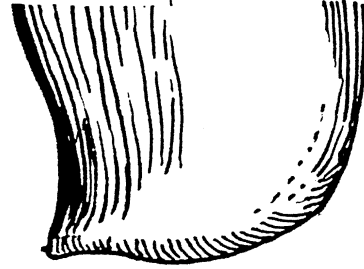
PROMINENT



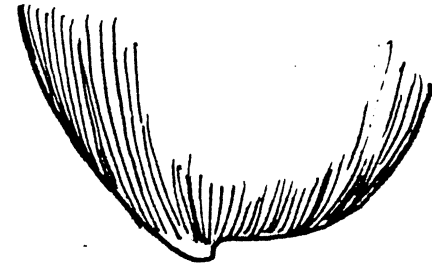
MAMMIFORM



BROADLY
MAMMIFORM



BEAKED-CURVED



BEAKED-HOOKED

fruits are described as poor, fair, good or excellent. In case of fruit, T.S.S. and pulp weight are described. The form, size, shape of the seed or stone are carefully and completely specified. These are required to be accompanied by weights and dimensions. The texture and the position of the fibre seem to afford some useful information for varietal identification. In some varieties, the fibres are confined only to the ventral edge of the seed and do not extend far to the flesh, while in some others they are spread all over. Some varieties are characterized by the existence of a few fibres on the ventral edge and short fibre all over the rest of the surface. The fibres are fine, intermediate or coarse. They may be scanty, intermediate or abundant. The veins on the stone are usually parallel or forked and may be either slightly raised or slightly depressed and are rarely either grooved or prominently ridged.

CHAPTER IV

EXPERIMENTAL RESULTS

EXPERIMENTAL RESULTS

Orissa is considered as secondary centre of origin of mango as the State is full of germplasm of local elites of mango. Among the coastal area, Cuttack district has maximum number of local elites of mango germplasm. An intensive investigation was carried out in most of the parts of the district during the year 1987-88 and 1988-89. It is found that sixty eight types of local elites of mango are found in the district. Out of these sixtyeight varieties, twelve prominent varieties are selected on the basis of external and internal fruit characters. These varieties can be comparable with leading commercial varieties of many other states. The prominent twelve varieties are Rajbhog, Nakel of Kusuma, Kalei, Kadalia, Kanchasudi, Sundari, Nangalmunda, Nakel of Kalapathar, Silpua, Bela, Raghunath Ballav and Krishna Ballav. Out of sixtyeight local types of mango varieties, some of the varieties are found in different synonyms in different places of district with slight variation in external and internal fruit characters. Out of the sixty eight types of local elites of mango, thirtyeight photographs of local elites have been included in this Chapter.

The descriptive terminology and method of selection of specimen employed by Naik and Gangolly (1950) are adopted in the present study. The detailed descriptions of fruit characters like size, shape, weight, appearance, internal morphology and stone characters of sixtyeight local elites of mango of Cuttack district are mentioned in this Chapter.

Details description of local elites of mango in Cuttack district of Orissa

1. SUNDARI

Source of collection - Nischintakelli, Cuttack district.

Fruit - Fruit medium to large, round shape, stalk attachment level, basal sinus absent, dorsal shoulder abruptly falling, ventral shoulder rising, round back, slight sinus, beak missing, round apex, smooth fruit surface, ground colour of skin greenish yellow, skin toughness intermediate, skin adhesion easily separating, pulp colour deep yellow, soft texture, intermediate fibre amount, fine fibre texture, long length of fibre, fruit aroma medium, acid taste, luscious flavour, abundant juice, general rating quality fair, T.S.S. - 16, moderate pulp.

Stone - round shape, small stone, veins forked and slightly depressed.

2. KALI

Source of collection - Nischintakelli, Cuttack district

Fruit - Fruit large, oblong shape, depressed stalk attachment, basal sinus slight, moderately falling dorsal shoulder,

ventral shoulder rising, flat back, sinus slight, prominent beak, obtuse apex, smooth fruit surface, ground colour of skin greenish yellow, skin toughness intermediate, intermediate skin adhesion, pulp colour deep yellow, intermediate pulp texture, intermediate fibre amount and texture, short fibre length, fruit aroma medium, sweet taste, pleasant flavour, abundant juice, general rating quality good, TSS-19, abundant pulp.

Stone - Oblong shape, medium stone, veins forked and slightly depressed.

3. HANGALKANTIA

Source of collection - Nischintakoili, Cuttack district.

Fruit - Fruit large, rounded shape, stalk attachment level, basal sinus absent, dorsal shoulder moderately falling, level ventral shoulder, flat back, slight sinus, slight beak, obtuse apex, smooth fruit surface ground colour of skin greenish yellow, skin toughness thin, skin adhesion intermediate, pulp colour pale lemon yellow, melting pulp texture, scanty fibre, fine fibre texture, short fibre length, fruit aroma medium, sweet taste, turpentine flavour, scanty juice, general rating quality fair. TSS-10, moderate pulp, Stone - round shape, medium to large stone, soft fibre all along, veins parallel and slightly raised.

4. MANDA

Source of collection - Nischintakoili, Cuttack district.

Fruit - Fruit large, round shape, stalk attachment depressed, basal sinus slight, dorsal shoulder moderately falling, rising ventral shoulder, flat back, sinus slight, beak missing, round apex, fruit surface smooth, ground colour of skin green, skin toughness and adhesion intermediate, pulp colour pale lemon yellow, soft pulp texture, intermediate fibre and texture, short length of fibre, fruit aroma medium, sweet taste, luscious flavour, abundant juice, general rating quality good, TSS-17, abundant pulp. Stone - round shape, medium stone, soft fibre all over.

5. MANDA

Source of collection - Salepur, Cuttack district.

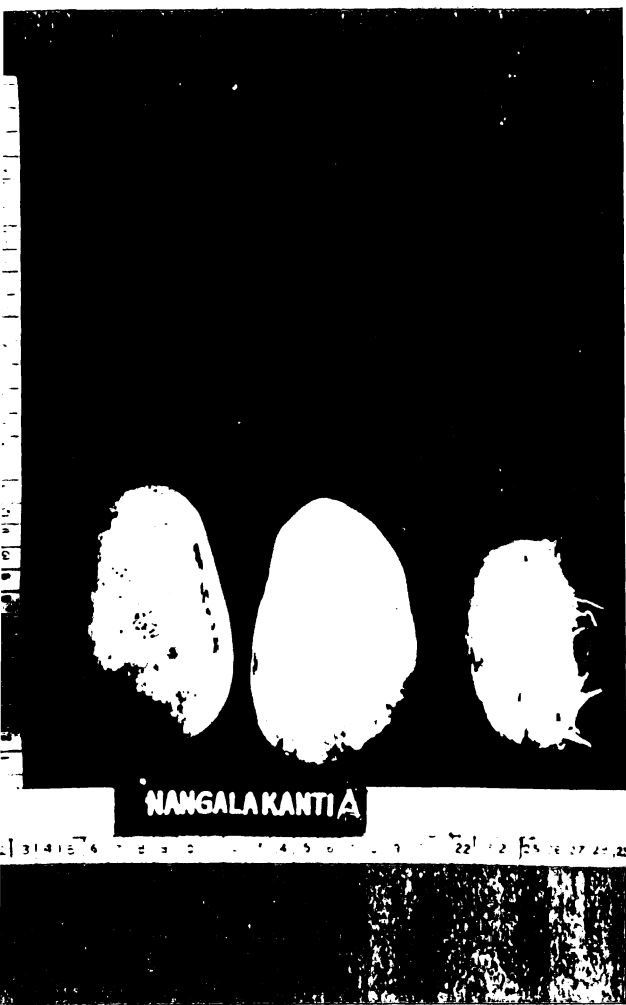
Fruit - Fruit large, round shape, stalk attachment level, basal sinus absent, dorsal shoulder moderately falling, ventral shoulder level, round back, sinus absent, slight beak, obtuse apex, smooth fruit surface, ground colour of skin greenish yellow, skin toughness thin, skin adhesion easily separating, pulp colour pale lemon yellow, melting pulp texture, scanty fibre, fine fibre texture, short fibre length, fruit aroma medium, sweet taste, luscious flavour, abundant juice, general rating quality good, T.S.S. - 14, moderate to abundant pulp. Stone - round shape, small stone, soft fibre all over, veins forked & slightly depressed.

6. LAMUDI

Source of collection - Tangi, Cuttack district.
 Fruit - Fruit large, oblong shape, elevated stalk attachment, basal sinus slight, dorsal shoulder abruptly falling, ventral shoulder rising, curved back, sinus slight, slight beak, acute apex, fruit surface smooth, ground colour of skin greenish yellow, skin toughness and adhesion intermediate, pulp colour yellow, soft pulp texture, intermediate fibre, fine fibre texture, short fibre length, fruit aroma medium, sweet taste, pleasant flavour, abundant juice, general rating quality good, TSS - 14, abundant juice.
 Stone - Oblong shape, small stone, soft fibre all along, veins forked and slightly raised.

7. NAKEI

Source of collection - Telengapentha, Cuttack district.
 Fruit - Fruit large, oval shape, elevated stalk attachment, basal sinus absent, dorsal shoulder moderately falling, ventral shoulder rising, curved back, sinus slight, prominent beak, round apex, fruit surface smooth, ground colour of skin greenish yellow, skin toughness and adhesion intermediate, pulp colour deep yellow, intermediate pulp texture, intermediate fibre amount, fine fibre texture, short fibre length, fruit aroma medium, acid taste, turpentine flavour, abundant juice, general rating quality fair, T. S. S. - 18, Stone - Oval shape, medium to large stone, soft fibre all along, veins slightly raised.



Sri B.C. Mallik
Nischintakoli,
Cuttack.



Sri Kashinath Sahu
Tangi, Choudwar,
Cuttack.

8. SILPUA

Source of collection - Niali, Cuttack district.

Fruit - Fruit large, oblong shape, stalk attachment depressed, basal sinus absent, abruptly falling dorsal shoulder, rising ventral shoulder, curved back, sinus absent, slight beak, round apex, smooth fruit surface, ground colour of skin green, skin toughness tough, skin adhesion adheres, pulp colour deep yellow, soft texture, scanty fibre, fine fibre texture, short fibre length, fruit aroma weak, acid taste, luscious flavour, medium juice, general rating quality poor, T.S.S. - 8, moderate to abundant pulp, Stone - oblong shape, medium to large stone, soft fibre all along, veins forked and slightly depressed.

9. KADALIA

Source of collection - Niali, Cuttack district.

Fruit - Fruit large, oblong shape, stalk attachment level, basal sinus absent, dorsal shoulder moderately falling, ventral shoulder rising, round back, slight sinus, prominent beak, acute apex, smooth fruit surface, ground colour of skin greenish yellow, skin toughness thin, skin adhesion easily separating, pulp colour orange, soft pulp texture, scanty fibre, fine fibre texture, short fibre length, fruit aroma weak, sweet taste, luscious flavour, medium juice, general rating quality fair, T.S.S. - 13, moderate pulp, Stone - oblong shape, medium to large stone, soft fibre all along, veins forked and slightly depressed.

10. RAJBHOG

Source of collection - Kantapara, Cuttack district.
 Fruit - Fruit large, round shape, stalk attachment depressed, basal sinus absent, dorsal shoulder moderately falling, rising ventral shoulder, round back, slight sinus, beak missing, acute apex, fruit surface smooth, ground colour of skin greenish yellow, skin toughness intermediate, skin adhesion easily separating, pulp colour orange, pulp texture intermediate, abundant fibre, intermediate fibre texture, short length of fibre, fruit aroma repungent, sweet taste, luscious flavour, medium juice, general rating quality fair, TSS-16, moderate pulp. Stone - round shape, small to medium pulp, soft fibre all over, veins parallel.

11. SILPUA

Source of collection - Kantapara, Cuttack district.
 Fruit - Fruit large, oval shape, stalk attachment level, basal sinus slight, dorsal shoulder moderately falling, ventral shoulder level, round back, sinus absent, beak slight, obtuse apex, fruit surface smooth, ground colour of skin green, skin toughness thin, skin adhesion easily separating, pulp colour pale lemon yellow, intermediate pulp texture, fibre amount and texture and length is intermediate, fair rating quality, TSS-12, moderate pulp. Stone - oval shape, large stone, soft fibre all over, veins forked and slightly depressed.

12. NAKEI

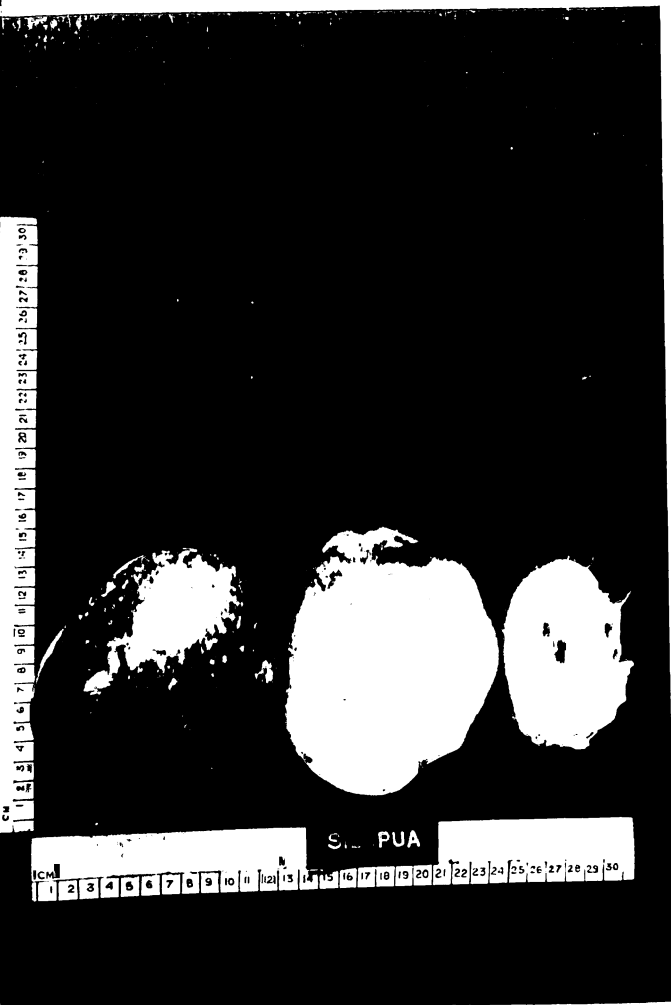
Source of collection - Niali, Cuttack district.

Fruit - Fruit large, oval shape, elevated stalk attachment, basal sinus present, abruptly falling dorsal shoulder, rising ventral shoulder, curved back, sinus absent, beak prominent, round apex, fruit surface smooth, ground colour of skin greenish yellow, skin toughness intermediate, skin adhesion easily separating, pulp colour deep yellow, intermediate pulp texture, intermediate fibre, fine fibre texture, short fibre length, fruit aroma medium, sweet taste, luscious flavour, abundant juice, good rating quality, TSS-13, moderate to abundant juice. Stone - oval shape, small to medium stone, soft fibre all over, veins parallel and slightly raised.

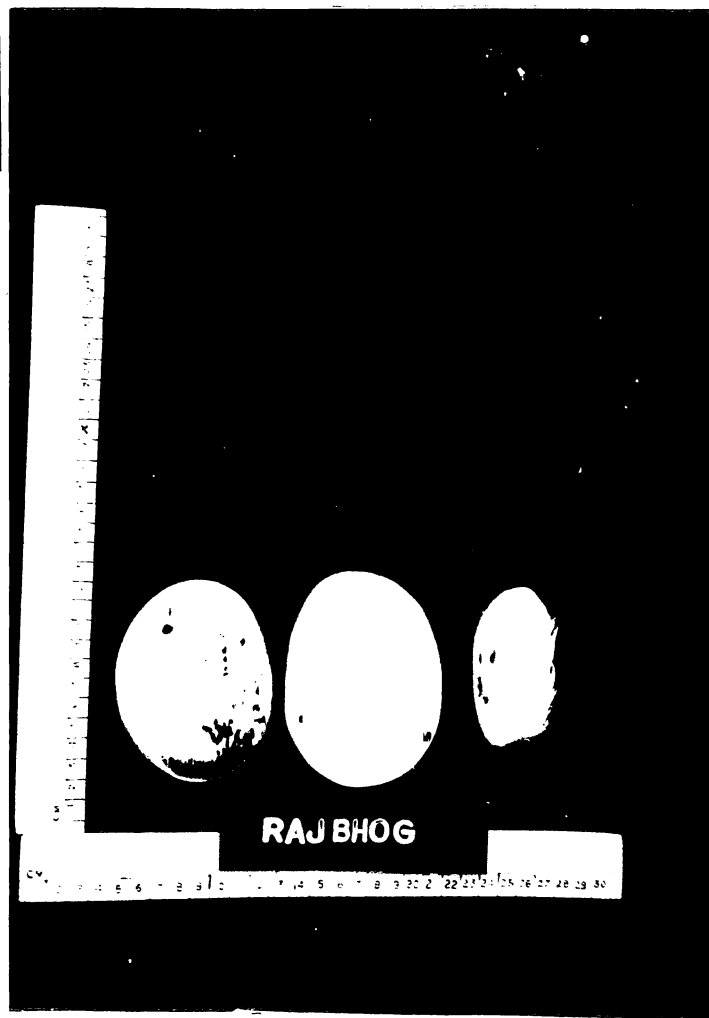
13. CHERUA

Source of collection - Kusuma, Cuttack district.

Fruit - Fruit medium, shape round, stalk attachment level, basal sinus absent, falling dorsal shoulder, rising ventral shoulder, curved back, marked sinus, slight beak, obtuse apex, smooth fruit surface, ground colour of skin green, skin toughness tough, skin adhesion easily separating, pulp colour deep yellow, pulp texture melting, scanty fibre, fine fibre texture, short length of fibre, medium fruit aroma, sweet taste, luscious flavour, medium juice, poor rating quality, TSS-7, moderate pulp. Stone - round shape, small stone, veins forked and slightly depressed.



**Sri Udyanath Parida
Salamanga, Niali,
Cuttack.**



**Sri Ramesh Ch. Biswal
Baghua, Kantepara,
Cuttack.**

14. NAKEI

Source of collection - Kusuma, Cuttack district.

Fruit - Fruit large, round shape, level stalk attachment, basal sinus absent, dorsal shoulder moderately falling, ventral shoulder rising, round back, sinus absent beak prominent, round apex, smooth fruit surface, ground colour of skin green, skin toughness intermediate and adhesion intermediate, pulp colour yellow, intermediate pulp texture, intermediate fibre amount and texture, short fibre length, repungent fruit aroma, spicy taste, pleasant flavour, abundant juice, fair rating quality, ISS-18, abundant pulp, Stone - round shape, large stone, soft fibre all along, veins forked and slightly depressed.

15. MANDA

Source of collection - Nachhipur, Cuttack district.

Fruit - Fruit large, round shape, depressed stalk attachment, basal sinus absent dorsal shoulder abruptly falling, rising ventral shoulder, round back, sinus absent, missing beak, round apex, smooth fruit surface, green skin colour, skin toughness thin and adhesion easily separating, pulp colour pale lemon yellow and texture soft, intermediate fibre and fine texture of fibre, short fibre length, medium fruit aroma, sweet taste, luscious flavour, abundant juice, fair rating quality, TSS-15, moderate to abundant pulp. Stone - round shape, small stone, soft fibre all over, veins forked and slightly raised.

16. KAKUDIA

Source of collection - Nachhipur, Cuttack district.

Fruit - Fruit large, round shape, elevated stalk attachment, basal sinus slight, abruptly falling dorsal shoulder, rising ventral shoulder, curved back, slight sinus, prominent beak, acute apex, undulating fruit surface, ground colour of skin greenish yellow, skin adhesion intermediate and toughness intermediate, pulp colour pale lemon yellow and soft pulp texture, abundant fibre, intermediate taste, short fibre length, fruit aroma medium, sweet taste, pleasant flavour, scanty juice, good rating quality, TSS-16 moderate pulp. Stone - round shape, large stone, veins forked and slightly depressed.

17. KALI

Source of collection - Adaspur, Cuttack district.

Fruit - Fruit large, oblong shape, level stalk attachment, basal sinus absent, moderately falling dorsal shoulder, rising ventral shoulder, round back, sinus absent, missing beak, round apex, smooth fruit surface, ground colour of skin green, skin toughness and adhesion intermediate pulp colour pale lemon yellow, intermediate pulp texture, fibre amount and texture is intermediate, short fibre length, fruit aroma weak, acid taste, turpentine flavour, scanty juice, poor rating quality, TSS-16, moderate pulp. Stone - oblong shape, small to medium stone, soft fibre all over, veins forked and slightly depressed.

18. ASADHUA

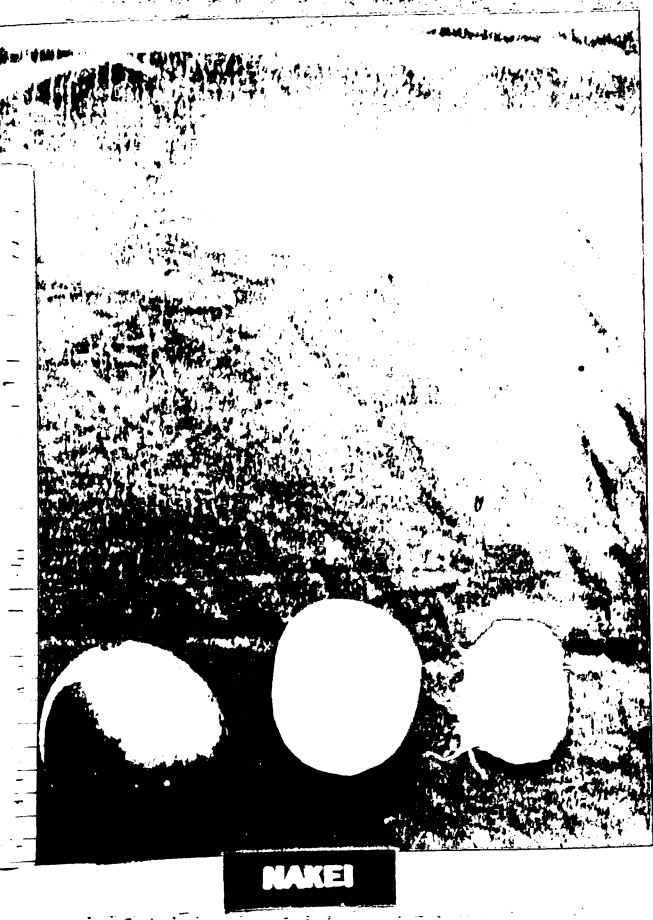
Source of collection - Salepur, Cuttack district.

Fruit - Fruit small to medium, round shape, stalk attachment level, basal sinus absent, moderately falling dorsal shoulder, rising ventral shoulder, sinus absent curved back, beak missing, round apex, fruit surface smooth, ground colour of skin green, skin toughness and adhesion intermediate, pulp colour pale lemon yellow and soft pulp texture, scanty fibre, intermediate fibre texture, intermediate fibre length, fruit aroma weak, acid taste, luscious flavour, abundant juice, fair rating quality, TSS-15, moderate pulp, Stone - round shape, small stone, soft fibre all along, veins forked and slightly depressed.

19. KADALIA

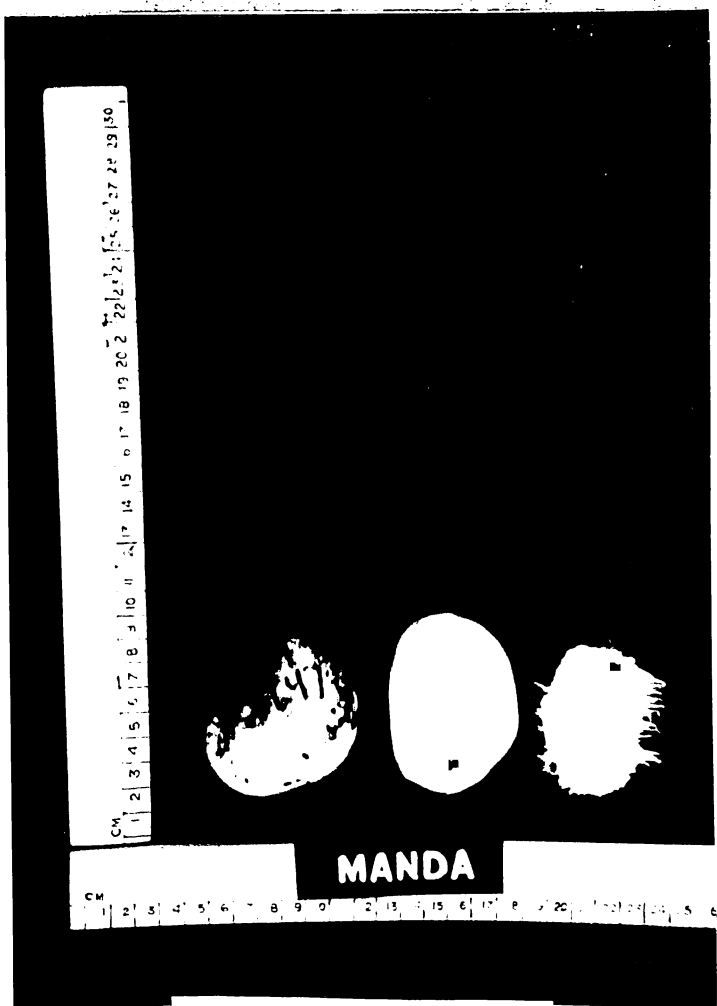
Source of collection - Kantapara, Cuttack district.

Fruit - Fruit large, oblong shape, elevated stalk attachment, basal sinus absent, moderately falling dorsal shoulder, rising ventral shoulder, flat back, sinus absent, beak missing, round apex, fruit surface smooth, ground colour of skin green, skin toughness and adhesion intermediate, pulp colour reddish yellow and intermediate pulp texture, scanty fibre, fine fibre texture, intermediate fibre length, fruit aroma medium, sweet taste, luscious flavour, medium juice, fair rating quality, TSS-14, moderate pulp, Stone - oblong shape, stone medium, soft fibre all over, veins forked and slightly raised.



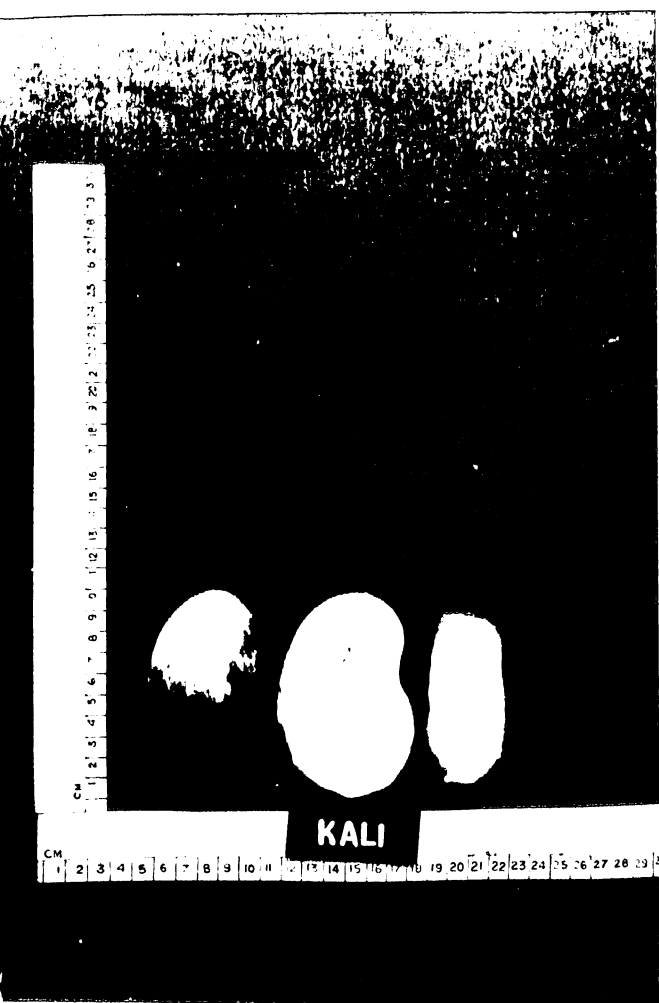
MAKEI

**Sri Chittaranjan Barik
Kusuma, Cuttack.**



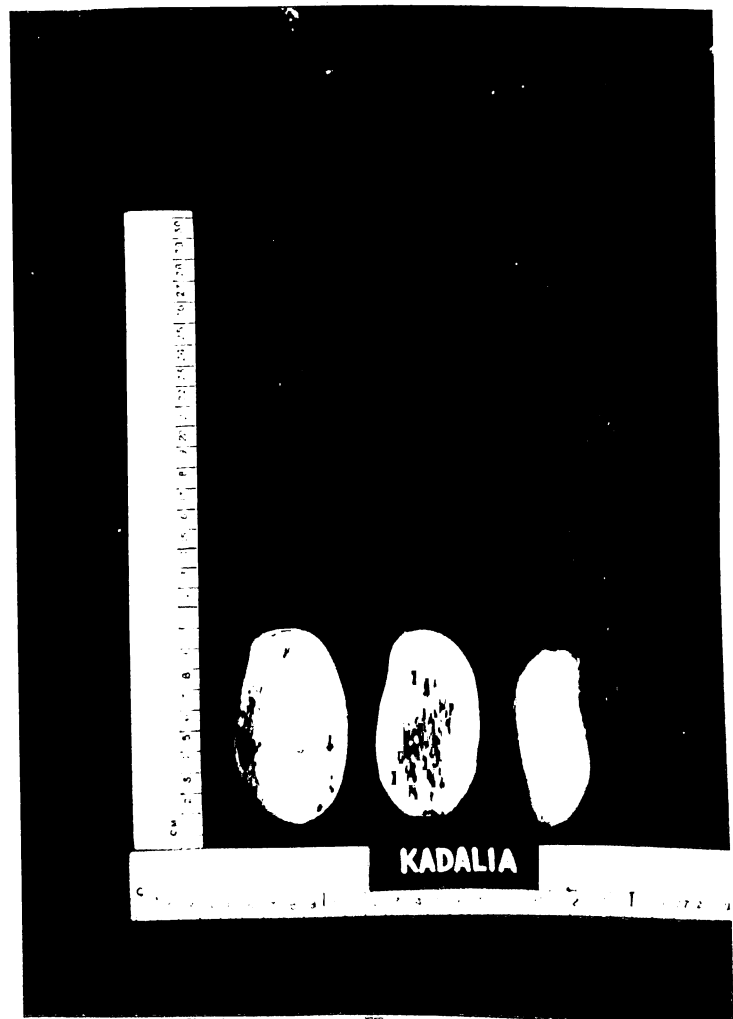
MANDA

**Sri Prahallad Panda
Nachhipur, Cuttack.**



KALI

**Sri Nityananda Ojha
Adaspur, Cuttack.**



KADALIA

**Sri R.C. Biswal
Baghua, Kantapara,
Cuttack.**

20. MAHUA

Source of collection - Nischintakoili, Cuttack district.
 Fruit - Fruit medium large, oval shape, elevated stalk attachment, basal sinus absent, moderately falling dorsal shoulder, rising ventral shoulder, round back, sinus absent, beak missing, obtuse apex, fruit surface smooth, ground colour of skin green, skin toughness and adhesion intermediate, pulp colour pale lemon yellow, melting pulp texture, intermediate fibre amount and texture; short fibre length, fruit aroma repungent, sweet taste, luscious flavour, juice medium, fair rating quality, TSS-16, moderate pulp, Stone - oval shape, medium stone, veins forked and slightly depressed.

21. KALEI

Source of collection - Nischintakoili, Cuttack district.
 Fruit - Fruit large, round shape, stalk attachment level, basal sinus present, moderately falling dorsal shoulder, flat back, marked sinus, prominent beak, acute apex, smooth fruit surface, ground colour of skin green, skin toughness thin, skin adhesion easily separating, pulp colour pale lemon yellow and soft pulp texture, fibre amount and texture intermediate, short fibre length, fruit aroma medium, spicy taste, luscious flavour, scanty juice, good rating quality, TSS-19, moderate pulp, Stone - round shape, medium stone, soft fibre all along veins are parallel and slightly raised.

22. ASADHI

Source of collection - Kantapara, Cuttack district.

Fruit - Fruit small to medium, oval shape, stalk attachment level, basal sinus present, moderately falling dorsal shoulder, ventral shoulder rising, flat back, marked sinus, prominent beak, acute apex, fruit surface smooth, ground colour of skin green, skin toughness thin, skin adhesion easily separating, pulp colour pale lemon yellow, soft pulp texture, fibre amount and texture intermediate, short fibre length, fruit aroma weak, sweet taste, turpentine flavour, juice medium, fair rating, TSS-13, moderate pulp, Stone - oval shape, small stone, veins slightly raised.

23. SUNDARI

Source of collection - Barda, Cuttack district.

Fruit - Fruit medium to large, round shape, stalk attachment level, basal sinus absent, level dorsal shoulder, rising ventral shoulder, flat back, sinus slight, beak missing, acute apex, fruit surface smooth, ground colour of skin greenish yellow, skin toughness intermediate and adhesion easily separating, pulp colour pale lemon yellow, soft pulp texture, intermediate fibre amount and texture, short fibre length, fruit aroma medium, sweet taste, luscious flavour, scanty juice, excellent rating quality, TSS-16, Stone - round shape, small stone, veins slightly depressed.

24. KADALIA

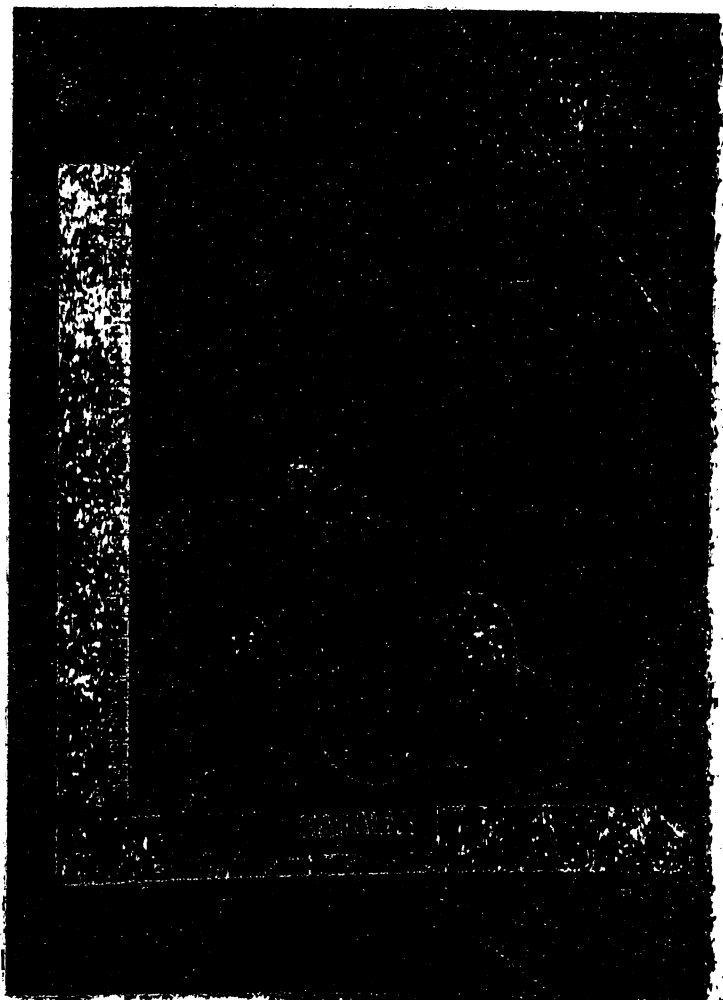
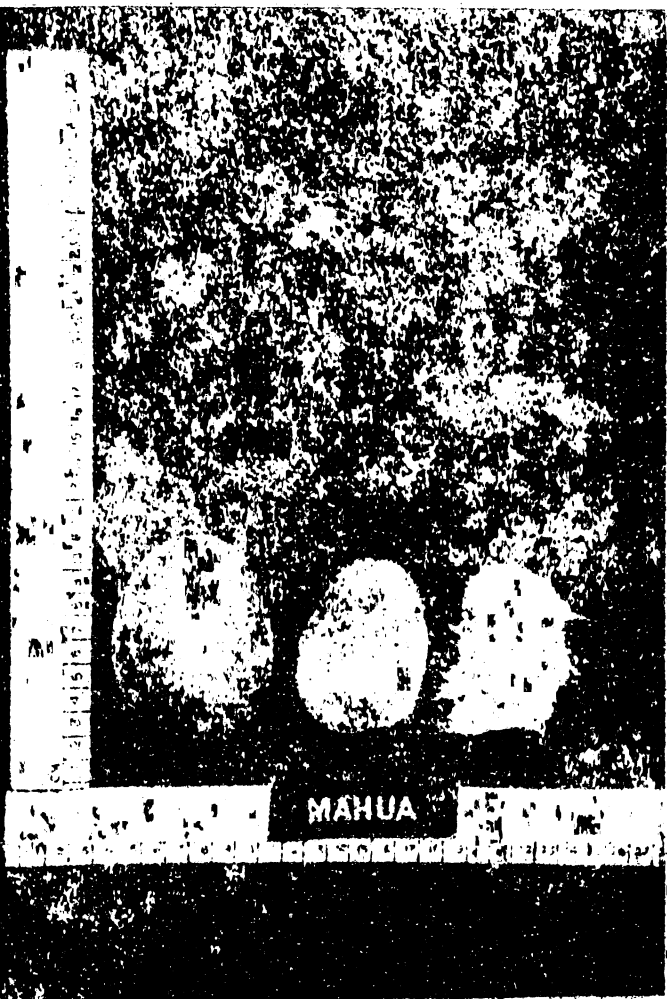
Source of collection - Kanpur, Cuttack district.

Fruit - Fruit small to medium, oblong shape, basal sinus present, stalk attachment level, dorsal shoulder moderately falling, level ventral shoulder, round back, marked sinus, prominent beak, acute apex, smooth fruit surface, ground colour of skin greenish yellow, skin toughness intermediate and adhesion easily separating, intermediate fibre amount and texture, short fibre length, fruit aroma medium, sweet taste, luscious flavour, juice medium, good rating, TSS-20, moderate pulp. Stone - oblong shape, small stone, veins are parallel.

25. GURUDI

Source of collection - Jagatsinghpur, Cuttack district.

Fruit - Fruit small, round shape, stalk attachment level, basal sinus absent, moderately falling dorsal shoulder, rising ventral shoulder, flat back, sinus absent, missing beak, round apex, smooth fruit surface, ground colour of skin green, skin toughness intermediate and adhesion intermediate, pulp colour orange, soft pulp texture, intermediate fibre amount and fine texture, short fibre length, repungent fruit aroma, sweet taste, pleasant flavour, abundant juice, good rating quality, TSS-22, moderate pulp. Stone - round shape, small stone, veins forked and slightly depressed.



Sri K.G. Mallik
Palada, Nisohintakolli,
Cutteek.



26. KANCHA SUADI

Source of collection - Jagatsinghpur, Cuttack district.

Fruit - Fruit small, round shape, stalk attachment elevated, basal sinus absent, abruptly falling dorsal shoulder, rising ventral shoulder, roundback, marked sinus, prominent beak, obtuse apex, smooth fruit surface, ground colour of skin green, skin toughness intermediate and adhesion easily separating, pulp colour pale lemon yellow and melting texture pulp, scanty fibre, fine texture fibre, short fibre length, fruit aroma medium, spicy taste, turpentine flavour, medium juice, good rating quality, TSS-24, moderate pulp. Stone - round shape, small stone, veins forked and prominently raised.

27. SUNDARI

Source of collection - Jagatsinghpur, Cuttack district.

Fruit - Fruit small to medium, stalk attachment level, basal sinus absent, abruptly falling dorsal shoulder, rising ventral shoulder round back, sinus absent, missing beak, obtuse apex, smooth fruit surface, ground colour of skin orange, skin toughness thin and adhesion easily separating, pulp colour deep yellow, and soft pulp texture, intermediate fibre amount and texture short fibre length, fruit aroma medium, sweet taste, pleasant flavour, abundant juice, good rating quality, TSS-17, moderate pulp, oblong shape. Stone - oblong shape, small stone, veins forked and slightly depressed.

28. CHEPETI

Source of collection - Jagatsinghpur, Cuttack district.
 Fruit - Fruit small to medium, round shape, stalk attachment level, basal sinus absent, abruptly falling dorsal shoulder, rising ventral shoulder, round back, sinus absent, missing beak, round apex, smooth fruit surface, ground colour of skin greenish yellow, skin toughness and adhesion intermediate, pulp colour whitish yellow, pulp texture intermediate, fibre amount and texture intermediate, short fibre length, fruit aroma weak, acid taste, turpentine flavour, medium juice, poor rating quality, T.S.S. - 11, moderate pulp. Stone - round shape, small stone, veins forked and slightly depressed.

29. KANCHA METHA

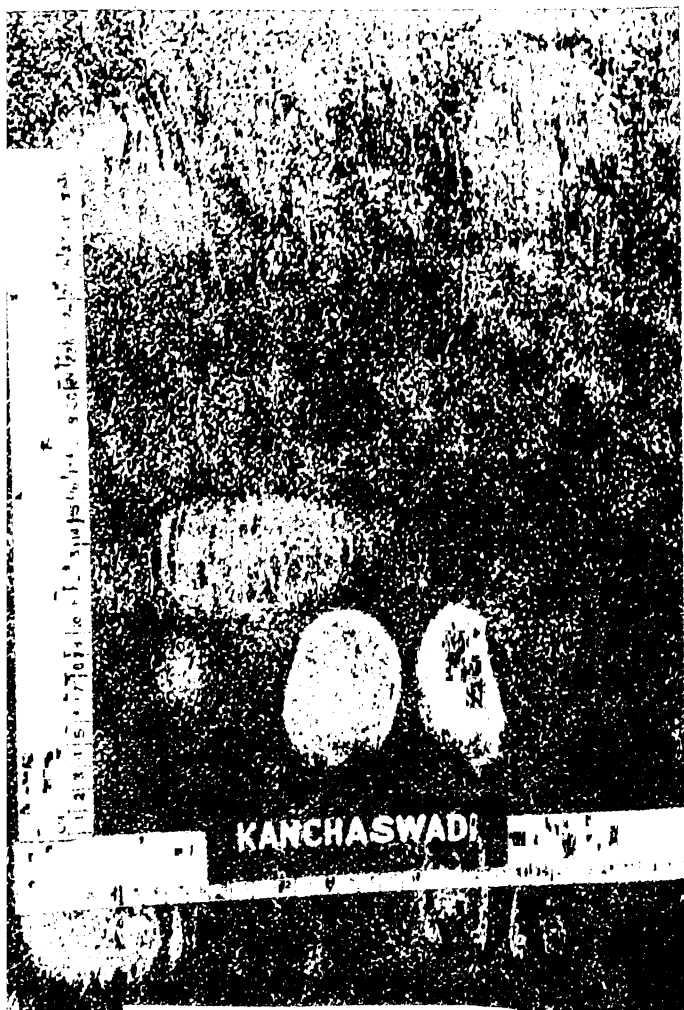
Source of collection - Jagatsinghpur, Cuttack district.
 Fruit - Fruit medium, round shape, stalk attachment level, basal sinus present, moderately falling dorsal shoulder, rising ventral shoulder, round back, sinus slight, beak slight, obtuse apex, fruit surface smooth, ground colour of skin green, skin toughness intermediate and adhesion easily separating, pulp colour pale lemon yellow, soft pulp texture, scanty fibre and fine fibre texture, short fibre length, fruit aroma weak, taste spicy, flavour turpentine, scanty juice, poor rating quality. T.S.S. - 13, moderate pulp. Stone - round shape, small to medium stone, veins slightly depressed.

30. CHEKEI

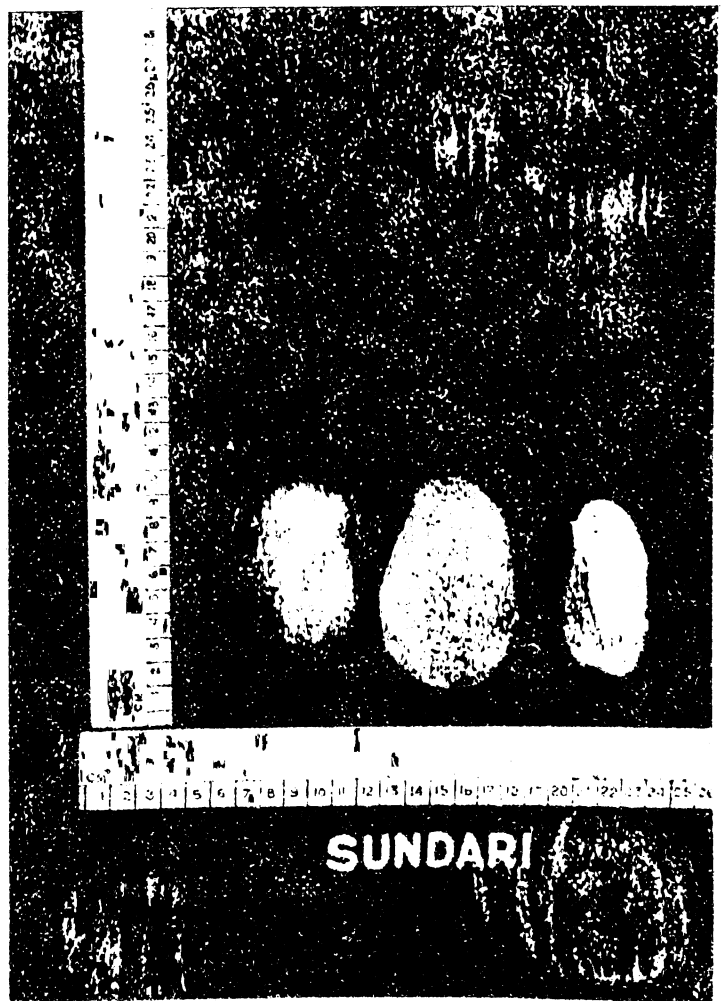
Source of collection - Jagatsinghpur, Cuttack district.
 Fruit - Fruit small to medium, round shape, level stalk attachment, basal sinus absent, moderately falling dorsal shoulder, rising ventral shoulder, round back, sinus absent, missing beak, round apex, smooth fruit surface, ground colour of skin greenish yellow, skin toughness thin and adhesion adheres, pulp colour deep yellow, melting pulp texture, scanty fibre, fine fibre texture, short fibre length, repungent aroma, spicy taste, pleasant flavour, medium juice, good rating quality, T.S.S. - 14, moderate pulp. Stone - round shape, small stone, veins forked and slightly depressed.

31. ASADHUA

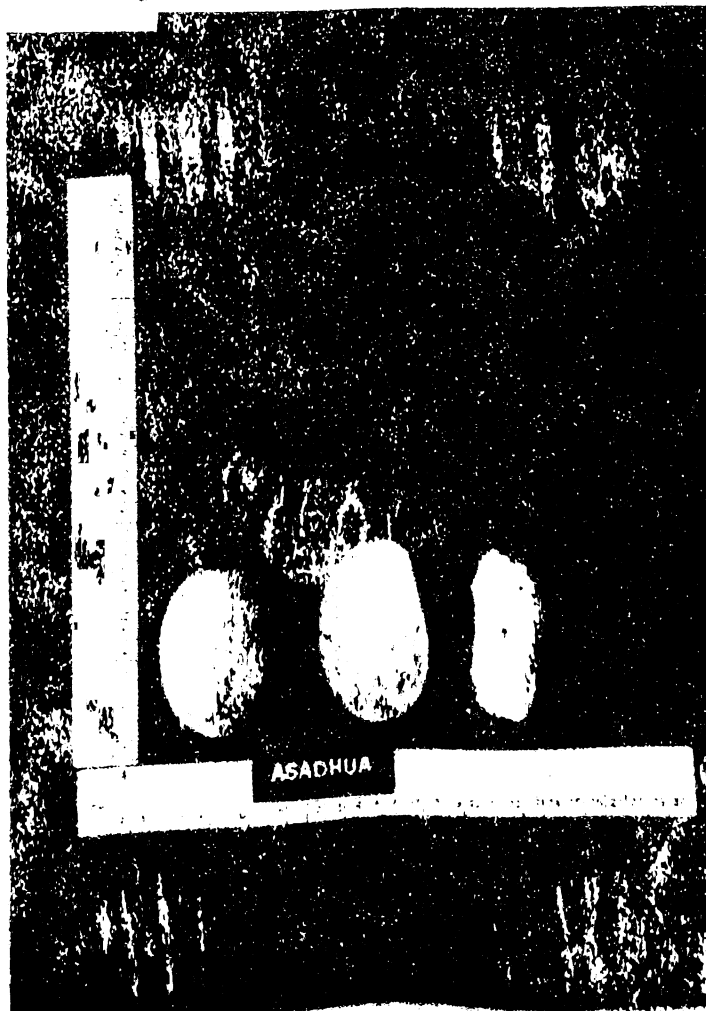
Source of collection - Jagatsinghpur, Cuttack district.
 Fruit - Fruit small, round shape, elevated stalk attachment, basal sinus absent, abruptly falling dorsal shoulder, rising ventral shoulder, round back, marked sinus, prominent beak, obtuse apex, smooth fruit surface, ground colour of skin greenish yellow, skin toughness thin and adhesion intermediate, pulp colour pale lemon yellow, soft pulp texture, fibre texture, amount of length intermediate, fruit aroma medium, sweet taste, turpentine flavour, scanty juice, poor rating quality, scanty pulp. Stone - round shape, small stone veins and slightly raised.



Sri K. Sethi,
Mahadipada, Alanshat,
Cutback.



Sri P. Parida
Birisi, Cutback.



Sri N.C. Behara,
Kugan, Cutback.

32. SUNDARI

Source of collection - Jagatsinghpur, Cuttack district.
 Fruit - Fruit medium to large, oval shape, stalk attachment level, basal sinus absent, abruptly falling dorsal shoulder, level ventral shoulder, round back, sinus absent, beak slight, obtuse apex, smooth fruit surface, ground colour of skin greenish yellow, skin toughness thin and adhesion easily separating, pulp colour pale lemon yellow and texture intermediate, scanty fibre, fine fibre texture, short fibre length, fruit aroma weak, acid taste, luscious flavour, medium juice, good rating quality, T.S.S. - 20, moderate pulp. Stone - Oval shape small stone, veins forked and prominently raised.

33. TOTA MUNDIA

Source of collection - Jagatsinghpur, Cuttack district.
 Fruit - Fruit large, round shape, elevated stalk attachment, basal sinus absent, moderately falling dorsal shoulder, rising ventral shoulder, flat back, sinus absent beak missing, round apex, smooth fruit surface, ground colour of skin greenish yellow, skin toughness intermediate and adhesion easily separating, pulp colour deep yellow, soft pulp texture, intermediate fibre aroma and colour texture, intermediate fibre length, repungent fruit aroma, acid taste, turpentine flavour, juice medium, fair rating quality, moderate pulp, T.S.S. - 12. Stone - round shape, medium stone, veins forked and slightly depressed.

34. ASADHUA

Source of collection - Jagatsinghpur, Cuttack district.
 Fruit - Fruit large, oval shape, stalk attachment level, basal sinus absent, moderately falling dorsal shoulder, rising ventral shoulder, flat back, sinus absent, missing beak, acute apex, fruit surface smooth, ground colour of skin greenish yellow, skin toughness thin and adhesion intermediate, pulp colour orange, soft pulp texture, scanty fibre, fine fibre texture, short fibre length, repungent fruit aroma, sweet taste, pleasant flavour, medium juice, good rating quality, T.S.S. - 14, moderate pulp. Stone - oval shape, medium stone, veins forked and slightly depressed.

35. BELEIMUNDI

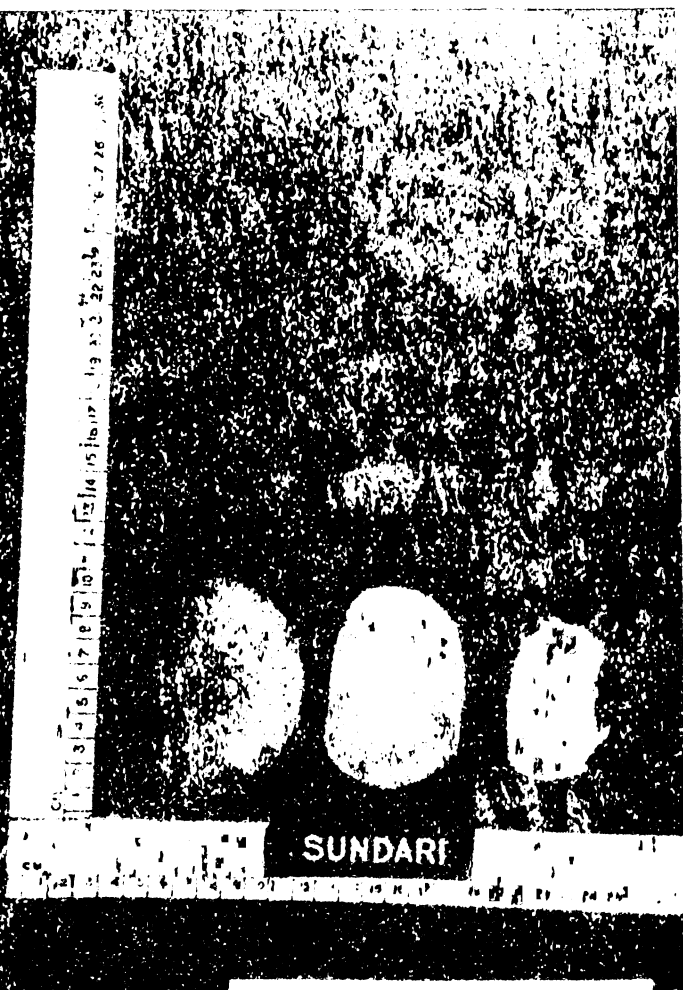
Source of collection - Jagatsinghpur, Cuttack district.
 Fruit - Fruit large, oblong shape, level stalk attachment, basal sinus slight, abruptly falling dorsal shoulder, level ventral shoulder, round back, sinus slight, beak missing, acute apex, undulating fruit surface, ground colour of skin greenish yellow, skin toughness thin and adhesion easily separating, pulp colour pale lemon yellow, melting pulp texture, scanty fibre, fine texture of fibre, short fibre length, fruit aroma weak, sweet taste, turpentine flavour, scanty juice, poor rating quality, T.S.S. 14, scanty pulp. Stone - oblong shape, medium stone, veins forked and depressed.

36. NANGALMUNDA

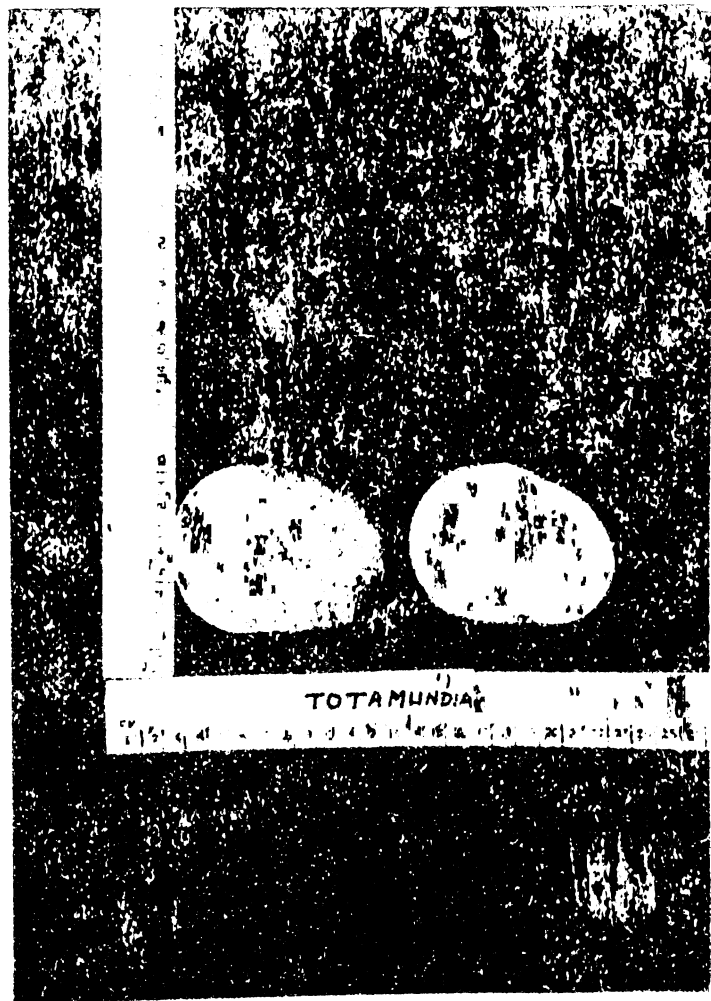
Source of collection - Jagatsinghpur, Cuttack district.
 Fruit - Fruit large, oval shape, stalk attachment level, basal sinus slight, abruptly falling dorsal shoulder, rising ventral shoulder, flat back, sinus slight, beak slight, obtuse apex, fruit surface, smooth ground colour of skin green, skin toughness intermediate and adhesion easily separating, pulp colour orange and intermediate texture, abundant fibre, intermediate fibre texture and length, repungent fruit aroma, sweet taste, pleasant flavour abundant juice, good rating quality, T.S.S. - 21.
 Stone - oval shape, large stone, soft fibre all over. veins are parallel and slightly raised.

37. SILPUA

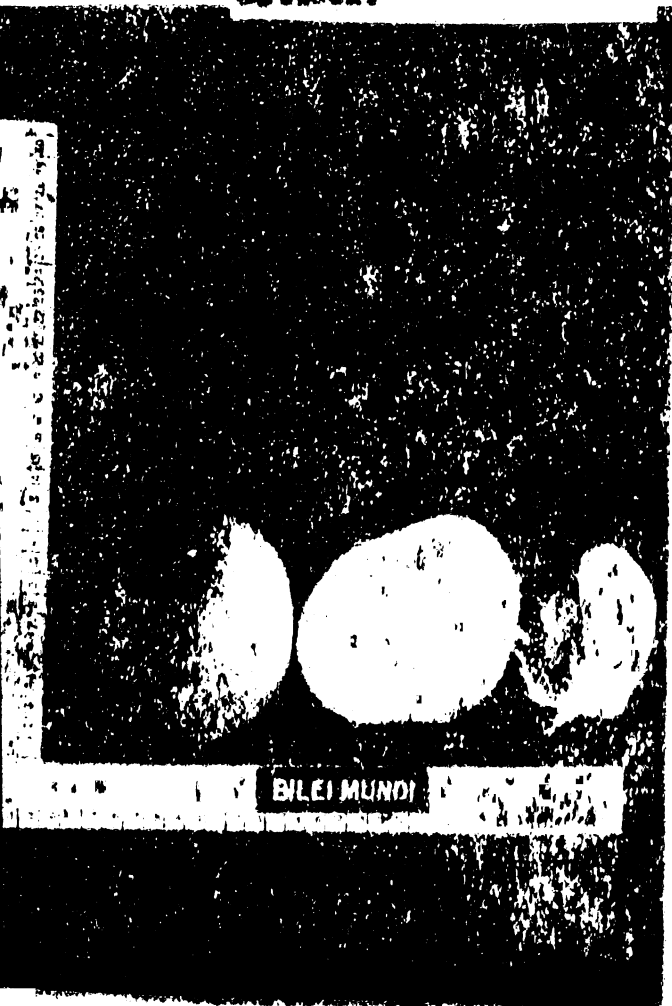
Source of collection - Jagatsinghpur, Cuttack district.
 Fruit - Fruit large, oblong shape, elevated stalk attachment, basal sinus shallow, abruptly falling dorsal shoulder, rising ventral shoulder, flat back, sinus slight, prominent beak, obtuse apex, smooth fruit surface, ground colour of skin greenish yellow, intermediate skin toughness and adhesion, pulp colour deep yellow and texture intermediate, fibre amount and texture intermediate, short fibre length, fruit aroma medium, spicy taste, pleasant flavour, abundant juice, fair rating quality, TSS-14, abundant pulp. Stone - oblong shape, large stone, veins forked and slightly depressed.



Sri S. Panda,
Balikuda (Jagatsinghpur)
Cuttack.



Sri S. Panda,
Biridi, Cuttack.



Sri Kanananda Sahu
Nungson, Jagatsinghpur,
Cuttack.



Sri S. Panda
Balikuda Sahu,
Jagatsinghpur, Cuttack

38. MANDA

Source of collection - Jagatsinghpur, Cuttack district.

Fruit - Fruit large, oval shape, stalk attachment depressed, basal sinus absent, moderately falling dorsal shoulder, rising ventral shoulder, curved back, sinus absent, missing beak, obtuse apex, smooth fruit surface, ground colour of skin green, skin toughness and adhesion intermediate, pulp colour deep yellow, intermediate pulp texture, intermediate fibre amount and fine fibre texture, short fibre length, repungent fruit aroma, sweet taste, pleasant flavour, abundant juice, good rating quality, TSS-17. Stone - oval shape, large stone, veins forked and slightly depressed.

39. SUAKHIA

Source of collection - Tritol, Cuttack district.

Fruit - Fruit small to medium, stalk attachment level, basal sinus present, moderately falling dorsal shoulder, rising ventral shoulder, round back, sinus slight, prominent beak, obtuse apex, undulating fruit surface, ground colour of skin green, skin toughness intermediate, skin adhesion easily separating, pulp colour deep yellow, soft pulp texture, scanty fibre amount, fine texture, short fibre length, fruit aroma weak, spicy taste, turpentine flavour, medium juice, poor rating quality, TSS-15, moderate pulp. Stone - oval shape, small stone, veins forked and slightly depressed.

40. SILPUJA

Source of collection - Tirtol, Cuttack district.

Fruit - Fruit large, oblong shape, elevated stalk attachment, basal sinus present, moderately falling dorsal shoulder, rising ventral shoulder, round back, sinus absent, beak missing, round apex, smooth fruit surface, ground colour of skin greenish yellow, skin toughness and adhesion is intermediate, pulp colour deep yellow, intermediate pulp texture, abundant fibre, intermediate fibre texture, short fibre length, fruit aroma medium, sweet taste, pleasant flavour, abundant juice, good rating quality, T.S.S. - 21. Stone - oblong shape, small to medium stone, veins forked and slightly depressed.

41. BELA

Source of collection - Athagarh, Cuttack district.

Fruit - Fruit large, round shape, level stalk attachment, basal sinus absent, abruptly falling dorsal shoulder, rising ventral shoulder, flat back, sinus absent, beak missing, round apex, smooth fruit surface, ground colour of skin greenish yellow, skin toughness intermediate, skin adhesion easily separating, pulp colour deep yellow, soft pulp texture, intermediate fibre amount fine fibre texture, short fibre length, medium fruit aroma, sweet taste, pleasant flavour, abundant juice, good rating quality, T.S.S. - 20, abundant pulp. Stone - round shape, medium stone, veins and slightly depressed.

40. SILPUJA

Source of collection - Tirtol, Cuttack district.

Fruit - Fruit large, oblong shape, elevated stalk attachment, basal sinus present, moderately falling dorsal shoulder, rising ventral shoulder, round back, sinus absent, beak missing, round apex, smooth fruit surface, ground colour of skin greenish yellow, skin toughness and adhesion is intermediate, pulp colour deep yellow, intermediate pulp texture, abundant fibre, intermediate fibre texture, short fibre length, fruit aroma medium, sweet taste, pleasant flavour, abundant juice, good rating quality, T.S.S. - 21. Stone - oblong shape, small to medium stone, veins forked and slightly depressed.

41. BELA

Source of collection - Athagarh, Cuttack district.

Fruit - Fruit large, round shape, level stalk attachment, basal sinus absent, abruptly falling dorsal shoulder, rising ventral shoulder, flat back, sinus absent, beak missing, round apex, smooth fruit surface, ground colour of skin greenish yellow, skin toughness intermediate, skin adhesion easily separating, pulp colour deep yellow, soft pulp texture, intermediate fibre amount fine fibre texture, short fibre length, medium fruit aroma, sweet taste, pleasant flavour, abundant juice, good rating quality, T.S.S. - 20, abundant pulp. Stone - round shape, medium stone, veins and slightly depressed.

42. NAKEI

Source of collection - Athagarh, Cuttack district.

Fruit - Fruit large, oval shape, elevated stalk attachment, basal sinus absent, dorsal shoulder moderately falling, rising ventral shoulder, round back, sinus absent, beak prominent round apex, undulating fruit surface, ground colour of skin greenish yellow, skin toughness and adhesion intermediate, pulp colour deep yellow, melting pulp texture, short fibre length, fruit aroma medium, sweet taste, pleasant flavour, medium juice, poor rating quality, moderate pulp, T.S.S. - 16.
Stone - Oval shape, small stone, soft fibre all over, veins are slightly raised.

43. NANGALMUNDA

Source of collection - Athagarh, Cuttack district.

Fruit - Fruit large, oblong shape, level stalk attachment, basal sinus present, dorsal shoulder moderately falling, rising ventral shoulder, round back, sinus absent, beak prominent, acute apex, smooth fruit surface, ground colour of skin green, skin toughness thin, adhesion easily separating, pulp colour pink, melting pulp texture, abundant fibre, intermediate fibre texture and length, repungent fruit aroma, acid taste, turpentine flavour, medium juice, poor rating quality, T.S.S. - 15, moderate pulp, Stone - Oblong shape, small stone, veins forked and slightly depressed.

44. RAGHUNATH BALLAV

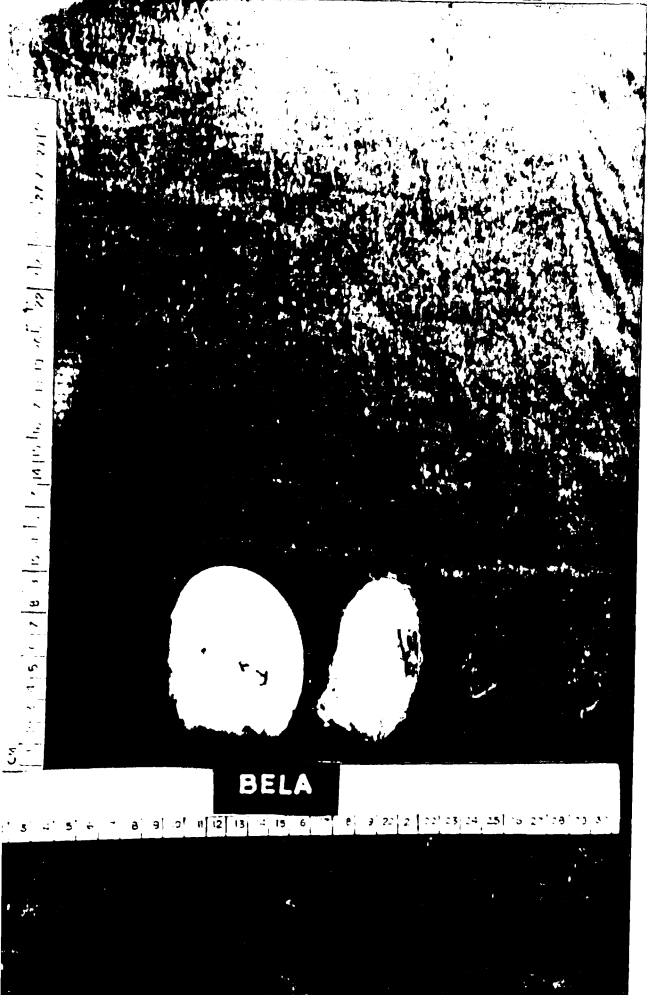
Source of collection - Athagarh, Cuttack district.

Fruit - Fruit large, oval shape, stalk attachment level, basal sinus slight, moderately falling dorsal shoulder, round back, sinus slight, beak slight, round apex, smooth fruit surface, ground colour of skin green, skin toughness tough and adhesion adheres, pulp colour pale lemon yellow and texture firm, abundant fibre, intermediate fibre texture and length, fruit aroma weak, resinous taste, turpentine flavour, scanty juice, fair rating quality, T.S.S. - 15, moderate pulp. Stone - Oval shape, large stone, soft fibre all over.

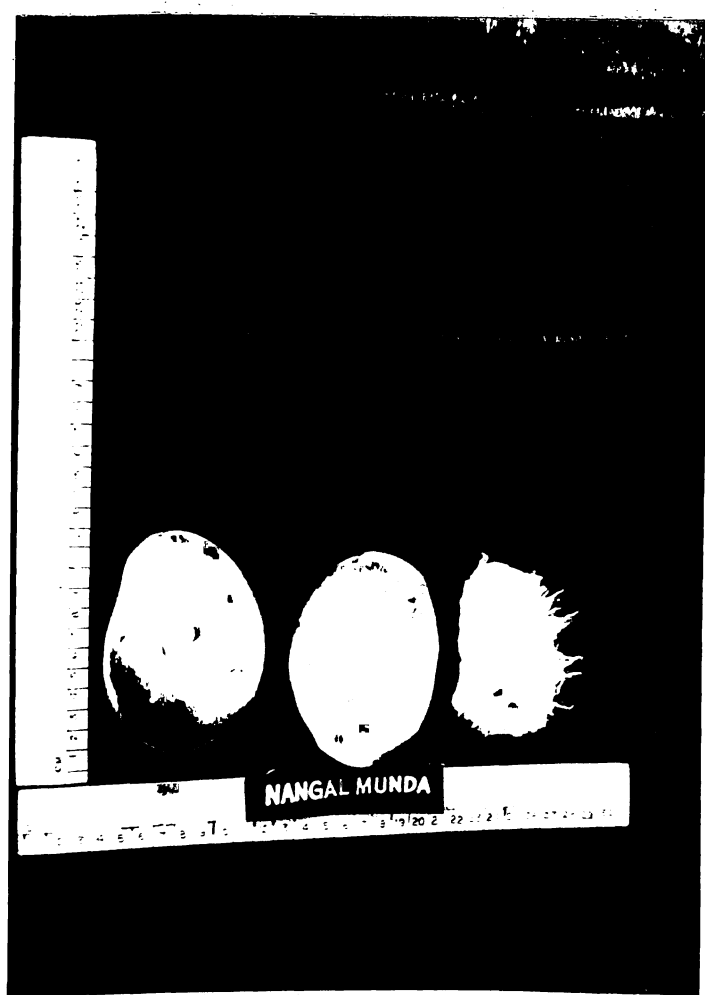
45. Gaja Paunsa

Source of collection - Athagarh, Cuttack district.

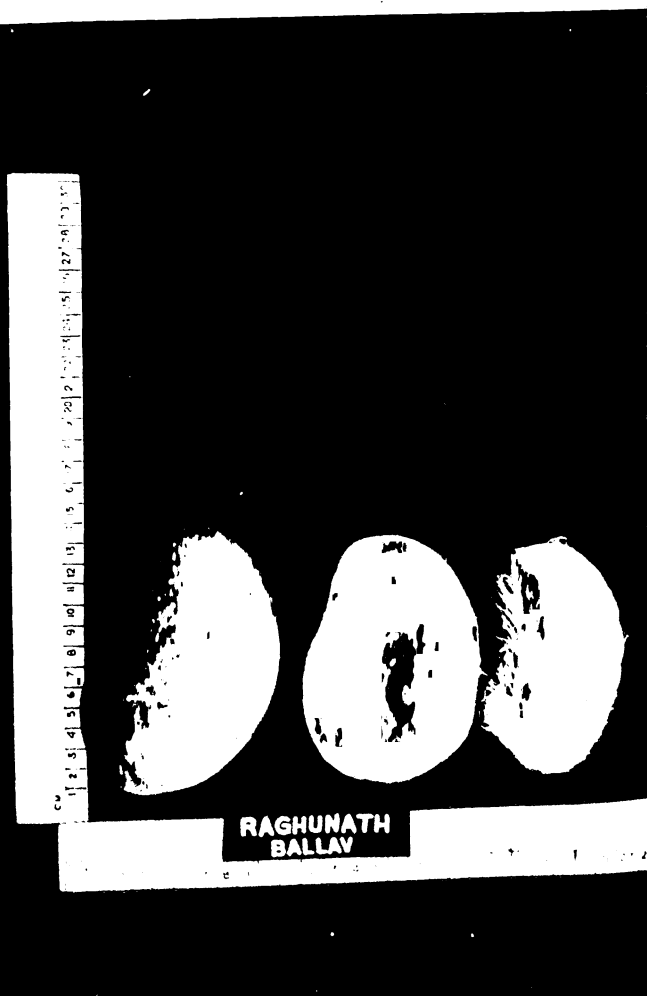
Fruit - Fruit large, oblong shape, level stalk attachment, basal sinus absent, moderately falling dorsal shoulder, rising ventral shoulder, round back, sinus absent, beak missing, round apex, smooth fruit surface, ground colour of skin greenish yellow, skin toughness intermediate and skin adhesion intermediate, pulp colour greenish yellow and melting texture, intermediate fibre amount, texture and length, fruit aroma weak, acid taste, turpentine flavour, juice medium, fair rating quality, T.S.S. - 17, moderate pulp, Stone - Oblong shape, medium stone, veins forked and slightly depressed.



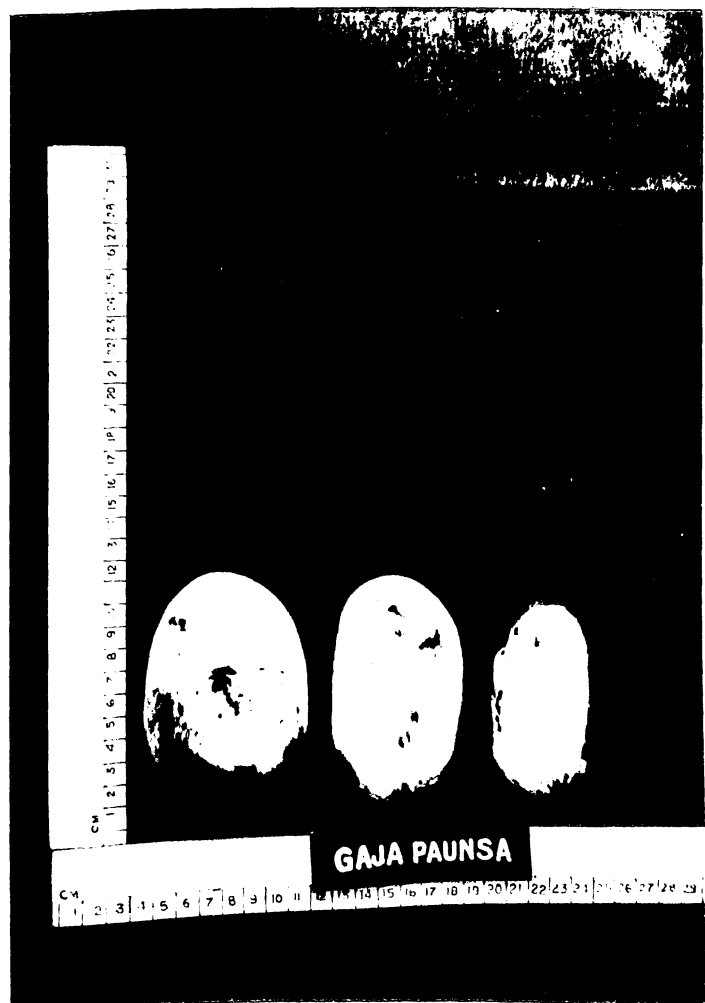
Sri Promod Tarasia,
Badamba, Cuttack.



Sri Trilochan Barik
Athgarh, Cuttack.



Sri K.C. Mangaraj
Athagarh, Cuttack.



Sri Manguli Rout,
Chakamunda, Athgarh,
Cuttack.

46. GOPALO

Source of collection - Athagarh, Cuttack district.

Fruit - Fruit large, oblong shape, stalk attachment level, basal sinus present, moderately falling dorsal shoulder, rising ventral shoulder, flat back, sinus absent, beak slight, acute apex, smooth fruit surface, ground colour of skin greenish yellow, skin toughness thin and adhesion easily separating, pulp colour pale lemon yellow, and melting texture, scanty fibre amount, fine fibre texture and short length, fruit aroma weak, sweet taste, luscious flavour, scanty juice, fair rating quality, T.S.S. - 14, moderate pulp, Stone - Oblong shape, medium stone, veins forked and slightly depressed.

47. KAKUDIA

Source of collection - Athagarh, Cuttack district.

Fruit - Fruit large, oblong shape, stalk attachment level, basal sinus present, moderately falling dorsal shoulder, rising ventral shoulder, flat back, sinus absent, beak slight, acute apex, smooth fruit surface, ground colour of skin greenish yellow, skin toughness thin and adhesion easily separating, pulp colour pale lemon yellow and melting texture, scanty fibre amount, fine fibre texture and short length, fruit aroma weak, sweet taste, luscious flavour, scanty juice, fair rating quality, T.S.S. - 14, moderate pulp, Stone - Oblong shape, medium stone, veins forked and slightly depressed.

48. BAHAGAJA

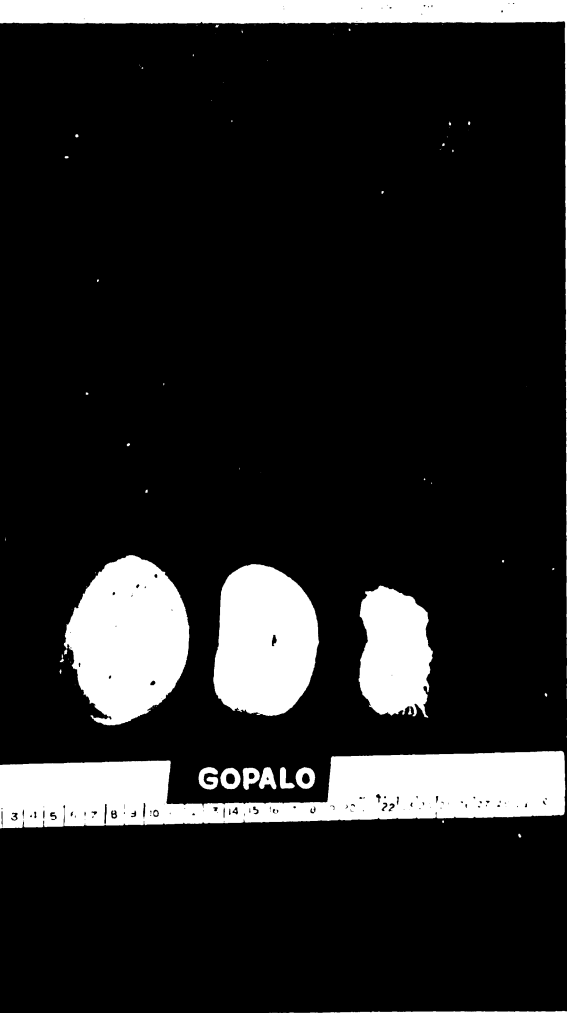
Source of collection - Athagarh, Cuttack district.

Fruit - Fruit large, oblong shape, level stalk attachment, basal sinus absent, moderately falling dorsal shoulder, level ventral shoulder, round back, marked sinus, beak slight, acute apex, smooth fruit surface, ground colour of skin greenish yellow, skin toughness thin and adhesion easily separating, pulp colour orange and melting texture, scanty fibre amount, fine fibre texture, short fibre length, fruit aroma medium, spicy taste, luscious flavour, scanty juice, fair rating quality, T.S.S. - 18, moderate pulp, Stone - oblong shape, medium stone, veins forked and slightly depressed.

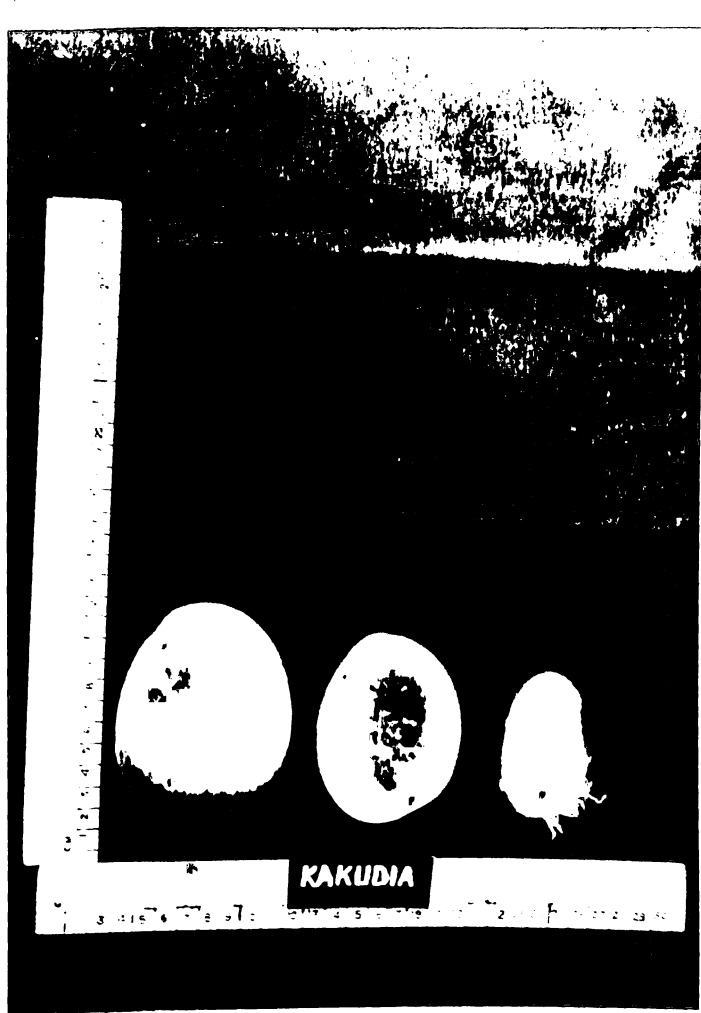
49. RASABALI

Source of collection - Athagarh, Cuttack district.

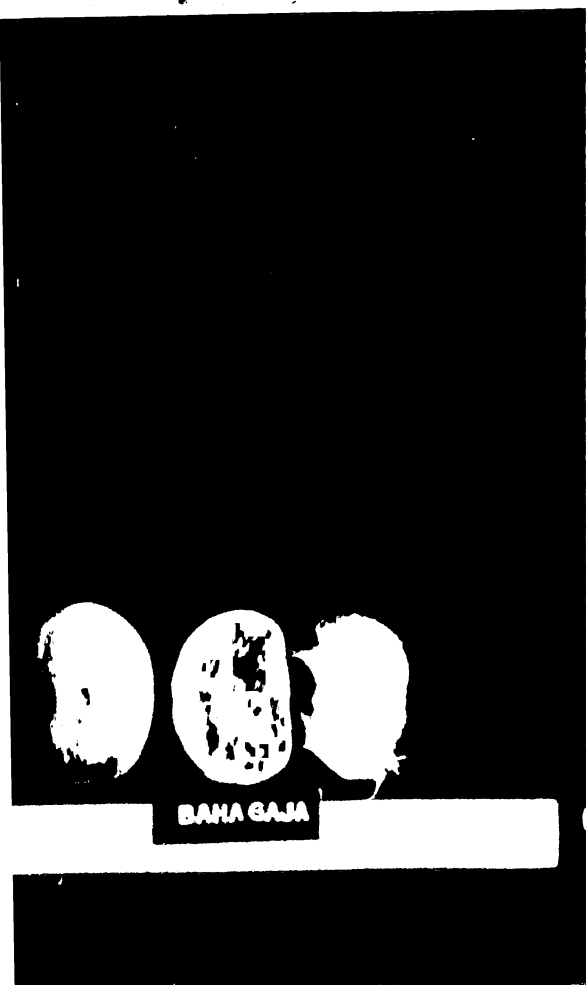
Fruit - Fruit large, oblong shape, elevated stalk attachment, basal sinus present, dorsal shoulder abruptly falling, rising ventral shoulder, curved back, sinus slight, prominent beak, round apex, undulating fruit surface, ground colour of skin green, skin toughness intermediate and adhesion adheres, pulp colour deep yellow and intermediate texture, scanty fibre, fine fibre texture, short fibre length fruit aroma weak, acid taste, turpentine flavour, juice medium, fair rating quality, T.S.S. - 11, moderate pulp. Stone - Oblong shape, small to medium stone, veins forked and slightly raised.



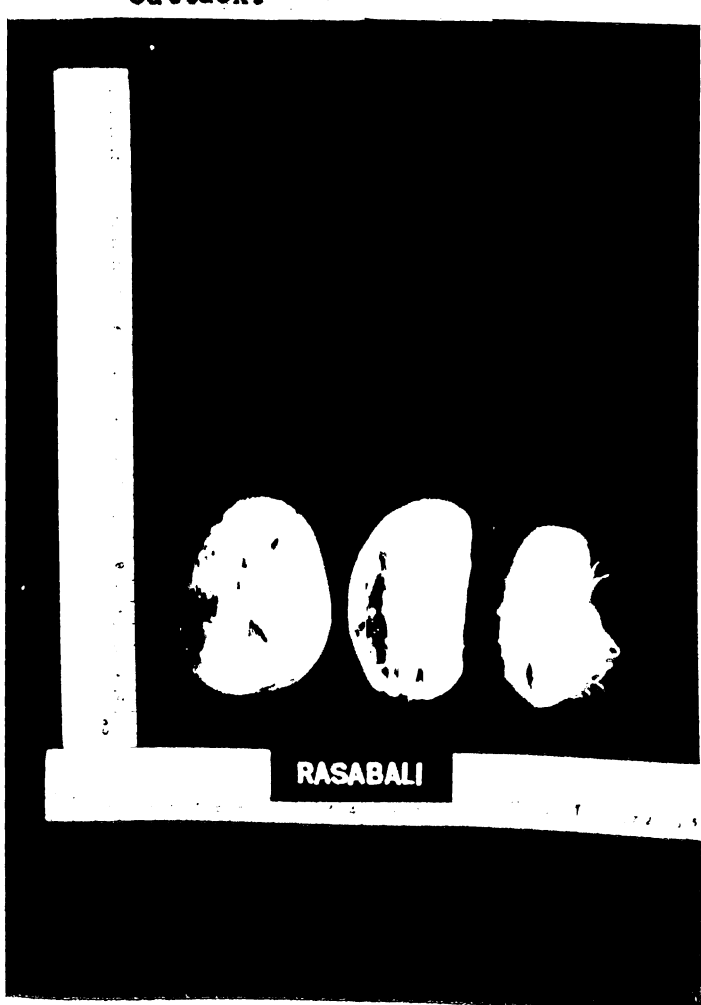
Sri K.C. Samal,
Badamba, Cuttack.



Sri Manguli Rout
Chakamunda, Athagarh
Cuttack.



Sri Sagarrenjan Pradhan,
Narasinghpur, Cuttack.



Sri Sagarrenjan Pradhan,
Narasinghpur, Cuttack.

50. GAJA

Source of collection - Athagarh, Cuttack district.

Fruit - small to medium, oval shape, level stalk attachment, basal sinus present, moderately falling dorsal shoulder, rising ventral shoulder, round back, marked sinus, slight beak, acute apex, smooth fruit surface, ground colour of skin green, skin toughness thin and adhesion easily separating, pulp colour pale lemon yellow and melting texture, scanty fibre, fine fibre texture, short fibre length, fruit aroma weak, spicy taste, turpentine flavour, medium juice, fair rating quality, T.S.S. - 9, moderate pulp. Stone - Oblong shape, small to medium stone, veins forked and slightly depressed.

51. BAJUNI

Source of collection - Athagarh, Cuttack district.

Fruit - Fruit large, oblong shape, stalk attachment level, basal sinus present, moderately falling dorsal shoulder, level ventral shoulder, round back, sinus slight, prominent beak, acute apex, smooth fruit surface, ground colour of skin greenish yellow, skin toughness thin and adhesion easily separating, pulp colour pale lemon yellow and melting pulp texture, scanty fibre, fine fibre texture, short fibre length, fruit aroma weak, sweet taste turpentine flavour, juice medium, poor rating quality, T.S.S. - 14, moderate pulp, Stone - Oblong shape medium stone, veins forked and slightly depressed.

52. KANHEI

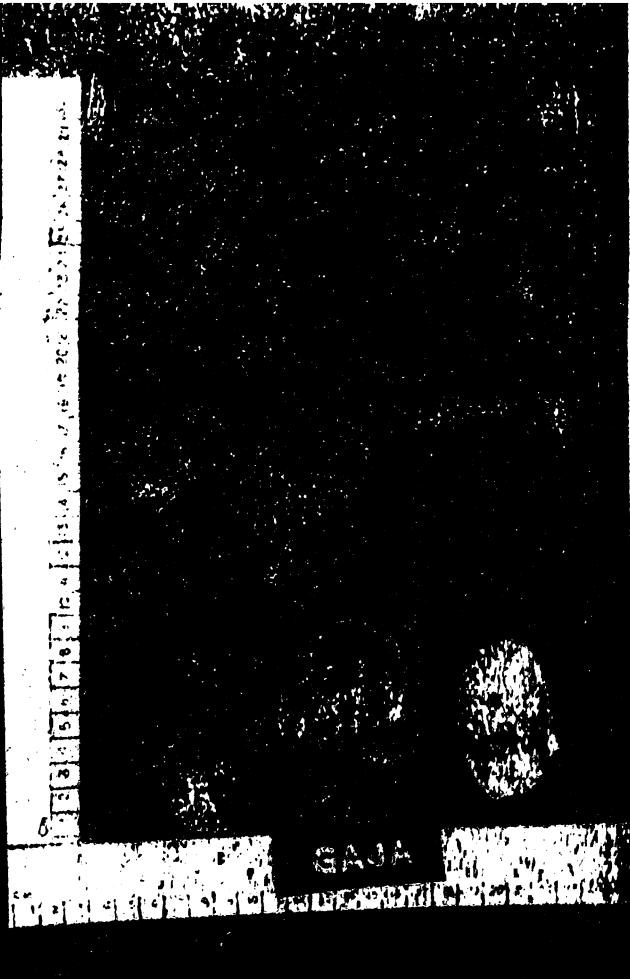
Source of collection - Athagarh, Cuttack district.

Fruit - Fruit medium to large, oval shape, stalk attachment, depressed, basal sinus absent, moderately falling dorsal shoulder, rising ventral shoulder, round back, sinus slight, beak missing, round apex, smooth fruit surface, ground colour of skin greenish yellow, skin toughness intermediate, adhesion easily separating, pulp colour pale lemon yellow, soft pulp texture, intermediate fibre amount texture and length; fruit aroma weak, sweet taste, turpentine flavour, medium juice, poor rating quality, T.S.S. - 14, moderate pulp. Stone - Oval shape, small stone, veins forked and slightly depressed.

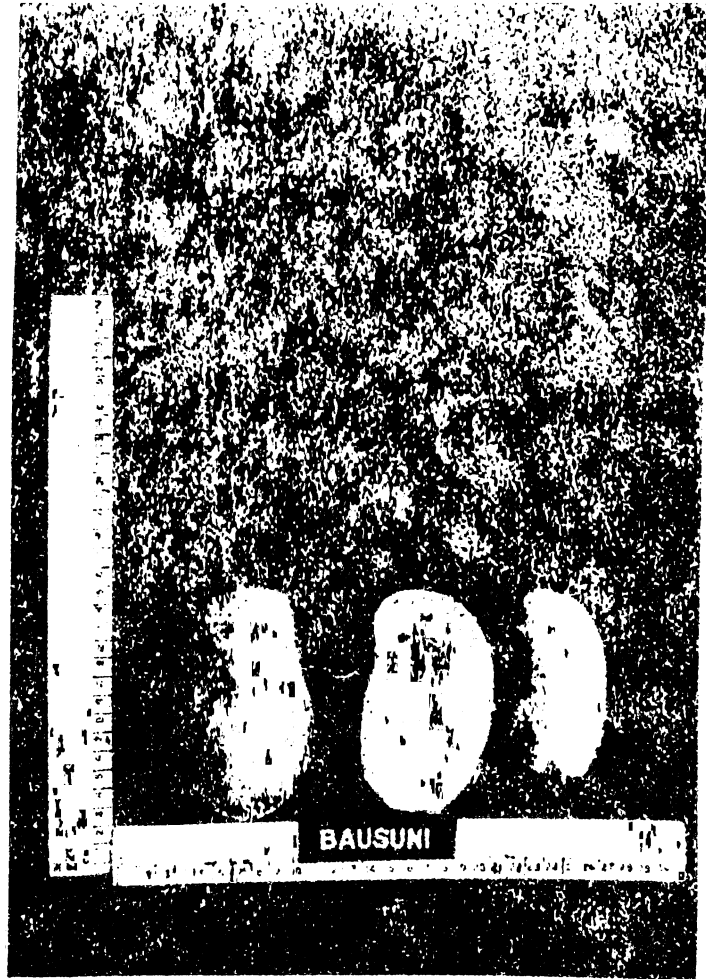
53. NAKEI

Source of collection - Athagarh, Cuttack district.

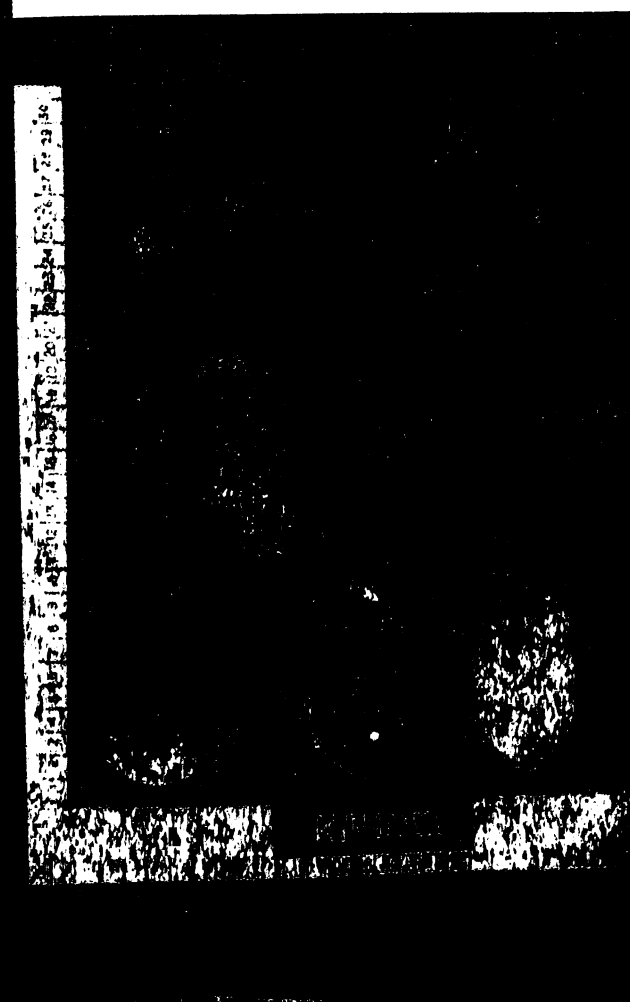
Fruit - Fruit small, oblong shape, stalk attachment level, basal sinus absent, moderately falling dorsal shoulder, ventral shoulder level, round back, sinus slight, prominent beak, obtuse apex, smooth fruit surface, ground colour of skin greenish yellow, skin toughness thin and adhesion easily separating, pulp colour pale lemon yellow, end melting texture, scanty fibre, fine fibre texture and short fibre length, fruit aroma weak, spicy taste, luscious flavour, medium juice, fair rating quality, T.S.S. - 15. Stone - Oblong shape, large stone, veins forked and slightly raised.



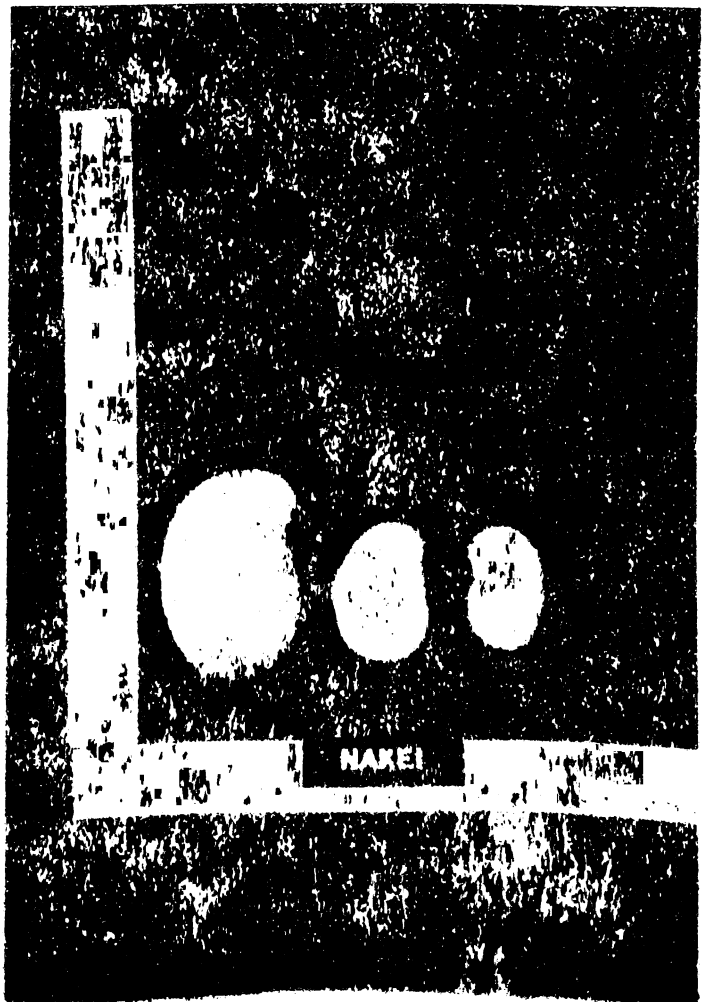
Sri Satraghna Rout,
Narasinghpur, Cuttack.



Sri Krishna Ch. Mahanty,
Narasinghpur, Cuttack.



Sagar ranjan Rout,
Narasinghpur, Cuttack.



Sri Niranjan Inhari,
Narasinghpur, Cuttack.

54. SUNDARI

Source of collection - Athagarh, Cuttack district.
 Fruit - Fruit small, oblong shape, stalk attachment level, basal sinus absent, moderately falling dorsal shoulder, rising ventral shoulder, curved back, sinus slight round apex, smooth fruit surface, ground colour of skin bright yellow, skin toughness thin and adhesion intermediate, pulp colour yellow and soft pulp texture, scanty fibre fine texture and short fibre length, fruit aroma medium, sweet taste, luscious flavour, scanty juice, fair rating quality, T.S.S. - 11, scanty pulp, Stone - Oblong shape, small stone, veins forked and slightly depressed.

55. GETTI

Source of collection - Athagarh, Cuttack district.
 Fruit - Fruit small to medium, round shape, elevated stalk attachment, basal sinus absent, moderately falling dorsal shoulder, rising ventral shoulder, round back, sinus absent, beak slight, obtuse apex, smooth fruit surface, ground colour of skin greenish yellow, skin toughness thin, skin adhesion easily separating, pulp colour pale lemon yellow, intermediate pulp texture, scanty fibre, fine texture, short fibre length, fruit aroma weak, acid taste, turpentine flavour, scanty juice, fair rating quality, T.S.S. - 16, moderate pulp.
 Stone - round shape, small stone, veins forked and slightly depressed.

56. TINIGACHHIA

Source of collection - Athagarh, Cuttack district.
 Fruit - Fruit large, oblong shape, stalk attachment level, basal sinus absent, moderately falling dorsal shoulder, rising ventral shoulder, round back, sinus slight, beak slight, acute apex, smooth fruit surface, ground colour of skin greenish yellow, skin toughness thin and adhesion easily separating, pulp colour pale lemon yellow and melting texture, scanty fibre, fine fibre texture, short fibre length, fruit aroma weak, acid taste, turpentine flavour, medium juice, poor rating quality, T.S.S. - 10, moderate pulp, Stone - Oblong shape, medium stone, veins forked and slightly depressed.

57. GAJADANTA

Source of collection - Athagarh, Cuttack district.
 Fruit Fruit large, oval shape, stalk attachment level, basal sinus absent, abruptly falling dorsal shoulder, level ventral shoulder, round back, sinus slight, prominent beak, round apex, undulating fruit surface, ground colour of skin greenish yellow, skin toughness tough and adhesion easily separating, pulp colour pale lemon yellow and intermediate texture, scanty fibre, intermediate fibre length, fruit aroma weak, spicy taste, turpentine flavour, scanty juice, poor rating quality, T.S.S. - 14, moderate to abundant pulp. Stone - Oval shape, medium to large stone, veins forked and slightly raised.

58. HATIDANFA

Source of collection - Athagarh, Cuttack district.

Fruit - Fruit large, oblong shape, stalk attachment level, basal sinus present, moderately falling dorsal shoulder, rising ventral shoulder, round back, marked sinus, prominent beak, obtuse apex, smooth fruit surface, ground colour of skin green, intermediate skin toughness and adhesion, pulp colour deep yellow, intermediate pulp texture and fibre amount, fibre texture and length intermediate, fruit aroma weak, spicy taste, turpentine flavour, texture and length intermediate fair rating quality, T.S.S. - 14, small to moderate pulp. Stone - Oblong shape, medium to large stone, veins depressed.

59. KRISHNA BALLAV

Source of collection - Thagarh, cuttack district.

Fruit - Fruit large, oval shape, level stalk attachment, basal sinus present, abruptly falling dorsal shoulder, level ventral shoulder, flat back, marked sinus, prominent beak, obtuse apex, smooth fruit surface, ground colour of skin greenish yellow, skin toughness intermediate, and adhesion easily separating, pulp colour pale lemon yellow and soft texture, scanty fibre, fine fibre texture and short fibre length, fruit aroma weak, sweet taste, luscious flavour, juice medium, good rating quality, TSS-21, moderate pulp. Stone - oval shape, large stone, veins are parallel and slightly raised.

60. SWARNALATA

Source of collection - Athagarh, Cuttack district.

Fruit - Fruit large, oval shape, stalk attachment level, basal sinus absent, moderately falling dorsal shoulder, rising ventral shoulder, flat back, sinus absent, missing beak, round apex, smooth fruit surface, ground colour of skin greenish yellow, skin toughness thin and adhesion intermediate, pulp colour yellow and soft pulp texture, scanty fibre, fine fibre texture, short fibre length, fruit aroma weak, sweet taste, pleasant flavour, juice medium, good rating quality, TSS-10, Stone - oval shape, small stone, veins are slightly depressed.

61. BALIA AMBA

Source of collection - Athagarh, Cuttack district.

Fruit - Fruit large, oblong shape, stalk attachment level, basal sinus absent, moderately falling dorsal shoulder, rising ventral shoulder, flat back, sinus absent, beak missing, round apex, smooth fruit surface, ground colour of skin greenish yellow, skin toughness thin and adhesion medium, pulp colour orange, soft pulp texture, scanty fibre, fine fibre texture, short fibre length, fruit aroma medium, sweet taste, pleasant flavour, abundant juice, fair rating quality, TSS-14. Stone - oblong shape, small stone, veins are slightly raised.

62. CHANDRAMA

Source of collection - Athagarh, Cuttack district.

Fruit - Fruit large, oblong shape, elevated stalk attachment, basal sinus present, moderately falling dorsal shoulder, rising ventral shoulder, round back, sinus slight, beak missing, obtuse apex, smooth fruit surface, ground colour of skin greenish yellow, skin toughness intermediate and skin adhesion easily separating, pulp colour deep yellow, intermediate pulp texture, scanty fibre, fine fibre texture, short fibre length, fruit aroma medium, sweet taste, turpentine flavour, juice medium poor rating quality, TSS-12, moderate pulp. Stone - oblong shape, small stone veins forked and slightly depressed.

63. KALIAGAJA

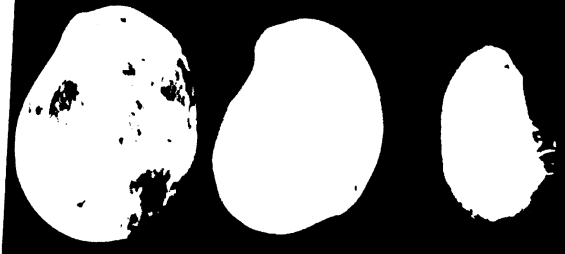
Source of collection - Athagarh, Cuttack district.

Fruit - Fruit large, oval shape, level stalk attachment, basal sinus absent, moderately falling dorsal shoulder, rising ventral shoulder, curved back, sinus slight, prominent beak, obtuse apex, smooth fruit surface, ground colour of skin green, skin toughness intermediate, skin adhesion adheres, pale lemon yellow colour pulp, melting pulp texture, scanty fibre, fine fibre texture, short fibre length, fruit aroma weak, sweet taste, luscious flavour, juice medium, fair rating quality, TSS-16, moderate pulp. Stone - oval shape, small to medium stone, veins are slightly depressed.



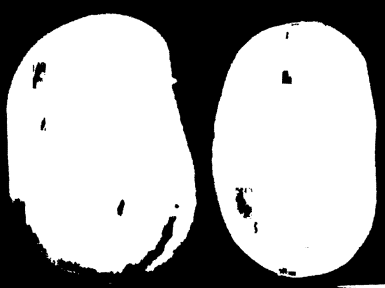
TINIGACHHIA

Sri Promod Tarasia,
Badamba, Cuttack.



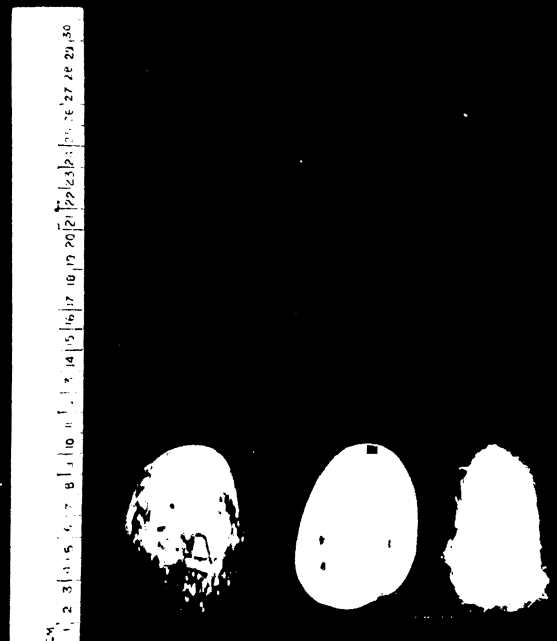
HATI DANTHA

Sri Satyaranjan Pradhan,
Jaresinghpur,
Cuttack.



KRUSHNA BALLAB

Sri Promod Tarasia
Badamba, Athgarh,
Cuttack.



KALIA GAJA

Sri Chintamani Babu
Athgarh, Cuttack.

66. BHELJA

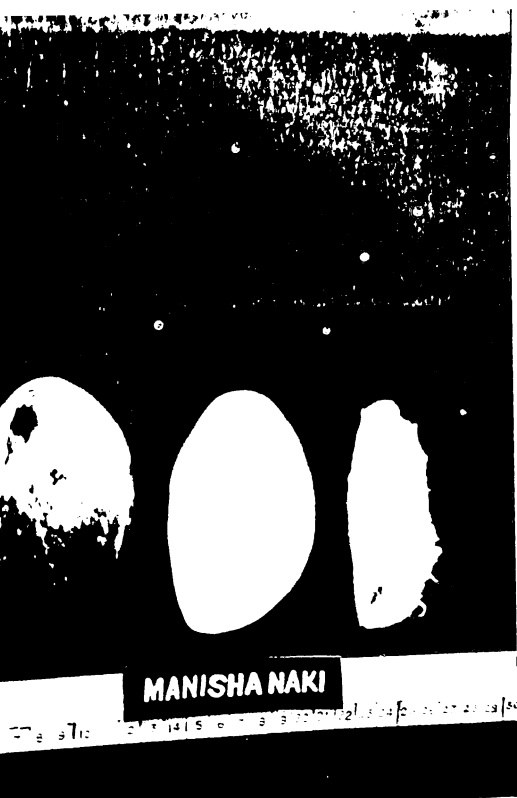
Source of collection - Jajpur, Cuttack district.

Fruit - Fruit large, round shape, level stalk attachment, basal sinus absent, abruptly falling dorsal shoulder, rising ventral shoulder, round back, sinus absent, beak missing, round apex, smooth fruit surface, ground colour of skin greenish yellow, skin toughness thin, and skin adhesion intermediate, pulp colour deep yellow, intermediate pulp texture, fibre amount and texture intermediate, short fibre length, fruit aroma median, spicy taste, luscious flavour, abundant juice, fair rating quality, TSS-18, moderate pulp. Stone - round shape, small stone, veins forked and slightly raised.

67. KALA PAHARA

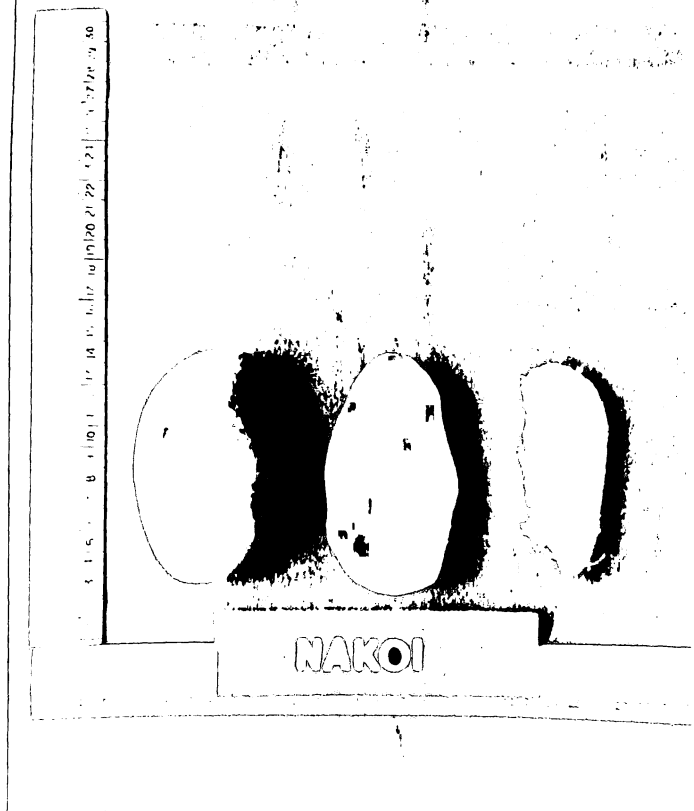
Source of collection - Jajpur, Cuttack district.

Fruit - Fruit large, oblong shape, depressed stalk attachment, basal sinus present, moderately falling dorsal shoulder, rising ventral shoulder, curved back, marked sinus, prominent beak, obtuse apex, smooth fruit surface, ground colour of skin green, skin toughness intermediate, skin adhesion easily separating, pulp colour deep yellow, soft pulp texture fibre amount, texture and length intermediate, fruit aroma weak, spicy taste, turpentine flavour, abundant pulp. Stone - oblong shape, medium, stone, veins forked and slightly depressed.



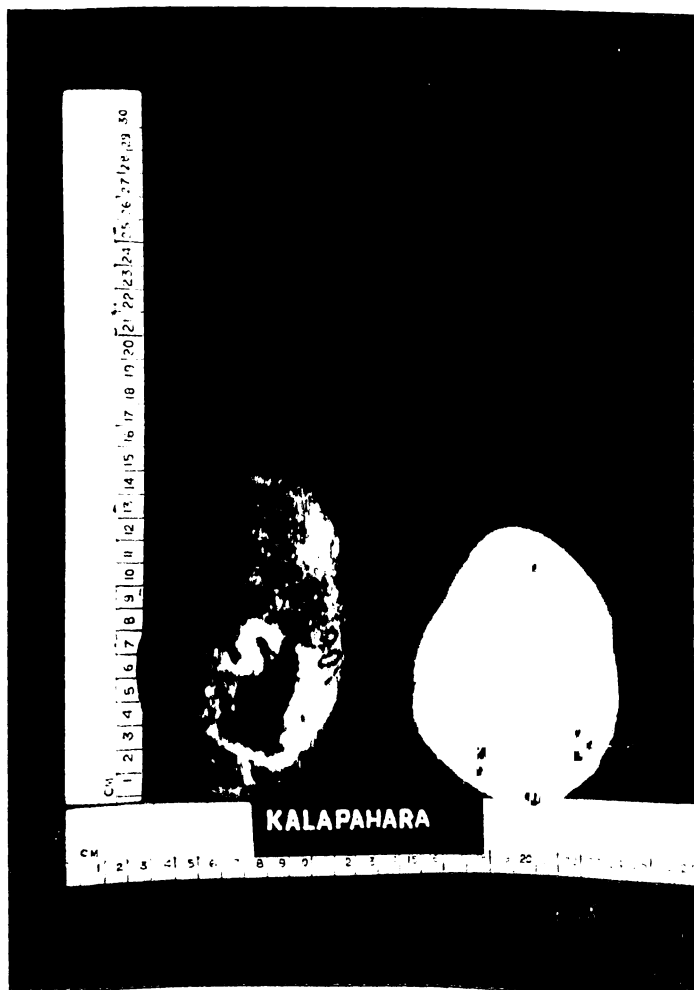
MANISHA NAKI

**Sri Krishna Ch. Pradhan,
Dharmasala, Jajpur,
Cuttack.**



NAKOL

**Sri Harihar Pradhan,
Jajpur, Cuttack.**



KALAPAHARA

**Sri Narayana Swain,
Jajpur, Cuttack.**

**Sri Ratnekar Pradhan,
Sagarathpur, Jajpur,**

CHAPTER V

DISCUSSION

DISCUSSION

Systematic study of all fruits is concerned with the naming, describing and classifying of varieties according to their natural relationships. Generally the structure and arrangement of various organs are studied to determine the points of similarity and dissimilarity in order to that of individuals which have a certain degree of resemblance are placed in the same group. Hedrick (1925) described that any system of classification is but a true picture of a bit of vegetable kingdom on a certain day, and may, therefore be not a good picture. He has also emphasized that there can never be a permanent classification of fruits, as it is a temporary arrangement of groups and individuals according to the knowledge available at that time. When more is known about the group, the classification is remade, so that, the knowledge can be utilised by the botanists, plant breeders, the horticulturists and the fruit growers.

The importance of some kind of classification of fruit involving the preparation of a workable key which could be helpful in identifying fruit varieties has long been recognized. In mango this is amply evidenced from the prevalent common and arbitrary classification of

varieties which were made such as "Kotha - rakham" (cut fruits), "Rasalus" (juicy fruits), "Theya - rakham" (fruit sweet when raw) etc. Popenoe (1927), Burns and Prayag (1921) and Rolphs (1915) emphasized the urgent necessity for a recognised and rational system of classification of mango varieties. The classification of local elites of mango in Cuttack district of Orissa has been described by following the guidelines of above scientists. Systematic study described the characters of the different parts of the fruits. According to Hedrick (1925) the differences in the kind of inflorescences distinguished the genera and species. He also described that in study of fruit varieties, characters must be looked for in the inflorescence itself like the minute differences of the shape, size etc. of the different parts of the inflorescence. This is because of the fact that the fruit varieties in general and mango in particular happens to be individuals of the same species but with also some recognisable differences. Therefore in the classification it was necessary to describe the characters of the inflorescence and also of the fruit character for identification of varieties.

Many workers like Blake and Connors (1936) Shaw (1914), and Winter (1925) have studied the fruit varieties from the point of vegetative characters of tree and leaf. Pearl (1932 & 1933) and Bunyard (1927) have

studied thoroughly the varieties from the floral stand point, while Durham (1920) has exhaustively investigated the taxonomic possibilities of fruit only. In the present investigation, importance has been given to fruit characters. Since the chances of a successful genetical classification in mango being unnecessary or remote and time taking, therefore, characters based upon features like shape, colour, flavour and season etc. are considered. In mangoes, Popenae (1927) has based his classification not only on the fruit characters but also to a certain extent on the vegetative and floral characters. Many scientists like Woodhouse (1909) and Burns and Prayag (1915) have described mainly on fruit characters as the basis for classification, paying little attention to the vegetative characters. In our classification the fruit character of local elites of mango has been described in detail for identification of selected varieties.

According to Scientists Shaw (1914) and Winter (1925) reported that other plant characters like leaf and floral character should be taken into account for determining the identity of young nursery stock and mature fruiting plants. Based on the work of scientists Woodhouse (1909) & Burns Prayag (1915), the present work was carried out mainly on fruit characters.

Hedrick (1925) pointed that it is impossible for any one working on taxonomy to observe all the varieties

cultivated in one place or different varieties grown in different places. Workers are therefore depend upon descriptions, illustrations in compiling the work as it is impossible for any one to form permanently in his mind a picture of the characteristics of each of the multitude of varieties. It is therefore essential that the description should be accurate and as comprehensive as possible. In-sufficient characterization is the chief defect in most of the systematic works on fruits and particularly in mangoes. A description may be accurate but be characterized by omission of important features or be weighed down by unimportant facts, so that the true picture is often obscured. It is not necessary to describe every aspect of fruit, but the outstanding features must be brought out. Even when all the characters are given, greater stress ought to be laid on those by which it can most readily be distinguished from its close relatives. According to Bunyard (1934), a descriptive horticulturist would be forced to deal with the adjectives and adverbs of quality, quantity and intensity. Hedrick (1925) reported that while employing such terms, a great deal of care has to be exercised as the descriptions are judged by clearness, accuracy and the correct use of different characters. He described that the best description is one that enables the reader to form a mental picture of the plant. He emphasized that there are no definite rules for description and that individuality must have full

play by each workers describing what he sees, with adequate set of technical terms, which should be accurate, lucid and brief. In the present investigation of mangoes, efforts were made to conduct the studies bearing all the above suggestions carefully in mind and in accordance with them.

In the varietal study, every variety would look alike. Close and repeated observations of the nature of flower and fruits would, however, revealed the peculiarities that characterized the each variety. It is but natural that a study of this nature should cover a very extensive range of characters. The environmental conditions and the cultural methods naturally bring about differences in certain morphological features, and this fact should be given due consideration in any comprehensive study aiming at the classification of varieties. Hence it was found essential to make a judicious selection of characters which were found to be most constant.

The data furnished in this thesis after such a detailed study have provided indications about the possibility of the use of the fruit characters in identifying the various varieties now under cultivation in Orissa. One of the interesting facts emerging from the present study is the observable differences in fruit characters. These are the characters that must be given an important place in classification. Less elementary characters have

been recognized but not formulated, as importance has been attached only to fundamental points. Extensive observations and studies have been made possible to determine which characters are of primary importance, and which are of minor importance and which are likely to be of additional value, being relatively constant for a given variety. It is on the basis of this differentiation that the key was constructed and classification was worked out. The nomenclature of mango varieties has been complicated by the general craze of many nurserymen and Orchardist vying to own large collections by naming every variable seedlings as a 'variety', usually associating with the name of the family members or relatives or patrons. The synonymes also has been further lengthened by the traders who adopt well known varietal names for inferior types in order to attract customers. Names are also coined after the locality, person, titles or surnames, romantic ideas, royalty or the nobility, animals, fishes, the drum, precious stones, shape, size.

In the present studies, observations on the fruit characters of local elites of mango of Cuttack district of Orissa was made in detail on various aspects on the basis of better characters alongwith better quality, it is observed that out of sixtyeight local elites, twelve are finally selected. These are of better types and comparable with existing important commercial varieties

of the country. These twelve varieties also have abundant pulp, less fibre, pleasant flavour, easily separating skin adhesion, soft texture, short fibre length, sweet taste, excellent rating quality, high TSS, small stone. The name of these twelve local elites are Nakei (1), Kalei, Kadalia, Kanchasuadi, Sundari, Nagalmunda, Nakei (2), Silpua, Bela, Rajbhog, Raghunath Ballav and Krishna Ballava. It is also observed in this survey as it was reported in previous publications by Naik and Gangolly and Pandey (1950). Many similar types of varieties are found in different synonymes in different places of the district. Very little variations in external & internal fruit characters have been observed and mentioned in this chapter.

It is seen from the table - 2 that the variety Sundari is found in Jagatsinghpur area of Cuttack district. The name 'Sundari' means beautiful. The shape of the fruit is oblong, the fruit has Orange Colour Skin, soft fibre, sweet taste, pleasant flavour, thin skin, deep yellow pulp, abundant juice & small stone. So this variety should be accepted as a good variety. The same variety is found in Nischintakoili, Barde and Athagarh area. Here the plant may be the seedling root stock of Jagatsinghpur Sundari variety.

Nakei variety is found in Kusuma area of Cuttack district. It is also called as Nakoi in Jajpur, Nangal-kantia in Nischintakoili, Nangalmunda in Jagatsinghpur and

Table 2. -- Details of Synonyms repeated for similar type of fruits in different places of the district

Name of the cultivar	Number of synonyms	Synonyms called in different places for different types
1. Sundari of Jagatsinghpur	3	Sundari of Nischintakoili, Barda and Athgarh
2. Nakei of Kusuma	7	Nakei of Jajpur, Nangalkantia in Nischintakoili, Nangalmunda in Jagatsinghpur and Athagarh, Nakei of Athagarh and Niali, Telengapentha
3. Manda of Nachhipur	3	Manda of Salepur, Nischintakoili and Jagatsinghpur
4. Silpua of Niali	6	Silpua of Tirtol, Kantapra, Jagatsinghpur; Kalapahara of Jajpur; Hatidanta and Kaliagaja of Athgarh
5. Kadalia of Kanpur	2	Kadalia of Kantapara, Niali
6. Kakudia of Nachhipur	1	Kakudia of Athagarh
7. Asadhua of Jagatsinghpur	2	Asadhua of Salepur and Sadhi of Kantapara
8. Mahua of Nischintakoili	1	Mahua of Jajpur
9. Kanchasuadi of Jagatsinghpur	1	Kanchamitha in Jagatsinghpur
10. Krishnaballav of Athagarh	3	Gopalo, Kanhei and Raghunathballav of Athagarh
11. Gaja Paansa of Athagarh	2	Gaja and Gajadanta

Athagarh area. This variety is having a prominent beak like nose. The shape is round or oval type, short fibre, yellow pulp, pleasant flavour and abundant juice. The variety looks green even in ripe condition. This variety is suitable for sucking, preparing mango leather and squash. So this variety should be accepted as a good variety.

Manda variety is found in Nachhipur area of Cuttack district. This is called 'Manda' because the shape of the fruit is round and flattened which resembles to a type of steam cooked cake called 'Manda Pitha' in Orissa. This variety looks green even in ripe condition. Although this variety is having sweet taste, luscious flavour and abundant pulp, thin skin but it has intermediate fibre.

Kali variety is found in Nischintakoili area of Cuttack district. This variety is also called Kalei. The skin of this fruit is thick and deep green when ripe. But this variety is having short fibre, sweet taste, pleasant flavour, abundant juice, high T.S.S. So this variety should be accepted. The same variety Kali is found in Adaspur area of Cuttack district with slight variation in fruit character.

Silpua variety is found in Niali area of Cuttack district. This variety is also called as Kalapahara and Manisa Naki in Jajpur area, Hatidanta and Kaliagaja in

Athagarh area of Cuttack district. The name 'Silpua' means an elongated piece of stone used for pasting spices on a stone base known as 'Sila'. The name of the fruit is probably given so due to large and elongated shape of the fruit with a very firm flesh and compact body. This variety is having scanty fibre, short and fine fibre, weak aroma, acid taste, medium juice content, low T.S.S. and large stone. So this variety should be discarded or screened further.

Kadalia is a variety found in Kanpur area of Jagatsinghpur. The local name indicates that the size of the fruit is long and banana like. The taste of the pulp is sweet and palatable with thin skin, short fibre, luscious flavour, medium juice, high T.S.S. and small stone. The same variety is found in Niali and Kantapara area of Cuttack district with slight variation in the internal character of fruit. Thus it indicates that Kadalia variety of Niali and Kantapara area may be the seedling root stock of Kanpur area. So this variety should be accepted as good variety. This variety is suitable for preparing mango leather and squash.

Rajbhog is a variety found in Kantapara area of Cuttack district. The name 'Raj' means king and 'bhog' means this variety is generally offered to the king. This variety has round shape fruit, medium skin toughness, orange colour pulp, sweet taste, luscious flavour and

medium juice, small stone. So these varieties are generally offered to king. So this variety should be accepted as a good variety.

Kakudia is a variety found in Nachhipur and Athgarh area of Cuttack district. The meaning of the name 'Kakudia' means 'Cucumber like'. The name is probably given due to sweetness and softness of the raw flesh of the fruit. The fruit of this variety is having sweet taste, pleasant flavour, short fibre, small stone, but the fruit has abundant fibre and scanty juice. So this variety should be discarded or screened further.

Asadhua is a variety found in Jagatsinghpur area of Cuttack district. The name 'Asadha' means 'the month of July'. The name is given so as this is a late season variety. This variety is generally ripen in the month of July i.e. during monsoon break. The skin colour of the fruit is light green during ripening. Although this fruit has sweet taste but it has scanty juice, turpentine flavour and intermediate fibre. So this variety should be discarded. But this variety has its significance as it is ripen in off period i.e. in the month of July when all the mango variety have gone out of the market. This variety is also called as Asadhi in Kantapara area. Asadhi is the synonym to Asadhua with slight variation in internal fruit character.

Mahua is a variety found in Nischintakoili area of Cuttack district. The name 'Mahu' means honey. The variety

is so named as the fruit of this variety is very sweet and palatable. The fruit has oval shape, thin skin, pale lemon yellow colour pulp, melting pulp texture, short fibre, sweet taste, luscious flavour, medium stone. So this variety should be accepted as a good variety. The same variety is found in Jajpur area of Cuttack district, this may be the seedling root stock of Mahua of Nischintakoili variety.

Kanchasudi is a variety found in Jagatsinghpur area of Cuttack district. It is also called as Kanchamitha. The name 'Kancha' means 'raw' and 'Suada' means 'taste'. This variety is so named as it is sweet in raw condition. The fruit of this variety has scanty fibre, fine fibre texture, medium juice and pulp, T.S.S. - 24 i.e. very high T.S.S., small stone. So this variety is selected as a good variety.

Krishnaballav is a variety found in Athagarh area of Cuttack district. This variety is also called as Raghunathballav, Gopalo and Kanhei. The name 'Krishnaballav' indicates that the fruit of this variety is probably offered to 'Lord Krishna'. The fruit has oval shape, thick skin, soft pulp texture, scanty fibre, fine fibre texture, sweet taste, luscious flavour, high T.S.S. i.e. T.S.S. - 21. So this variety is selected as a good variety.

Gaja Paunsa is a variety in Athagarh area of Cuttack district. It is also called as Gaja and Gajadanta. The

name 'Gaja Paunsa' means the fruit has a whitish coating over its surface in ripen condition. It has thick skin, intermediate fibre, weak aroma, acid taste, turpentine flavour, medium size stone. So this variety should be discarded.

Swarnalata is a variety found in Athagarh area. The name 'Swarna' means 'gold' and 'lata' means 'the drooping habit of tree'. The name is so given as the skin of the fruit is golden yellow when ripe. The fruit has oval shape, thin skin, scanty fibre, fine fibre texture, sweet taste, pleasant flavour. So it is taken as a good variety.

Rasabali variety is found in Athagarh area of Cuttack district. The name 'Rasabali' means the fruit is having abundant pulp and juice. The fruit has oblong shape, thick skin, scanty fibre, but it has acid taste, turpentine flavour, medium size stone. So this variety should be screened further.

Balia Amba variety is found in Athagarh area. The fruit has been named according to the name of that locality. The fruit has oblong shape, thick skin, orange colour pulp, scanty fibre, sweet taste, pleasant flavour, abundant juice, small stone. So this variety is taken as a good variety.

Bahagaja and Tinigachhia Bausuni variety are found in Athagarh area of Cuttack district. The fruits of these varieties are having acid taste, turpentine flavour, weak aroma, low T.S.S., medium size stone. So these variety

should be discarded. The name of this variety are given arbitrarily having no base. Another variety Chandrama found in Athagarh area. The name 'Chandrama' means it looks like 'moon'. The variety looks beautiful like 'moon'. The fruit has oblong shape, thick skin, deep yellow pulp, scanty fibre, sweet taste, low T.S.S., small stone. So this variety should be accepted and screened further.

Bhelua of Jajpur, Bela of Athagarh, Suakhia of Tirtol, Totamundia, Baleimundi, Chepeti, Chekel and Gurudi of Jagatsinghpur, Getti of Athagarh, Cherua of Kusuma and Lamudi variety of Tangi areas are named so without any base by the local people of that areas. The above said varieties have more fibre, scanty juice, acid taste, turpentine flavour, small to medium size stone, weak aroma. So the above varieties are generally discarded.

From the above survey the twelve varieties such as Sundari, Nakei(1), Nakei(2), Kalai, Kadalai, Rajbhog, Silpua, Kanchasudi, Nangalaunda, Krishnaballav, Raghunathballav, Bela have been selected because of their better external and internal characters of the fruits along with better quality as they have scanty fibre, abundant pulp, sweet taste, pleasant flavour, high T.S.S. and small size stone and good aroma. These varieties are more or less comparable to other popular commercial varieties of mango grown in other States of India. The vegetative and flowering characters of these selected varieties will be studied in

the current season and thereafter final selection will be made for its commercial exploitation within the state as it was practised in other states.

CHAPTER VI

SUMMARY AND CONCLUSION

SUMMARY AND CONCLUSION

An intensive survey of local elites of mango have been taken up by covering all the places of Cuttack district during the year 1987-88 and 1988-89. A good number of different types of local elites of mango germ-plasm have been collected. Out of these important sixty-eight rare elite varieties have been selected and earmarked for collection of fruits on the basis of tree characters, size, form and colour of the fruit and recommendations made by the local people. A systematic description of fruit, stone and qualitative aspects of pulp was done.

Out of these sixtyeight types, thirtyone varieties have been pointed out in different synonymes with different identical characters of fruits in between them. In the rest thirtyseven varieties, only eleven significant different types are available with similar type of synonymes in different places of the district. In total fortytwo identical varieties have been found out which are having different synonymes and also having differential characters in between them out of the sixtyeight collections made from the Cuttack district.

Finally, twelve superior types such as Rajbhog, Nakei of Kusuma, Kalei, Kadalia, Kanchasuadi, Sundari, Mangalmunda, Nakei of Kalapathar, Silpua, Bela, Raghunathballav and Krishnaballav were selected. These selected twelve types are more or less superior and comparable with other popular commercial varieties of mango grown in other parts of the country. The vegetative and flowering characters of these selected varieties will be studied in the coming season and thereafter, the final selection will be made for its commercial exploitation within the State as it was done in other States.

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APPENDIX

APPENDIX

Some of the Fruit and stone characters of local elites of Mango of Cuttack district,
Orissa

Sl. No.	Varieties	Source of collection	Fruit character			Stone character			Acidity (gm)		
			Fruit Length (cm)	Fruit width (cm)	Fruit weight (gm)	Skin weight (gm)	Pulp weight (gm)	Length (cm)		Width (cm)	Weight (gm)
1	2	3	4	5	6	7	8	9	10	11	12
1.	SUNDARI	Nischintakolli, Cuttack	7.0	3.0	180	80	70	5.9	3.0	30	1.2
2.	KALI	Nischintakolli, Cuttack	11.0	6.0	510	60	400	10.0	4.0	50	1.5
3.	NANGALKANTIA	Nischintakolli, Cuttack	12.0	6.0	360	240	60	8.5	5.0	60	1.7
4.	MANDA	Nischintakolli, Cuttack	10.0	6.0	470	35	395	7.5	2.5	40	0.9
5.	MANDA	Salapur, Cuttack	10.0	8.5	440	100	310	6.0	3.0	30	1.3
6.	LAMIDI	Tangi, Chouduar, Cuttack	12.5	7.3	370	70	270	9.5	4.2	30	1.2
7.	NAKEI	Telangapatha, Cuttack	9.5	7.6	330	90	180	9.5	4.5	60	1.7
8.	SILPUA	Niali, Cuttack	14.0	11.5	320	110	150	9.5	6.5	60	2.0
9.	KADALIA	Niali, Cuttack	15.5	6.1	400	60	250	13.0	5.0	90	1.4
10.	RAJBHOG	Kantapara, Cuttack	8.0	4.0	300	50	210	7.5	2.5	40	1.8
11.	SILIPUA	Kantapara, Cuttack	14.0	10.5	520	110	270	11.5	5.5	140	0.9
12.	NAKE	Niali, Cuttack	11.5	6.5	450	80	330	10.1	4.3	40	1.1
13.	CHERUA	Kusuma, Cuttack	8.0	6.5	150	50	65	7.0	4.0	35	1.6
14.	NAKEI	Kusuma, Cuttack	7.3	6.5	260	25	215	6.2	4.7	20	1.3
15.	MANDA	Nacchipur, Cuttack	8.5	7.1	300	100	180	7.3	5.0	20	1.0
16.	KAKIDIA	Nacchipur, Cuttack	11.0	7.0	350	110	130	8.5	3.5	110	1.2

Contd.....

1	2	3	4	5	6	7	8	9	10	11	12
17.	KALI	Adaspur, Cuttack	9.3	6.3	240	70	110	7.6	4.3	60	1.4
18.	ASADHUA	Salepur, Cuttack	5.5	3.5	120	40	60	5.5	2.5	20	1.9
19.	KADALIA	Kantapara, Cuttack	7.8	6.7	270	100	120	6.9	5.6	50	1.7
20.	MAHUA	Nischintakolli, Cuttack	6.5	5.0	170	35	85	6.5	3.5	50	1.2
21.	KALEI	Nischintakolli, Cuttack	9.5	8.0	250	85	100	7.0	4.0	65	1.2
22.	ASADH	Kantapara, Cuttack	8.0	5.0	120	40	55	6.5	3.5	25	1.5
23.	SUNDARI	Barda, Cuttack	8.0	6.0	160	55	50	7.0	4.5	55	1.6
24.	KADALIA	Kanpur, Cuttack	9.0	5.5	140	20	95	8.3	3.5	35	1.8
25.	GURUDI	Balikuda, Cuttack	5.5	3.5	90	25	45	5.5	3.3	20	0.9
26.	KANCHASUADI	Balikuda, Cuttack	8.0	6.0	100	20	50	5.0	3.5	30	0.8
27.	SUNDARI	Jagatsinghpur, Cuttack	10.0	7.5	170	40	100	6.5	3.5	30	1.2
28.	CHEPETI	Jagatsinghpur, Cuttack	6.5	5.4	130	35	70	6.3	4.2	25	1.0
29.	KANCHAMITHA	Jagatsinghpur, Cuttack	10.0	6.2	150	50	60	5.5	4.0	40	1.1
30.	CHEKEI	Naugam, Cuttack	5.5	4.2	130	30	75	5.0	3.8	25	1.6
31.	ASADHUA	Naugam, Cuttack	9.5	4.8	70	25	25	8.0	4.0	20	1.8
32.	SUNDARI	Jagatsinghpur, Balikuda, Cuttack	9.0	6.5	170	65	75	7.0	3.5	30	1.3
33.	TOTANUNDIA	Biridi, Jagatsinghpur, Cuttack	7.0	5.5	350	40	260	6.5	4.5	50	1.2
34.	ASADHUA	Biridi, Jagatsinghpur, Cuttack	8.0	6.1	230	80	100	6.0	3.9	50	1.0
35.	BELEIMUNDI	Naugam, Cuttack	8.5	5.0	140	70	20	7.0	3.5	50	1.1
36.	NANGHIMUNDA	Jagatsinghpur, Cuttack	12.0	4.0	430	80	250	9.5	3.0	100	1.5
37.	SILPUA	Jagatsinghpur, Cuttack	13.0	6.0	500	60	370	9.0	3.0	70	1.9

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1	2	3	4	5	6	7	8	9	10	11	12
38.	HANDA	Jagatsinghpur, Cuttack	9.5	8.5	490	50	280	8.5	6.5	70	2.0
39.	SUAKHIA	Tirtol, Cuttack	8.5	6.0	140	40	80	6.5	4.5	20	1.4
40.	SILPUA	Tirtol, Cuttack	12.7	6.7	450	80	320	11.0	4.5	50	1.9
41.	BELA	Badamba, Cuttack	9.0	8.5	300	50	190	7.5	4.5	60	0.8
42.	NAKEI.	Narasinghpur, Cuttack	9.5	7.5	230	60	150	7.0	4.0	20	1.9
43.	NANGALMUNDA	Chakamunda, Cuttack (Narasinghpur)	9.5	5.5	200	50	110	8.0	1.0	40	1.6
44.	ROHUNATHBALLAV	Badamba, Cuttack	12.0	8.5	280	80	150	10.5	5.0	50	1.8
45.	GAJAPAJUNGA	Narasinghpur (Athgarh) Cuttack	9.0	7.0	250	30	170	6.5	4.0	50	1.4
46.	GOPALO	Athgarh, Cuttack	7.0	6.0	180	50	100	6.0	3.5	30	1.2
47.	KAKUDIA	Athgarh, Cuttack	9.5	6.2	270	80	160	7.5	4.1	30	1.2
48.	BAHAGAJA	Narasinghpur, Cuttack (Athgarh)	10.5	6.1	260	30	120	8.0	3.9	60	2.1
49.	RASABALI	Narasinghpur, Cuttack (Athgarh)	9.5	5.0	210	70	100	8.5	4.5	40	1.3
50.	GAJA	Narasinghpur, Cuttack (Athgarh)	6.0	5.0	140	25	75	6.0	3.5	40	1.2
51.	BAUSUJHI	Narasinghpur, Cuttack (Athgarh)	12.5	7.5	320	90	180	9.5	3.5	50	1.1
52.	KANHEI	Aathgarh, Cuttack	10.0	7.0	175	60	80	7.0	4.0	35	1.2
53.	NAKEI	Narasinghpur, Cuttack (Athgarh)	7.0	6.0	70	20	30	6.5	4.0	20	1.2
54.	SUNDARI	Badamba, Cuttack	8.0	6.5	70	20	20	5.5	3.0	30	1.0
55.	GETTI	Badamba, Cuttack	5.0	6.5	140	40	65	9.0	4.0	35	1.1
56.	TIRIGACHHIA	Badamba, Cuttack	9.5	6.5	200	35	120	7.5	4.4	45	1.5

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1	2	3	4	5	6	7	8	9	10	11	12
57.	GAJADANTA	Badamba, Cuttack	15.0	10.0	400	135	175	13.0	4.0	90	1.4
58.	HATIDANTA	Narasinghpur, Cuttack	10.5	7.0	210	70	80	8.0	5.0	60	1.2
59.	KRISHNABALLAV	Badamba, Cuttack	11.0	8.0	400	70	260	8.0	6.0	70	1.3
60.	SWARNALATA	Narasinghpur, Cuttack	9.0	6.0	200	35	110	7.5	6.2	55	1.3
61.	BALIAMBHA	Narasinghpur, Cuttack	12.0	9.0	240	20	180	10.5	8.2	40	1.7
62.	CHANDRAMA	Athgarh, Cuttack	13.5	8.5	280	70	150	9.0	5.0	60	1.9
63.	KALAGAJA	Athgarh, Cuttack	11.0	7.0	260	70	130	8.5	4.0	60	2.0
64.	NAKIDANKI	Jajpur, Cuttack	8.0	4.0	140	30	80	6.0	3.0	30	1.3
65.	NAKOI	Jajpur, Cuttack	12.5	5.1	250	100	120	11.0	3.9	30	1.6
66.	BHELUA	Jajpur, Cuttack	12.0	8.0	250	40	170	8.0	4.5	40	1.8
67.	KALAPALLARA	Jajpur, Cuttack	14.0	10.0	540	100	390	9.0	5.0	50	0.9
68.	MAHUA	Jajpur, Cuttack	12.0	7.0	330	90	180	10.0	4.0	60	1.2