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Mandarin Orange Cultivation in the Agency Tract

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Introduction : The Godavari and Vishakapatnam Agency constitute one of the vast and hitherto undeveloped hill regions of the Madras State and lie for the most part in the thickly wooded jungles of the Eastern Ghats. Due to their inaccessibility and unhealthy nature, these regions have remained largely unexploited, particularly in respect of the horticultural resources they possess. Nearly 60 or 70 years ago some Christian Missionaries and a few enterprising European planters made an attempt to develop portions of these tracts by introducing crops such as the mandarin orange, pineapple, coffee, ginger, chiratta, etc. These pioneering efforts, however, did not meet with any large measure of success due to the extremely adverse natural conditions of the tract. Some of the orange and other plantations have completely disappeared due to lack of attention and a few are found in greatly neglected state.

Among the various fruits that are grown in the Agency tracts, the mandarin oranges have a reputation for fruit quality in the plains of the East Coast and the produce has always a keen demand. It was thus felt that a survey of the tract may be made with a view to study the conditions under which this fruit is being grown at present and to formulate steps to improve the industry. Accordingly the authors, (under instructions of the Director of Agriculture, Madras) undertook a tour for a period of one month in the Rampachodavaram and Gudem Agencies in which mandarin orange is grown fairly extensively. The salient features of the cultivation of this fruit in these tracts are set out below with a gist of the recommendations for the development and extension of the area under this fruit.

Climate and soil features : The Rampachodavaram taluk of East Godavari district covers an area of about 700 sq miles and the Gudem taluk of Vishakapatnam district, 1868 sq. miles, composed mostly of hilly tracts with table lands between the hills. In both the regions much of the area has not been surveyed. There are some villages which lie scattered about along the banks of the jungle streams connected only by footpaths and occasionally by bad roads.

The average annual rainfall in the interior places of the Rampachodavaram Agency is about 70 inches while in the Gudem Agency, it is about 40 inches. Though exact information on the range of temperatures is not available, it is estimated to be between 50°F and 100°F. The tract may be said to have the characteristics of a warm humid climatic zone. In general, Rampachodavaram presents more humid conditions over a greater part of the year than Gudem.

The land on which the mandarin orange is grown is very undulating, interspersed with rocky patches. The soil depth varies from a few inches to about 10 feet. The soils of Rampachodavaram vary from sandy loam to clayey loam and are fairly fertile. The better types of soils met with in Gudem are utilised for cultivation of other crops such as millets, ginger, banana, etc., and mandarin orchards are raised on poorer types of soil.

Age of existing mandarin orange groves, their area and location: It is said that the first introduction of the mandarin orange to this tract was made by a Christian missionary in Dumma Gudem of Badrachalam taluk. The extension of the area under this fruit in the two taluks of Rampachodavaram and Gudem is claimed to be from this source. The present areas in Rampachodavaram and Gudem are estimated at 300 and 200 acres respectively. About half of the estimated area consists of trees over 25 years old, while the rest is composed of younger orchards. The groves are mostly situated at altitudes ranging from 1000′ to 2500′ in the valleys and on hill slopes, and are surrounded by fairly dense rain forests which ensure the maintenance of highly humid conditions throughout the year – a feature considered essential for the successful culture of the mandarin orange in South India. The grove sites are invariably selected on both banks of the jungle streams which flow along the hill slopes, with a view to take advantage of the moist soil conditions. Due, however, to the slopy nature of the land and the close proximity to the streams which overflow during the floods, the orchard sites are badly eroded leading to extensive exposure of the roots of the fruit trees. Constant soil wash also leads to loss of plant nutrients by leaching.

Varieties: The main variety under cultivation is known locally as "Kamala". The fruits are of orange colour, surface smooth but somewhat ribbed, shape oblate to spherical, base necked, apex depressed, rind, medium thick, loosely attached, axis hollow, segments easily separating, pulp dark orange, tender, juicy and flavour rich and and sprightly. Apart from this variety, another small fruited and loose skinned type resembling mandarins (except in regard to fruit shape, size, colour and taste and flavour of pulp) has been noticed. The fruits of this type are deep orange in colour, oblate in shape and flattened at both ends, small in size with juicy and subacid pulp. This is said to occur in a wild state in the forests.

Cultural practices: The oranges in the Agency tract are wholly seed propagated with no parental selection whatsoever. The seeds are sown in beds in November – December and the seedlings are transplanted in the orchard sites when they are two to three years old. The land is cleared of trees and scrub jungle growth in summer. Soon after the receipt of rains in June – July, small pits are dug (1' x 1' x 1½') and the seedlings lifted from the seed beds with naked roots are planted. No regular spacing is given in planting the trees and the distance between the trees ranges as widely as six to twenty feet. The shorter spacing is preferred by most of the growers. As a result of close planting, trees grow tall and lanky.

Systematic cultivation of orchards is unknown in these parts and the wild plants and creepers grow unchecked over long periods smothering the orange trees wholly at times. Once in a year, during the fruiting season in November – December, the weed growth is cut close to the ground, mainly to facilitate movement in the orchard and to enable harvesting of fruits.

The groves are neither manured, nor irrigated. The newly planted seedlings are hand watered during rainless periods for two or three years after planting.

In Rampachodavaram no intercropping in the alleys is practised; nor is it feasible due to the irregular planting and close spacing. On the other hand, a regular utilisation of the alleys is practised in certain parts of Gudem where successive intercrops of chiratta and ginger are taken even in bearing orchards much to the detriment of the orange trees.

Season of cropping, yields and longevity of trees: Only one crop is borne in the year from November to January in the Agency tract in contrast to the bi-annual cropping in Wynaad and Nilgiris. The range in the yield of trees is very wide and is conditioned by the age of the trees, fertility of the soil and the care bestowed on the unkeep of the orchard. The yield of a tree varies widely and range from 100 to 500 fruits, the latter being exceptional. The trees commence bearing in six to eight years after planting. In normal trees the profitable bearing age is between the 12th and 25th years and the longevity is estimated at 45 years. But such trees are few and a majority of the trees become uneconomic within about 25 years of planting.

Pests and diseases: The more important pests of oranges in the areas surveyed are, in the order of their importance, the fruit sucking moth, citrus butterfly, leaf miner and white ants. The fruit sucking moth is the most serious of all the pests, the incidence being heavy in October and November and is said to be at its minimum towards the

close of the fruiting season. *Tinospora cordifolia*, host plant for the larval stage of this moth is found in great abundance in the neighbourhood of the orchards. Citrus butterfly, particularly *Papilio demoleus*, is found to be a serious pest of young plants, especially in the late summer months of May – June. Curryleaf trees found everywhere in great numbers act as an alternate host for the caterpillars. Leaf miners and white ants also cause some damage, the former to tender leaves and the latter by eating away the bark near the base of the tree. Of the non-insect pests, monkeys rank foremost while rodents like squirrels also cause some amount of damage to mature fruits.

Among diseases, the most serious is the dieback caused by decline in the health of the trees. It is common to see more than a third of the trees having extensive dieback symptoms. Other diseases of importance are leaffall, yellowing and mottling of leaves and powdery mildew. The complete neglect of the orchards, absence of proper cultural operations, selection of shallow soils for growing mandarins in some cases, soil erosion and consequent loss of fertility, all these individually and collectively form the predisposing causes for the general decline in the health of the trees which results finally in decaying and deadwood. Leaf fall caused by Phytophthora is common during the monsoon months between July and September and its intensity is said to decrease by December – January, when most of the leaves would have shed. Ganoderma rot was noticed in Rampachodavaram. Powdery mildew and yellowing and mottling of leaf occur on a small scale. Bark rot characterised by white froth exuding from cracks on the bark of the trunk, sooty mould, and pink disease have also been noticed and the persistance of the last-mentioned may contribute to the death of branches of the trees in the absence of proper control measures. On account of the humid conditions prevalent, lichens were found growing on almost all the trees.

Packing, grading and disposal of the produce: The usufructory rights are sold to the merchants or alternatively, the fruit is harvested and taken to the shandies and sold. Due to lack of facilities for vehicular transport, the fruits are carried by men or on pack-bullocks to the shandies. Sometimes, a rough grading of the fruits by hand into big, medium and small sized fruits, is resorted to before reaching the market. The produce is brought to the weekly shandies held at nearby places on the plains and purchased by middlemen in the trade by open bid system. These middlemen form a clique to bring down the price of the produce and also adopt other dubious methods to deceive the illiterate and simple aboriginal tribes of the agencies. As a result, the prices are brought down at times to such a low level that they meet only the expenditure incurred on the transport of the produce.

Economics of cultivation: The details furnished below give an account of the economics of cultivation of mandarin orange in the Agency tract based on prevalent practices.

Expenditur		*Rupees*
Cost of clearing the land	...	100
Cost of raising 120 seedlings required for an acre and planting	...	40
Watering for the first two years	...	200
Clearing jungle growth in the orchard every year for six years	...	60
Total upto 6th year (i. e.) bearing year	...	400
Clearing jungle growth from 7th to 20th year	...	140
Picking the fruits in the season from 7th year to 20th year	...	280
Total upto 20th year	...	820

Income		*Rupees*
Yield – 6000 fruits per acre for 3 years (6 - 8 years)	...	360
12,000 fruits per acre from 9th to 13th	...	1,200
60,000 fruits per acre from 13th to 20th year	...	3,840
Total	...	5,400
	...	
Average income per year from bearing age		360
Average income per year from planting	...	270
Average expenditure per year	...	41
Net income per acre per year	...	229

Average return per tree on the above basis works out to Rs. 2/- approximately

From the above, it can be seen that the owner is satisfied if he gets a return of Rs. 2/- per tree. But by a systematic adoption of proper cultural methods, this return can be increased considerably

Suggestions for improvement: The improvement of orange cultivation in the Agency tract resolves in practical terms into mainly a problem of renovation of the orange gardens. It is essential that the resources and limitations of the people engaged in the industry are duly taken into account before any improvement is thought of. The people, belonging to the aboriginal tribes, are generally lazy and contented. They live mainly by a form of shifting cultivation, called "podu". They are illiterate, simple and generally of a weak constitution. They also suffer from chronic malaria. Their antipathy to the people of the

plains is well known. Most of the orchards have been mortgaged for periods ranging from ten to fifteen years and this constituted one of the most important reasons for the present neglect of the orchards. The people of the Gudem Agency are more advanced and less primitive. The people are relatively rich, deriving considerable income by growing crops such as ginger and chiratta. They are cheerful and energetic. But as far as orchard management is concerned, they are as conservative as the people of the other taluk. It is therefore seen that the improvement of the mandarin orange industry in the Agency tracts is closely linked with the improvement of the socio-economic conditions of the people. The following lines of improvement of the industry, so far as the orchards are concerned, suggested themselves on the basis of the observations made. They are :– (1) Steps to prevent soil erosion, (2) systematic and efficient control measures against the various pests and diseases, (3) a liberal fertiliser programme along with raising of green manure crops, (4) provision of summer irrigation, (5) improvement in grove sanitation, pruning of dead-wood and living parasites, (6) moderation in intercropping in the Gudem Agency, and (7) the provision of proper marketing facilities. For any extension of area contemplated in future it will be necessary to confine plantings with selected nursery stock preferably propagated by budding on a suitable and hardy rootstock which would confer resistance to the die-back. Attention to other cultural aspects, such as proper spacing, irrigation, manuring, inter-cultivation etc., must also be bestowed. The benefits of systematic and sound methods of orange culture can be impressed upon the people only by the aid of a demonstration orchard as any amount of mere propaganda by words and posters would hardly impress the backward people of this tract. With the programme for development of the mandarin orange industry on sound lines, steps should also be taken to improve the lot of the people inhabiting this area providing proper communication facilities, improving the health of the people by eradicating malaria, education and an improvement of their economic condition by means of cottage industries and other subsidiary occupations.

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