

There are on the whole in the Courtallam hills 76 Mangosteen trees i. e. 50 trees at Thekkumalai, 14 trees at Arivikkarai, 7 at Udatrām and 5 at Five Falls hills. It thrives very well in elevations which are from 1,500 to 3,000 feet above sea level. It requires a cool atmosphere. Every year out of these 76 trees about 20,000 fruits are brought down and sold at Courtallam during the season from June to September.

Cultivation. Fruits which are quite ripe are picked up from well-grown trees. Immediately the seed is removed from each fruit and the seed is sown in mud pots of one foot diameter and one foot height the pots being filled with well-rotten cattle manure and fine silt. The contents in the pots are kept moist always. The pot with the seed sown in it is kept at the foot of the hills or in the hill itself where it is cool. After two years, the seedling which would have been 9 inches high by this time is removed and planted in pits of 3 feet cube and spaced 25 feet apart. The planting is generally done just at the commencement of the south west monsoon. In elevated places ranging from a height of 2,000 to 3,000 feet the pit prior to the planting of the seedling is simply filled with fine earth. No manure is applied. As soon as the seedling is planted, fencing is done all round to act as wind break and to protect the young seedling from the sun. When there is no rain, the seedling is watered once in 3 days. Brackish water is harmful to the seedling. Only good water should be used. After 30 years from the time of planting the tree begins to yield. A good tree will yield even 2,000 fruits per year but the average yield per tree is only 250 fruits. At 12 annas per dozen, the average money value of fruits per tree is Rs. 16. About 50 trees can be planted to the acre and the money value per acre from fruits collected is nearly Rs. 800.

On the Courtallam hills, Mangosteen is not cultivated solely. It is cultivated along with tea, coffee, cloves, etc. The contractor gets a profit of nearly one rupee per 100 fruit.

CULTIVATION OF CHILLIES* IN GUNTUR DISTRICT.

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Introductory. Chillies, though classified as a minor crop under condiments and spices, form one of the most valuable crops in the Madras Presidency as it is a daily necessity with both the rich and poor alike. The crop with its wide-spread cultivation and the varied uses in an Indian house-hold leads one to think that it is indigenous, but on the other hand it is an introduced one having its home in South America. It is cultivated as an irrigated crop in the south and as a rain-fed crop in the north of the presidency. Guntur

* *Capsicum frutescens*. 1. *Pennisetum typhoidum* 2. *Panicum miliaceum*.

is one of the important chilli centres in the Circars. The present article is mainly confined to the cultivation of the chilli-crop in the Guntur District.

Soil. The crop is cultivated in black soils. They are heavy with good retentive capacity for moisture. The texture of the soil is fine with an admixture of clay, and sand with lime in small pebbles. The high retentive capacity of the soils, the fairly good rainfall after the transplanting of the chilli-crop, and the industrious nature of the ryot who conserves the soil moisture at every stage, go to the successful cultivation of the crop under rain-fed conditions.

Rotation. The time-honoured rotation of the place is to raise a grain crop of *jonna*, (sorghum) *sajja*¹ or *variga*² in the first year which will be followed by chillies and tobacco respectively in the succeeding two years. Chillies following *variga* is considered to be the best as it is the least exhaustive crop of the three mentioned above. The popular belief is that the chilli crop raised year after year in the same field produces gold, meaning thereby that bumper yields can be expected. In order to find out the validity of the statement a plot has been set apart last year by the farm staff of the Agricultural Research Station, Guntur to grow the crop as mentioned above. After the introduction of the groundnut, the ryots are more after that crop as it gives them money at the kist time and hence are sowing that only on a large area unmindful of the principle of rotation.

Preparatory cultivation. With the advent of the South-West Monsoon in June, the ploughing commences. This consists in ploughing the land with a heavy country plough both ways. In so doing the plough furrows are cut at regular distances so that small ridges and furrows are formed for allowing the soil to absorb as much of the rain-water as possible. Indirectly the furrows also help drainage and protect the ploughed soil from being washed away in times of heavy rain. The peculiarity of the place is to work all the cultivators at least once diagonally. The principle is a sound one, in that, it ploughs all the uncultivated portions left by country plough. By about the middle of August a third ploughing is given diagonally. This will be followed by one or two more ploughings according to circumstances. In the succeeding ploughings the furrows are cut as close as possible for reducing the soil to a fine tilth. The land gets ready by about the middle of September when furrows two feet apart are run by a country plough along the length of the field. Along the breadth of the field an implement which may be called a Chilli-marker, and which consists of a beam to which blunt wooden tynes are fixed two feet apart, is worked. The seedlings are transplanted at the points of inter-section.

Manuring. Chilli crop being an exhaustive one, is manured direct in large doses. Usually the crop receives 15 to 20 cart-loads of cattle manure. In addition to this 1,500 to 2,000 sheep are penned costing

1. *Pennisetum typhoides* 2. *Panicum miliaceum*.

Rs. 15 to 20 per acre. Sheep-penning is considered to be the best for the reason that the manure gets incorporated in the soil readily without leaving any decaying vegetable debris for the cock-chafers to lay eggs and the grubs to feed on. Chillies obtained from a sheep-penned plot are believed to get a bright colour. In the tract, the attack of cock-chaffer grub is a menace and any remedy suggested to overcome it is a boon to the cultivator. When once the eggs are laid, grubs emerge and attack the transplanted chilli seedlings in the absence of decaying vegetable matter. As a preventive, facilities for laying eggs should not be created.

Nurseries. The foundation of the chilli crop is in the seed-beds and hence they are to be prepared with the utmost care for the production of healthy seedlings. A good stimulus given at the start will overcome all the intervening temporary set back and finally give a good crop. The nurseries are usually raised on a high piece of land near small ponds of water which are locally known as *kuntas*. The *kuntas* are dug generally just by the road-side so as to get the advantage of drainage water. No regular crop is raised over the seed beds but they are used as nurseries of chilli and tobacco year after year.

The portion is ploughed well three or four times and worked with a *gorru** once or twice, to produce tilth. The whole thing is finally levelled up with a *guntaka*†. Like the main-field, nursery portions also are heavily manured with cattle manure and composted tobacco suckers. The local experience is, that tobacco compost forms an excellent manure for chilli nursery. By about the end of June or beginning of July, chilli seed at a rate of $1\frac{1}{2}$ to 2 *manikas* or $4\frac{1}{2}$ to 6 lbs. is broad-casted over a cent in long narrow beds and covered by working the *gorru* lengthwise and cross-wise. The beds are 20 to 25 yards long and 1 to $1\frac{1}{2}$ yards broad. They are separated by one foot of walking space along the length of the beds. Seedlings from the area of one cent will be sufficient to transplant an acre. A gentle slope is also provided for giving a natural drainage. The interspace between beds come off handy for the purpose of weeding and sprinkling water. If the germination were to be poor or a good germination is followed by drought, hand watering is resorted to.

As an improvement over the local practice, raised seed beds are prepared on the Agricultural Research Station, Guntur. These facilitate good drainage especially in very young stages of the nurseries when the tender seedlings are prone to die in patches due to excess of moisture. The beds are 40 yards by $1\frac{1}{2}$ yards with a gentle slope running from one end of the bed to the other. Well-rotten cattle manure made into fine powder is applied to the beds. Chilli seed at the rate of three to four lbs. per bed is sifted between fingers and covered

* An indigenous tyncharrow.

† An indigenous blade-harrow.

by working the *Kanki-danti* * along the length and breadth of the bed. One or two coolies walk over the bed pressing the loose surface with their feet so as to give a firm footing to the tender seedlings. After consolidating the beds, they are watered either with a rosecan or by sprinkling water. Watering the bed is continued daily once or twice till the germination is completed lest the surface should be too cracked exposing the radicles to the hot sun. The seedlings under this system come up vigorously and are healthier than those obtained by the local method.

The seeds commence to germinate on the third day after sowing by sending their radicles into the soil. On the fourth day the bends of hypocotyls are sparsely visible. A greater number of these can be seen on the fifth day. In a very few cases the plumules emerge out on the sixth day but in general the seedlings with their first pair of linear lanceolate cotyledon leaves can be seen on the seventh and eighth days. The nurseries are weeded from time to time and at times the struggling seedlings, are helped by lifting the surface crust

In about six to seven weeks the seedlings get ready for transplanting. Usually a week or 10 days before the time of transplanting the seedlings are topped on a bright day early in the morning. The idea of topping in the morning is that the healing of the cut ends must take place as quickly as possible during the hot part of the day. The stem of the chilli plant is hollow and if even a light drizzle were to follow the topping, the stem gets rotted and becomes watery. Topping facilitates profuse side branching and the thickening of the main stem. Well-developed chilli seedlings come off easily for distribution at the time of transplanting and remain erect even when the plants are in their full bearing. The nurseries are watered the evening previous to the day on which the seedlings are removed. This saves the tender roots from being severed. The seedlings are tied into bundles and the roots are washed free of soil and kept covered in baskets till the time of planting. Chilli seedlings are transported to long distances in head-loads or by carts. Generally the seedlings are removed in the morning and transplanted in the evening.

Transplanting. This is done in the evening so as to give the seedlings the advantage of cool temperature during the night. The season for planting extends over a month and is generally done in September. In a few cases it may be done as late as the middle of October. In villages which are in the vicinity of towns, commanding good marketing facilities a few ryots transplant the seedlings very early in June. These plots are primarily intended for raising green chillies for the vegetable market.

* A small wooden rake for gathering ear-heads on threshing floor.

In the Guntur District two methods of transplanting are in vogue viz. (a) Transplanting the seedlings with the help of hand watering and (b) *Burada-natu* or planting the seedlings in a miry condition of the soil.

(a) At the time of transplanting, one man goes in advance and makes a small hole with a bamboo stake or a wooden peg at the places of intersections mentioned above. Another man following the first pours water in the holes when two or three women coolies distribute seedlings to the transplanting women. The seedlings are placed in position in the watered holes and are pressed firmly. The number of seedlings per hole varies with the quality of the seedlings. Seedlings raised under local conditions require six to eight per hole while those raised after the Agricultural Research Station fashion need only four seedlings.

(b) *Burada natu* as the name indicates is done immediately after a heavy down-pour and when the soil is very wet. This dispenses with the extra cost of hand-watering at the time of transplanting. Unless a rain is received soon after planting, the seedlings suffer badly as the soil gets hardened by this method. It is always better to wait, water and then transplant the seedlings when the soil is in a fit condition to receive them.

Transplanting and filling in gaps created by the attack of cockchafer grubs should be done as early as possible for giving the plant sufficient time for vegetative development before they come to flower. In about six to eight days the transplanted seedlings strike new roots and get established.

After cultivation. If the weather conditions are favourable the *Dantulu* is worked once or twice both ways. The operation removes weeds and forms surface mulch. The finishing of the above operations synchronises with the general commencement of flowering which will be roughly about a month from the time of planting. At about that time the field is ploughed with a country plough between rows along the length and breadth of the field. By this a sort of root pruning is given to the plants. The plants once again put forth fresh roots and grow vigorously.

Flowering and Setting. Flowering in chillies commences from October. Usually the setting of the first formed flowers is rather poor for the nights will be dewy and the Guntur District experiences heavy rain in October and November. The two phases viz. dew and heavy rain cause a lot of the flower buds and set fruits to shed in the early stages of the crop. By about the end of December or beginning of January cool sea-breeze which is popularly known as *Pairu-gali* (crop-wind) commences to blow during night time. This has a miraculous effect on all dry crops by giving them new vigour and acts as

a tonic on the standing crops. It is during this period that one more flush takes place with the maximum setting.

Harvest. The crop comes to harvest in about 3 to 3½ months from the time of planting. The early formed fruits come to harvest in December. Two more pickings are taken say one in January and the other in February. Since the harvest time comes in summer no difficulty is felt for drying the chillies.

Yield. In good years the crop yields 1 to 1½ candies† of dried chillies per acre costing Rs 100 to 150 per candy according to the market fluctuations.

Varieties. The varieties of the locality are 'Bellary', 'Local' and 'Nallapadu'. The fruits of the Bellary variety are broad and long. Locals are light green, medium, broad and short while the Nallapadu chillies are narrow and long with dark green colour. In the local market the Nallapadu chillies fetch Rs. 1 or 2 more per candy than the other two types for the reason that the pedicel along with the calyx adheres firmly to the fruit even after drying. The calyx is loose in the other two varieties and gets separated from the fruit either at the time of picking or drying whereby the seeds which contribute most to the pungency are lost while drying and storing.

Marketing. The dried chillies are pressed in gunnies especially stitched for the purpose and known as *Boras*. Each *bora* holds half a candy (250 lbs) of dried chillies. These are transported to Guntur and are sold to wholesale dealers.

Export. The major part of the production in the presidency is consumed within India and the balance working roughly to 35 per cent. of the total exports from India, is exported to Ceylon, Strait Settlements, Mauritius, Aden and the United Kingdom.

Uses.* Chillies are put to several uses. They serve as a bite in the green state for the working classes at the time of taking their morning *kanji* †. The green fruits are pickled or cooked fresh with various kinds of Indian dishes. The fruits are used in all its stages of their development viz. tender, green, ripe and dried as well. The dried fruit reduced to powder forms the 'Cayenne' of commerce. Cayenne as a rule is prepared from pungent types of fruits. For all culinary purposes red chillies are preferred as they impart their red colour to the preparations.

In Bengal an extract of the consistence of treacle is regularly prepared and sold. There are various brands of pepper sauce which are produced as decoctions of the fruit in salt or vinegar. 'Tobasco' and 'Paprika' are the special European sauces.

† One candy = 500 lbs.

* This para has been largely drawn from the Commercial products of India by Sir George Watt.

† Rice gruel.

As a medicine, capsicum is stomachic, stimulant and astringent and an ingredient in most medicines that are intended to alleviate toothache. As a rubifacient and counter-irritant the bruised fruits, in the form of a poultice, act energetically, and added to mustard are often highly beneficial.

Deterioration. Of late the chilli crop in the district is in a state of decline due to the insecurity of reaping the fruits of the toil and the low prevailing market value for chillies. The low price offered is not only due to the trade fluctuations but also due to the inferior quality of the chillies that are being cultivated. The deterioration in the quality can be attributed to,

1. Introduction of the ground-nut crop.
2. Negligence on the part of the ryots to select and reserve their own seed for next year's sowing.
3. Admixture of superior and inferior types at the time of drying.

(1) It is nearly 10 years since ground-nut crop found its way into the tract. Since then the area under chillies is dwindling and the yields are also becoming low while the area under ground-nut is proportionately increasing. Thrips found on ground-nut leaves have developed a taste for the chilli crop. To their advantage the harvesting time of ground-nut and the transplanting time of chillies coincide. The thrips leave the drying crop of the ground-nut and pass on to the fresh crop of chillies. The damage done by the insect is considerable for their size and in cases of bad attack the whole crop fails to the utter dismay of the cultivator. People have come to realise that this is due to the introduction of ground-nut. Every one waits for the other man to stop cultivating the ground-nut but no one has taken the lead so far.

(2) One bad practice with most of the cultivators of this place is to sell their produce completely without keeping any seed for next year's sowing. Especially in chillies the ryots dispose off the good stuff at the high prevailing market rate and for seed purchase the sweepings of the common drying floors at a very low price from depressed classes. Thus the quality gets deteriorated by the wanton negligence of the ryots.

3. At the time of chilli harvest one common drying floor is prepared in every village for purposes of safety. Unless one is very careful there is ample scope for the different types to get mixed while spreading daily for drying.

For some reason or other work on this useful crop was not taken up in this presidency till 1931. Considering the deterioration of the crop and the varied uses of chillies it was felt that work on this essential crop should be taken up for evolving types of chillies which are

superior in yield and quality than those commonly cultivated. With the kind permission of the Cotton Specialist and the Deputy Director of Agriculture, Second circle, the writer has started selection work at the Agricultural Research Station, Guntur, last year.

Pests and Diseases. The major pests of the place are thrips and cock-chaffer grubs.

Thrips. (*Scirtothrip dorsalis* Hood). The minute insects attack the crop both in the nursery and in the advanced stages. The damage becomes all the more severe when the plants begin to flower and bear. The eggs are laid in leaf-tissues. The nymphs that emerge out of the eggs cause a drain on the leaves and make them curl. The curling of the leaves is known as *Mudatha*. In cases of severe attack the curls increase greatly and the normal development of the plant is arrested. The plants become stunted, leaves get reddened and finally they succumb to the attack. The pest is virulent during dry weather and gets reduced in the rainy season. The attack in the severe form is called *Korivi*.

Cock-chaffer grubs. (Melolonthid beetle) These make their appearance in the main field where the seedlings are transplanted. They burrow into the soil and cut the growing plants just above the root system. As a result of the attack the plants dry up and drop to the ground. When once the grubs cut away the plants at a place they move on to the next and so on. The grubs can easily be spotted through the dying plants. They can be removed and destroyed by digging the soil at the place of attack. They are chiefly found in singles and rarely in doubles.

Fruitrot. (*Vermicularia Capsici* Syd.) This is a fungoid disease and appears only to a small extent both in the green and ripe chillies. Fruits turn yellow, and rot and sunken spots with black dots arranged in concentric circles are found. The fruits lose their pungency and become useless.

APPENDIX

Cost of cultivation of the chilli crop under the local system. (Per acre)

Preparatory cultivation.		Rs.	A.	P.
Preliminary ploughings	... two (2 pairs & 2 men)	2	8	0
Diagonal ploughing	... one (1½ pairs & 1½ men)	1	14	0
Final ploughings	... two (4 pairs and 4 men)	5	0	0
Marking with country plough and chilli marker	(1 pair & 1 man)	1	4	0
Manures and manuring.				
Cattle manure	15 cartloads at Re. 1 Per cart-load	15	0	0
Sheep penning	(1500) at Re. 1 per 100	15	0	0
Spreading and covering with country plough	(1 pair & 4 men)	2	3	0
Seed-bed. (1 cent).				
Ploughing, working <i>gorru</i> , covering manure levelling etc.	(1½ pairs and 1½ men)	1	14	0

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Half a cart load of cattle manure	...	0	8	0
Cost of 6 lbs. of chilli seed.	...	1	4	0
Hand watering three times. (1 man)	...	0	8	0
Transplanting.				
Pulling seedlings, washing carrying, watering and transplanting complete. Contract rate at Rs. 3 per acre.	...	3	0	0
After Cultivation.				
Working country plough (1 pair and 1 man)	...	1	4	0
Harvesting.				
Collection of chillies 3 times (40 women)	...	7	8	0
Drying and Marketing.				
Charges for 1½ candies	...	1	5	0
Total.	...	60	0	0

CULTIVATION & EXTRACTION OF SUNNHEMP FIBRE

SOME ECONOMIC ASPECTS

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This crop is largely cultivated for fibre in Nainaragaram, Tenkasi Taluk and also in Aikudi village, 6 miles from Tenkasi (Travancore area). The area under this crop for fibre in Nainaragaram is about 25 acres. This crop is also grown in Elangi in about 10 acres for fibre.

Season. Sunnhemp for fibre extraction is sown in wet lands between the last week of May and the first week of June.

Nature of soil. It requires rich loamy soil with good drainage facility

Seed-rate. The seed-rate per acre is 56 Madras measures and it costs Rs. 12-8-0.

Preparation of the land. The land intended for sowing sunnhemp is ploughed four times. No manuring is done. After sowing the crop is irrigated once in 10 days. The water stored in tanks is used for irrigation. The crop is not irrigated here from wells. On the whole till the time of harvest, about 9 irrigations are given and it costs Rs. 3-6-0 per acre at 6 annas for each irrigation.

Sowing expenses. For forming beds and sowing one acre three men are required and it costs Rs. 1-8-0.

After cultivation. For watching the crop, Rs. 3 is spent.

Harvesting. The crop is harvested for fibre after 100 to 105 days from date of sowing. For harvesting an acre 12 men are required and it costs Rs. 4-8-0 at 6 annas per man. After harvest, the crop is tied into bundles and it is stacked for which 4 coolies are required and it costs Rs. 1-8-0. Then whenever fibre is required, the bundles are