



MY AGRICULTURAL  
EXPERIENCE  
IN HILL'S

R. PAVALA RAJAN

Published by :

**R. Pavalarajan,**

Planter,

6-1/76 Main Road, Pattiveeranpatti - 624 211,

Dindigul District, Tamil Nadu.

Ph : 04543 - 267345

Cell : 09442 267345

e-mail: pavalarajan@gmail.com      Web Site: www.pavalarajan.com

www.pavalarajan.in

© All Rights Reserved

(This book or part there of cannot be translated or reproduced in any form (Except for review or criticism) without the written permission of the Author and the Publishers)

**ISBN No. 00.0000-000.0**

**1st Edition : 2017**

**Price : Rs. 150/-**

Computer Typeset by :

S. Manjula Sukumar,

MS Print, 167/181, 2nd Street, Gandhipuram, Coimbatore - 641 012.

Printed at :

-----  
-----

## Introductions



*I am R. Pavalarajan, S/o. Sri P.K.C.K. Rajasekaran residing at Pattiveeranpatti which is in Dindigul District in Tamil Nadu, India. Since 1974 onwards for the past 44 years I am cultivating and maintaining horticultural crops and this has helped me to gain a lot of experience and to reap monetary Benefits.*

*These presentations are intended to share my experience to the farmers like me and to the Horticultural Students. This includes my practical experience, information that I have gained from my predecessors, technical details that I learned from the Scientists of Tamil Nadu Agricultural University. All through these days the knowledge that I gained from the above sources were recorded as small notes then and there. All such records are summed up into useful information and now submitted as a reference book.*

*If the readers could come up with more suggestions, recommendations, and ideas they are free to upload in my web site : [www.pavalarajan.com](http://www.pavalarajan.com). This sort of effort will help to spread innovative techniques in the field of Horticulture.*

*At this juncture I would like to extend my sincere thanks to the nature, my Parents, Scientists of Tamil Nadu Agriculture University, Scientists of Kerala Government, Scientists of Coffee Board, my Friends with agriculture background & those who helped me in developing my form.*

**R. Pavalarajan,**  
Planter,  
6-1/76 Main Road,  
Pattiveeranpatti - 624 211,  
Dindigul District, Tamil Nadu.

Ph : 04543 - 267345  
Cell : 09442 267345  
e-mail: [pavalarajan@gmail.com](mailto:pavalarajan@gmail.com)  
Web Site: [www.pavalarajan.com](http://www.pavalarajan.com)  
[www.pavalarajan.in](http://www.pavalarajan.in)

## Foreword

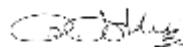


*For a vast majority of people in India agriculture is a way of life. Eventhough we have achieved & self sufficiency in food production as a result of green revolution, our farmers at present are not in a happily situation and face lot of constraints and chanllenges in agriculture. steady and steep increase in input cost, non availability and high cost of labour, decline in soil fertility and thereby crop productivity, frequent occurance of droughts and at times floods due climate change and monsoon behaciour and above all lighly fluctuating and inadequate price for farm produce, all these make the farmers very difficult to continue to be in farming.*

*on the other land due to steady increase in population in our country, there is an urgent need to double the productivity of crops to meet our future food demand . To achieve this goad, it is necessary to introduce and adopt new innovatives and improved technologies and practices in agriculture and there by the traditional agriculture should be change ad commercial agriculture / agribusiness.*

*In this regard, Mr. R. Pavalarajan, a progressive planter from Pattiveeranpatti, Dindicul District, Tamil Nadu with his long and vast experience has brought out this useful and highly informative booklet on my Agricultural Experience in Lower Palanis's manly to sustain and eulance the productivity of barticultural crops. mandrain Orange etc., Mr. Pavalarajan gained all this indepth Knowledge on these Crops mainly by conducting field trials on his own, visiting borticultural research stations and having interactions with researchers and other progressive planters. The dedication and hard work, interest and involvement, innovative thinking etc. made him possible to complete this task.*

*I am sure that this high informative booklet will be much useful to the planters in lower palani hills and other parts of India and students and researchers to plan and move further to Sustain and improve the productivity of borticultural crops in livelly resions. S congratulate Mr. R. Pavalarajan for this achivement and with him all the best in his future endurance.*



**Dr. P. SUBBIAN, Ph.D**

Former Director Agri business Development & Former Register  
Tamil Nadu Agri. University, Coimbatore.



## Foreword

**Dr. D. Veeraragavathatham, Ph.D.,**  
Former Dean of Horticulture  
(Tamil Nadu Agricultural University )  
Horticultural Consultant



*I am glad to introduce the book entitled "My Agricultural Experience in Lower Palanis" written by Mr. R. Pavalarajan, Patioveeranpatti, Dindigul District of Tamil Nadu. Who is a well known expert in that area. When I was going through the manuscript. I could see that the core of the material was all about the practical problems he faced in the cultivation of major hill crops and how he was able to overcome them which generally individuals won't reveal. He used to discuss the field problem with Agricultural scientists of TNAU as well as ICAR Institutes through out India. I understand that he has undergone the degree programme Bachelors in Farm technology offered by TNAU under open an Distance leaving which would help to further refine his farming. I hope this book would be useful not only to other farmers but to students of Agriculture and Horticulture also. I congratulate him for his efforts to bring out such useful information in this form of a book. I am doubly glad to understand that the soft copy of this book can be downloaded from his website. I wish that he would bring out such publications in the future also.*



Dr. D. Veeraragavathatham, Ph.D.,

---

Resi : E2-Second Block, Radha Apartments,  
Pudukinar Street, P.N. Pudur, Coimbatore - 641 041. Tamil Nadu.

## *Contents*

1. Focusing on Practical approaches for rejuvenation of hill banana Sirumalai & Virupatch	1
2. Salient features of growing hill banana	7
3. Experience while grading standard hill banana before sale	9
4. Profit ensuring statistical information gain profit during sale of hill banana of farm-gate	10
5. Cost of cultivation hill banana - mono crop (For first 18 Months)	11
6. Cost of cultivation hill banana - Multi - Tier systems (For first 18 Months)	13
7. Prunning in Coffee	15
8. Multi-Tier systems in coffee	24
9. Coffee - Replanting cost	28
10. Cost of cultivation in Arabica Harvest	30
11. Mandarin Orange cultivation in Lower palani's	32
12. Irrigated farming in lower Palani's	42
13. The Wilt syndrome in pepper cultivation and practical remedies	48
14. Coconut row planting	56
15. Cost of coconut cultivation in row planting	63
16. Jack	70
17. Acid Lime	74
18. Cultivation cost of Lime in one acre	80
19. Butter beans in lower palani's	83
20. My Observation on Mango flowering	87
21. Chow Chow in Lower palani's	92
22. Cost of cultivation of Chow Chow	98
22. Do you know the plant - fill it	102
23. Educational tour report	104

## FOCUSING ON PRACTICAL APPROACHES FOR REJUVENATION OF HILL BANANA SIRUMALAI & VIRUPATCHI

### INTRODUCTION:-

“ Hill Banana had been the ruling crop of the lower Palani's, Sirumalai and Kolli hills from 1940 - 1975. But due to several reasons like virus incidence it began to lose its importance day by day. The government of Tamilnadu. TNAU and NRCB have started to take several steps for rejuvenating systematic growing of the crop and from 2000 onwards, the crop has started to gain its glory. If the planters use this rare opportunity then this crop would again flourish well in these regions, provided we follow correct cultivation practices. ”

### Unique Features :

Hill banana is a very important crop and to mention its importance there is a saying in Tamil, “மலைவாழை போல் அல்லவோ கல்வி” As soon as we hear the word hill banana we feel like eating it. Its year round availability is another favourable factor. Mango, Banana, Jack என்ற முக்கணிகளில் Banana claims the first position during auspicious occasions because mango is a seasonal fruit while JackFruit cannot be considered as such due to its size and difficulty in excavating the edible carpels. Banana is the best fruit for young babies. Hill banana is the best suitable variety for பழுனி பஞ்சாமிந்தம் It has the best flavor among all the available banana. This is the only bananas, which is available for multi-tier crop system. The most significant trait is its longest storability under ambient temperature amongst all the cultivars. Above all this banana is most convenient for packing.

**Ideal conditions :**

It grows only in hilly and non wind prone areas. That is why it is called the 'Hill banana' This banana grows at an elevation of 2000-5000 feet at requires well distributed yearly rain fall of 1250 mm – 1500 mm. Virgin soil with more humus content is most suitable. Would be optimum soil without water stagnation is ideal. It grows in a temperature of 10-35° C while 75% sunlight and 60% humidity would be optimum.

**Cultivation Steps :**

1. Selection of Suckers and Planting.
2. Methods of Maintenance.
3. Manuring
4. Pests and Diseases.
5. Management of Virus Incidence.
6. Harvesting.
7. Marketing.

**1. Selection of Suckers and Planting :**

A farm free from virus infection and wilt disease suckers should be selected. East – West rectangular planting method is the best one for planting. Sword sucker is best suitable. The sucker with 2½ to 3 feet height with the age of 3 months and 9-12 sheath is ideal. The selected sucker should be planted the same day or sometimes later. The best month for planting is April 15th – May 15th or July 15th – August 15th One banana clump requires approximately 100–150 Sq. feet of land area. E.g., 10x10 feet, 12x8 feet, 12x10 feet, 15x8 feet, 15x10 feet. The pit size should be 2x2x1½ feet and filled with 200 gm of super phosphate mixed with 5 kg of cow dung. Before planting the rotten sheath and the sheath damaged due to mechanical injuries should be peeled off. We must also peel out a

thin layer of the Rhizome and dip the sucker in 1% solution of Nuvacron for 5 minutes. Sprinkle 20 gm of Carbofuran into the pit and plant the sucker. Fill the pit with soil and make it airtight. Tissue culture plants, which are certified as free from virus, can also be used for planting based on its availability. The tissue culture plant takes more time for Rhizome development. In Mono crop we plant can 400 to 450 plants per acre whereas in multi-tier system 250 plants are possible.

## 2. Methods of Maintenance:

After 21 days of planting add 100 gm of Carbofuran around the sucker on the ground then again make it air tight. After the first rain, put some soil around the sucker and make it air tight again. Dead and dried suckers should be changed immediately. Maintain the banana plant with 10-12 leaves always. In multi-tier system 8 leaves are sufficient. The knife used for cutting should be very sharp. The intrusion of wild animals into the farm should not be allowed.

The clump should be maintained neat and clean without weeds. Yearly twice the unwanted bark should be removed once before and another after monsoons. Remove the older leaves whenever necessary to reduce transpiration during summer, at least 10 times a year. At a time remove three leaves only. After harvesting the pseudo stem should be removed from the field and a 'U' Cut is given at lower region 75% shade regulation should be maintained. Maintain a clump with two mother plants along with two suckers. In multi-tier system a clump with one mother plant and one old sucker along with one young sucker should be maintained and allow the suckers to grow very close to the mother plant. Every month remove bunchy top affected plants. Gap filling should be done yearly twice. Lean and lanky sucker should be removed.

A stone wall should be built along the contour line. The sucker cannot be taken from the mother plant until the first harvest is done. Cut the excess sucker which is not needed upto the ground level.

### 3. Manuring:

Apply 10-15 kg of cow dung in a circle, two feet away from the clump every year. 50 per cent of the recommended dose of manure should be given at the time of summer showers and the remaining should be given before monsoon. The nutrient recommendation / clump / year is 160:40:320 g.of NPK in the case of multi-tier system and 240:60:480 g.of NPK in the case of mono crop. Applying 1 kg of neem cake / clump is very good for the plant both as nutrient and nematode. The fertilizers should be applied 1 ½ feet around the clump and covered with soil which has to be mulched.



### 4. Managing Pests and Diseases:

Rhizome weevil, stem borer and sucking Aphids are the three major pests. A mixture of 1 ml. of monocrotophos in 1 liter of water should be sprayed during initial stages. (Or) A mixture of 100 ml. Monocrotophos and 400 ml. of water should be injected @ 1 ml. per banana with the help of a baby injector from the fifth month until it produces the bunch (or) apply 2 to 5 granules of Carbofuran in the gap of leaf and sheath every 21 days.

Any one of the above three methods may be implemented but to a maximum of 10 times a year. The interval will be changed to 40 days during continuous rainy days or continuous drought. When the humidity is high, the application should be once in 21 days. Maintaining the clump neat and clean is essential.

One of the major diseases is panama wilt avoiding water stagnation up to a distance of 5 feet can prevent Panama Wilt. A corn pit of 6x1½ x 1½, 5 feet away from the clump is to be made.

60 mg Bavistin capsule is applied at the point of junction of Rhizome and Pseudo stem using a capsule applicator. It is given twice a year before and after monsoon. Both these solutions can also be sprayed to the banana by adding a sticking agent yearly twice. The use of chemicals beyond the required rate will lead to residual effect.

Which can be controlled by Sigatoka leaf spot (*Cercospora musicola*) is controlled by 5 gm of C or 1 ml. / litre of Calixin with 1 litre of water solution spray. To spray, a wetting agent should be added. Cutting of older leaves from time to time will enhance free aeration and thus reduce pest and diseases.

Apply 40 grams of *Pseudomonas* to control the wilt. The soil must be maintained free from nematode. Give 50 gm of Carbofuran per clump yearly twice to maintain the plant free from nematode. Every year 50 kgs of cow dung will reduce the wilt pathogen and nematode. One kg. of neem cake will also reduce the nematode. Recommended dose of manuring maintains the plant healthy.

### **5. Management of Virus incidence:**

Aphid is the vector which should be kept under control. If a planter happens to see a virus infected banana along with a snake, he is bound to give due importance to the removal of the virus infected plant at first.

A mixture of one ml. Nuvacron in 1 litre of water should be sprayed every 21 days (or) 100 ml. Nuvacron, 400 ml. of water should be injected per banana @ 1ml per plant (or) apply 2 to 5 granules of Carbofuran in the gap of leaf and sheath every 21 days. All the above

three methods should be implemented yearly 10 times. The time interval will be changed to 40 days during continuous rainy days or continuous drought. During high humidity the application should be once in 21 days.

### 6. Harvesting:

The climatic condition and the elevation are the main ruling factors of maturation after flowering. The maturation takes place in 150-180 days. We should not irrigate the plant, because it will change the quality (sweetness and flavor). During the harvesting period 6 leaves should be maintained. This helps in improving the size of the fruits. Cut the bunch and remove the cluster. Five out of 105 fruits are considered as a casualty loss. An ideal bunch should have 5 to 7 clusters and 12 fingers / cluster. The possible yield per acre is 800 bunches in the case of mono crop and 400 in the case of multi-tier system. A pack contains 420 to 525 fruits.

### 7. Marketing:

Fruits are graded into two different sizes, and are send to near by cosmopolitan cities. The marketing should be done by the next day of harvesting.

## CONCLUSION :-

“ To be more profitable with the hill banana a planter has to pay more attention and give continuous care towards the crop. This helps the planter to get high and stable profit and it is not like other plantation crops which vary periodically with their profit. It is a kind of crop which never lets down a planter at any situation. Revenue from this plant can be realized every week, so planters at any level who can ensure their high attention towards the crop can be benefitted to a great extent.”



## SAILENT FEATURES OF GROWING HILL BANANA



In the whole world Hill Banana is available only in the Lower Palani below Kodaikanal hills of western ghats of Tamilnadu, India. This is rain-fed horticultural crop growing at a height of 2000 feet from the mean sea level.

The specialty of this AAB – Pome Type fruit is that it grows specifically in the virgin soil with neutral **PH** and humus content. It grows healthily in mountain passes and valleys. It is the duty of a farmer to protect variety.

Another distinct feature of this fruit is that it maintains clumps and takes only 18 months to generate the fruit. The crop is grown organically and needs evenly distributed rainfall not less than 90 days in a year with the quantum of 1500 mm.

Every month by overcoming many barriers, a farmer produces the crop, separates then into bunches, carries them through even ponies from the places where transport facility is not available and then by trucks to reach the market for sale.

There it is kept in smoke chamber for 18 hours and then sent to the user within 24 hours. The user based on his need can keep the fruit from deterioration for 7 to 10 days under normal conditions. This is the only variety that can be consumed by all age groups from kids to aged one. With multi medicinal features, this is a fruit with much sweet ness, taste and flavour that kindles a person to eat more and more. This fruit is available all through the year.

For the people of Tamil Nadu it is a pride to serve this fruit in functions while hosting guests. Only this banana can be used in the preparation of 'panjamirtham' offered to God (Lord Murugan at Palani).

The unique feature of this fruit is black pixels on its surface. Since only in hill banana, the number of fingers in a hand is almost 12, this fruit is sold at a price of dozen.

Off the three prime fruits namely Banana, Mango and Jack fruit, Hill Banana ranks first. With the above features, though the price of hill banana is slightly high, it proves its worth with its quality and nutrition.

This statistical information will serve as a useful guide to farmers while grading fruits before sale as there may be meager differences between the fruits harvested during rainy and summer seasons.

**NOTE :**

1. Packing and Handling charges etc.
2. Sales tackle is with regard to the Farmer.
3. In metropolitan city, it gets high Price.
4. The whole harvested fruits are sold within 24 hours.

**GRADING OF HILL BANANA -  
OBSERVATION ON CERTAIN OF BUNCH TRAITS.**

Sl. No.	Gross Weight of a Bunch in kgs.	Weight of a Flower Stem in kgs.	Weight of a back Stem in kgs.	Weight of stem while separating Hands from Bunch in kgs.	Weight of Hands after removal from Stem-kg.	No. of Hands from a Bunch	Avg. No. of Fingers in a Bunch	Weight of a individual finger in Grams	Grade awarded to this Bunch
1.	4.000	0.450	0.450	0.100	3.000	4 to 5	50	50 - 60	III
2.	5.100	0.500	0.500	0.100	4.000	6	60	60 - 70	III/II
3.	7.500	0.500	0.850	0.150	6.000	7	80	70 - 80	III/I
4.	9,250	0.500	1.050	0.200	7.500	8	95	80 - 90	I/Super
5.	11.500	0.500	1.350	0.200	9.500	9	110	90 - 100	Super
6.	4.000	0.600	1.650	0.250	11.000	10 - 11	125	80 - 90	I

**PROFIT ENSURING STATISTICAL INFORMATION GAIN PROFIT DURING SALE OF  
HILL BANANA ON FARM-GATE (2005)**

Sl. No.	No. of Hands	Avg. No. of fingers in a hand	Total No. of Fingers (Aprox)	Avg. Weight of a fingers	Avg. Total Weight (in kgs.)	Avg. Total Weight of a Hand (Kg)	Avg. Weight of a Hand	Selling Price of one Finger (in estate)	Grade
1.	35	12	420	0.100	42	1.200	23	2.30	Super
2.	35	12	420	0.095	40	1.150	23	2.20	Super
3.	35	12	420	0.090	38	1.100	22	2.00	Super
4.	35	12	420	0.085	36	1.000	21	1.80	I
5.	35	12	420	0.080	34	0.920	20	1.60	I
6.	36	12	420	0.075	32	0.900	19	1.40	II
7.	36	12	420	0.070	30	0.800	18	1.25	II
8.	38	11	420	0.065	27	0.700	17	1.10	III
9.	38	11	420	0.060	25	0.650	16	0.95	III
10.	42	10	420	0.040	18	0.400	12	0.50	IV

**One Acre Cost of Cultivation**  
**Hill Banana – Mono Crop (For First 18 Months) as on 01.01.99**

\* Man power, Wages, as on date should be used.

Cultural Practices	Particulars	Income (in Rs.)	Expenditure (in Rs.)
1. Land Clearing	—	2000	
2. Pit Preparation	450 x 3	1350	
3. Planting Material Cost	450 x 10	4500	
4. Planting Cost	450 x 5	2250	
5. After Cultivation (Weeding and other cultural Practices for initial 1 ½ yrs)	450 x 1	4500	
6. Manuring (Both Organic and Inorganic)	450 x 15	6750	
7. Plant Protection	450 x 2.75	1250	
8. Harvesting and Packing		3400	
9. Management & Miscellaneous Expenses	—	1400	
<b>Cultivation Expenditures</b>		27400	
Total Number of Bunch Harvested	33600 fingers		
400 nos. x 84			
Cost of I st Quality is head grade Banana (30000 x 1.50 Rs.)		45000	
Cost of II nd Quality Banana (3500 x 0.40 ps.)		1500	
Transportation Charges (67 bags x 25 Rs.)			1850
Freight			
Commission @ 10 %			4650
<b>Gross Income</b>		<b>46500</b>	
<b>Total Expenditures</b>			<b>33900</b>
<b>Net Profit</b>		<b>12600</b>	

**Cost of Cultivation – 18 to 30th month**

Cultural Practices	Particulars	Income (in Rs.)	Expenditure (in Rs.)
1. Removal of Lanky Suckers and Gap Filling	—	300	
2. Weeding and Clump Clearing	—	1850	
3. Neem Cake Application	—	2400	
4. Plant Protection	—	1000	
5. Manuring	—	3650	
6. Removal of Leaf (Old)	—	800	
7. Harvesting and Packing	—	6000	
8. Labour and Miscellaneous Expenses	—	4000	
<b>Cultivation Expenditures</b>			20000
Total Number of Bunch Harvested 800 nos.x75	60000 fingers		
Cost of I grade Banana (50000 x 1.40 Rs.)			70000
Cost of II grade Banana (10000 x 0.50 ps.)			5000
Transportation Charges (120 bags x 25 Rs.)			3000
Merchant Commission @ 10 %			7500
<b>Gross Income</b>		<b>75000</b>	
<b>Total Expenditures</b>			<b>30500</b>
<b>Net Profit</b>			<b>44500</b>

**One Acre Cost of Cultivation**  
**Hill Banana – Multi-Tier system (For First 18 Months)**  
**as on 01.01.99**

\* Man power, Wages, as on date should be used.

Cultural Practices	Particulars	Income (in Rs.)	Expenditure (in Rs.)
1. Land Clearing	—		2000
2. Pit Preparation	250 x 3		750
3. Planting Material Cost	250 x 10		2500
4. Planting Cost	250 x 5		1250
5. After Cultivation (Weeding and other cultural Practices for initial 1 ½ yrs)	250 x 6		1500
6. Manuring (Both Organic and Inorganic)	250 x 14		3500
7. Plant Protection	250 x 2.8		700
9. Management & Miscellaneous Expenses	—		800
<b>Cultivation Expenditures</b>			<b>13000</b>
Total Number of Bunch Harvested	17600 fingers		
220 nos. x 80			
Cost of I st Grade Banana (15000 x 1.40 Rs.)		21000	
Cost of II nd Grade Banana (2600 x 0.60 ps.)		1560	
Transportation Charges (34 bags x 25 Rs.)			850
Commission @ 10 %			2250
<b>Gross Income</b>		<b>22560</b>	
<b>Total Expenditures</b>			<b>16100</b>
<b>Net Profit</b>		<b>6460</b>	

### Cost of Cultivation – 18 to 30th month

\* Man power, Wages, as on date should be used.

Cultural Practices	Particulars	Income (in Rs.)	Expenditure (in Rs.)
1. Removal of Lanky Suckers and Gap Filling	—		200
2. Weeding and Clump Clearing	—		200
3. Neem Cake Application	—		1200
4. Plant Protection	—		500
5. Manuring	—		1800
6. Removal of Leaf (Old) Labour Costing	—		500
7. Harvesting and Packing	—		1600
8. Labour and Miscellaneous Expenses	—		1000
<b>Cultivation Expenditures</b>			<b>7000</b>
Total Number of Bunch Harvested 300 nos.x70	21000 fingers		
Cost of I grade Banana (17000 x 1.30 Rs.)		22200	
Cost of II grade Banana (4000 x 0.50 ps.)		2000	
Transportation Charges (120 bags x 25 Rs.)			1380
Merchant Commission @ 10 %			2420
<b>Gross Income</b>		<b>24200</b>	
<b>Total Expenditures</b>			<b>10800</b>
<b>Net Profit</b>		<b>13400</b>	



## PRUNING IN COFFEE

### INTRODUCTION:-

“ This note on “PRUNING IN COFFEE” came out of my practical experience. The facts and the methods of pruning detailed here would help planters of all categories to practically apply these methods on their plantation. The planters on practicing these methods would certainly increase the productivity of plantations.

In general, pruning influences the plant physiology of the plants in many ways there by C/N ratio is affected and the quantity of 'Auxins' & 'Gibberellins change By this the percentage of 'retardants' is also affected.

The main objective in developing and perfecting a pruning method is to remove only the Non-productive parts so as to divert the energy to the productivity parts. The desirable level of pruning for mature plants differs in Arabica & Robusta. Evergreen trees do not tolerate any sort of thinning or pruning.”

### I. WHY DO WE PRUNE ?

### II. ADVANTAGES OF PRUNING :

- 1) Maintains good health condition and size of the bush.
- 2) Optimizes nutrient requirement there by application of manures.
- 3) Improves aeration and availability of same light.
- 4) Induces the uniform flowering.
- 5) Helps uniform ripening.
- 6) Quality produce is achieved.
- 7) Avoids unwanted diseases.
- 8) Enhances the photo synthetic efficiency.
- 9) Regulates the yield.

There by prevents alternate/erratic / bearing over year

### III TYPES OF PRUNING:

- 1) Plant training.
- 2) De-Suckering.
- 3) Handling.
- 4) Pruning with knife.
- 5) Heavy pruning
- 6) Collar pruning
- 7) Root pruning.

### 1. WHY SHOULD WE TRAIN & PRUNE THE COFFEE BUSH ?

- ✓ To facilitate easy intercultural operations we take up training and pruning.
- ✓ Fruits obtained in the respective seasons never fetch high price. By pruning we can change the cropping pattern thereby produce in the "off season and get a good price for the crop. Pruning is done to improve the quality of the produce.
- ✓ Pruning is done to improve the quality of the produce.
- ✓ We can avoid congested unwanted growth.
- ✓ An ugly look of a plant demands immediate pruning. To improve an ill-maintained plantation pruning is required.
- ✓ If the plants do not show any positive response, do our regular operations.

### 2. USES OF PRUNING:

#### Maintains good health condition and size of Bush :

When good health condition of bush is maintained it would lead to proper vegetative and reproductive phase.

When proper size is maintained it would help in proper accommodation of sufficient number of plants in a given area.

### **Minimizes the fertilizer applications.**

As uneconomic branches are removed, it helps in optimum removal of nutrients from the soil there by the amount of fertilizers to be applied is considerably reduced resulting in significant reduction in cost of cultivation.

### **Uniform Flowering**

Pruning helps to maintain uniformity in reproductive bud production, which in turn will increase yield. Due to increased bud production the bee's activity increases result in increasing pollination. Hence fruit set is good and good quality fruits are ensured.

### **Uniform Ripening :**

Pruning favours microclimate for uniform ripening. By this harvesting charge, handling and transportation cost are reduced.

### **To get quality Produce :**

Pruning helps in development of good colour, size, density and flavor of the fruit also increased and hence quality produce is achieved.

### **To Avoid unwanted Diseases :**

Due to pruning sun light availability is good hence light falls on all the parts of plant. Thus occurrence of diseases such as is minimized black rot Increases the economic photosynthesis activity.

Due to pruning the plants is maintained in a conical shape. Thus there is uniform light intensity from top to bottom. All the leaves including the leaves on the lower branches gets enough light CO<sub>2</sub> and nutrients thereby increasing the photosynthetic activity.

### **Regulation of Yield :**

In biennial bearing nature when the plants are pruned, the

next year yield would be increased. Hence by pruning, regulation of yield is done.

### 3. TYPES OF PRUNING:

#### 1) Plant Training:

Plant Training is done during the initial crop growth phase. After three years training near not be very essential.

##### a. Tying with Stakes:

During the windy times, seedling swings and may be damage. Therefore to avoid this, a stick of 10mm thickness and 2 feet height is placed near the seedling and tied to anchor it in place. In summer we give some shade to the seedlings to avoid scorching sunlight. It must be also tied with sticks. Around the plant we give 2kg of mulch spreading 1½ feet diameter. It helps avoid evaporation of moishere.

#### 2) De-Suckering:

De- suckering is generally done as and when necessary (At least twice in a year).

##### a) Topping:

The plant height is to be maintained. Thereby the intercultural operations can be practiced easily. Topping helps in arresting apical growth.

##### b) Removal of Water Shoot suckers:

Water shoot suckers on removal helps the lateral growth. The plant gets a good appearance due to removal of water shoot suckers.

#### 3) Handling:

It should be done every year.

**a) Dead Wood Removal :**

The dead woods and leaves, which are liable to invite unwanted pathogens, must be removed.

**b) Thinning of Unwanted Branches :**

Unwanted branches refer to unproductive and un self sustainable branches. The leaf area of such Branches will not be enough to satisfy the photosynthetic need of the branches.

**c) Removal of Dead Leaves :**

This method of pruning is applicable only on Multi-tier system. The dead leaves of higher plants can be removed. This will enhance good light harvest by the plants at lower height in the multi-tier system.

**4. Pruning with Knife :**

Pruning with knife is generally done once in three years. It is done during summer showers & after the harvest. Done only on those branches below pencil thickness.

**a) Removal of Crisscross Branches :**

Crisscross branches are those arising from a lateral branch & growing towards the center.

**b) Removal of Dead Woods :**

All dead woods which invite pathogens must be removed.

**c) Give a "Skirt Type" Appearance :**

The plants should get free aeration from below. Hence a gap of 1 foot is very much necessary in between soil surface & lower parts of plant. This gives the plant a skirt like appearance.

**a) Center Clearing:**

The center clearing helps the light penetration inside the bush through the branches. This helps in maximum light harvest which in turn leads to maximum photosynthetic activity and thereby good yield.

**b) Removal of Uneconomic Branches:**

We are removing chattaivathu, Charaduvathu, Nulvathu, Velaivathu, Kuduraivathu, Kolivathu. This type of branches will not produce economic flower bud (or) branches. Cut the goormundasers 7 to 10 years only.

**d) Maruchi Aruthal:**

In this case, we remove the lower part of the branch when the new tertiary branches are raised.

**5) Heavy Pruning:**

It is otherwise called as parrot-pole pruning. In this method of pruning all unwanted things above pencil thickness are removed and plant size is ultimately reduced.

It is important to analyse whether heavy pruning is needed or not. Practical experience is paramount in deciding the necessity of heavy pruning. Pruning should be carried only when there is a rich source of carbohydrate. If enough carbohydrate is not present, two foliar nutrient sprays at the interval of 21 days is recommended. This is generally done twenty days prior to a rainfall. If there is no rain, then it is essential to irrigate heavily pruned plants. This type of pruning is done three times only in the entire life span of the plant. A well-maintained plantation does not require such type of pruning. Its recovery percentage is 96-98.

**6) Back Pruning:**

This is similar to heavy pruning. It is otherwise known as "thinning out". Terminal portions of all branches are removed leaving their basal portions intact.

### **7) Collar Pruning (1/2 Foot Cutting)**

Carbohydrate reserve and good rainfall are must in the case of ½ foot cuttings. Also it is a very sensitive method of pruning. There are only 70 to 80 per cent successes in this type of pruning. It is done only during the end of the life span of the plant.

#### **a) For Purpose of Regeneration**

In older plantation we cut the old stem to a height of ½ foot from the ground level in such a way that it has to 45° towards north and swab 1% of bordeaux mixture. We allow the suckers to grow up to pencil thickness and graft the buds with good varietal characters to develop. This method would help in regenerating the entire field with uniform desirable new material and save 2 years.

#### **b) For Purpose of Replanting:**

'When plants have reduced carbohydrate resource, it is not advisable for regeneration and hence we go for replanting. For this pits are taken along the sides of the previously existing crops and replanting is taken up.

#### **a) For Multiple Stem System:**

If there is a dilemma between taking up either regeneration or replanting then multiple stem system is taken up. In this method 2 to 3 suckers or shoots with different height and directions are allowed and nearly 2 to 3 crops is obtained. Generally quick replanting is recommended within this Period.

### **7) Root Pruning:**

**a) Forking:**

When the plants are not responding to the regular course of nutrition and irrigation management, then we use this type of pruning. We use a fork for digging the soil up to one-foot depth. As a result Primary roots are cut. Cow dung, nutrients and water are applied to the soil. It helps the plant for forming a new root system. Hence fresh leaves are produced of the crop. It is also done only once in the life span. The soil must be free of nematode and soil born fungi as otherwise the roots may get infected.

**4. DEMERITS OF PRUNING :**

Pruning is generally not necessary in coffee plantation due to the following reasons.]

- 1) When do not have well trained labourers.
- 2) The time of pruning of the plants will be uncertain due to irregular rainfall.
- 3) The worldwide research tells us that evergreen plants do not need pruning.
- 4) The cost of pruning is very high.
- 5) The yield and plant condition serve as the best index to manipulate the shade management.
- 6) Our rainfall is irregular with higher number of rainy days.
- 7) Frequent pruning will shorten life span of the plant.



- 8) Only minimal saving on manures.
- 9) Goornundasers give a very high yield.
- 10) More leaves lead to more photosynthesis.
- 11) Running blossoms extends harvesting period.
- 12) Nutrient management can regulate our quality crops.
- 13) In root pruning, plants waste its resources and time.
- 14) Conservative tillage and no tillage are gaining popularity world over.
- 15) Above all leave the plants to Nature.

### CONCLUSION :-

“ Pruning is the part and parcel of the cultural management of coffee plantation. In addition other feature like climatic conditions (Seasons, temperature and rainfall) and nutritive condition of the soil etc., also contribute for the increased productivity of the plants. But pruning alone will not give higher yield or quality fruits. We have to exploit the complete genetic potential of the cultivar. To obtain better yield we have to give attention on proper manuring, what ever you give organic (or) inorganic form, nutrition is very important.

The small growers, big growers and companies do not adopt the same type of pruning. They follow their own methods.”

## MULTI-TIER SYSTEM IN COFFEE

The methods practiced in normal plantation, of mono cropping don't fetch more profit today, the reason being insufficient yield which is due to less number of plants per unit area. As a planter, by probing the reasons for this uneconomical returns. I have understood the necessity of a different method of planting, and to me the best way was Multi-tier System.

Multi-Tier System is the method of planting different types of plants with different height and light requirements. In multi tier system we utilize maximum unit area. Since we plant different kinds of plants we are able to obtain yield though out the year. It helps the farmer to remain distinct from others by way of getting profit through sale of various produces not depending on single one.

It helps in maximization of harvesting light with effective utilization of Unit Area accommodating different types 1000 Arabian coffee plants / acre. Hence this method fulfills the requirements of the planter and helps him to increase this profit.

It is a modern method of coffee cultivation involving planting of fruit trees and timber yielding trees for better light interception and to ease the mechanized operations. It makes maximum use of land to achieve high yields in early periods of orchard life. I found it successful with pepper, orange, banana, areca nut and timber trees etc. The use of dwarfing root stocks and training systems have helped in adoption of Multi-Tier System in many crops and it has its own merits.

It has many salient feature like accommodating more number of plants per unit area, minimization of weed population, more economic returns per unit area, minimum water usage, maximum

job satisfaction, increased humidity and reduced harvesting charges. However the plants should have different types of root system which will help feeding of nutrient at difference depths. However, it also demands a large working capital.

It requires a fertile, well drained sandy loam soil. Hilly soil rich in humus is most suitable. An annual rainfall above 750 mm and a relative humidity of about 60% is essential. Rectangular planting in east west direction tilted towards north to an angle of 135° is most (more details require or a small diagram need) appropriate with a pit size of one and half cubic feet. Multi-Tier System in an area of one acre requires roughly about 1,03,000 litres of water per week with the help of 2 HP motor. For the initial 3 years Drip irrigation is recommended and later on Flood irrigation can be practiced. A rainfall during January deleterious would be dangerous since it would hamper plants turning to flower. If excess nitrogen is applied then we can't avoid vegetative growth and plants would never enter into a reproductive phase. Hence optimum nitrogen should be applied and more potash would help flowering.

This system not only involves proper cultivation practice but also efficient farm management. On farm staying is must. If not possible daily visit to farm and day to day observation on farm works are essential. A planter will have to manpower labours who have a good knowledge about Multi-Tier System. A good farmer would have to maintain constant touch with Coffee Board and also with reputed agricultural institutions and should know all the recent research finding for adopting better farming practice. It is always good for a farmer to use his own funds rather than borrowings.

There is a possibility of high incidence of a high pests and diseases in Multi-Tier System. Hence great care is to be taken to see that all plants obtain an optimum sunlight which would help in minimizing pest and disease incidence. Pre treatment with copper

oxy chloride / Bavistin (or) any other fungicide, spraying of neem extract or chemicals would reduce disease and pest incidence. Generally avoid synthetic pyrethroids to prevent development of resistance by insects.

Regarding harvesting it is important that fully mature produce should be harvested in time. Due to this system, since we extract a high yield we get little less size. (not clear)

My practical know-how in **Multi-Tier System** involves wonderful experience and some of result from my experimental trials are given below.

Crop	Number of Plants / acre	Yield / Plant
Coffee (Arabica) (5x7)	900	5 Kg fruit
Mandrin	115	500 fruit
Jack and Silver Oak	100	----
Pepper Vine	100	2 Kg dried
<b>Total / Acre</b>	<b>1215</b>	<b>----</b>

I am practicing this successfully for over 6 years.

Apart from this I do practice another Multi-Tier System.

- (a) Elevation - 3000 ft
- (b) Rainfall - 1500 m m
- (c) Relative Humidity- 65%

Crop	Number of Plants	Yield / Plant
Coffee (Robusta) (10x10)	900	7 Kg fruit
Banana (20x20)	115	85 fruits/bunch
Jack and Silver Oak	100	-----

Pepper Vine	100	2 Kg dried
Silk Cotton	35	500 pods
<b>Total</b>	<b>1250</b>	<b>-----</b>

I am practicing this successfully for over a period of 15 years.

In one of my experimental trails I included cardamom, pepper and mandarin in an elevation of 4000 ft. But this system failed and only cardamom was able to survive.

Multi tier system in coffee may be successful with the following plants.

Coconut, Nutmeg, Vanilla, Arecanut, Mangosteen Avacoda (butter fruit) and Cinnamon at an elevation of 2000 ft, with a rainfall 2500 mm and above and relative humidity 75%.

- (a) Elevation - 4000 ft
- (b) Rainfall - 1500 mm
- (c) Relative Humidity - 60%

Under these conditions at lower Palani hills I am practicing a Multi-Tier System involving coffee, pepper, Mandarin and silver oak.

**Inference:**

Multi-Tier System in general would help the planter in increasing his profit. It keeps the planter engaged all through the year and hence there is a constant turn over for him. To succeed it is very much essential to introduce new genotypes for dwarfism. Growing dwarf plants would help the planter to take a steep jump in his profit rate. Thus if the genetic research findings go hand in hand with the hard work of the planter then his yield triumph would become a landmark in history of plantation crops.

**COFFEE-REPLANTING COST (2003-2004)**

OWNER'S NAME : \_\_\_\_\_ **First Year :**  
 AREA : 1 Hectare **I. Land Preparation**  
 ESTATE NAME : \_\_\_\_\_ **II. Nursery Management**  
 VILLAGE : \_\_\_\_\_ **III. Planting**  
**IV. Shading Management**

**I. Land Preparation :**

1. Removal of Old Stem	-	5,750
2. Land Cleaning Cost	-	8,500
3. Stone Wall Re-Work	-	11,450
4. Weeding Cost	-	3,150
5. Shade Regulation	-	2,600
<b>TOTAL</b>	<b>-</b>	<b>31,450</b>

**II. Nursery Management :**

1. Cost of Seedlings	-	7,300
2. Permanent Shade Trees – Seedling	-	1,300
3. Seedling Management Cost	-	1,700
<b>TOTAL</b>	<b>-</b>	<b>10,300</b>

**III. Planting :**

1. Peg Marking With Stick	-	2,600
2. Pitting Cost	-	11,450
3. Basal Application of Manure	-	1,150
4. Pit Closing Charges	-	2,600
5. Weeding	-	2,600
6. Planting Charges	-	2,600
7. Overheads	-	1,700
<b>TOTAL</b>	<b>-</b>	<b>24,700</b>

**IV. Shade Management :**

1. Weeding	-	2,600
2. Temporary Shade Developing Cost	-	2,550
<b>TOTAL</b>	<b>-</b>	<b>5,150</b>

**TOTAL COST FOR FIRST YEAR**

I. Land Preparation	-	31,450
II. Nursery Management	-	10,300
III. Planting	-	24,700
IV. Shading Management	-	5,150
<b>TOTAL</b>	<b>-</b>	<b>71,600</b>

**Second Year (Estimated Cost)**

1. Weeding	-	12,600
2. Supply – Casualty Seedling	-	2,600
3. Manuring	-	2,300
4. Spray (Tonic and Pesticides)	-	2,300
5. Shade Management	-	2,300
6. Watering	-	1,200
7. Watch and Management	-	600
<b>TOTAL</b>	<b>-</b>	<b>26,800</b>

**Third Year (Estimated Cost)**

1. Weeding	-	12,600
2. Supply – Casualty Seedling	-	1,150
3. Manuring	-	4,600
4. Spray (Tonic and Pesticides)	-	4,600
5. Shade Management	-	2,300
6. Watering	-	1,150
7. Watch and Management	-	1,150
<b>TOTAL</b>	<b>-</b>	<b>27,550</b>

**Fourth Year (Estimated Cost)**

1. Weeding	-	11,450
2. Supply – Casualty Seedling	-	600
3. Manuring	-	6,900
4. Spray (Tonic and Pesticides)	-	6,900
5. Shade Management	-	2,300
6. Watering	-	1,150
7. Watch and Management	-	1,150
<b>TOTAL</b>	<b>-</b>	<b>30,450</b>

**Year 2001-2002 March**  
**Cost of Cultivation in Arabica harvest**  
**0.4 Tonnes Clean Coffee Per Acre**

**I. Labour Cost**

\* Man power, Wages, as on date should be used.

Month	Details	Female Labours	Male Labours	Cost (in Rs.)
April	1) First Round Weeding	10	1	400
	2) Handling Charges	10	3	500
	3) First Round Manuring	3	1	15
May	1) First Round Spray	6	6	510
June	1) Shade Lopping	-	8	500
	2) Second Round Manuring	3	8	155
July	1) Second Round Handling	10	1	400
	2) Second Round Weeding			
August	1) Second Round Spray	6	6	510
September	1) Sport Spraying	1	1	100
	2) De Suckering	2	1	120
October	1) Third Round Weeding	10	1	400
November	1) Third Round Manuring	3	1	150
November to March	1) Harvesting (only) (Approximately 2500 Kg. of Fruits x Rs.1.40)	100	-	3500
		100	-	3500
	<b>TOTAL</b>	<b>174</b>	<b>34</b>	<b>7900</b>

**II. Cost of Fertilizers and Pesticides**

S.No.	Details	Cost (in Rs.)
1.	Three Rounds of Fertilizer including Freight Charges	3000
2.	Pesticides	1500
	<b>TOTAL</b>	<b>4500</b>



### III. Approximate Overheads Per Acre (for Planter's with 20 Acres)

S.No.	Details	Cost (in Rs.)
1.	Gunny Bags and Jute Cost	300
2.	Transportation	300
3.	Tax	300
4.	Watch and Supervising Charges	1800
5.	Diesel and Oil	300
6.	Mechanic Charges	200
7.	Toand Fro (atleast bike)	1200
8.	Labours Beneficial and Medical Expenses	3000
9.	Phone Charges	100
10.	Pulping Labours	150
11.	Drying Yard and Warehouse Charges	300
12.	Unexpected Expenses	250
	<b>TOTAL</b>	<b>5500</b>

### IV. Curing Charges

S.No.	Details	Cost (in Rs.)
1.	Hulling Charges (500 Kg. of Parchment)	200
2.	Handling Charges	100
	<b>TOTAL</b>	<b>300</b>

### Derivation of E.P. Bulk Production Cost

S.No.	Details	Cost (in Rs.)
I.	Labour Cost	7900
II	Cost of Fertilizer and Pesticide	4500
III	Overheads	5500
IV	Curing Charges	300
	FAQ 400 Kg. of Clean Coffee E.P. Bulk Production Cost	18200

**Cost of Clean Coffee Per Kg. = Rs.45.50**

## MANDARIN ORANGE CULTIVATION IN LOWER PALANI HILLS

### INTRODUCTION:-

“ In Lower Palani Hills, (Dindigul District, Tamil Nadu) Orange is cultivated as inter-crop in Coffee in an area of more than 1500 hectares. This crop loves the high temperatures prevailing in day and low temperature during night i.e. the optimum temperature in day is not more than 32° C and in night not below 10° C. The R<sup>H</sup> must be 50%. The Lower Palani Hills usually do not receive rain in January and February and in rest of the months it will get about 1400 mm rain in 100 rainy days. This suits Orange very much. But because of growing in rain-fed condition, the yield is low. The economical yield of the tree starts is from 7th year and would last upto 30 years.”

### 1) Land Preparation:

Since Orange is cultivated as inter-crop with Coffee spacing is more important. The optimum spacing is 15 ft. between trees and 18 ft. between rows. There is also possibility of having 12' between trees and 15' between rows depending on the slope of the land. During January, and February pits measuring 3'x3'x3' must be taken filled with 10 kg. of Farm Yard manure and 200 gm. of Super Phosphate.

### 2) Seedling Production:

**There are two types of seedling production:**

- 1) **Through Seeds**
- 2) **Through Budding.**

### 1) Through Seeds:

Select a tree which has been yielding consistently for 15 years and the seeds from fully ripped fruits must be collected. The seeds must be coated with ash and shade dried for 2 days. The seeds must be sown in the primary bed in rows. They will germinate in 15 to 17

days. 21 days after germination, the seedling shall be transferred to polythene bags measuring 12" x 6".

The bags must be filled with FYM, sand and soil in the ratio of 1:1:3. While transplanting the tap root should not be damaged. These bags shall be arranged in a bed with 3' width. The bed should have pandal at 6' height to have 50% shade. Watering shall be done whenever needed.

Once the seedlings attain a height of 1.5' in 6 to 8 months, they can be planted in the main field.

When there is more moisture, fungal disease will affect the seedlings and the plant will die due to root rotting. To avoid this, 1% bordeaux mixture has to be sprayed. Likewise to avoid leaf miner 1% neem oil or NSKE shall be sprayed. To have healthy seedlings, small amount of DAP shall be put in the corner of seedling bags and sprinkle water. The seedlings got from seeds should be free from any viral diseases.

## **2) Through Budding:**

There are many species to have as root stock viz Cleopatra (Mandarin) Rough Lemon and Rangpur Lime etc.

The seeds of these species shall be grown in bags. After attaining pencil thickness of stem, in 6 to 8 months, the buds from selected Orange trees which has been yielding consistently higher yield for 15 years must be budded with the root stock.

The person doing budding must be experienced in order to have at least 90% success rate from budding.

The bud lings will be ready for planting in 16-18 months whereas the seedlings from seeds will be ready for planting in 8-10 months.

The planting of seedlings i bud lings must be in July – August to have better growth.



### 3. Planting:

Two months before 2'x2'x2' pit must be taken. The pits are filled with 5kg FYM and 200g super phosphate after that seedlings must be planted at 1' depth in the pre-prepared pits and must be tightly placed with ½' sand. Then the seedlings must be protected by inserting 3 sticks with 5" thickness and 2' length in triangle shape. After getting the 1st shower, the seedlings must be again tightly placed by pressing the soil around the plant.



### Maintenance:

- Have proper fencing to save plants from wild animals.
- In case of budded plants, the growth from below the budded point should be removed then and there.
- During the 1st year, weeding must be done 6 times around the seedlings (1½' radius)
- During the 2nd year, weeding must be done 5 times around the seedling (2' radius)

- From the 3rd year the weeding shall be done 4 times.
- If the land is slopy, more than 30% of the lower side of the seedling should be elevated by 1½' height in half circle shape. This will improve the growth of the plant.
- The tertiary roots around the plant should not be damaged, while weeding around the plant. If the roots are damaged, the plant will be predisposed for nematode.

Perfection Trees usually have more fruits than its bearing capacity. So to avoid breaking of branches, the trees should be supported by wooden support sticks in all the four sides.

### 1) Pruning:

The new shoots coming in 1 ft. from ground level during the 1st year, 2 feet in the 2nd year and 3 ft. in 3rd year should be removed by leaving ½ cm. (not clear) If such shoots are in pencil thickness, bordeaux paste must be applied in the wound.



The new shoots must be removed once in 2 years during February or August. Likewise the dried shoots/branches, phanerogamic parasites etc. should also be removed during such period.

All water shoots shall be removed till the 10th year. This will stop trees growing shapelessly. After 15th year removed. The pruned branches shoots etc., should be burnt.



## 6) Water Management

During the 1st year watering is necessary if there is a scarcity of rain. -Usually plants under irrigation will start yielding from 5th year. -The fully grown tree will flower during April and yield during December. -If there is no rain in any one of the months June, July, and August, the yield will be affected. The weight and size of fruits will also be reduced. -But in irrigated condition, 7 fruits will weigh 1 kg. -The fruits with 14 Nos. in 1 kg. will fetch Rs.20/kg. and fruits with 7 Nos./kg. will fetch Rs.30/kg. -So, 700 fruits obtained from a tree under rain-fed condition will get Rs.1,000/-, whereas 700 fruits got from a tree under irrigated condition will fetch Rs.3,000/- --The picking cost will come down by Rs.2/-/kg. Hence, under irrigated condition Rs.2,200/tree will be additional income.

## 7) Pest and disease Management

To control Powdery mildew and other fungal diseases, the new shoots must be protected. Fungicide like wettable sulphur should be sprayed. 3 – 4 times, to protect the stem from fungus, infection the stem should be thoroughly wiped off and 10% (1% or 10% please check) bordeaux paste must be applied. To control fruit fly, and fruit sucking moth contact pesticide must be sprayed. During summer to control mealy bug systemic pesticide must be sprayed. Also in summer, mites will suck the juice from leaves. This will affect the growth of the plant. To control this, wettable sulphur @ 3 gm./lr. must be sprayed.



To avoid scaling in the fruits, when the fruits are in marble size, Zolon @ 2 ml/lr + 2.5 gm of wettable sulphur shall be sprayed. To avoid scaling in the fruits, when the fruits in marble size Zolon @ 2 ml/lr + 2.5 gm of wettable sulphur shall be sprayed.

Shoot die back is also another fungal disease. To control this, 2 kg Copper sulphate, 1½ kg lime in 200 litre of water (1% bordo mixture) shall be sprayed. Or 1 gm/1 lr. carbendazim shall be sprayed. To control fruit fly, the adult moths should be destroyed by placing pheromone traps. To control Stem border, the branches containing grubs must be pruned and burnt. Then plug the holes with cotton soaked in monocrotophos solution ( @ 5 ml/20 ml of water.) This should be repeated after 15 days.



Another important disease is overbearing dieback. This will happen when the trees lose its vigour. The important indication is, the trees will flower abundantly and the fruit will be very small in size. To save the tree, the number of fruits must be thinned drastically. Or, even we can remove all the flower/fruits. 1% Bordeaux mixture has to be sprayed and 5 liters has to be poured in the root zone. Abundant watering has to be done after giving 250 gm Ammonium Sulphate. And also 200 gm carbofuran must be given around the root zone. If all of these are done, we can rejuvenate the trees. Generally after 10 years, if this disease appears,

integrated measures as given above must be done both before and after monsoon. Otherwise, after 15 years, entire orchard will be affected by this disease.

While spraying systemic pesticide or micro-nutrient, it is enough to spray 1 litre per tree during the first 3 years. During the 4th& 5th year 2 litres, 6th& 7th year 3 litres, 8th to 10th year 4 litres and after 14th year 5 litres are enough. If we spray more than requirement, unnecessarily expenses will increase. Heavy usage of fungicide will also kill the good fungus in the soil.



### 8) Micro Nutrient Management:

In Lower Palani Hills generally Orange is subjected to micro-nutrient deficiency. The indication is pale green and yellow leaves. The tender leaves are yellow in color and smaller in size. In general total, the tree is stunted with pale leaves. This will lead to 80% crop loss and the fruits will be very small. To mitigate this deficiency every year the following micro-nutrients must be given 2 or 3 times.

Magnesium Sulphate    300 gm.

Zinc Sulphate            450 gm.



Borax 100 gm.

Ferrous Sulphate 50 gm.

To neutralize the above, 350 gm lime water must be added in 200 lt. water and sprayed. If we add 2 kg. urea and 500 gm. Potash. We can get good result. Only once in a year 30 gm. Molybdenum must be added. This will lead to even sized fruits. Once a year while spraying Bordeaux to Coffee, the same can be sprayed to Oranges also, to rectify the Copper deficiency. Otherwise, in the above given micro-nutrient mixture, 250 gm. in copper sulphate and 150 gm. lime shall be added.

### 9) Manuring:

During the 1st year, 6 months after planting, once in 3 months, 150 gm urea, 250 gm super phosphate and 125 gm M.D. potash shall be given through soil application.

In the 2nd year, along with 10 kg. Farm Yard Manure, 150 gm. urea, 250 gm. Super phosphate and 125 gm. M.D. potash shall be repeated. During the 3rd years, the same combination with 15 kg. Farm Yard Manure should be repeated. During the 5th year, the same combination must be increased to 100% i.e. 300 gm, Urea, 500 gm. Super, 250 gm potash with 15 kg. of Farm Yard Manure and 1 kg, Neem Cake must be repeated 4 times.

Along with the above dose, application of 5 kg. vermi compost, 50 gm, Pseudomonas, 50 gm. Phosphor bacteria 50 gm Azospirillum will give added benefit. While manuring it is necessary to see that the tertiary roots are not be damaged. Watering must be done as and when necessary. Once in 5 years, soil testing shall be done and accordingly the quantity of manure should be changed.

### 10) Harvesting:

Though the trees yield from the 5th year, economic yield will start from the 7th year. From the 10 th year onwards each tree will give 700 fruits or 100 kg fruits. Orange will give yield 2 crops in a year.

Flowering during November will come to harvest in July. Flowering in April will come to harvest in December. Harvest in July will give good return. If it is properly irrigated, the fruits will be bigger in size and will fetch good rate.

Matured fruits in the stage of greenish Orange color must be harvested and packed in plastic crates. Each layer must be separated with a paper. The fruits must be arranged in such a way that all the fruits are kept upside.

130 to 150 trees in an acre will give good yield and per acre yield will be 15,000 kg.



## CONCLUSION :-

“ In lower palani hills at an elevation above 3500 feet to 5000 feet MSL, Mandarin Orange is an excellent profitable cash crop. It is being cultivated as a single crop or as intercrop with coffee. The area is more susceptible to powdery mildew and micro nutrient deficiency .If we over come both of these, we can earn more income. Farmers can fully depend on this crop under irrigated condition as intercrop in coffee to get double their profit. ”

## IRRIGATED FARMING IN LOWER PALANI HILLS

### INTRODUCTION:-

“ In Lower Palani Hills, rain-fed farming is in practice. The crops vary depending upon the elevation. In Lower elevation from 800 to 1000 MSL, above MSL crops like Coffee, Pepper, Lime and Citron are cultivated. In mid range from 1000 MSL to 1500 MSL . above MSL cash crops viz Coffee, Orange, Pepper, Avocado, Hill Banana, Cardamom and vegetable crops like Beans, Chow Chow are grown. In higher elevation, fruit crops like Pear, Plums, vegetable crops like Garlic, Carrot, Cabbage, Butter Beans, Potato, Cauli Flower, Khol-Khol are grown. All the above crops are cultivated as rain-fed crop and the farmer has to depend on the rainfall for successful farming. If the rainfall comes down, it will result in crop failure which will affect the farmer's economy. To mitigate the situation, if the farmer practices irrigated farming, he could be certain in getting good harvest from his farming activity and he would avoid uncertainty in his income.”

### Why Irrigated Farming:

In Lower Palani Hills, only rained farming is in practice since long time. The highest average rain fall is 1400 mm, in 110 rainy days. This will vary every year. In a block of 10 years, 4 years may get normal rain fall and another 4 years will get moderate while 2 years will get very poor rain fall. This will be around 900 mm. in 70 rainy days. As the rain fails consecutively for 3 months, the moisture in soil will completely



dry and the micro organisms will not survive in the soil. Consequent to the dryness, both small plants and plants in yielding stage such as coffee seedling or pepper vine will die, causing huge loss to the growers. In orange, lime and citron due to insufficient water, fruits will not grow and attain their normal size and also will result in premature. Fruit drop this will cause 90% loss to the farmer.

When the vegetable crops get good price in market, farmer could may not get good yield because of poor rain fall. But during the time of good monsoon, farmer cannot get a good price for his produce because of over production. This situation could be overcome by practicing irrigated farming. Before practicing irrigated farming, the following aspects have to be taken into account.

- 1) Water requirement of the crops.**
- 2) Method of Irrigation.**
- 3) Investment requirement.**
- 4) Economics.**

#### **1) Water requirement of the crop:**

The average water requirement to irrigate 1 acre of land for 7 days is 1 lakh lts. Or, for 7 acres of land daily requirement is 1 lakh lt. The required water could be obtained from any source viz underground water, well water, river water, canal or farm pond storage.

The capacity of motor required to irrigate 1 acre of land is 1 HP if it is Electrical Motor and 1.5 HP for diesel Engine. PVC pipes measuring 2½" for main line and 2" for sub-main have to be laid in a depth of 2 feet.

Usually the crop requires irrigation during February, March, July and August, when there will not be any spell of rain. This period

is very crucial as flowering and fruit setting take place during this time.

## 2) Method of Irrigation:

Following are the easy methods of irrigation suitable for hill plantation.

### a) Irrigation through hose pipe.



### b) Drip Irrigation.

### c) Sprinkler Irrigation.

### Irrigation through hose pipe:

In the 2" sub-main, 2" x  $\frac{3}{4}$ " saddle has to be fixed. From the saddle through  $\frac{3}{4}$ " valve and  $\frac{3}{4}$ " nipple, 1" PVC hose pipe has to be fixed for irrigating the plants. The length of the hose pipe should not exceed 200 feet as it will affect the flow of water. 150 feet length is most suitable. If the sub-main is laid with 250 feet interval, the hose pipe length shall be upto 200 feet. At a time we can irrigate through 3 hoses.

Generally, through a single hose pipe, one person can irrigate the plants in 1 acre in 6 hours. The irrigation shall be once a week till arrival of rain. The basin of all plants shall be covered with dry leaves as mulch to reduce the evaporation.

The capacity of the pump required for this arrangement is 5

HP, which will make 200 lts. of water per minute to flow through the 2½" main pipe. This will also make 50 lts. of water per minute through the hose pipe.

It is the prime duty of every farmer to irrigate the seedlings regularly till it gets established. It will reduce the causality of seedlings upto 6%.

Water requirement per seedling of lime, citron, orange, pepper etc., in 200 lts. on 1st day, 150 lts. on the 3rd day and 100 lts. once in every week; which will be easily possible through hose pipe irrigation.

### **b) Irrigation through Drip Lines:**

Unlike hose pipe irrigation, for Drip Irrigation, initial investment is high. But, the benefits are more than hose pipe irrigation. In drip irrigation, plants will get irrigation on daily basis. Accordingly the water requirement will be less viz 15 lts/day for coffee, 20 lts for banana, 30 lts for other crops. Also, to manage 5 acres under drip Irrigation one female employee is sufficient drip installation has to be done through Govt. authorized Companies.

### **c) Irrigation through Sprinkler:**

Sprinkler Irrigation is most suitable for coffee, cardamom and vegetable crops. The water requirement is 1 lakh lts. per acre per day. After that 50,000 lts/day is sufficient with an interval of 3 days. The number of sprinklers installed and the discharge from each sprinkler have to be taken into account to decide the running time of the system.

The sprinkler system requires more water than other systems. But the labour requirement is low at 1 person for 5 acres. The installation has to be done with proper guidance from agricultural engineer.

### **3) Investment Requirement :**



For any type of irrigation, finding a permanent water source is important. Open Well, Bore Well or Small perennial Water Streams are permanent water sources in hill areas. Open well near the water streams will serve the purpose. To have a well or bore well with motor arrangements it will cost nearly Rs.60,000/acre. After establishing water source, we can decide the type of irrigation as per to the water availability.

The expenses for providing irrigation equipment will be (as on November 2012) Rs.10,000/ acre for hose pipe irrigation, Rs.30,000/acre for Drip Irrigation and Sprinkler Irrigation. The subsidy available for Drip and Sprinkler irrigation is to the maximum of Rs.20,000/acre.

### **Economic Growth:**

Hill crops like coffee, orange, pepper, lime and citron are responding well to the irrigation. This will increase the productive life of the plants to at least 35 years.

- The quality of the produce will improve substantially and so, the prices realized by the produce will be double.
- Plants will get resistance against disease.
- It is possible to get yield during off season which will fetch good price in the market.
- In cardamom, sprinkler irrigation is substantially increasing the humidity by at least 30% which is most suitable for the crop.
- In coffee, the percentage of A grade will increase substantially which will improve the realizable value.
- Vegetables like chow-chow will yield heavily upto 40 tonnes/acre in 10 months, while it will be only 16 tonnes/acre under rainfed condition.
- In orange, flowering starts by April and fruits will come for harvesting by December. A tree will yield 700 fruits. If the

monsoon fails in any of the month from June to August, the size of the fruit will be small. The economics through better fruit size is as follows.

**14 Oranges of small size = 1 kg or 7 Oranges of big size = 1 kg.**

The rate in the market is Rs.10/kg. for small and Rs.40/kg. for big fruits. So, under irrigated condition farmer will get 700 big fruits from a tree. Where, as from the trees of un irrigated condition the farmer will get 700 small Oranges. The realizable value,

<b>700 big Oranges (100 kg.)</b>	<b>=</b>	<b>Rs.3,000/-</b>
<b>700 small Oranges (50 kg.)</b>	<b>=</b>	<b>Rs.1,000/-</b>

This clearly shows the difference in income under irrigated condition.

✓ similarly in pepper also the out-turn ratio, size, quality etc. are good under irrigated condition. This will increase the realizable value considerably. We can give economics it data are available for pepper.

Thus, irrigation enables the farmer to be sure of his income, rather than being uncertain due to vagaries in monsoon.

## CONCLUSION :-

“ The water requirement depends on the quality of soil and it may vary from land to land. The investment required is also variable according to the water source, distance between the source and the main land etc. After arranging the permanent source of water, farmer can approach banks for loan facility.

Big growers shall atleast start irrigation for 25 acres of land initially. Thereafter, they can bring 10 acres per year under irrigation.

If the crops under monsoon are kept under irrigation, farmers will surely get 3 times more income. This will improve their living standard considerably. ”



## THE WILT SYNDROME IN PEPPER CULTIVATION AND PRACTICAL REMEDIES

### INTRODUCTION:-

“ Pepper, commonly called “Black Gold” is considered as “The King of Spices”. It is the most profitable spice crop. It gives economic yield from the 3rd year to the 30th year. It is an ideal crop among spices for multi tier system in hill crop. There are two cultivable peppers. ”



1. **Pepper nigrum – Black Pepper**
2. **Pepper longum – Long Pepper / Wild Pepper**

Pepper survives upto an altitude of 4500 feet above the mean sea level. It requires a deep and nematode free soil for its better growth. The optimum PH is 6 and humidity requirement is 80%. The rainfall requirement for pepper is about 1500 – 2000 mm. It can survive at a temperature upto 36° c. The suitable optimum temperature is 17°-32° c.

Quick wilt and slow wilt have become the deciding factors in pepper production. An appropriate control of this wilt will increase the Indian production by 40% and the planter's profit by 75%. So it is necessary for us to take practical remedies against this.

## PRACTICAL STEPS

- |                              |                               |
|------------------------------|-------------------------------|
| (1) Nursery Management       | (2) Methods of Planting       |
| (3) Growth and Maintenance   | (4) Bush Pepper               |
| (5) Manuring                 | (6) Plant Protection Measures |
| (7) Wilt Control Methods I–V | (8) Harvesting                |
| (9) Inference                |                               |

### 1. NURSERY MANAGEMENT

We must select vigourous and good bearing runner vine from the mother plant. We must plant three numbers of two noded cuttings in a bag. At least two cuttings must be sprouting along with fine and heavy roots within the period of 60 days. Panniyur – I and Karimunda selection are the ruling varieties in pepper. But during selection it must be assured that same varieties of cuttings are grouped together. Planting in nursery should be done in February for better sprouting, due to better carbohydrate reserve in the runners. Heavy bearing mother plant does not produce much Runner Vine.

The soil must be free from disease causing fungus. The polybag mixture consists of 1:1:3 ratio of sand, compost and jungle soil.

The nursery must be maintained very neat and clean and in the mist chambers. The size of the polythene bag must be 6 × 8 inches with 8 holes. In nursery the bags are placed in groups of ten with a spacing of ½ feet arranging in each group. Sprouting in nursery takes place during the month of February. After a period of 60 days, the seedling in mist chamber is given a hardening phase of 30 days. A proper care should be given to prevent the rainwater falling from shade nets and trees under which the seedlings are kept. 1% Bordeaux mixture is sprayed during hardening. There will be 85% sprouting in nursery.

Rapid multiplication technique is also used for propagation of

pepper in which there is 100% sprouting.

1 meter length cutting can be used for direct planting in the field.

We can get the seedlings in the tissue culture method also.

We can get the seedling from seeds but the characteristic features of the plant will not be uniform due to their cross pollination. The seedlings that are produced by this method are used only for research purposes.

## 2. METHODS OF PLANTING

The size of the pit must be  $1\frac{1}{2} \times 1\frac{1}{2} \times 2$  feet and 2 feet away from the climber tree. The priority in planting the pit is given to the South West direction. The second choice is to the West in heavy rainfall receiving areas. In the areas of scanty rainfall North East or Northern direction is preferred. If the girth of the trees is approximately 24 inches, we can plant one bag in a pit, if the girth is 48 inches, we can go for two bags in two different pits at various direction and if it is 60 inches, we can plant 3 bags in 3 pits at different directions. If it exceeds 100 inches, a maximum of 7 bags can be planted. 10 kg of Cow dung and 50 gms of Carbofurodon is given before planting.

The cuttings are planted in such a way that  $\frac{1}{2}$  meter is inside the soil and  $\frac{1}{2}$  meter is tied to the stakes. Same variety of the crop should be planted around a stake. At the same time it is always better to maintain all the varieties in the same field. In the case of mono crop 450 plants are maintained and 150 per acre if grown as multi-tier-system. The girth of the stakes should not be below 18 inches.

### 3. GROWTH AND MAINTENANCE

The growing vine is supported with 3 sticks until it reaches the stakes. The vine is kept tied to the stakes until it reaches 4 feet height. If the plant undergoes drought during initial 3 years of planting, watering is must. Normally micronutrient application is not necessary. Terminal growth of the plant should not be arrested to prevent self-shading, which would hinder the water pollination. The manure must be kept 2 to 3 feet away from the vine. Knife or any such things must not touch the stem of the vine. Upto three feet from the plant, there should be no water stagnation and should be maintained cleanly.

Hanging Vine and runners should be removed. Runners should be cut in the month of february half foot away from the stem. During the time of pollination, if there is an absence of drizzling, we can spray water to the plant. It is very helpful for the setting of berries. In addition spray 10ppm of NAA ( Planofix at the rate of 90ml. per 200 liters of water.)



A corn pit must be dug with a dimension of  $1\frac{1}{2} \times 1\frac{1}{2} \times 6$  feet at a distance of 5 feet from the vine. The crop should be maintained in such a way that the green pepper yield is 10-15 kg. At the same time yield below 6 kg. is considered uneconomical. After harvesting, 60 days gap and 70 mm rainfall is essential for spike initiation and it takes 120 days for complete flowering. If there is less than 7% of panickle setting then the spikes will drop. It is necessary to clear the secondary branches from the stem upto the height of  $2\frac{1}{2}$  feet from the ground level.

#### 4. BUSH PEPPER

The lateral shoots are used for propagation of bush pepper in nursery. There is 60 % sprouting. The spacing required is 6 × 6 feet. Dosage of manure – 1/3rd of the dose recommended for vine pepper. Bearing starts from 1st year onwards. The crop shows a good response with drip irrigation. The average crop yield is 1,800 gms. of green berries per plant. Bush pepper is apt for all ideal conditions of pepper cultivation excluding soil texture. Arrange the dimension of correct a stonewall for a height of 2 feet and width 3 feet, fill it with good soil. This condition is an ideal one, for bush pepper planting.

#### 5. MANURING

During the 1st year we have to apply 5 kgs. of Cow dung and 50g of N.P.K. in the ratio of 15:15:15. three times a year per plant. In the 2nd year 75 gms. of N and 50 gms. of P and 100 gms. of K must be given in 3 splitted doses along with 10 kgs. of Cow dung. From the 3rd year, for every 15 feet height of the vine or for every harvest of 6 kg. of green berries, 50:50:150 gms of NPK is applied along with 15 kg of Cow dung in 3 split doses. From the 5th year onwards for every 15 feet height of the vine or for every harvest of 6 kg of green berries 100:40:140 gms of NPK is applied along with Cow dung in maximum split doses. Application of 1kg of neem cake is highly essential after the 5th year.

#### 6. PLANT PROTECTION MEASURES

The major pests of pepper are Shoot borer, Pullu Beetle, Thrips, Mites. Spray Nuvacron 1 ml. or Endosulphan, 2 ml in 1 litre of water for shoot borer. Shade regulation followed by Endosulphan 2 ml spray for pollu-bettle. Spray Monocrotophous 1ml per lit of water for thrips. Spray Kelthane 0.5 ml fit for mites. The major diseases of pepper are Stem rot, Root rot, Quick wilt (*Meloidogyne* sp), Slow wilt – (*Radophilis similes*) and Anthracnose Swabbing with 10%

Bordeaux paste upto a height of 2 feet for stem rot. Spraying Carbendazim 1% before monsoon for anthracnose. Drenching the soil little by little with 5 liters of 1% Bordeaux mixture / COC at the rate of 5 gms. per liter before and after monsoon. Apart from pest and diseases, nematode can also be controlled by 50 gms of Carbofudon after the 5th year before every year monsoon.

### 7. FORWILT METHODS OF REMEDIES :

As a planter we must be able to recognize the symptoms of the infected plants. Immediately we must pour 25 liters of water. On the second day, again we must pour 15 liters of water and 50 gms. of Carbofurodon to the soil to control nematodes and also 5 liters of Bordeaux mixture drenching. Third day, again pour 15 liters of water and give Neem Cake and also spray 1% of Bordeaux mixture on the vine. On fourth day, again pour 15 liters of water and apply 10% of Bordeaux pasting on the stem. Fifth day apply 250 gms. of Ammonium Sulphate and 15 liters of water. By following these methods we can save life of the 80% of the infected vine.

### 8. CONTROL MEASURES

We must clear off the affected vine and burn it completely. We must dig  $2 \times 2 \times 2$  ft. size pit nearest the affected plants and apply  $1 \frac{1}{2}$  kg. of lime in it. After 3 months we can plant a seedling in the place of affected vine additionally by applying 50 gms. of Carbofuran in the soil. This method is not applicable if more than 15% of the total number of plants are affected by the wilt per year. Since there is economic crop only after the 4th year, only the remaining 40% of the vine will be bearing. 15%

Quick wilt



Slow wilt



is planted, 15% is one year old, 15% is two years old, 15% is three years old..

### **9. METHODS OF REMEDIES**

We must give systemic fungicide to the affected vine. Eg. 5 gm of Redomil dissolved in 5 liter of water per plant. We give contact fungicide 5 gms of Emison along with 5 liters of water consecutively for 3 days. We give 100 gms of N, 50 gms of P and 100 gms of K By following this method, we get 80% of success in saving the life of the plant, but vine shows stunted growth resulting in a marginal crop after second year.

### **10. PREVENTIVE MEASURES**

We must maintain the farm neat and free from fungi. The soil must be maintained free from nematode yearly twice by giving 50 gms. of Carbofuran for each and every plant. Every year we must give the recommended manures in more than 3 split doses. Every year we must give 15 kg of Cow Dung per vine. When the plant is with the full crop we should not leave it under water stress. We must provide 50 liters of water to the plant every day.

Before and after monsoon we must drench with 5 liters of 1% of Bordeaux mixture. We must apply 10% of Bordeaux paste to the stem before monsoon. We must maintain the surrounding of the vine very clean and prevent water stagnation. If we bring the seedlings from some other place, first we must verify whether the soil is free from Pathogens. Soil PH must be around 6. We must spray the 1% of Bordo Mixture every year to the vine before monsoon. Avoid spraying in the blooming time.

### **11. METHODS OF REMEDIES : (ORGANIC)**

Maintain the farm neat and clean. Every year give 25 kg of Cow Dung to the plant. Give Trichoderma Viridi at a rate of 40 gm per plant. If the slope of the land is 25° and above, a pit must be dug of 6



× 1 ½ × 1 ½ feet which has to be five feet away from the vine. The recommended dose of manure should be given as a single dose. Maintain soil moisture level at 60%. Mulch the soil during summer. We can give Vermicompost @ 1 ½ to 2 Kg. per plant per year. It would improve the humus content in the soil. Give 1 kg of Neem cake per plant per year. The crop cultivated using this method is an organic produce. Generally organic produce fetches the best price in the market.

## 12. HARVESTING

Fully mature spike must be harvested. Harvesting immature and ripened spikes must be avoided. Avoid more than 2 harvest, which may damage the vine. Store it for more than 3 years without any fungal growth. We get 4 colors of pepper – red pepper, white pepper, green pepper and Black pepper. After harvest, the beans are trampled under feet or can be removed mechanically, using Vivega pepper thresher. Recovery percent of dry pepper is 28 to 33 and that of white pepper is 23 to 25.

## INFERENCE

All this five methods will be applicable to different farmers in different ways. The plant cannot be cured without taking any of this remedies. Overbearing should be arrested, as it is not good for the plant health. Avoid fully ripened fruits repine. 25 kg of cow dung and 1 kg of neem cake per vine per year must be given. The farm should be maintained very neat and clean. If wilt syndrome is controlled then pepper cultivation would be very much of successful.



## COCONUT ROW PLANTING

### INTRODUCTION:-

“Coconut planters with the traditional concept and with the support of scientists plant coconut trees to an extent of 69 trees in one acre of land with a gap of 25 feet x 25 feet and reap an average of 6000 nuts per acre. Tamil Nadu suffered a great setback during the years 2001-2004 resulting in less nut yields due to lack of rain and shortage of ground water. Therefore I would like to suggest that in order to avoid this type of adverse situation in future and to protect coconut trees farmers plant should go for row planting.

This proposal for Row Plantation is proposed not with the intention to inform farmers that this is a new type of planting trees, but to confirm that this type of planting traditionally exists and nuts have been reaped by row planting around wells, canals and land. If we adopt a full fledged row planting based on my practical experience farmers can reap great benefits.

In an acre coconut takes the nutrition only from 3000 sq.ft. of land but the farmer spends a lot by maintaining 43,560 sq.ft. of land which increases the maintenance cost.”



**VARIETIES:**

Though many varieties of coconut exist, West coast Tall, Tall X Dwarf types are planted for nuts and oil. Dwarf varieties like Chowghat, Malayan yellow, Orange, Chowghat Green are planted for tender coconut. For big nuts Yazpanam trees and for more nuts "Ayiram Kaichi" trees are suitable. Likewise "Latchaganga" released by Central Plantation Crops Research Institute at Kerala is a good yielding variety. VHC3 hybrid released by Tamil Nadu Agriculture University in the year 2000 is a high yielding variety.

**LAND FERTILITY AND TEMPERATURE:**

This tree grows under the conditions of rainfall level from 1000mm to 3000mm 2000ft. elevation from mean sea level, 70% of air moisture, good drainage facility, sandy loan soil rich in humus content, upto a depth of 3m. and soil PH from 6 to 7 are ideal. This tree requires temperature from 27° Celsius to 36°C and it likes sunlight but day and night temperature variation at 5°C is apt.

**UNIQUE FEATURES:**

The coconut tree gives benefit from 4th year and can live up to 80 years but good yield can be obtained from 10th year to continue up to 60th year. It can survive and grow at a temperature from 10° Celsius to 44° Celsius. It can grow even if the soil PH level is at 8.

**ROW PLANTING:**

By adopting two rows technique, a farmer can plant 100 to 140 trees in an acre. Leaving a gap of 5 to 6 feet from land border and 16 feet gap (gap range 12 to 18 feet) between two trees a farmer can plant 48 trees in an acre. There may be a slight reduction in the number of nuts harvested from 7th year to 12<sup>th</sup> year, but from 13<sup>th</sup> year onwards with the increased growth in between gap it receives maximum sunlight and start giving fullfledged yield.

This number of trees occupies only 20% of land and consumes 30% of the total sunlight received in an area of land. By planting less sunlight requiring plants in 10% of land which is shaded by the coconut trees, a farmer can make himself available 70% of land in which cultivation can be done at his discretion.

Water plays a main role in coconut cultivation. For example at a specific soil fertility, if 25 litres of water is provided for a tree per day the tree can survive and grow, with 50 litres of water the buds will come out but not nuts, while with 100 litres of water, a tree will give 50 to 75 nuts and with 125 litres of water it can give its potential output.

With the increasing water scarcity, a farmer can avoid the situation of providing water to the garden just for its survival by shifting to row planting, in which he has to provide water only to the coconut trees. This will help the farmer to provide sufficient water to ensure a good harvest. In the remaining available land he can grow a rainy season short duration crop.

### **MANURE MANAGEMENT:**

For a tree which gives 65 to 75 nuts per annum the following combination of manure can be prescribed.

Urea	=	1400 g.
Super Phosphate	=	2000 g
Potash	=	2000 g.

The above combination has to be given twice a year in two equal spilt doses. Along with the above enriched farm yard manure of 25 kg is to be given.

For a tree yielding 100 to 150 nuts per annum the manure application would be enhanced:

Urea = 2000 g.  
 SuperPhosphate = 3000 g  
 Potash = 3000 g.

The above combination of manure is to be given in three equally split doses in a year. Along with the above, 1 kg of neem cake, 50 kg of enriched farm yard manure, 25 kg of green manure are to be given once in a year.

Nature of Soil	Annual Rainfall		% of Avg. Air and Moisture per year	Drip Irrigation Water/ Day	Providing Water once in 5 days
	inch				
Sandy Soil:	40"	1000	50%	150 lits.	1000 lits.
	60"	1500	60%	125 lits.	900 lits.
	80"	2000	70%	100 lits.	800 lits.
	100"	2500	80%	75 lits.	700 lits.
Red Soil:					Weekly once
	40"	1000	50%	125 lits.	900 lits.
	60"	1500	60%	100 lits.	800 lits.
	80"	2000	70%	75 lits.	700 lits.
Alluvial Soil:	100"	2500	80%	50 lits.	600 lits.
					One in 10 Days
	40"	1000	50%	100 lits.	800 lits.
	60"	1500	60%	80 lits.	700 lits.
Clay Soil:	80"	2000	70%	60 lits.	600 lits.
	100"	2500	80%	40 lits.	500 lits.
					Once in 10 Days
	40"	1000	50%	75 lits.	700 lits.
	60"	1500	60%	60 lits.	600 lits.
	80"	2000	70%	45 lits.	500 lits.
	100"	2500	80%	36 lits.	400 lits.



Sl. No.	Gap between trees in a row	Land Occupied by a tree in Sq. Ft.	Trees planted only by circutory rows (No. of trees in Acres)							
			1 Acre	2 Acres	3 Acres	4 Acres	6 Acres	8 Acres	9 Acres	10 Acres
1.	12'	84	69	121	173	173	242	312	312	381
2.	14'	98	59	104	148	148	208	267	267	326
3.	15'	10	55	597	139	139	194	249	249	305
4.	16'	112	52	91	130	130	182	234	234	286
5.	18'	126	46	80	115	115	161	208	208	254



### CONCLUSION :-

“ In the future scenario, I believe that a farmer instead of relying completely on coconut trees by planting it as a garden, can opt for row planting by planting one row along the boundary, two rows in between in the East West direction, type of row planting. This will ensure needed number of trees for coconut cultivation and a yield of 18,000 nuts per acre which ultimately assure a beneficial return to a farmer.

At this instance I would also like to put forth the idea that the scientists should apply their education and make strenuous efforts in innovating new methods of coconut crop cultivation, for enhancing the standard of living of the farmers and lead the nation to a greater development. ”



## SPECIAL FEATURES OF SINGLE ROW PLANTING

1. By planting trees along the fence one can plant 26 to 45 trees in a acre.
2. Land occupied by the tree is only 10% to 20%
3. It consumes 20% -30% of total sunlight available for one acre.
4. 10% to 20% of land watering is sufficient.
5. A farmer can make available 70% to 80% of land for cultivation of duration crops.
6. In the shadow region of coconut trees (20%) a farmer can cultivate green manure and grass for cattle or he can grow less sunlight needed plants.
7. In this method sufficient water to be provided once a week.
8. From the 15<sup>th</sup> year onwards he can harvest 150 to 200 nuts from a tree per annum and an average of 6000 nuts per acre.
9. Since the gap between nodes is very less the trees will not be very tall.
10. Harvested nuts and old leaves can be removed easily.
11. Fungal infections and insect infestation can be easily identified and controlled.
12. Usually there will be 7 to 15% of trees in a coconut garden without giving any benefit and it will not be more than 1 to 2% of the population in row planting.
13. A farmer can monitor all the trees individually.
14. Weeding and land maintenance cost is very low. The coconut cultivated area cannot be ploughed.

## ASPECTS TO BE MONITORED

1. It is advisable that the land to be used for row planting be in East West direction and in rectangular shape.
2. Though the trees are planted at a range of 12 feet to 18 feet gap, 15 feet gap is suitable for the tree.
3. Yield gets little bit reduced from 5<sup>th</sup> to 8<sup>th</sup> year and from 13<sup>th</sup> year onwards it gives good benefit to the planter.
4. There are possibilities for the squirrels, rats and tree dogs to damage the baby nuts. These can be killed by placing monocrotophos injected bananas on tree top.
5. Based on the land structure and soil fertility a farmer can plant enough trees by going for single row or double row planting. There is also possibility for three rows planting.
6. With regard to irrigation, 600 litres of water once a week for a tree is sufficient.
7. In order to get more light coconut trees incline and grow more towards the South West direction and some trees incline towards West direction and some towards South direction. Usually the trees will not grow towards the North, North East and East direction.
8. With regard to row planting in East West direction, the trees in the Western direction will be less tall and the trees in the Eastern direction will be taller.
9. In double row planting at East West direction, the trees in the Northern direction grow straight and the trees in the Southern direction grow inclining towards South West direction.
10. If row planting done in East West direction and inclination of  $18^\circ$  in the Northern side of West direction, the trees will receive even sunlight. (may be explain further)

**COST OF COCONUT CULTIVATION IN ROW PLANTING (2002)**  
**Approximately 40 Trees Per Acre**

**INITIAL YEAR**

1. Pitting Charges (40 x Rs.25)	1,000
2. Seedling Cost (40 x Rs.60)	2,400
3. Basal Manure with Cow Dung	800
4. Pit Closing with sand (40 x Rs.70)	2,800
5. Irrigation Infrastructure	4,000
6. Weeding	800
7. Manuring	400
8. Pest and Diseases	100

**TOTAL 12,300**

**II YEAR**

1. Water Management	1,000
2. Weeding	700
3. Pest and Diseases	300
4. Manuring	1,000

**TOTAL 3,000**

**III YEAR**

1. Water Management	1,000
2. Weeding	800
3. Pest and Diseases	300
4. Manuring	1,300

**TOTAL 3,400**

**IV YEAR**



1. Water Management	1,000
2. Weeding	600
3. Pest and Diseases	400
4. Manuring	1,300
5. Neem Cake and Green Manure	300
<b>TOTAL</b>	<b>3,600</b>

**V YEAR**

1. Water Management	1,000
2. Weeding	600
3. Pest and Diseases	400
4. Manuring	1,300
5. Neem Cake and Green Manure	300
6. Cow Dung	1,100
<b>TOTAL</b>	<b>4,700</b>

**SUMMARY**

1. Initial Year	12,300
2. Second Year	3,000
3. Third Year	3,400
4. Fourth Year	3,600
5. Fifth Year	4,700
<b>TOTAL</b>	<b>27,700</b>

Without Interest, total remuneration from coconut cultivation is Rs.27,000. After 5 years, the tree cost is approximately Rs.675.

## CULTIVATION COST ON COCONUT CROP IN ROW PLANTING (2002)

### (One Year)

1. Irrigation	1,000
2. Pest and Diseases management	400
3. Manuring	2,000
4. Green manuring and Neem Cake	600
5. Cow Dung	1,000
6. Overheads	200
7. Management Salary	600
8. Harvesting Charges	1,500
9. Watch	400
10. Weeding	600
<b>TOTAL</b>	<b>8,300</b>

Yield 5,680 nuts.

5,400 marketable nuts only (including 10% Second Quality)

Production Cost per nut in Rs. 1.65

## COST OF COCONUT CULTIVATION ( Approximately 80 trees / acre )

### INITIAL YEAR

1. Land Clearing	2,000
2. Land Ploughing	1,000
3. Construction of Bunds	1,000
4. Pitting (80 x Rs.25)	2,000
5. Seedling Cost (80 x Rs.60) DxT	4,800
6. Basil Manuring with Cod Dung (80 x ₹.20)	1,600
7. Pit Closing charges with sand (80 x ₹.70)	5,600
8. Irrigation Infrastructure	20,000
9. Irrigation One Year with labour	3,000
10. Weeding (4 times with ploughing)	1,400
11. Manuring	900
12. Management of Pest and Diseases	200
13. Watch	1,000
14. Fencing	20,000

15. Overheads	500
<b>TOTAL</b>	<b>65,000</b>

**II YEAR**

1. Land Ploughing	1,000
2. Irrigation with Labour	3,000
3. Watch	1,000
4. Weeding	1,000
5. Pest and Disease Management	600
6. Manuring with Labour	2,000
7. Overheads	400
<b>TOTAL</b>	<b>9,000</b>

**III YEAR**

1. Land Ploughing	1,000
2. Irrigation with Labour	3,000
3. Watch	1,000
4. Weeding	800
5. Pest and Disease Management	700
6. Manuring with Labour	2,600
7. Overheads	400
<b>TOTAL</b>	<b>9,500</b>

**IV YEAR**

1. Land Ploughing	1,000
2. Irrigation with Labour	3,000
3. Watch	1,000
4. Weeding	800
5. Pest and Disease Management	700
6. Manuring with Labour	2,600
7. Green Manuring with Neem Cake	500
8. Overheads	400
<b>TOTAL</b>	<b>10,000</b>

**V YEAR**

1. Land Ploughing	1,000
2. Irrigation with Labour	3,000
3. Watch	1,000
4. Weeding	800
5. Pest and Disease Management	700

6. Manuring with Labour	2,600
7. Green Manuring with Neem Cake	500
8. Cow Dung	2,000
9. Overheads	400
<b>TOTAL</b>	<b>12,000</b>

### SUMMARY

1. Initial Year	65,000
2. Second Year	9,000
3. Third Year	9,500
4. Fourth Year	10,000
5. Fifth Year	12,000
<b>TOTAL</b>	<b>1,05,500</b>

Without taking Salary, Land Cost and Interest into account total remuneration from coconut cultivation is Rs.1,05,500.

After 5 years, the tree cost is approximately Rs. 1,320.

### CULTIVATION COST OF COCONUT CROP (One Year)

1. Land Ploughing	1,000
2. Irrigation	3,000
3. Watch	1,000
4. Weeding	800
5. Pest and Diseases management	700
6. Manuring	4,000
7. Green Manuring	800
8. Neem Cake	500
9. Cow Dung	2,000
10. Management Salary	1,750
11. Overheads	400
12. Harvesting Charges(9 times)	3,000
<b>TOTAL</b>	<b>18,950</b>

Yield 10,000 nuts

9,500 marketable nuts only (including 10% second quality)

**Production Cost per nut is Rs.2.15**

**COST OF COCONUT CULTIVATION IN BORDER ROW PLANTING (2000)**  
**Approximately 40 Trees per acre**

**INITIAL YEAR:**

1. Pitting Charges (40 x Rs.25)	Rs.	1,000
2. Seedling Cost (40 x Rs.60)	Rs.	2,400
3. Basil Manure with Cowdung	Rs.	800
4. Pit Closing with sand	Rs.	2,800
5. Irrigation Infrastructure	Rs.	4,000
6. Weeding	Rs.	800
7. Manuring	Rs.	400
8. Pest and Diseases Management	Rs.	100

**Total Rs. 12,300**

**II YEAR:**

1. Water Management	Rs.	1,000
2. Weeding	Rs.	700
3. Pest and Diseases Management	Rs.	300
4. Manuring	Rs.	1,000

**Total Rs. 3,000**

**III YEAR:**

1. Water Management	Rs.	1,000
2. Weeding	Rs.	800
3. Pest and Diseases Management	Rs.	300
4. Manuring	Rs.	1,300

**Total Rs. 3,400**

**IV YEAR:**

1. Water Management	Rs.	1,000
2. Weeding	Rs.	600
3. Pest and Diseases Management	Rs.	400
4. Manuring	Rs.	1,300
5. Neem Cake and Green Manure	Rs.	300

**Total Rs. 3,600**

**V YEAR:**

1. Water Management	Rs.	1,000
2. Weeding	Rs.	600
3. Pest and Diseases Management	Rs.	400

4. Manuring	Rs. 1,300
5. Neem Cake and Green Manure	Rs. 300
6. Cow Dung	Rs. 1,100

**Total Rs. 4,700**

**SUMMARY:**

1. Ist Year	Rs. 12,300
2. IInd Year	Rs. 3,000
3. IIIrd Year	Rs. 3,400
4. IVth Year	Rs. 3,600
5. Vth Year	Rs. 4,700

**Total Rs. 27,000**

Without Interest, Total remuneration from coconut cultivation

**Rs. 27,000**

After 5th year the tree cost is approximately

**Rs. 675**

**CULTIVATION COST ON COCONUT CROP IN ROW PLANTING  
(ONE YEAR)**

1. Irrigation	Rs. 1,000
2. Pest and Diseases Management	Rs. 400
3. Manuring	Rs. 2,000
4. Green Manuring & Neem Cake	Rs. 600
5. Cow Dung	Rs. 1,000
6. Overheads	Rs. 200
7. Management Salary	Rs. 600
8. Watching	Rs. 400
9. Weeding	Rs. 600
10. Harvesting Charges	Rs. 1,500

**Total Rs. 8,300**

Total number of 5,680 nuts were harvested 5,400 marketable nuts only  
Of which 10%

**Second Quality, Production Cost per nut Rs. 1.65**

## JACK

### INTRODUCTION:-

“ Jack is a profitable fruit crop, growing in subtropical climatic conditions. It is grown in hill over 3000 ft, above MSL anetherefore the foot hill sea shores are more suitable. The land must a have soil depth of 10 mts. with pH between 1.5 to 6 and humidity between 40% and 60%. ”

### Seedling:

Usually grafted seedlings are prepared for planting. The selected seeds are grown in polythine bags till attain pencil thickness. Then the bags are kept near mother plant for approach grafting. After 3 months, it is separated and maintained in the nursery for another 3 months. The age of such greats is 1½ to 2 years.

**Available Varieties:** Released by:

**Palur 1**  
**Palur 2**

} TNAU, Palur.

**MuttamVariki**  
**Singapore**

} TNAU, Pechiparai

**Lalpagh Mathura**  
**Byrachandra**  
**Sampaticumles**

} Karnataka Govt. Nursery

**Thrichur**

} KAU., Mannuthy

**Kallar**  
**Kurtallam**  
**Patlamkadu**

} Tamil Nadu Govt. Nursery





The seedling are also available in good quality with private nursery farms. In a farm in Thirusur, quality seedlings grafts are available at a rate of Rs.100/- (2015). Hence farmers can get the seedlings from outside also.

### **Planting:**

The spacing shall be 24' x 25' or 20' x 30' in case of single crop and to get 600 sq.ft. space for each tree. The number of trees per acre will be around 72.

- The pit size of 3' x 3' x 3' must be dug during April and 15 kg of FYM, 200 gm. super phosphate, 50 gm. carbofuran, 25 gm lindane dust must be put in each pit.
- Purchased seedlings from nursery should be planted within 10 days.
- The seedling must be 1½' – 2' height.
- While planting, the rope in graft area should be removed.
- The graft point should be above the ground level, while planting.
- Each seedling should have the support of a stick.
- As the casualty rate is around 30%, the replacement must be done immediately.
- Watering through drip irrigation is more suitable and 12 lts of water/day is required.

### **Maintenance:**

- During 1st year 50 gm. of 17:17:17 complex fertilizer has to be given per tree once in 3 months.
- During 2<sup>nd</sup> year, 100 gm of the above complex has to be given once in 3 months. From 4<sup>th</sup> year onwards, recommended full dose of fertilizer has to be given in 2 split doses.
- Weeding has to be done as and when necessary.

- To control mealy bugs, Ekalux 1 ml per 1 lts. of water has to be sprayed. New shoots growing below the graft joint has to be removed then & there.
- To train the plant, during 1<sup>st</sup> year, shoots within one year has to be removed. During 2<sup>nd</sup> year shoots below 2 ft, and during 3<sup>rd</sup> year shoots below 4 ft and during 4<sup>th</sup> year shoots below 8 ft. have to be removed. This will improve the timber quality after 30 years. After removing these branches/shoots Bordeaux paste has to be applied.
- After 3 years the plants do not require much water. If no rain is received continuously for 2 months, water shall be given through drip at 200 lts per day or 1000 lts per week.
- After 5 years, 50 kg FYM along with 450 g. N., 150 g P. 450 gm K. shall be given in 2 split dozes during April, May and Oct./Nov., only for trees which are bearing fruits.
- Once a year ploughing is necessary and weeding has to be done along the basin.
- Twice a year 1% Bordeaux mixture has to be sprayed before start of monsoon and after the monsoon.
- After summer showers, flowers will appear in trees. Female inflorescence will appear in larger branches and trunks. Male inflorescence will appear in smaller branches. The ratio of male to female inflorescence will be around 400:1. Pollination will be taking place within 10 days. Hand pollination can also be done.
- Usually zinc deficiency appears in Jack. To mitigate this, ½ kg. Zinc Sulphate shall be given per tree once a year. Or, Zinc sulphate solution 3 gm/lr. of water shall be sprayed 10 lr per tree twice a year. i.e. during February and April. The solution must be neutralized with lime before spraying.

- Bordeaux paste shall be applied on the trunk upto 3' to prevent fungal disease.
- To control stem borer, cotton drenched with 20 ml. Monocrotophos must be put inside the hole and the hole must be closed and sealed with clay.
- The trunk should not be damaged to avoid infestation of stem borer.

### Harvest

Generally grafts will start giving yielding in three years and ordinary seedlings in 5 years. The fruits comes to harvest in 120 days to 150 days after flowering. The fruits must be fully grown before harvesting. To know about the status of the fruit, the milky substance oozing from the fruit will help. Fruits must be harvested before ripening on the tree to avoid damage during transportation.

The fruits will weigh from 7 kg. to 30 kg. Each tree will yield 15 to 25 fruits. The inner edible fruits will be 50% of the total weight of the fruit. The farmer will get Rs.100/- (2015) per fruit. The retailer will earn Rs.100/- to Rs.150/- from each fruit.

From jack fruit many value added items like, Jam, Jelly, Juice can be made. The seed is used for manufacturing starch. The skin of the fruit is used as fodder for cattle.



### CONCLUSION :-

“ Farmers usually grow Jack in the fence with a spacing of 16 to 18 feet, instead of growing as single crop. Farmers can get more profit if they themselves do the marketing by avoiding middleman and manufacture value added products. ”

## ACID LIME

### INTRODUCTION:-

“ Lime is being grown as inter-crop in Hill stations and as individual crop in Plains. It is one of the cash crops giving yield through out the year. It is widely grown in Southern parts of Tamil Nadu and also in lower Palani Hills, Kolli hills and Shevroys. It usually comes to bearing from 3<sup>rd</sup> year and will yield for 25 years. But the yield from 5<sup>th</sup> year to 20<sup>th</sup> year will be economical. ”

### Climate Conditions:

It requires nearly 1000 mm rain fall within as pan of 8 months. It does not tolerate drought for a period of 2 months between two flushing a year It usually withstands temperature from 10°C to 40°C. Temperature ranging 17°C to 36°C and with high diurnal variation between day and night would be more suitable for this crop. Humidity should not below 60%.

### Soil:

A good soil with 3 m. depth and proper drainage facility is suitable to grow lime. The pH range should be 6-6.5. Land that is below 1000 mtr. elevation from sea level is most suitable.



### Seedling Selection:

Generally planting materials are developed through budding and from seeds. One lime seed is capable of producing 1 to 3 seedlings as it is polyembryony. The seeds must be sown in nursery within 2 weeks. Old seeds will not germinate properly as the viability is lost quickly.

Seeds must be collected from selected fruits got from mother plant which yields more good quality fruits and regular in bearing shade the seeds must be dried. The seeds shall be sown in beds with 3 cm gap between rows and 1 cm gap between seeds. To protect the seeds from ants and insects, put Lindane dust over the bars and cover it with mulch.

When the seeds start to germinate in 15 days, remove the mulching over the beds. After 30 days, 1% bordeaux mixture has to be sprayed and seedlings must be shifted to 5" x 12" poly there bags. The soil in the bag must be rich in organic matter and without nematode infestation. The seedlings will grow healthier, if we mix Azospirillum, phosphobacteria and Pseudomonas fluorescence. The seedlings are ready for planting after 6 months, on achieving 1.5' height.

With regard to budded plants, as we cannot prepare it on our own, we have to buy it from nurseries. The rate per seedling prevailed as on 1-1-2003 is Rs.15/- to Rs.20/-. It is better to buy budded plants at the age of 1½ years. Before planting the seedlings, it should be kept in sun light for atleast 1 month and 1% Bordeaux mixture has to be sprayed.

### Planting:

There is no difference in spacing between ordinary seedling and grafted seedling. Depending upon the type of soil and farming practices, the spacing shall be 5 m. x 5 m. or 6 m. x 6 m. Pits with 1 m.

length x width x depth, filled with 25 kg. FYM, 500 gm. Superphosphate, 50 gm. Carbofuran and soil have to be kept ready. The seedling must be planted in ½ ft. depth. Water has to be given on daily basis with 10 litre, if it is through drip irrigation or 30 litres twice a week if it is through hose.

#### **Post Planting Techniques:**

The recommended NPK for Lime is 600 gm N 500 gm P and 700 gm.K. For younger plants, during 1st year, 1/3rd of recommended dose has to be given. The dose has to be split into 4 at the interval of once in 3 months. Along with NPK, ½ kg Neem cake and 10 kg FYM per plant per year and 20 gm. carbofuran twice in a year have to be given. Fertilizers have to be applied around the trunk without digging deeply as Lime trees will not develop deep arrow roots.

In grafted plants, new shoots developing below the grafted point has to be removed then and there. Also any new shoots developed, within 1 ft. during 1st year, 2 ft. during 2nd year and 2½ ft. during 3rd year have to be removed with knife. The scars during removing the new shoots should be covered with Bordeaux paste.

For grown up plants, 100 lts of water per day has to be given through drip irrigation. Drip irrigation is the most suitable method for Lime and yield will increase every year. To avoid evaporation loss mulching has to be done along the basin. Weeding has to be done once in 3 months.



Spraying micro nutrients 3 times a year will improve the yield. In 200 lit of water, 1 kg. Zinc sulphate, ½ kg. Lime, 2 kg. Urea, ½ kg. Munat Potash must be mixed, for an acre of grown plants 400 lit. of mixture would be required. (2) Zinc + Magnesium + Manganese + Boron + Iron.

### Controlling Insects and Fungus:

#### Insects:

To control insects/worms which eat tender leaves 2 ml of Ekalux or Monocrotophos per 1 lts of water can be sprayed.

Though the leaf miner is not damaging the plant to a larger extent, affected plants are more susceptible to leaf canker. To control this, 1 ml of Nuvan per 1 lit. of water shall be sprayed. Along with the above, mixing a solution of neem cake 10 kg./200 lit. soaked for water 24 hours, will give more effective result.

Root grubs affected plants will dry. To control this, 200 gm. carbofuran / plant has to be put 2 ft. away from the trunk. Also, the liquid with Monocrotophos 20 ml. in 10 lit. of water shall be poured along the side of the trunk. This has to be done continuously for 3 days. After that in 5 lit at 1% Water, Bordeaux mixture has to be poured in. Then ½ kg. ammonium sulphate has to be given to plants and irrigated copiously.

During long summer, mites are common. To control mites, 1 kg wettable sulphur per 200 lts of water has to be sprayed.

For stem borer, Monocrotophos has to be injected and the hole has to be closed with cotton and clay.

#### Disease:

- Citrus canker is the most common disease and it will spoil the texture and appearance of fruits. To control this, 3 gm of copper oxy chloride per litre of water has to be sprayed when new shoots come Streptocyclin 100 ppm way be sprayed.



- When humidity is more, to protect from fungus, fungicide Carbendazim 1 gm / 1 lt of water shall be sprayed.
- This will also protect the plants from die-back disease.
- Oozing gum from the trunk is a fungal disease. To control this, 1 kg copper sulphate and 1 kg lime have to be mixed in 10 lit. of water. The paste has to be applied throughout the trunk (3 ft.) after cleaning the trunk.
- Another important disease is dieback. This disease appears when the plant loses its vigour. Due to over bearing the indication is, the plant will yield extraordinarily high. To control this, the number of fruits has to be thinned or even remove the entire small fruits.
- After that the process of controlling fungal disease and nematode has to be followed. If the disease affects after 7 years of planting, integrated fungicidal treatment has to be given before and after rainy season. Otherwise all plants will die after 10 years.
- In Lemon, root zone is the most important and should not be damaged during any agricultural operation.

### Pruning:

The instrument must be sharp and must cut without any damage. Generally during first 3 years, new shoots coming within 2½ ft. Trunk and below the graft have to be removed.

During 3-5 years, the unhealthy shoots grown towards the centre stem have to be removed. This has to be done twice a year during that period.

After 5 years, dead shoots alone shall be removed and no need to remove water shoots.

When the thickness of shoots is more than the pencil thickness, Bordeaux paste has to be applied immediately. The cut shoots must be removed from the garden.

#### Harvest:

Generally we get yield throughout the year. But during April, May and September, October there will be good yield. During this season fruits can be harvested once in 5 days and during lean season once in 7 days.

- If the rate is high, fruits with green and yellow in the plants also can be harvested.
- If the rate is low, only fruits with full yellow color alone can be harvested. Green fruits should not be harvested.
- The thickness of the skin of the fruit depends upon the irrigation method.

#### Marketing:

- Grading is the important activity that every farmer must do immediately after harvest.
- Usually in 1st grade, 1000 fruits will weight 35-40 kgs will have the same weight of 35 kg.
- All damaged fruits must be separated.
- During rainy season the fruits must be thoroughly wiped off to remove water and dirt.

#### CONCLUSION :-

“ If the plants are maintained without fungal infection and weed, it is a good cash crop that gives the farmer regular income. Hence farmers can choose Acid Lime for single crop or multiple crop without any hesitation. ”

## CULTIVATING COST OF LIME IN ONE ACRE

\* Man power, Wages, as on date should be used.

## I. INFRASTRUCTURE COST (1997)

S.No	DETAILS	AMOUNT (in Rs.)
1	For Land Clearing	1000
2	Pitting Cost (180 x 20 Rs.)	3600
3	Cowdung 4 Tonnes	6000
4	Basil Manure and Carbofuron	2000
5	Infrastructure for Drip Irrigation	7500
6	Planting Material and Labour Charges	3900
	<b>TOTAL</b>	<b>24000</b>

## II. FIRST YEAR MAINTENANCE

S.No	DETAILS	AMOUNT (in Rs.)
1	Weeding Charges	3000
2	Fertilizers and Cowdung	1200
3	Pesticides	500
4	Irrigation and Maintenance	2100
5	Handling Charges	200
	<b>TOTAL</b>	<b>7000</b>

## III. SECOND YEAR MAINTENANCE

S.No	DETAILS	AMOUNT (in Rs.)
1	Weeding Charges	3000
2	Fertilizers and Cowdung	1200
3	Pesticides	1000
4	Irrigation and Maintenance	2400
5	Handling Charges	400
	<b>TOTAL</b>	<b>8000</b>

#### IV. THIRD YEAR MAINTENANCE

S.No	DETAILS	AMOUNT (in Rs.)
1	Weeding Charges	2500
2	Fertilizers and Cowdung	3000
3	Pesticides	2000
4	Irrigation and Maintenance	2500
5	Handling Charges	500
6	Harvesting Charges	500
	<b>TOTAL</b>	<b>11000</b>

#### TOTAL CAPITAL INVESTMENT

S.No	DETAILS	AMOUNT (in Rs.)
1	I. Infrastructure Cost	24000
2	II. First Year Maintenance	7000
3	III. Second Year Maintenance	8000
4	IV. Third Year Maintenance	11000
	<b>TOTAL</b>	<b>50000</b>

#### ONE YEAR MAINTENANCE COST

S.No	DETAILS	AMOUNT (in Rs.)
1	Weeding Charges	2500
2	Fertilizers and Cowdung	3000
3	Pesticides	2000
4	Irrigation and Maintenance	2500
5	Handling Charges	500
6	Harvesting Charges	4500
	<b>TOTAL</b>	<b>15000</b>

**SUMMARY OF INCOME AND EXPENDITURE (MINIMUM)**

S.No	DETAILS	Amt. (in Rs.)	Amt. (in Rs.)
1	Income from 150 bags x 250 Rs. (ave)		37500
2	Maintenance Cost	15000	
3	Commission	3750	
4	Transport Charges	2250	
5	Miscellaneous Expenses	1000	
<b>TOTAL</b>		<b>22500</b>	<b>37500</b>
<b>PROFIT AT THE END OF FOURTH YEAR Rs. 15,500/-</b>			

**SUMMARY OF INCOME AND EXPENDITURE (MAXIMUM)**

S.No	DETAILS	Amt. (in Rs.)	Amt. (in Rs.)
1	Income from 150 bags x 500 Rs. (ave)		75000
	50 bags x 250 Rs. (Second Grade)		12500
	40 bags x 100 Rs. (Third Grade)		4000
	10 bags x 50 Rs. (Defective Quality)		500
2	Maintenance Cost	15000	
3	Commission	9200	
4	Transport Charges	3800	
5	Miscellaneous Expenses	2000	
<b>TOTAL</b>		<b>30000</b>	<b>92000</b>
<b>PROFIT AT THE END OF FOURTH YEAR Rs. 15,500/- Year-2002</b>			



## BUTTER BEANS IN LOWER PALANI HILLS

### INTRODUCTION:-

“ During the year 2000 to 2004, because of scanty rainfall, horticultural crops got less attention, and also because of various difficulties faced by the farmers in maintaining the traditional horticultural crops like Banana, Orange and Pine Apple they were forced to go for an alternate vegetable crop viz Butter Beans.

Already cultivation of Bush beans is in practice due to identical cropping period of April to June, farmers usually get good rate. Hence, butter beans is a best alternative crop which has no rate fluctuation and always gives good return.

Butter Beans is being cultivated in Munnar, Kerala and Upper Palani Hills at an altitude of 4500 MSL to 6000 MSL. This was introduced by British.”

### 1) Soil & Weather:

Land with good water source and less than 10° slope and soil with good organic matter and pH not more than 6 is most suitable for this crop. The rainfall must be 1500 mm to 2000 mm. The climatic condition must be 30° C in day and 16° C in night. The relative humidity ranging from 50% to 60% is suitable.

In land with more than 10° to 35° slope, the land must be leveled. Land with more than 35° slope is not suitable for this crop.

### 2) Seed:

There are four types of cultivars viz White, Brown, Yellow and Spotted. The White variety seeds are small in size but with good aroma. Yellow and Brown varieties are bold seeded with less aroma. A variety called Kodaikanal 1 – a selection with white seeds was released by Kodaikanal Horticulture Research Station. But the seeds are not available now.

The seed requirement is 15 kg to 20 kg / acre. The seeds must be shade, dried to below 6% moisture and must be kept treated with fungicide and pesticide.

### 3) Sowing:

Butter Beans shall be sown all round the year except during December and January. In Lower Palni Hills, sowing is taken up before North East monsoon.

The land must be prepared and 5 tonnes of farm yard manure/acre must be put before forming bunds, along with Super Phosphate 100 kg, Urea 50 k,g. Muriate of Potash 50 kg, and micro-nutrients 50 kg.

The Bunds must be 9" to 12" height 12" width. The distance between these broad beds must be 3' to 3½'. The seeds must be sown on both the sides of bunds with ½' between seeds at one inch depth. The beds should be irrigated on the day or again on 3<sup>rd</sup> day. The seeds will germinate on 6<sup>th</sup> day. In case of failure, on 9<sup>th</sup> day resowing seeds must be done for gap filling.

### 4) After cultivation Measures :

- The germinated seeds will start climbing on 15<sup>th</sup> day onwards. Hence on 7<sup>th</sup> day, support sticks measuring 50 mm thickness and 8' height @ one stick per 4 to 6 plants must be planted. In between - Weeding must be done on 15<sup>th</sup>, 30<sup>th</sup> and 45<sup>th</sup> day.
- The plants must be trained on 20<sup>th</sup>, 25<sup>th</sup> & 35<sup>th</sup> day to climb to the pandal.
- The plants must be irrigated if there is no rain consecutively for 10 days.
- On 15<sup>th</sup> day, 17:17:17 complex fertilizer 100 kg./acre along with 50 kg. urea must be given as top dressing.
- The crop duration will be from 90 days to 130 days depending to the season. The flowering starts from 35th day of sowing.



- Foliar Spray of 2 kg urea, 1 kg Di-ammonium phosphate and ½ kg. Sulphate of potash in 200 ltr of water on 30th day and 45th day will improve the vigour of the plant.
- The flowers will be eaten by sparrows. To avoid this suitable measures to get rid of sparrows must be taken.
- When the bean matures, rat menace must be controlled.

#### 6) Pests and Diseases:

- Before sowing, 50 kg Lindane dust must be sprinkled in the soil to kill worms and pests.
- To control leaf miner, 2 ml oil/litre or 1 ml. Rogor shall be sprayed.
- To control leaf worm on 15<sup>th</sup> day, 3 ml. of chloriphyriphos or 2 ml Quinalphos/litre shall be sprayed.
- To control fungal disease 2.5g. / litre Dithane M45 or Z78 shall be sprayed.
- To control fruit borer on 45<sup>th</sup> day 2 ml. Mono- crotophos shall be sprayed.
- To control white fly, 1 gm. Acephate & 25 ml. neem oil and 0.5 ml. / 1ml water adhesives shall be sprayed..
- On 30th day Dithane M.45 @ 2.5 gm/litre shall be sprayed to avoid fungal disease
- On 45th day flowering will be high. During that time if the climate is cloudy, fungal disease viz Angular leaf spot will attack. This will affect both leaf and fruit. To control this bavistin 1 gm. or tilt 1 m. or Ridomil 1 gm./litre of water shall be sprayed @ 600 litre per acre.
- To control leafrust 5 g./litre wettable sulphur shall be sprayed.
- During rainy season, when the temperature is 22° C in day and 90% humidity, a fungal called clerodonia rot, will affect the

plant, and fruit. Within 2 to 3 days heavy damage will occur. To control this Bavistin 1 gm./litre and Dithane M.45 2.5 gm/litre shall be sprayed @ 400 litre per acre.



- Frequent usage of fungicide when the fruits are maturing, will lead to leaf shedding. This will lead to 50% crop loss.
- Mosaic virus disease will affect the leaves. To control this Rogor 1 ml./litre shall be sprayed.

### 7) Harvesting:

After flowering on 35<sup>th</sup> day, the fruits will be ready to harvest on 45<sup>th</sup> day. The harvested fruits shall be packed in jute bag during summer and with well ventilated bag during rainy season. During summer, the jute bags must be dipped in water before packing. The harvested fruit must reach the consumer before next day. The harvesting shall be once in 5 days during summer and 8 days during other season. The yield will be around 3000 kg - 6000 kg per acre according to this method of cultivation.

### CONCLUSION :-

“ Butter Beans is the best crop for small and marginal farmers. Usually white beans get better rate in the market. However, the plants of a yellow and brown beans variety are more vigorous and disease resistant than white beans.

This crop shall be grown in maximum of 25 cents to avoid difficulties in cultivation practices. As the crop is more susceptible to fungal diseases, the profit per acre is entirely depending upon the control of fungal diseases.”

## MY OBSERVATIONS ON MANGO FLOWERING

### INTRODUCTION:-

“Mango is an evergreen tree and the fruit is most desired by many people among the TRIPLET fruits (Mukkani). It is a seasonal fruit. If it is multiplied by grafting method, it will start flowering from the next year onwards.”

#### 1.1. Particulars:

Mango starts flowering from November to January. Generally here the number of days taken from flowering to fruit is 150 days. Though mango makes a good flowering and yield from 5th year onwards, only from the 10th year it gives economic yield. From 15<sup>th</sup> year to 35<sup>th</sup> year the yield performance will be consistent.



#### 1.2. Reasons for Flowering:

In the mango there exists a concept that the tree flowers at its discretion. But at the same time one cannot say by visualizing alone that this tree will flower and yield a lot this year. There are a few reasons associated with mango flowering.

These differences are due to the following reasons:

- (i) The Carbohydrate reserve in the tree should be high and carbon-nitrogen ratio has to be balanced.
- (ii) The land should be ploughed in the month of August and October. This will enhance the water holding capacity of the soil.
- (iii) Every tree must receive 100 Kg of Cow dung or 5 tones per acre per year.

- (iv) The recommended manure must be given in two split doses once during March-April and the other during August-September.
- (v) The young flush when at its maximum must be protected from Pest, atleast twice in a year. During protection nutrient tonic should be added with the spray.
- (vi) The stem must be protected from fungal growth.
- (vii) Dead woods and dried spikes, water shoot sucker should be removed.
- (viii) If there exists gap between trees, after harvesting in the month of May, June, Green manure to be sown. In August the land ploughed will enrich the soil.
- (ix) 90% to 95% mature mango fruits should be harvested. Harvesting at the stage of 60% maturation and over ripening need to be avoided.
- (x) Small growers have to plant either early bearing variety or late bearing variety. In Orchard, early, middle, choice and late varieties have to be established.

The planter has to complete all the above recommendations before 15th of November every year, so that he can enable the tree to have good flowering. At the same time. It also require a favourable weather condition.

Diurnal temp variation is an essential one. The day temperature has to be double that of the night temperature. Also there must be a quick variation in early morning temperature particularly from 6.00 to 8.00 a.m.

The atmosphere air humidity level has to be less than 50%. Also rain during the months of December and January is not desirable.

If there is a diurnal variation continuously for more than 15 days, the reproductive phase advances the vegetative phase. After the reproductive phase the vegetative phase succeeds. Since the better effect of diurnal variation is realized by the tree on its East, West and Southwest direction, there is an effective flowering in these sides of the tree.

If the day temperature goes beyond 35°C the length of the flower spikes gets shorter, since the tree has to protect its bisexual flowers. In the colloquial language this flower is called as "Koulusu".

If the farmer fulfills all the above requirement and also if there is a favourable climatic condition, with a good integration of these two factors, mango will be a profitable cash crop every year.

If there is any deviation in climatic conditions, the farmer can manipulate to induce maximum percentage of flowering by the following measures.

If the farmer could predict the unfavourable climatic conditions atleast two months before, he can apply Paclobutrazol in prescribed quantity, which will ensure definite flowering of the tree. But this should not be applied every year.

If unfavourable temperature is predicted 15 days ahead farmer should plough the land, dig the drip circle and dry the area around the tree. Also he has to increase the temperature surrounding the tree. By spraying Sulphur the tree temperature can be enhanced. The quick initiation of the flower can be attained by spraying nitrogen at the level of 2 to 5%.

If unfavourable climatic condition is predicted one month before, pruning should be done to remove unwanted branches to change the C.N. ratio and channelize the nutrition to the reproductive phase thereby helping the initiation of flower buds.

**All these decisions have to be taken by the farmer alone because :**

- (I) Under favourable climatic conditions, when the mango tree is in good condition, though the flower bud and the vegetative bud are ready for initiation, flower bud comes first. For completing its span flower buds normally takes 40 days. If it rains immediately flowering the flowers get washed away.
- (ii) Based on the condition of the tree, quantity of the flower has to be decided by the farmer.
- (iii) If the farmer could forecast the forthcoming year as an “on-year”, no special efforts towards flowering should be taken. Because if there are more number of fruits than its normal potential level the quality will reduce and also the price will be lower.
- (iv) If the prediction is “off-year”, the farmer should take high risk and manipulate the plants to flower.
- (v) Attempts towards off-seasonal flowering should not be made.

**Information's Required:**

- (i) In a branch though three to four vegetative buds are seen, only two buds turn to be good growing.
- (ii) Most of the flower spikes are at the tip of the branch?.
- (iii) Rare flowering on the branch sides and the stem, trunk also.
- (iv) Percentage of bi-sexual flower.
- (v) Drizzling or rain is in no way good at the time of flowering, Why?
- (vi) Though the tree produces a good yield, due to some reasons, because of the existence of old bearing stick, no flowering is seen.
- (vii) A tree looking bushy gives fewer yields than the tree with this broad and scattered.

- (viii) Though the tree has enough carbohydrate reserve, it does not channelize it to the branches which are lacking it. This may be a reason for unpredicted flowering.
- (ix) For profuse flowering how many leaves a branch should have?
- (x) Is there any relationship between the flowers in a branch and the number of leaves in the same branch
- (xi) If so, then what is the age of the leaf in that branch?
- (xii) Generally, what is the life span of a mango leaf?
- (xiii) With the favourable conditions for reproductive phase, a tree yields for years consecutively still its reserve gets exhausted. On exhaustion it ends its life. It does not go back to vegetative phase. Why?
- (xiv) Under favourable conditions trees can flower in the presence of water even during months of December.



### CONCLUSION :-

“ A proper integration between the cultural practices and the natural weather conditions will fetch fruitful results. But if the barriers in way of flowering are removed, there is a better opportunity for good results during every year. Triggering the gene which stimulated flowering, preserving carbohydrate at all seasons, dedicated efforts by the scientists to make the the genes dominate in flowering, thereby creating a break-through in this field, making changes with dwarf plants and choice variety, will all prove that mango tree is the one which will flower and bear fruit consistently in all the years. ”



## CHOW CHOW IN LOWER PLALANI HILLS

### INTRODUCTION:-

“ Chow Chow is a traditional crop belonging to the pumpkin family that originated from Mexico of Central America and West Indies. In Tamil Nadu this is cultivated in hill areas as ten months crop. Chow chow which is also called as Bangalore Brinjal, Seemai Suraikai and Merakai, has no separate seeds for its reproduction. Only fully matured and sprouted chow chow is used as planting material. The immature younger vegetables are used in cooking. This vegetable crop yields good profit for very small and small farmers in Lower Palani Hills. ”

### Temperature:

This crop grows well under medium sunlight and from 3,000 to 4,500 feet height from the mean sea level. Its growth will be good in the temperature from 16° Celsius to 30° Celsius. It can tolerate temperature varying from 10° - 35° Celsius or less than 10° Celsius. It also requires 50% humidity and day and night temperature variation for its growth. Annual rainfall required by the crop is 1500 mm. This rainfall must be made available to the crop throughout the year except in the month of January.

### Soil Fertility:

The soil with the p<sup>H</sup> level of 6.5 to 7.5 with good drainage facility and with sufficient soil moisture is suitable for the chow chow crop. This crop grows well and gives good yield in the soil where humus content is more. In heavy rainy season there should be a good drainage facility so that the water does not stagnate on the land. If the crop is cultivated in the land where the land has a slope more than 30°, it is important to ensure bench terrace.

**Varieties:**

With regard to this vegetable, there are two varieties namely one with green colour and the other with white colour. There are also other types with more thorns on the body, less thorns on the body and no thorns on the body. Generally the vegetable the characteristics like greenish colour, no thorn on the body, with and a fruit weight from 300 to 350 grms, fetches good price in the market and for this reason this type of well matured vegetable is used as seed.

**Land Preparation and Planting:**

Pits with 2 feet length and berth and 1½ feet depth should be made depending upon the soil fertility and water availability. Generally it should be made with inter-gap of 8 x 6 feet to 12 x 16 feet and in the irrigated condition land the inter-gap between the pits may be from 8 x 12 feet to 16 x 16 feet. The pits should be closed with a good mixture of 10 to 12 kilograms of enriched farm yard manure, 200 grams of Urea, 200 g of DAP, 500 grams of Potash, ½ kg. of neem cake and 20 to 40 grams of carbofuran. Then well mature and cropped up chow chow should be planted in the land. The number of such seeds required is 1500 under rainfed condition, 1200 in irrigated condition land and 1000 in intensive cultivation. Based upon the pit, 2 to 5 chow chow fruits can be planted and while planting the edge of the chow chow should look upwards. Though April, May July and August months are suitable for plantation, generally planting is done during the months of November and December. When the chow chow comes out of harvest in the month of April, the price for the vegetable will be high.

**After Cultivation:**

Pits should be irrigated on the day of planting, three days from planting and until the vine comes out satisfactorily in such a

Nature of Land Maintenance	Gap Interval in Feet	Number of Pits in One Acre	No. of Chow Chow planted in One Pit	Quantity of Cow Dung placed in the Pit	Quantity of Carbofuredon placed in the Pit.
Rainfed	8 x 8	680	2	7 kg.	10 gms
Rainfed	8 x 10	544	3	9 kg.	15 gms
Rainfed					
Irrigated Condition	8 x 12	453	3	11 kg.	20 gms
Irrigated Condition	8 x 14	388	3	13 kg.	25 gms
Irrigated Condition	8 x 16	340	4	15 kg.	30 gms
Intensive	12 x 16	222	4	20 kg.	40 gms
Intensive	16 x 16	170	5	25 kg.	50 gms



way that the moisture of the soil is maintained. When the climber starts growing depending on the quantum of rain, water should be supplied to the plant once in 7 to 10 days. When the climber becomes a well developed seedling and starts growing, plant pillar at a distance of 8 x 8 feet and at 6½ feet height. Then twine the 12 G metal wire in a group of two on the fencing pillars and one metal wire at a distance of 8 x 8 feet in between. 16 G Zinc coated wire should be twinned in between the above squares one at a distance of 1 feet. This climbers can be taken above to the pandhal using small sticks or rope.

The weeds growing up in the pit and in between the pits should be removed then and there. In case of rain fed crop, each pit needs to be top dressed and mixed well in the soil with 100 gm. of urea, 100 gm. of super phosphate, 75 gm of potash in the 3<sup>rd</sup>, 5<sup>th</sup> and 7<sup>th</sup> month of planting.

Under irrigated condition or intensive cultivation one acre needs to be top dressed with 120 kg of nitrogen, 60 kg of phosphorous, 120 kg of potash in 5 equal parts and approved front the 3<sup>rd</sup> to 7<sup>th</sup> month. When the chow chow gets ready for harvesting from the climber, old leaves have to be removed. When the harvesting is over, the climbers can be cut at 2 feet height from the ground level and allowed for return, and this can be done three times. Under rainfed condition if a planter is going for ratoon, the recommended nitrogen, phosphorous and potash i.e. 100 gm. of urea, 100 gm. of super phosphate, 50 gm. of potash has to be provided in the 3<sup>rd</sup> and 5<sup>th</sup> month.

From the 5th month of planting, the climber starts giving a crop and for the succeeding 5 months it gives good yield. A farmer can get good yield by renewing the climber every time since the

yielding capacity of the climber reduces in case of ratoon due to viral infection. In order to encourage the growth of climbers, 2 kg of urea, 1 kg of di-ammonium phosphate, 500 gm potash can be mixed in 200 liters of water and sprayed on the climber to realise good and vigorous growth of the climber. When the climber starts flowering, to avoid the falling down of female flowers, 45 ml. of NAA. (planofix) has to be mixed in 200 liters of water to get 10 ppm and this should be done within 21 days.

When the flowers starts appearing on the climber, Ethrel 250 ppm (2.5 ml. Ethrel in 10 liters of water) for one hectare 50 ml. interval to be mixed in 200 lit of water and sprayed twice at 15 days interval to enhance the female flowers productions.

#### **Crop Protection:**

In order to contain the insects like aphids, hoppers, leaf curl, worms that attack the chow chow climbers, Monocrotophos or Metheyl dematon has to be mixed with water in the ratio of 1 ml. chemical in one litre of water and sprayed using hand sprayers. To control the attack of fruit flies, the fruits attacked by such flies are to be removed from the climbers immediately. Also take polythene bag of 5" breadth and 8" height and make 6 holes with a diameter of 3 mm. at a height of 3". 20 gms. of dried fish shaped as a sphere is to be placed on one corner of the bag and in the other corner cotton dipped in 5 ml. of Nuvon chemical has to be placed and this bag should be hung below the pandhal at a height of 1.5 feet from the pandhal using a thread. It must be ensured that the number of such bags in a acre is atleast 20, and these bags should be changed once in 15 days.

Also insects can be attracted and destroyed using sex attraction. A quantity of 600 ml. of Malathion or 300 ml of fenthian or in 250 liters of water has to be sprayed thrice with a gap of 15 days in between. Chemical is to be sprayed atleast four days before

harvesting. If yellow dots appear on the bottom side of the leaf, 5 gms of copper oxy chloride has be sprayed in one liter of water. To protect the climbers from virus, systemic chemical has to be sprayed once in every 21 days to control the disease spreading hoppers.

### Harvesting:

The crop will be ready for harvest in 5<sup>th</sup> months time and gives good yield for 5 months continuously. Harvesting must be done once in 7 days and before the chow chow fruit fully mature. It must be sent to the market as a bag containing 100 chow chows weighting 30 to 35 kg. Care should be taken that these bags reach the user with in 24 hours from the time of harvesting. On an average, under of rain fed cultivation, 30 tonnes or 1000 bags and under irrigated condition 40 tonnes or 1200 bags while in intensive cultivation more than this yield can be obtained. To realise profit all though the year a farmer can divide his land into 3 parts and plant chow chow seedlings at an interval of 4 months as staggered planting.

### Inference:

Big farmers cannot earn the profit as earned by very small and small farmers. If a farmer cultivates to a maximum of 2 to 3 acres, due to practical reasons the profit reduces. By going for inter-crop cultivation during initial time, a farmer can get more profit. In a period of 5 years, planting this crop six times under the same panthal, a farmer can get more profit. Then there is a need to change the place. Since the price of chow chow is low in the month of February, cultivation has to be carried out in a manner that no chow chow becomes ready for harvest during that month.



## COST OF CULTIVATION OF CHOW CHOW IN ONE ACRE IN FIRST 10 MONTHS (2002)

### I. INFRASTRUCTURE COST

\* Man power, Wages, as on date should be used.

S.No	DETAILS	Amt. (in Rs.)
1	For Land Clearing - Male 4 x 60 = 240 - Female 20 x 35 = 700	940
2	Zinc Coated Wire - 12 Gauge - 200 Kg x Rs.24 = 4800 - 16 Gauge - 350 Kg x Rs.27 = 9450	14250
3	Wire Transport Cost Lorry	200
4	Wooden Post 680 Nos. x Rs.10	6800
5	Labour Charge for Wire Netting Per Anthar Rs. 700 x 11	7700
6	Wire for Thorn Fencing and Nail 3400	
7	Labour for Thorn Fencing	600
<b>TOTAL</b>		<b>33790</b>

### II. PLANTING COST

S.No	DETAILS	Amt. (in Rs.)
1	Cow Dung (including Lorry Transportation and Pony) for 4 Tonnes	6000
2	Pitting Charges (Spacing 16 x 12, for 225 pits x Rs.3)	675
3	Basil Manure and Carbo-Furedon	1000
4	Seed Materials 1000 x Rs.1.25	1250
5	Planting Labour	825
6	Maintenance and Irrigation for total life span	6000
7	Stacks 1000 x Rs.0.75	750
8	Refreshment Expenses	400
9	Plastic Tying Materials and Jute	50
<b>TOTAL</b>		<b>16950</b>



### III. MAINTENANCE COST

S.No	DETAILS	Amt. (in Rs.)
1	Weeding Charges Female Labourers 30 x Rs.35	1050
2	Fertilizer Cost Including Labour	3200
3	Pesticide Cost Including Labour	2200
4	Removing Dead Leaves Before Harvest 20 x Rs.35	700
	<b>TOTAL</b>	<b>7150</b>

### IV. HARVESTING COST

S.No	DETAILS	Amt. (in Rs.)
1	Harvesting Charges (25 Harvest x 4 + 1)	5000
2	Removing Dead Leaves 50 x Rs.35	1750
	<b>TOTAL</b>	<b>6750</b>

### V. MARKETING COST

S.No	DETAILS	Amt. (in Rs.)
1	Commission @ 10 %	9350
2	Transport – Lorry	11000
3	Handling Charges, Unloading Charges and Jute Bags	1500
	<b>TOTAL</b>	<b>21850</b>

### SUMMARY OF INCOME AND EXPENDITURE

S.No	DETAILS	Amt. (in Rs.)	Amt. (in Rs.)
1	Income from 40 Tonnes of Chow Chow (Approximately 1100 Bags x Rs.85 on an average)		93500
2	I. Infrastructure Cost	33790	
3	II. Planting Cost	16950	
4	III. Maintenance Cost	7150	
5	IV. Harvesting Cost	6750	
6	V. Marketing Cost	21850	
	<b>TOTAL</b>	<b>86490</b>	<b>93500</b>

**FIRST 10 MONTHS PROFIT Rs. 7,010/-**

### I. INFRASTRUCTURE COST

S.No	DETAILS	Amt. (in Rs.)
1	For Land Clearing - Male 4 x 60 = 240 Female 20 x 35 = 700	940
2	Maintenance Cost for Panthal, Post and Fencing Male 20 x Rs.50	1000
	<b>TOTAL</b>	<b>1840</b>

### II. PLANTING COST

S.No	DETAILS	Amt. (in Rs.)
1	Cow Dung (including Lorry Transportation and Pony) for 4 Tonnes	6000
2	Pitting Charges (Spacing 16 x 12, for 225 pits x Rs.3)	675
3	Basil Manure and Carbo-Furedon	1000
4	Own Seed Materials	----
5	Planting Labour	825
6	Maintenance and Irrigation	6000
7	Stacks 1000 x Rs.0.75	750
8	Refreshment Expenses	400
9	Plastic Tying Materials and Jute	50
	<b>TOTAL</b>	<b>15700</b>

### III. MAINTENANCE COST

S.No	DETAILS	Amt. (in Rs.)
1	Weeding Charges Female Labourers 30 x Rs.35	1050
2	Fertilizer Cost Including Labour	3200
3	Pesticide Cost Including Labour	2200
4	Removing Dead Leaves Before Harvest 20 x Rs.35	700
	<b>TOTAL</b>	<b>7150</b>

#### IV. HARVESTING COST

S.No	DETAILS	Amt. (in Rs.)
1	Harvesting Charges (25 Harvest x 4 + 1)	5000
2	Removing Dead Leaves 50 x Rs.35	1750
	<b>TOTAL</b>	<b>6750</b>

#### V. MARKETING COST

S.No	DETAILS	Amt. (in Rs.)
1	Commission @ 10 %	9350
2	Transport – Lorry	11000
3	Handling Charges, Unloading Charges and Jute Bags	1500
	<b>TOTAL</b>	<b>21850</b>

#### SUMMARY OF INCOME AND EXPENDITURE

S.No	DETAILS	Amt. (in Rs.)	Amt. (in Rs.)
1	Income from 40 Tonnes of Chow Chow (Approximately 1100 Bags x Rs.85 on an avg.)		93500
2	I. Infrastructure Cost	1840	
3	II. Planting Cost	15700	
4	III. Maintenance Cost	7150	
5	IV. Harvesting Cost	6750	
6	V. Marketing Cost	21850	
	<b>TOTAL</b>	<b>53290</b>	<b>93500</b>

EVERY SUBSEQUENT 10 MONTHS PROFIT Rupees 30210 / acre.



**DO YOU KNOW THE PLANT – FILL IT:**  
**(Fruit Crop)**

**Common Name:** \_\_\_\_\_

1. Local Name : \_\_\_\_\_
2. English Name : \_\_\_\_\_
3. Botanical Name : \_\_\_\_\_
4. Family : \_\_\_\_\_
5. Chromosome Number : \_\_\_\_\_
6. Type of Plant : \_\_\_\_\_
7. Propagation : \_\_\_\_\_
8. Life Span : \_\_\_\_\_
9. Type of Pollination : \_\_\_\_\_
10. Type of Soil & PH Required : \_\_\_\_\_
11. Indication Plant : \_\_\_\_\_
12. Tolerant Temperature : \_\_\_\_\_
13. Optimum Temperature : \_\_\_\_\_
14. Yearly Rainfall : \_\_\_\_\_
15. Required No. of Labour per year : \_\_\_\_\_
16. Required Investment per year : \_\_\_\_\_
17. System of Planting : \_\_\_\_\_
18. Spacing : \_\_\_\_\_
19. Water Requirement : \_\_\_\_\_
20. Input Requirement : \_\_\_\_\_
21. Method of using any Farm Machinery : \_\_\_\_\_
22. Leaf Life Span : \_\_\_\_\_
23. Special Operation : \_\_\_\_\_
24. Crop Duration from Planting : \_\_\_\_\_
25. Favorable condition for Flowering : \_\_\_\_\_

26. Flowering to Fruiting Days : \_\_\_\_\_
27. Leaf Phyllochron : \_\_\_\_\_
28. Maturity Index / Harvesting : \_\_\_\_\_
29. Method of Harvesting : \_\_\_\_\_
30. Potential Yield : \_\_\_\_\_
31. Average Yield Kg. per Ha. : \_\_\_\_\_
32. Packing Method of : \_\_\_\_\_
33. Keeping Quality : \_\_\_\_\_
34. Value added Products : \_\_\_\_\_
35. Crop Based Industries : \_\_\_\_\_
36. World Production : \_\_\_\_\_
37. Indian Production : \_\_\_\_\_
38. Area under the Crop in India (Ha.) : \_\_\_\_\_
39. Marketing : \_\_\_\_\_
40. Profit per Ha. : \_\_\_\_\_
41. National Research Station : \_\_\_\_\_
42. Which Countries consuming more : \_\_\_\_\_
43. Reference Book : \_\_\_\_\_
44. Latest Information : \_\_\_\_\_
45. In Govt. Support ? : \_\_\_\_\_
46. Constraints in Production : \_\_\_\_\_
47. Either to suggest for any information : \_\_\_\_\_
48. What is your opinion? : \_\_\_\_\_
49. Conclusion : \_\_\_\_\_
50. Cost of Production : \_\_\_\_\_

**Name of the Practitioner-**

**Place :**

**Designation-**

**Date :**

## EDUCATIONAL TOUR REPORT

- I
1. Name of the Station/Farm ..
  2. Location (Full Address) ..

3. Name of the nearest Town ..
4. How many k.m. from this town ..

- II
1. Who is in-charge of the Station ? ..
  2. On what basis was the station started? ..
  3. When was the station started? ..
  4. What are the Departments available? ..

- III
1. Area of the Station ..
  2. Yearly Rainfall ..
  3. Number of Rainy Days ..
  4. What is the type of Soil and  $p^H$  ..
  5. What is the Minimum & Maximum Temp.? ..
  6. What is the average relative humidity? ..
  7. What is the elevation from mean sea level? ..
  8. In which direction is the land facing? ..

- IV
1. Which is the main crop of the station? ..
  2. What other crops are there in addition? ..
  3. What were the researches on the crop? ..
  4. What type of irrigation done? ..
  5. Are you make a photo of the are? ..
  6. Is there any Farm Machinery is being used? ..

**V**

1. Previous research on the main crop ..
2. Are there any useful books available about the station? did you buy it? ..
3. Copy of the Research: a) Leaflet ..  
b) Booklet ..  
(Any Language – English is preferable)
4. What are the new material available now? ..  
(Seeds and Seedlings)
5. If it is possible, please attach a copy of the head's visiting card ..
6. Finally thank the Professor, Head or in-charge ..

**VI**

1. What is your opinion about the Station? ..
2. What will you say about this for the Farmer? ..

**VII**

1. Nearest sight seeing place ..
2. Where did you stay on that day? ..
3. To whom you should express your gratitude? ..

**Name of the Student / Farmer:**

**Place:**

**Date:**

**Signature**

**Verified and Found Correct:**

**Name :**

**Designation :**

**Date :**

**Verifier Signature**



## Postface



*This book on my field level practical knowledge and observation, different experimental results, and experiences in different horticultural crops, provides practical approach to improve the efficiency of horticulture and agriculture crops.*

*The book is planned to enable easy understanding for the upcoming youngsters in agriculture, Under graduate Students Agriculture and Horticulture as well as farmers to execute their practical farming. I hope this book would receive warm reception by the students and farming community. I would very much appreciate suggestions from readers so that shortcomings, if any, can be corrected in future editions.*

*I am sure that this publication would be helpful to everyone, who are involved and dedicated to Agriculture. I have undergone Bachelors in Farm technology offered TNAU. I found it very much useful for updating my technical knowledge in farm science. In future editions i will try and bring hi- tech farming technologies and mechanization in horticultural crops which will be useful for profitable Agri - business. The soft copy of this book can be downloaded from my website for your reference. Thanks.*

### **R. Pavalarajan,**

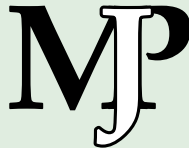
Planter,  
6-1/76 Main Road,  
Pattiveeranpatti - 624 211,  
Dindigul District,  
Tamil Nadu.

Ph : 04543 - 267345  
Cell : 09442 267345  
e-mail: pavalarajan@gmail.com  
Web Site: www.pavalarajan.com  
www.pavalarajan.in





**R. Pavalarajan,**  
Planter,  
6-1/76 Main Road,  
Pattiveeranpatti - 624 211,  
Dindigul District, Tamil Nadu.



Ph : 04543 - 267345  
Cell : 09442 267345  
e-mail: [pavalarajan@gmail.com](mailto:pavalarajan@gmail.com)  
Web Site: [www.pavalarajan.com](http://www.pavalarajan.com)  
[www.pavalarajan.in](http://www.pavalarajan.in)