

CASHEW CULTIVATION

Science & Techniques



Dr. M. Abdul Salam
Dr. N. Mohanakumaran &
Mr. P.P. Balasubramanian



DIRECTORATE OF CASHEW & COCOA DEVELOPMENT
Govt. of India, Ministry of Agriculture, Cochin - 682 016

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FOREWORD

Cashew is one of the most important commercial crops of our country that helps to earn considerable amount of foreign exchange through export of its kernels. During 1996-97, the earning through export of cashew kernels was Rs.1283 crores.

Cashew production in India is sufficient to meet only less than half of its requirement. Therefore, it is essential to enhance the productivity and production of this crop. Popularization of high yielding varieties and technologies among the farmers would enable to enhance cashew production in the country. Publications explaining the production technologies of this crop are of immense value in this regard.

I am sure "*Cashew Cultivation - Science & Techniques*" would be a very valuable reference material to the farmers, the extension workers and the cashew planters, to boost cashew production in the country.

I congratulate the authors for bringing out this valuable publication.

Mr. P.P. Balasubramanian

Director, Directorate of Cashew & Cocoa Development
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P R E F A C E

Cashew industry provides employment to over three lakh persons through over 1000 cashew factories in the Country. The estimated demand of raw nuts at present is 10 lakh tonnes. The present internal production is only 4.30 lakh tonnes. India imported cashew nuts valued at Rs. 641 crores during 1995-96. To minimize the drain of foreign exchange through import of raw nuts and to sustain the cashew industry, it is essential to enhance the production of cashew in the Country.

High yielding varieties and improved technologies capable of boosting cashew production are available. These should reach the farmers in a comprehensive manner. The "*Cashew Cultivation - Science & Techniques*" describes the farming practices to be carried out for cashew for every month.

The different cultural, manurial and plant protection operations that are to be carried out are presented in a simple manner with the help of diagrams / photographs so that the technologies can be easily understood by the farmers. It is hoped that this publication will serve as a useful reference material for the farmers, extension workers and planters.

Scientific information generated by cashew researchers have been liberally used which the authors gratefully acknowledge. The authors are also grateful to the Director, Directorate of Cashew & Cocoa Development, Government of India, Ministry of Agriculture, Cochin, for publishing this book.

M. Abdul Salam
N. Mohanakumaran
P.P. Balasubramanian

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Cashew (*Anacardium occidentale* L.)

General information about cashew

Common name	Cashew
Scientific name	Anacardium occidentale L.
Family	Anacardiaceae
Origin	Brazil
Bearing behaviour	Flowers and fruits once an year
Major cashew growing countries	India, Brazil, Australia, Benin, Costa Rica, El Salvador, Guatemala, Honduras, Indonesia, Ivory Coast, Kenya, Madagascar, Malaysia, Mozambique, Nigeria, Panama, Philippines, Sri Lanka, Tanzania, Thailand, Togo, Venezuela, Vietnam.
Major cashew growing states in India	: Kerala, Karnataka, Andhra Pradesh, Tamil Nadu, Goa, Maharashtra, Orissa and West Bengal
Area in India (97 - 98)	7.00 lakh ha
Production in India (97 - 98)	3.60 lakh tonnes
Average productivity in India (97 - 98)	740 kg/ha
State with highest production (97 - 98)	Kerala (Production 1,00,000 and productivity 850 kg/ha)
State with highest productivity	Maharashtra (1500 kg/ha)
Export earning during (98 - 99)	Rs. 1,630 crores



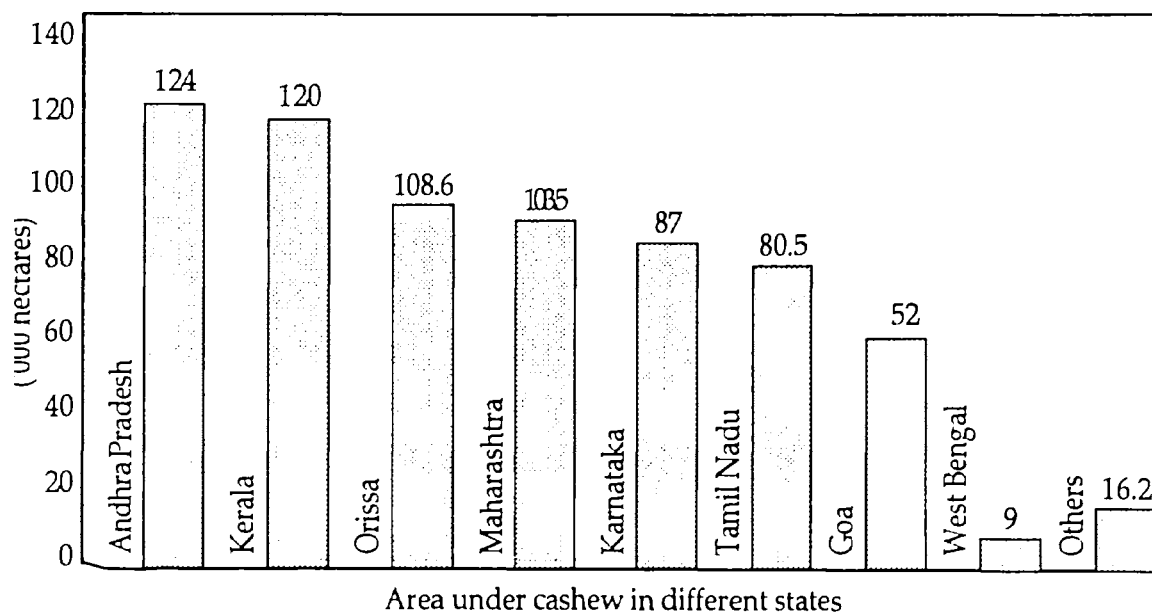
Major cashew growing states of India

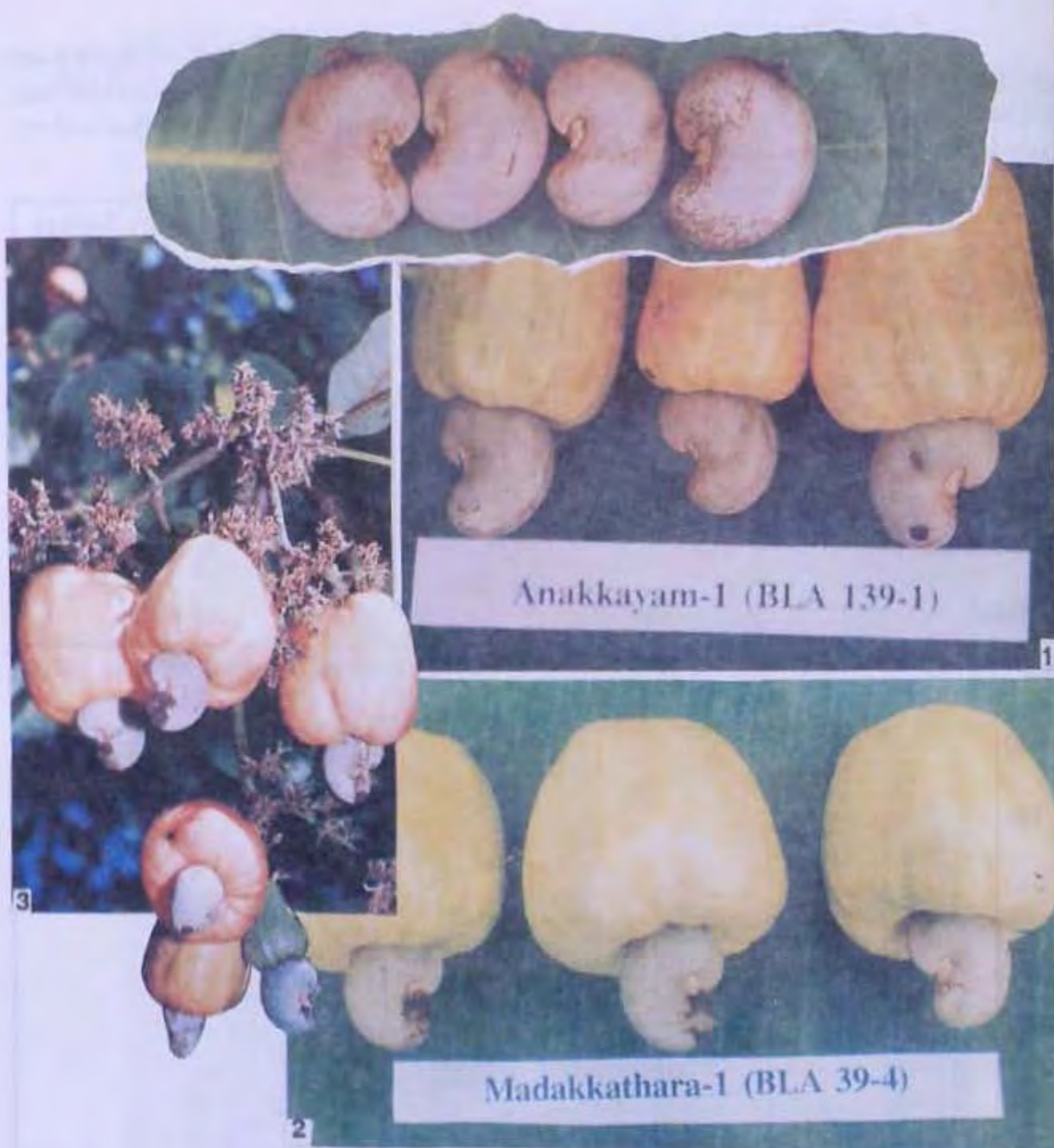
Area, production and productivity of cashew in India (97-98)

The area, production and productivity of cashew in different states of the country are given below. Andhra Pradesh ranks first in area (1,21,000 ha.) followed by Kerala (1,19,000 ha.) and then Orissa. Kerala ranks first in production (1,34,000 tonnes). The productivity of cashew is the highest in Maharashtra (1570 kg/ha).

State	Area ('000 ha)	Production ('000 t)	Productivity (kg/ha)
Kerala	120	100	850
Karnataka	87	35	460
Andhra Pradesh	124	50	690
Tamil Nadu	80.5	30	390
Goa	52	25	530
Maharashtra	103.5	60	1500
Orissa	108.6	45	750
West Bengal	9	6	860
Other states	16.2	9	610
Total	700	360	740

Source : Directorate of cashew & Cocoa Development, Govt. of India, Ministry of Agriculture, Cochin - 682016





High yielding varieties of cashew
1. Anakkayam - 1 2. Madakkathara - 1 3. Madakkathara - 2

TECHNOLOGIES FOR CASHEW CULTIVATION

The technologies recommended for cashew cultivation are given below.

High yielding varieties

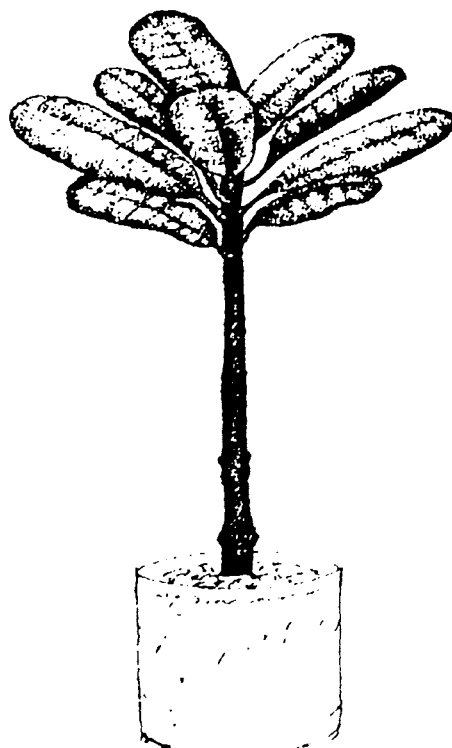
Successful cashew cultivation depends on the selection of the best varieties suited for the agro-climatic condition and adoption of the right package of practices recommended for the region. Several high yielding varieties have been released for cultivation, for different states. The varieties recommended for different states along with their yield potential are given in a table on the next page.

Soil

Cashew can be grown in almost all types of soils from sandy to laterite (upto an elevation of 600-700 m) including waste lands of low fertility. It grows and yields best in well drained red sandy loams and light coastal sands. Heavy clay soils, poor drainage conditions, very low temperature and frost are unsuitable. Sites prone to water logging and excessive alkalinity and salinity may be avoided.

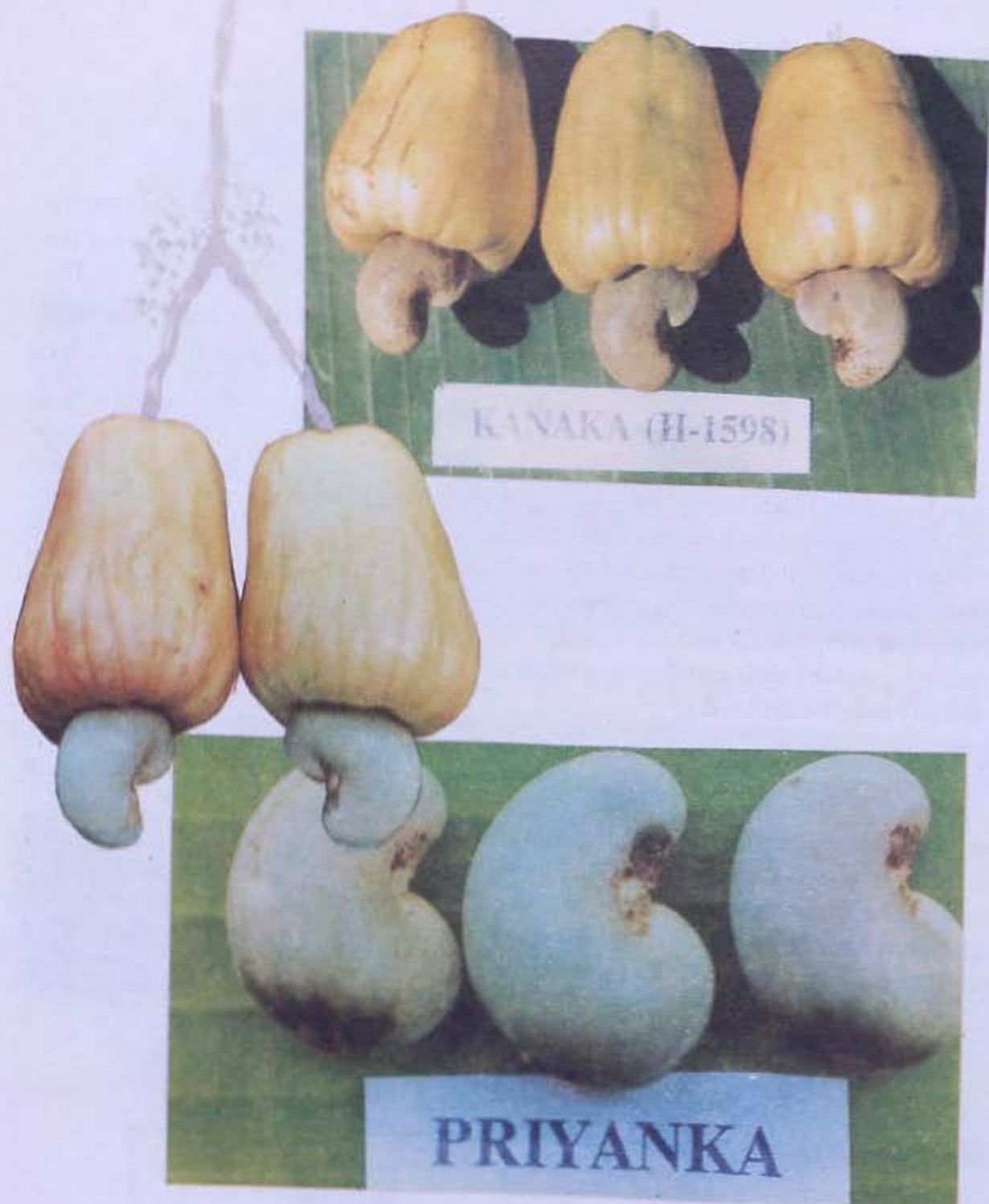
Planting material

Selection of planting material is most important in cashew culture. Soft wood grafts are the best planting material. Since cashew is a cross pollinated crop, vegetative propagation is recommended to produce planting materials true to the mother.



Cashew graft

Soft wood graft is the ideal planting material in cashew cultivation



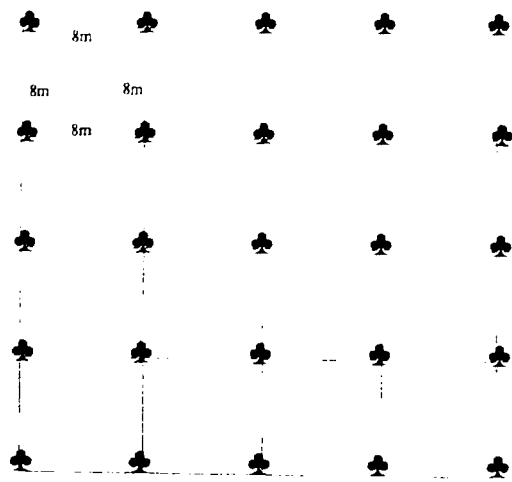
High yielding varieties of cashew

1. Kanaka

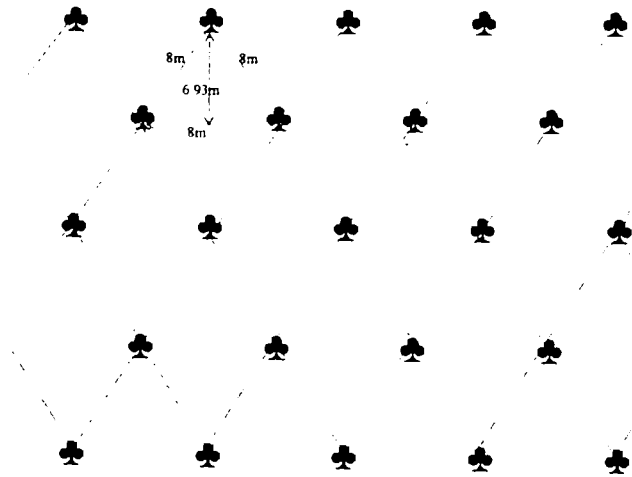
2. Priyanka

**High yielding cashew varieties (along with their yield potential)
recommended for various states**

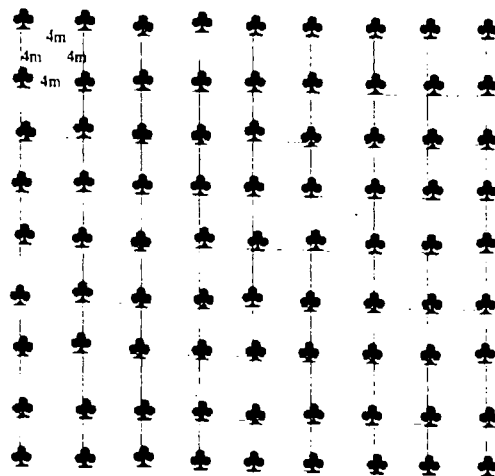
State	Variety	Hybrid	Yield potential
Kerala	Anakkayam-1 (BLA-139-1)		12.1
	Madakkathara-1 (BLA-39-4)		13.0
	Madakkathara-2 (NDR 2-1)		17.0
	Kanaka (H-1598)	(BLA 139-1 x H 3-13)	12.8
	Dhana (H-1608)	(ALGD 1-1 x K 30-1)	10.7
	Priyanka (H-1591)	BLA 139-1 x K 30-1)	16.9
	Dharasree (H-3-17)	(T 30 x Brazil 18)	18.6
	Sulabha (K-10-2)		21.9
	Amrutha (H.1597)	(BLA 139-1 x H3-13)	18.3
	Anaga (H8-1)	T20 x K 30-1)	13.7
	Akshaya (H7-6)	(H 4-7 x K 30-1)	11.8
	Vridhachalam-3 (M 26/2)		10.0
Tamil Nadu	Vridhachalam-1 (M 10/4)		7.1
	Vridhachalam-2 (M 44/3)		8.1
	Vridhachalam-3 (M 26/2)		14.2
Andhra Pradesh	BPP - 1 (H2/11)		17.0
	BPP -2 (H2/12)		19.0
	BPP -3		16.0
	BPP -4		13.0
	BPP -8 (Hybrid-2/16)		21.5
Karnataka	Ullal -1 (8/46)		19.0
	Ullal - 2 (3/67)		18.0
	Ullal - 3		15.0
	Chinthamani-1 (B/46)		7.2
	NRCC Selection - 1		10.0
	NRCC Selection - 2		9.0
Orissa	BHB - 1 (WBDC-v)		16.0
	BPP - 8 (Hybrid 2/16)		8.0
West Bengal	Jhargram - 1		10.0
Maharashtra	Vengurla - 1 (Ansur-1)		23.0
	Vengurla - 2		24.0
	Vengurla - 3	(Ansore-1 x Vetore-56)	14.0
	Vengurla - 4	(Midnapore Red x Vetore-56)	14.0
	Vengurla - 5	(Ansur early x Mysore)	21.0
	Vengurla - 6	(Vetore-56 x Ansur-1)	16.0
	Vengurla - 7	(Vengurla 3 x M 10/4)	18.5
	Vengurla - 8	(Vengurla 4 x M 10/4)	16.4



Square system of planting (8m X 8m)



Triangular system of planting (8m X 8m)



High density planting (4m X 4m)

Spacing

Normal spacing recommended for cashew is 7.5 m x 7.5 m for poor soils to 10 m x 10 m for rich and deep soils and sandy coastal areas. On lands with steep slope, the rows may be spaced 10-15 m apart with a spacing of 6-8 m between the trees in a row.

Systems of planting

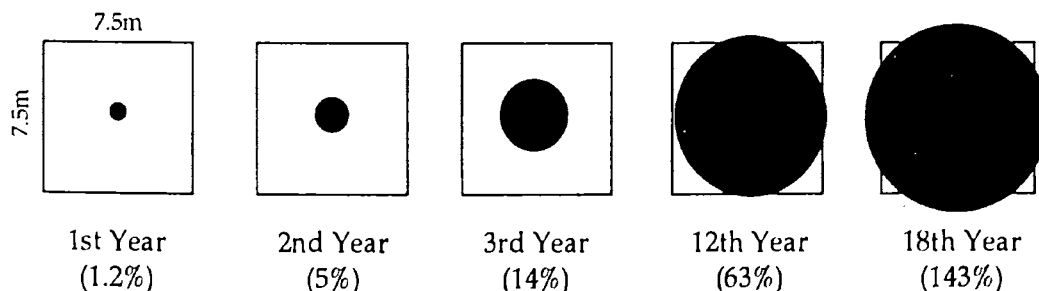
Mainly, two systems of planting are in vogue in cashew, the square system and the triangular system.

Square system : In this system of planting, the inter row and intra row spacing will be the same such that the plants occupy the corners of imaginary squares.

Triangular system : In this system of planting, the inter row and intra row spacing will be adjusted such that the plants occupy the corners of the imaginary equilateral triangles.

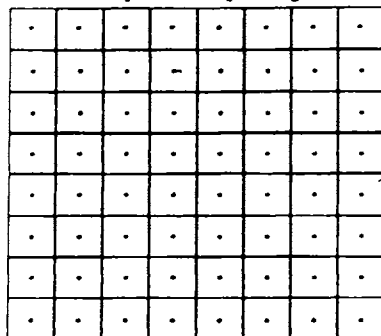
The spacing and plant population in these two systems of planting are as follows :

Spacing	Plant population/ha	
	Square system	Triangular system
10 m x 10 m	100	116
8 m x 8 m	156	180
7.5 m x 7.5 m	177	204



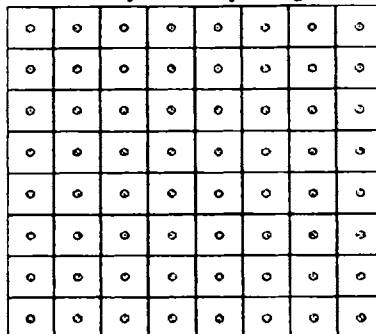
Land area covered by cashew to land area provided per plant (as %) in relation to age of tree

1-2 years after planting



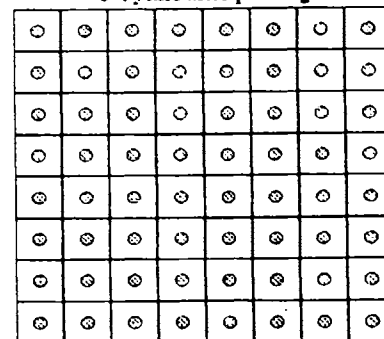
Spacing = 4 m x 4 m
Plants/ha = 625

2-3 years after planting



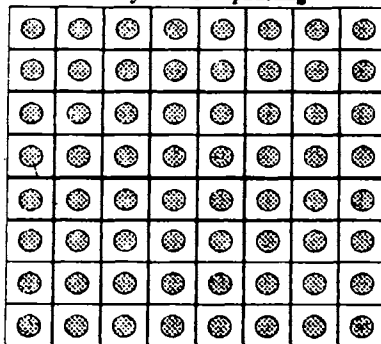
Spacing = 4 m x 4 m
Plants/ha = 625

3-4 years after planting



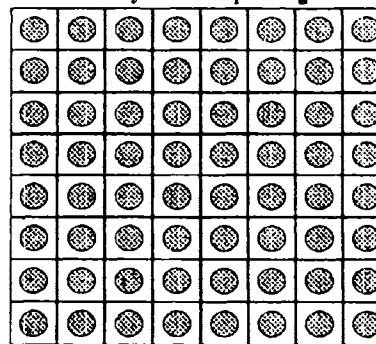
Spacing = 4 m x 4 m
Plants/ha = 625

4-6 years after planting



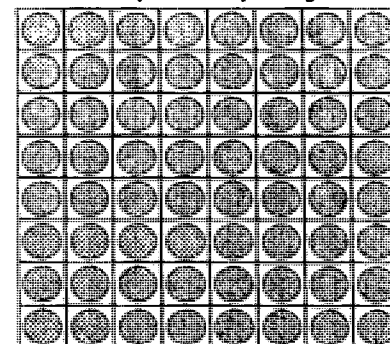
Spacing = 4 m x 4 m
Plants/ha = 625

5-7 years after planting



Spacing = 4 m x 4 m
Plants/ha = 625

6-9 years after planting



Spacing = 4 m x 4 m
Plants/ha = 625

High density planting (4m X 4m) - Canopy development pattern over years

High density planting

High density planting is recommended for enhancing the production of cashew. This technique involves planting more number of grafts per unit area initially and thinning them out at later stages. In high density planting, grafts may be planted at a spacing of 4 m x 4 m or 5 m x 5 m or 8 m x 4 m. While adopting planting at a spacing of 4 m x 4 m in square system of planting, there will be 625 plants per hectare. This population can be retained for a period of seven to nine or ten years depending upon the canopy expansion rate. If the soil is very rich, the canopy development rate will be faster. High density planting technique would be more useful in poor soils where the rate of canopy expansion is slow. Considering the fertility status of the soil, the level of management in terms of fertilization, irrigation etc., the initial plant population is to be decided carefully for every agro-climatic region. Later, after monitoring the canopy pressure between adjacent plants, the alternate plants are to be removed. Finally, when the plants attain full growth, the spacing between the plants will be optimum.

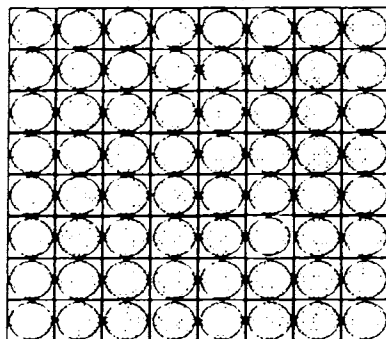
If uniform management practices are adopted, during early years of yield the per tree nut yield will be more or less the same with all the trees, both in the normal density planting and in the high density planting. But the per hectare yield will be more from high density plantations (due to higher plant population) compared to the normal density plantations. During later years when the plant population is equalized to that of normal density plantation, the productivity of both the plantations would be more or less the same. The bonus yield obtained during the early years would be substantial in high density plantations. In addition to higher yields, substantial quantities of firewood can be obtained during thinning which may fetch additional revenue to the farmer. The weed growth in the interspace can also be checked to a greater extent.

Critical Management Practices

For the success in High density planting, the following management practices should not be missed.

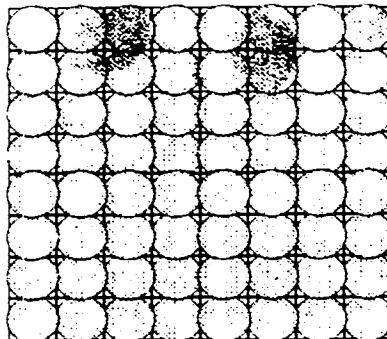
- ☞ The planting material should be grafts
- ☞ Plant grafts (4 to 6 months old) of varieties suited to the region.
- ☞ Adopt the pit method of planting (pit size not less than 60cm X 60cm X 60cm)
- ☞ Transport grafts carefully to minimise transporting shock
- ☞ Plant grafts at the onset of monsoon.
- ☞ Polythene tape around the graft union must be removed before planting.

7-10 years after planting



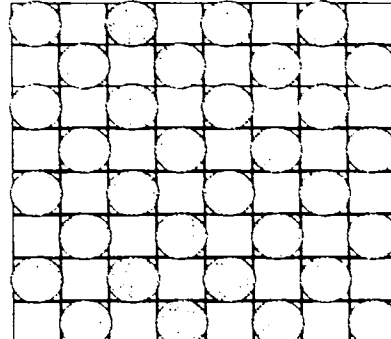
Spacing = 4 m x 4 m
Plants/ha = 625

8-11 years after planting (before thinning)



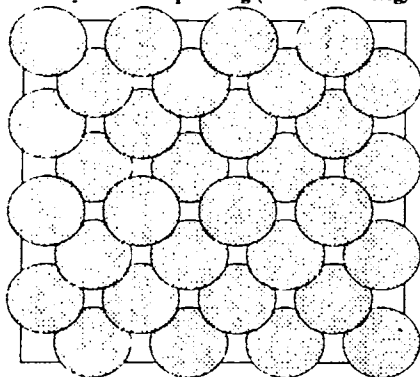
Spacing = 4 m x 4 m
Plants/ha = 625

8-11 years after planting (after thinning)



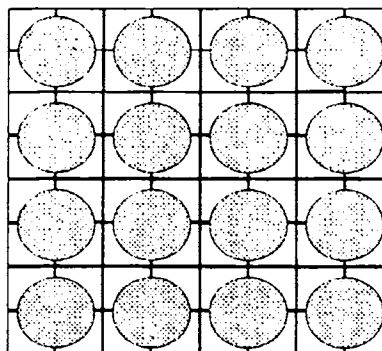
Spacing = 8 m x 4 m
Plants/ha = 312

10-12 years after planting (before thinning)



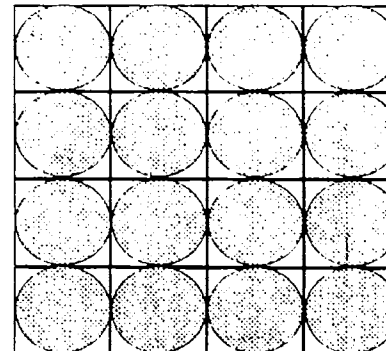
Spacing = 8 m x 4 m
Plants/ha = 312

10-12 years after planting (after thinning)



Spacing = 8 m x 8 m
Plants/ha = 156

12-15 years after planting



Spacing = 8 m x 8 m
Plants/ha = 156

High density planting (4m X 4m) - Canopy development and thinning pattern over years

- ☞ Staking and mulching of young plants are necessary.
- ☞ Apply recommended fertilizers and manures on a per tree basis.
- ☞ Irrigation during the initial years may be necessary for better establishment.
- ☞ Ensure gap filling in time (not later than second year).
- ☞ Remove branches emerging from the root stock.
- ☞ Train and prune the plants to get a one metre straight stem at the bottom.
- ☞ Adopt recommended plant protection measures in time.
- ☞ Thinning of alternate plants should be done before severe competition sets in.

Season of planting

Under rain fed conditions, plant soft wood grafts during June-July or September-October, coinciding with the monsoons. If irrigation is assured, planting can be taken up at any time during the year.

Method of planting

Planting is done in pits. Dig pits of 60 cm cube. Fill the pits with top soil and organic manure (minimum 10 kg / pit) to 3/4 of the pit capacity. The grafts are planted after carefully removing the polythene bag. Care should be taken while planting to see that the graft union is 2.5 cm above the ground level. The polythene tape surrounding the graft union is to be carefully cut and removed. Staking should be done immediately after planting to protect the grafts from wind damage.

Post-planting care

Immediately after planting, the basins of the plants are to be mulched with organic materials. From the first year onwards, cashew requires regular weeding, pest and diseases control, manuring and irrigation.

Weed control

Depending upon the type of weeds and intensity of weed growth, weeding is to be done during June-July and / or August-September, either chemically or manually or mechanically.



Method of fertilizer application



Root distribution pattern

Application of Paraquat @ 0.4 kg ai. /ha thrice at monthly intervals starting from July will effectively control all types of weeds. Commercial formulation of paraquat (2.0 l of 20% strength) may be required per hectare. Mix paraquat @ 4-5 ml per litre of water. 400 - 500 litres of water may be required per hectare.

Application of Glyphosate once @ 0.8 kg ai. /ha (2 litres of 40% commercial formulation) during July or August, can effectively check all types of weeds. Mix Glyphosate @ 4-5 ml per litre of water and 400 - 500 litres of water may be required per hectare.

Manuring

A fertilizer dose of 750 g N, 325 g P₂O₅ and 750 g K₂O is recommended for cashew in the state of Kerala. Apply 1/3 portion of the recommended dose during the first year, 2/3rd portion of the recommended dose during second year and full dose from the third year onwards.

The quantity of nutrient and fertilizers recommended by the Kerala Agricultural University, for cashew trees of varying age.

Nutrient	1 Year		2 Year		3 Year on wards	
	g/tree	Fert g/tree	g/tree	Fert g/tree	g/tree	Fert g/tree
N	250	543*	500	1087*	750	1630*
P ₂ O ₅	108	675**	217	1350**	325	2025**
K ₂ O	250	417***	500	833***	750	1250***

*Urea : 46% N

** Super Phosphate : 16% P₂O₅

*** Muriate of Potash : 60% K₂O

When to apply fertilizers ?

Apply the fertilizers, either as a single dose during September-October (North-East monsoon season) or in two splits, 50 percent during June-July (South-West monsoon season) and 50 percent during September- October.

How to apply fertilizers ?

Adult trees : Broadcast the fertilizers over the entire tree basin (15 cm deep) within a radial distance of 2 to 3 metres within the canopy spread, leaving half a metre from the tree trunk and incorporate by light raking.



1. Tea mosquito 2. Tea mosquito damage on growing region 3. Tea mosquito damaged tree

Young trees : Broadcast the fertilisers over the entire tree basin (10 cm deep) with in a radial distance of 1 to 1.5 metre (depending on age) within the canopy spread and incorporate by light raking.

Weed the plantations before fertilizer application. Soil should be moist at the time of application. Choose dry spells between rains to minimise run off . Injury to roots should be minimum during application.

Fertilizer (N, P₂O₅, K₂O) recommendation for different states (g/tree/year)

States	N	P ₂ O ₅	K ₂ O
Kerala	750	325	750
Tamil nadu	500	200	300
Andhra Pradesh	500	125	125
Orissa	500	250	250
Maharashtra	1000	250	250
Karnataka	500	250	250

Plant protection

Timely plant protection operations are extremely important to minimise yield loss.

Major pests of cashew

Tea mosquito, stem borer, thrips, leaf miner and leaf blossom webber are the important pests of cashew. Of these, the first two are the major pests and their damage results heavy loss.

Tea mosquito

It is the most notorious pest of cashew. Tea mosquito attacks the tree every season during flushing, flowering and fruit set. Since it is a recurring pest, regular control measures are necessary to protect the crop.

How to control tea mosquito ?

A spray schedule involving three sprays are recommended to control this pest.

First spray	October-November (at the emergence of the new flushes)
Second spray	December-January (at the commencement of flowering)
Third spray	January-February (at complete flowering /fruit initiation)



Spraying pesticides against Tea mosquito

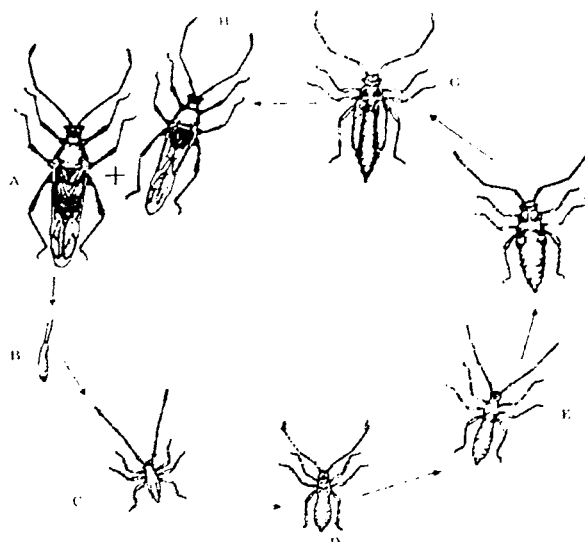
One of the following insecticides may be used for the above sprays in a rotational manner

Quinalphos	(25% EC)	-	0.05 %
Endosulfan	(35% EC)	-	0.05 %
Carbaryl	(50% WP)	-	0.01 %
Phosphamidon	(85% WSC)	-	0.03 %

Quantity of insecticides and water required per tree to prepare spray solution for controlling tea mosquito

Insecticides	Tree age - 8-10 yrs		Tree age - more than 10yrs	
	Qty of insecticide	Water (litre)	Qty of insecticide	Water (litre)
Thiodan 35% EC (Endosulfan)	8 ml	5	16 ml	10
Sevin 50% WP (Carbaryl)	15 g	5	30 g	10
Sevin 85% WP (Carbaryl)	8 g	5	16 g	10
Ekalux 25% EC (Quinolphos)	10 ml	5	20 ml	10
Dimecron 86% EC (Phosphamidon)	3 ml	5	6 ml	10

The maximum number of sprays per year should not exceed three. Follow a need based spraying strategy. The time of spray must coincide with flushing, flowering and early fruiting, depending on the severity of infestation. The same insecticide should not be used for the subsequent sprays. A rotation of insecticides would be desirable. Use rocker sprayer with high - tree lance to spray big trees. Power sprayers can also be used effectively to spray insecticides.



Life cycle of tea mosquito. (A) Female bug (B) Egg (C) 1st instar nymph (D) 2nd instar nymph (E) 3rd instar nymph (F) 4th instar nymph (G) 5th instar nymph (H) Male bug. The tea mosquito bug takes 15 to 20 days to complete its life cycle.



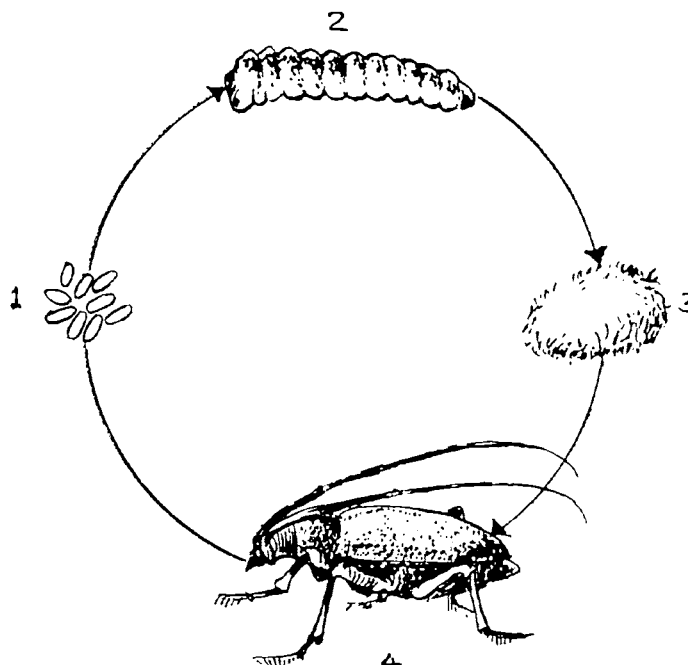
1. Stem borer - adult beetle

2. Stem borer - larvae

3. Tree killed by stem borer

Stem borer

Stem borer is another major pest of cashew. It is a beetle and the larvae of it tunnel into the tree trunk and supporting roots. The female beetles lay eggs on the crevices of the bark, at the collar region of the tree trunk. The egg hatches and larva tunnels into the trunk and destroys the bundle sheath. Food and water translocation is affected and tree gradually dies. Early stages of attack is seen from the chewed wood observed at the base of the tree.



Life cycle of cashew stem and root borer 1. Egg 2.Larva 3.Pupa 4. Adult
(Incubation period of eggs : 4 to 6 days, Larvae phase : 6 to 3 months, Pupal phase : 2 months)
Stem borer takes 7-9 months to complete its life cycle.

Control of stem borer

Extract mechanically by chiselling out the damaged area of the tree and swab that portion with 0.2% Carbaryl (Sevin) solution (Dissolve 4 g of Sevin 50% WP in 1 litre of water) or pour the solution at the tree base. **OR**

Swab 5% neem oil (50 ml of neem oil + 1000 ml of water + half ml of teepol or 5 g of soap) on the tree trunk upto a height of 1 m during April - May and Oct - Nov. This can keep the stem borer away for three months. **OR**

Apply 75 g Sevidol 4 G per tree, in the soil at the tree base and incorporate.

Remove or destroy dead and decaying plant parts to ensure plantation sanitation.



Intercropping with pineapple

Diseases

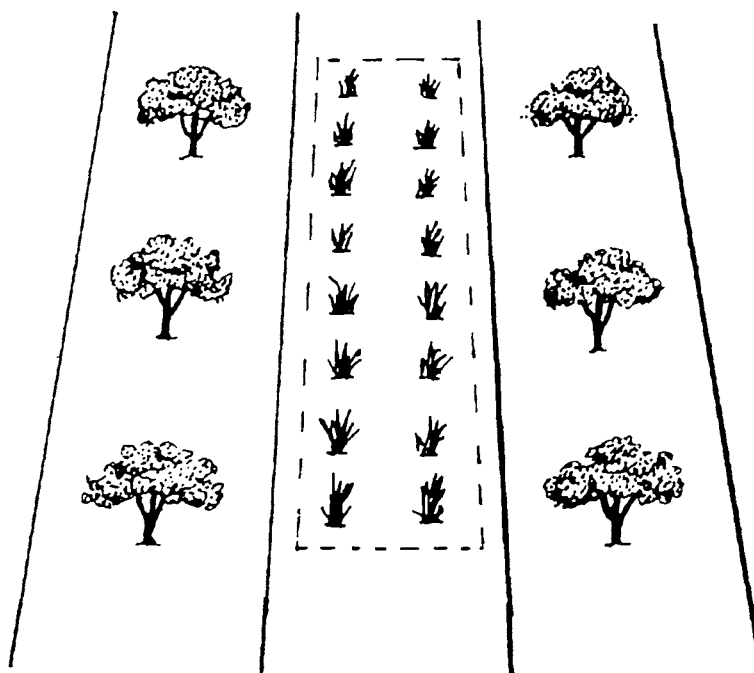
Leaf spot is the common disease observed mainly in the nursery plants. Spray Bordeaux Mixture (1%) if the attack is severe. For the preparation of Bordeaux mixture see page 56

Harvesting

The fruits will be ready for harvest about two months after fertilisation of flowers. The ripened fruits will fall down which can be collected manually. The nuts can be extracted from the apple, dried in sun for about two days and stored temporarily till marketing.

Intercropping

Pineapple is the most profitable intercrop in cashew plantations during early stages. Tapioca, ground nut, pulses etc. can also be raised successfully during the initial three to four years. Care should be taken to see that both the crops (cashew and inter crops) are adequately manured.



Method of planting pineapple in the cashew plantation
Pineapple suckers are planted in trenches taken in between rows of cashew trees

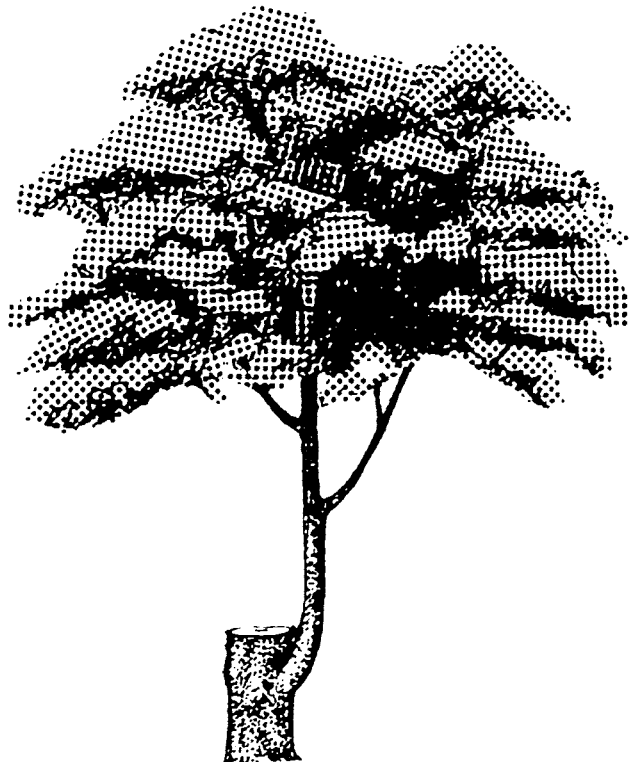


Tree developed by top working

TOP WORKING

Top working is a technique evolved to rejuvenate the unproductive and senile cashew trees. Poor yielding trees of 5-20 years of age can be successfully rejuvenated by top working. The unproductive trees are to be beheaded at a height of 0.75 to 1.00 m from the ground level. The stem should be sawed off to avoid stump splitting. The best season for beheading trees is May-September. Soon after beheading, the stumps and cut portions should be given a swabbing with Blitox and Sevin 50% WP (50 g each per litre of water). Sprouts emerge 30-45 days after beheading. Sprouting will be profuse in young trees. On 20-25 day old new shoots, graft scions of high yielding varieties following soft wood grafting technique. 10-15 graftings are to be done on every tree to ensure at least 6-7 successful grafts per tree. The best season for grafting is July-November. Thinning of the extra shoots arising from the stumps should be done to obtain better growth of the grafts. Removal of sprouts below the graft joint and removal of polythene strip from the graft joint should be done. Top working is simple and can be done by farmers themselves after getting proper training.

The top worked trees start yielding right from the second year of top working. Early bearing can be treated as one of the best advantages of this technique. The major disadvantage associated with top working is the huge casualty of trees due to stem borer attack. Intensive care and management to ward off stem borer is essential. As such adoption of top working on a larger scale would be difficult.



A top worked tree



A cashew graft

SOFT WOOD GRAFTING

Different methods of propagation viz. epicotyl grafting, soft wood grafting, veneer grafting, side grafting, layering, patch budding etc., have been tried in cashew with varying degrees of success. Among them, soft wood grafting has been found to be the best for commercial multiplication of cashew.

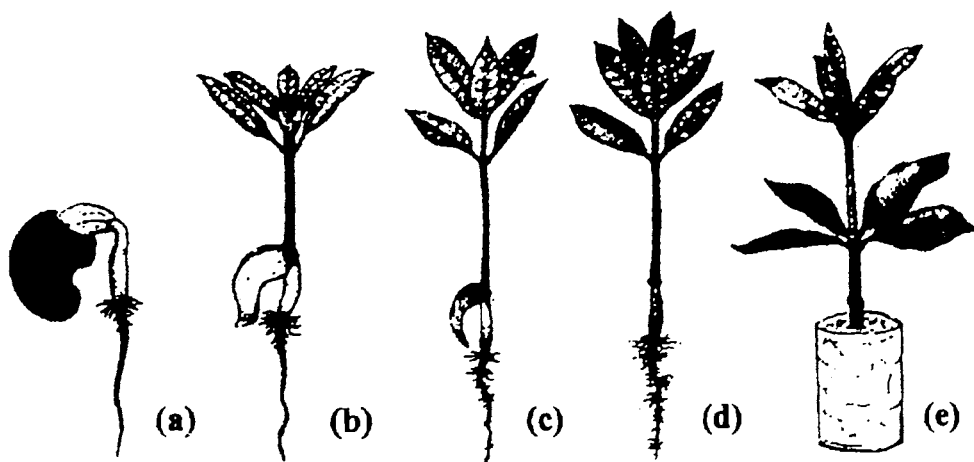
Various steps involved in soft wood grafting are given below

Selection of seednuts

- * Seednuts may be collected during the peak period of harvest (February-March) and sun-dried for two to three days.
- * Dense seed nuts may be selected by immersing the nuts in water or 10% saline solution. Seeds which sink in water may be selected.
- * Medium sized nuts (7-9 g) may be selected to get vigorously growing seedlings.
- * Fresh seednuts are to be used for raising root stocks. More than one-year old seednuts may be avoided.

Raising root stocks

- * The seednuts should be soaked in water overnight before sowing
- * Use polythene bags of size 25 cm x 15 cm and 300 gauge thickness.
- * Punch about 16-20 holes on the polythene bags to ensure good drainage
- * Prepare potting mixture with soil, sand and compost @1:1:1 ratio and mix with rock phosphate @ 5 g per 2 kg potting mixture.
- * Fill the polythene bags upto the brim of the bag.



Rootstock development (a) Germinating seed nut (b) Seven days after germination (c) 14 days after germination (d) 21 days after germination (e) 45 days after germination (Rootstock ready for grafting)

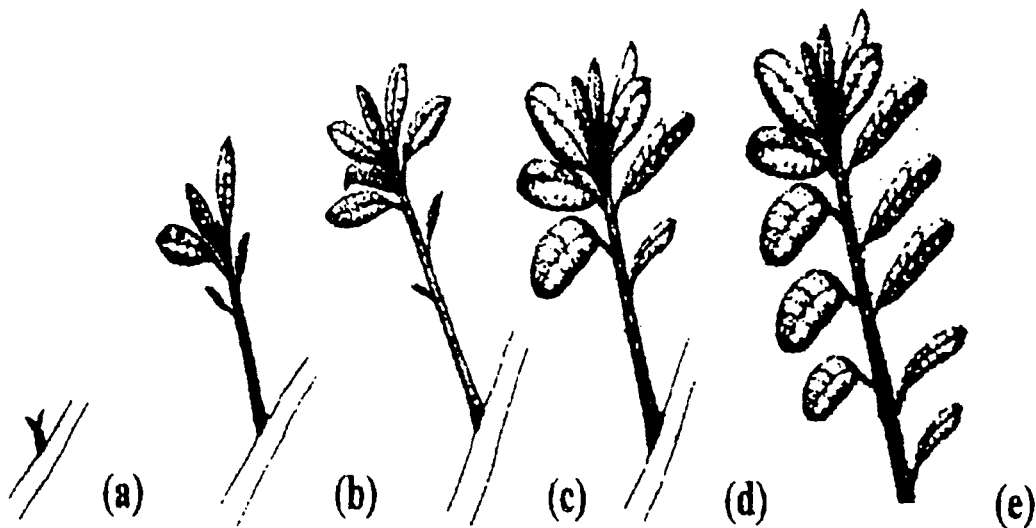
- * Sow the soaked nuts in the centre of the bag with stalk end up, at a depth of 2.0-2.5 cm.
- * Water the bags immediately after sowing and daily thereafter. Avoid excess irrigation.
- * Nuts usually germinate within 15-20 days after the sowing during the monsoon months and within 8-10 days during the dry months
- * Prevent damage to germinating nuts from squirrels, birds etc.
- * Nuts should be sown at weekly intervals to get continuous supply of root stocks. During the summer, provide partial shade to the seedlings till they change their bronze colour to green and then keep them in the open.
- * The seedlings will be ready for grafting 40-50 days after germination.
- * During the rainy season, damping off of young seedlings is common. To control this disease, spraying/drenching Bordeaux Mixture (1%) is effective.

Selection of root stock

- * Select 40-50 day old healthy seedlings having unbranched main stem and growing in the centre of the polythene bag, as root stock.

Selection of scions

- * Select a high yielding variety of cashew as a mother plant to collect adequate number of scions.
- * Select three to five month old non-flowering lateral shoots of current season's growth
- * The selected scions should be 10-12 cm long, straight, uniformly round, pencil thick and brown having dormant plump terminal bud. The top four to five leaves will be dark green indicating proper maturity of the scion



Scion development (a) Scion at initiation (b) 7 days after initiation (c) one month after initiation (d) 2 months after initiation (e) 3 months after initiation

Pre-curing

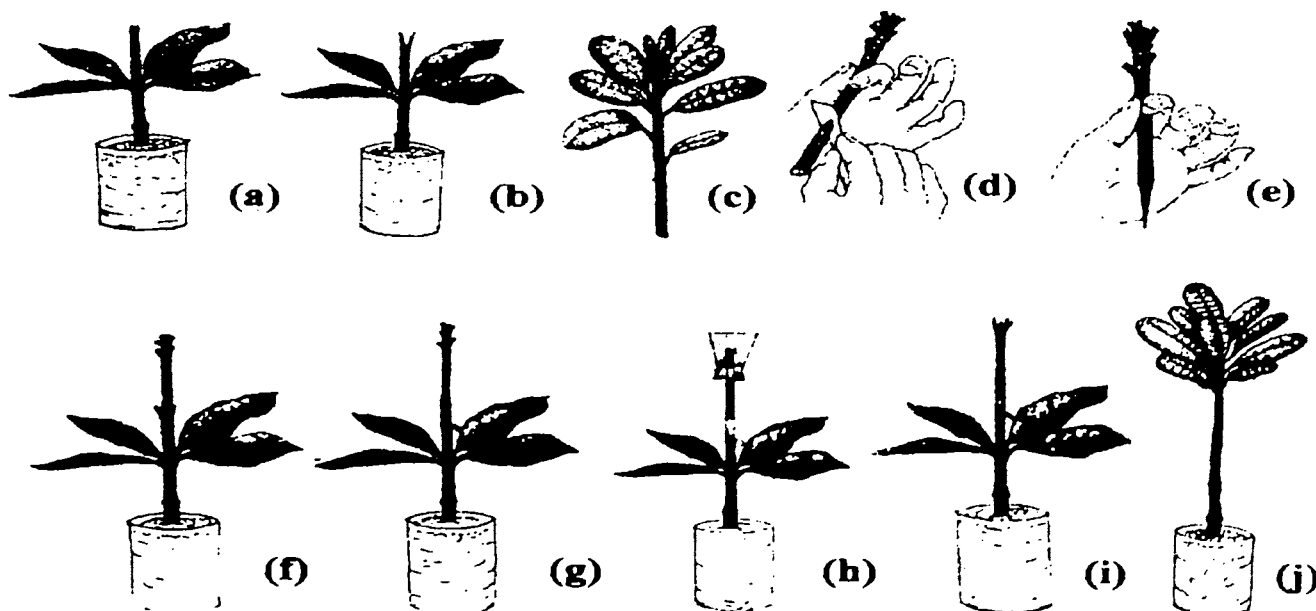
- * Pre-cure the selected scions by clipping off 3/4 portion of the leaf blades.
- * The scions will be ready for grafting in seven to ten days thereafter.

Collection of scions

- * The pre-cured scions are to be cut early in the morning to avoid desiccation
- * The scions should be collected before the terminal buds sprout.
- * Wrap the scions in moist cloth and put in polythene covers as soon as they are cut from the mother tree and bring them to the nursery for grafting. If necessary, they can be stored for three to four days and used for grafting

Preparation of root stock

- * Retain two pairs of bottom leaves and remove the others from the selected seedling, using a sharp knife.
- * Give a transverse cut on the main stem, 15 cm above ground level
- * Make a cleft of four to five cm depth in the middle of the de-capitated stem of the seedling by giving a downward cut



Steps in grafting (a) Decapitated rootstock (b) Rootstock with a longitudinal cut through the centre of the stem (c) Scion (d) Scion preparation by giving cut on either side (e) Scion shaped to a wedge (f) Scion inserted in to the cleft (g) Graft union tied intact (h) Scion covered with polythene cap (i) A successful graft (j) A graft ready for painting

Preparation of scion

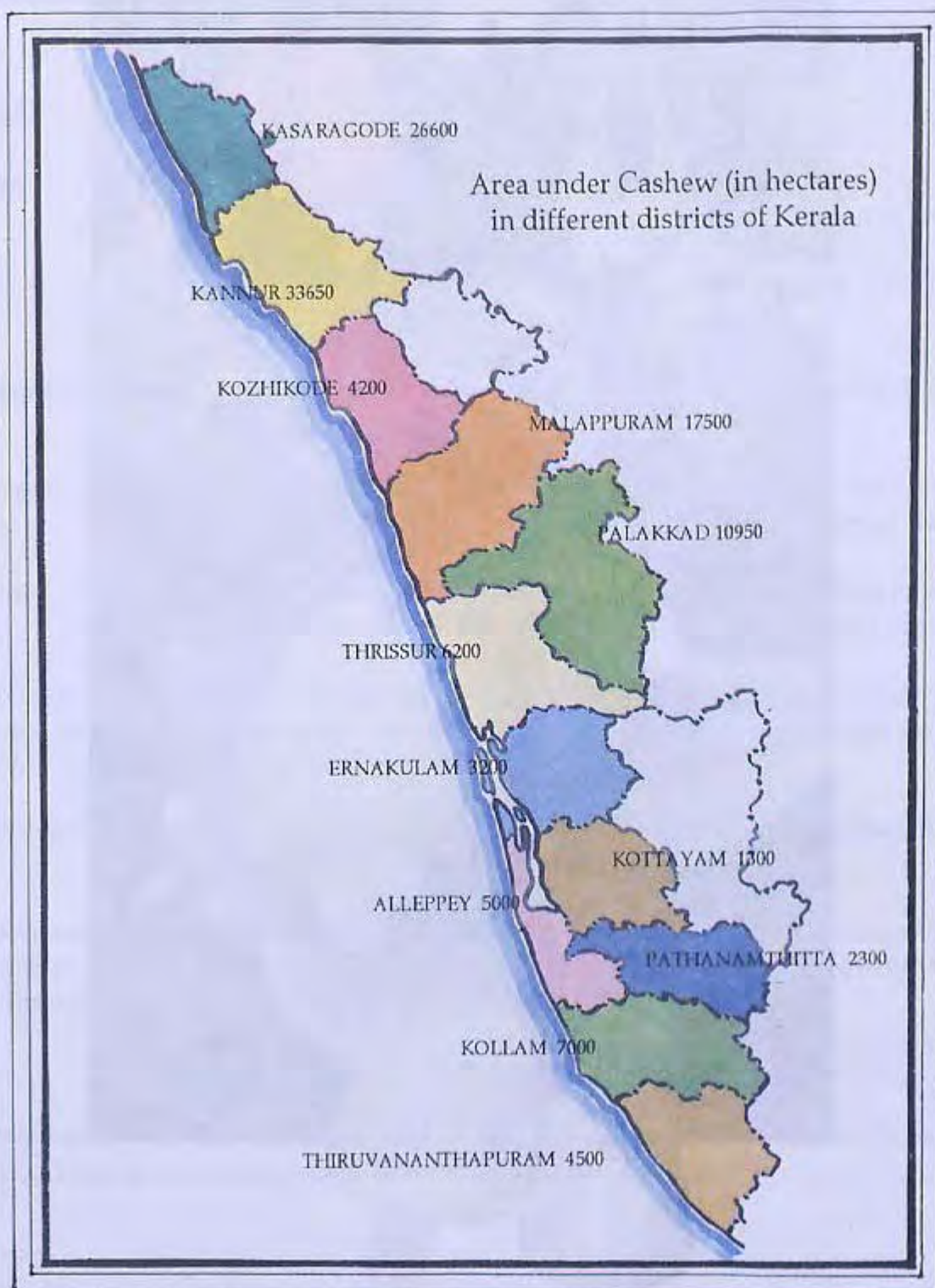
- * Select a matching scion stick (same thickness as that of the root stock)
- * Shape the cut end of the scion to a wedge of four to five cm long by chopping the bark and wood from opposite sides.

Grafting

- * Insert the wedge of the scion into the cleft of the root stock, taking care to ensure that the cambium layers of the stock and the scion are in perfect contact with each other.
- * Secure the graft joint firmly by a polythene tape (1.5 cm wide and 30 cm long).
- * Cover the scion with a wet polythene cap (15 cm x 12.5 cm, 100 gauge thickness) and tie at the bottom to maintain humidity inside and to protect the apical bud from drying. The polythene cap should not touch the terminal bud.
- * Keep the grafted plants under shade for 10-15 days to enable sprouting of the terminal buds.
- * Remove the polythene caps and the grafts are shifted to open. The successful grafts show signs of growth within 3-4 weeks after grafting
- * The grafts will be ready for planting 5-6 months after grafting.
- * The success percentage in softwood grafting is more during March to September, than the other seasons, under Kerala conditions.

Care in the nursery

- * Water the grafts regularly using a rose can or micro-sprinklers.
- * Remove the polythene tape from the graft joint about three months after grafting to avoid girdling.
- * Remove the new sprouts emerging from root stock at frequent intervals
- * Remove panicles, if produced by the grafts, as and when observed.
- * Shift the grafts frequently from one place to another to prevent them from striking roots into the ground.
- * Spray insecticide (depending upon requirement) for controlling the infestation of sucking insects.





Cashew at flowering (Early varieties start yielding during this month)

Operations for the Month

JANUARY

Crop stage	Flowering - fruit set
Irrigation	Plants may require irrigation. About 200 litres of water per adult tree may be applied at an interval of 15 days
Harvest	Early varieties start yielding. Only mature nuts that fall to the ground may be collected.
Tea mosquito control	Need based spray. One of the following insecticides may be sprayed
Young trees	: Thiodan 35% EC (Endosulfan) - 8 ml + 5 litres of water OR Sevin 50% WP (Carbaryl) - 15 g + 5 litres of water
Adult trees	Thiodan 35% EC (Endosulfan) - 16 ml+10 litres of water OR Sevin 50% WP (Carbaryl) - 30 g + 10 litres of water

The maximum number of sprays per year should not exceed three. The same insecticide should not be used for the subsequent sprays. Use rocker sprayer with high - tree lance to spray big trees. Power sprayers can also be used effectively.

Watch for stem borer Keep a vigil on the incidence of stem borer. Identify trees showing symptoms of stem borer attack.

Stem borer control : Need based. Extract mechanically by chiselling out the damaged area of the tree and swab that portion with 0.2% Carbaryl (Sevin) solution (Dissolve 4 g of Sevin 50% WP in 1 litre of water) or by pouring the solution at the tree base.

OR

Apply 75 g Sevidol 4 G per tree, in the soil at the tree base and incorporate. Remove or destroy dead and decaying plant parts to ensure plantation sanitation.



Harvesting phase (Collect only nuts that fall on the ground)

Operations for the Month

FEBRUARY

Crop stage	Flowering - fruiting
Irrigation	Plants may require irrigation. About 200 litres of water per adult tree may be applied at an interval of 15 days
Harvest	Early varieties start yielding. Only mature nuts that fall to the ground may be collected.
Tea mosquito control	Need based spray. One of the following insecticides may be sprayed
Young trees	Thiodan 35% EC (Endosulfan) - 8 ml + 5 litres of water OR Sevin 50% WP (Carbaryl) - 15 g + 5 litres of water
Adult trees	: Thiodan 35% EC (Endosulfan) - 16 ml + 10 litres of water OR Sevin 50% WP (Carbaryl) - 30 g + 10 litres of water

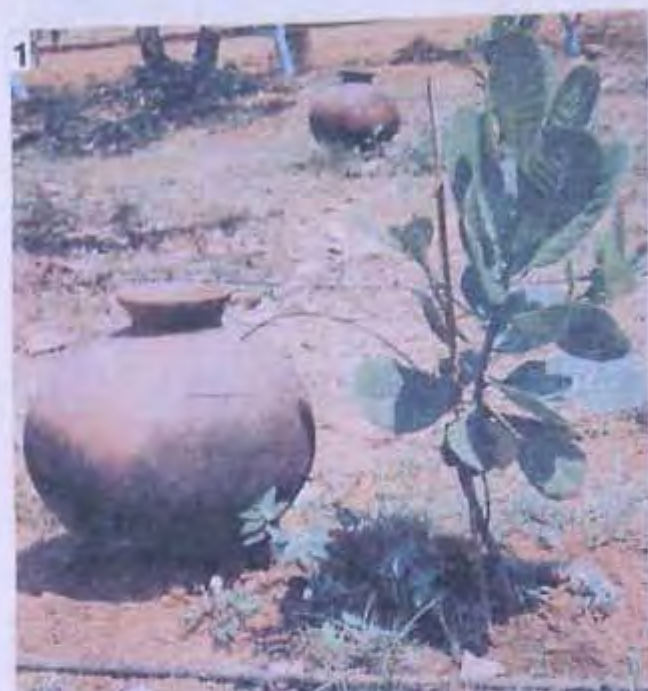
The maximum number of sprays per year should not exceed three. The same insecticide should not be used for the subsequent sprays. Use rocker sprayer with high - tree lance to spray big trees. Power sprayers can also be used effectively.

Watch for stem borer Keep a vigil on the incidence of stem borer. Identify trees showing symptoms of stem borer attack.

Stem borer control : Need based. Extract mechanically by chiselling out the damaged area of the tree and swab that portion with 0.2% Carbaryl (Sevin) solution (Dissolve 4 g of Sevin 50% WP in 1 litre of water) or by pouring the solution at the tree base.

OR

Apply 75 g Sevidol 4 G per tree, in the soil at the tree base and incorporate. Remove or destroy dead and decaying plant parts to ensure plantation sanitation.



1. Young plants irrigated using mud pots and micro tubes
2. Young plants irrigated through drip
3. Drip irrigation of adult plants
4. Tree in the harvesting phase

Operations for the Month

MARCH

Crop stage

Flowering - fruiting - harvest

Irrigation

About 200 litres of water per adult tree may be applied at an interval of 15 days. Drip irrigation is effective. For small plants, water may be applied using mud pots and micro tubes

Harvest

This is the peak period of harvest. Mature nuts that fall to the ground may be collected. Immature nuts should not be collected as it may result production of poor quality kernels.

Watch for stem borer

Keep a vigil on the incidence of stem borer. Identify trees showing symptoms of stem borer attack.

Stem borer control : Need based. Extract mechanically by chiselling out the damaged area of the tree and swab that portion with 0.2% Carbaryl (Sevin) solution (Dissolve 4 g of Sevin 50% WP in 1 litre of water) or by pouring the solution at the tree base.

OR

Apply 75 g Sevidol 4 G per tree, in the soil at the tree base and incorporate. Remove or destroy dead and decaying plant parts to ensure plantation sanitation



Harvesting
Nuts are being separated from the apples

Operations for the Month

APRIL

Crop stage

Harvest

Watch for stem borer

Keep a vigil on the incidence of stem borer. Identify trees showing symptoms of stem borer attack.

Stem borer control : Need based. Extract mechanically by chiselling out the damaged area of the tree and swab that portion with 0.2 % Carbaryl (Sevin) solution (Dissolve 4 g of Sevin 50% WP in 1 litre of water) or by pouring the solution at the tree base.

OR

Swab 5% neem oil (50 ml of neem oil + 1000 ml of water + half ml of teepol or 5 g of soap) on the tree trunk upto a height of 1 m. This can keep the stem borer away for 3 months.

OR

Apply 75 g Sevidol 4 G per tree, in the soil at the tree base and incorporate. Remove or destroy dead and decaying plant parts to ensure plantation sanitation.

Irrigation

About 200 litres of water per adult tree may be applied at an interval of 15 days.

Harvest

Only mature nuts that fall to the ground may be collected. Immature nuts should not be collected as it may result in the production of poor quality kernels.



Harvesting phase
Nuts ready for harvest

Operations for the Month

MAY

Crop stage

Harvest

Watch for stem borer

Keep a vigil on the incidence of stem borer. Identify trees showing symptoms of stem borer attack.

Stem borer control : Need based. Extract mechanically by chiselling out the damaged area of the tree and swab that portion with 0.2 % Carbaryl (Sevin) solution (Dissolve 4 g of Sevin 50% WP in 1 litre of water) or by pouring the solution at the tree base.

OR

Swab 5% neem oil (50 ml of neem oil + 1000 ml of water + half ml of teepol or 5 g of soap) on the tree trunk upto a height of 1 m. This can keep the stem borer away for 3 months.

OR

Apply 75 g Sevidol 4 G per tree, in the soil at the tree base and incorporate. Remove or destroy dead and decaying plant parts to ensure plantation sanitation.

Irrigation

About 200 litres of water per adult tree may be applied at an interval of 15 days.

Harvest

Only mature nuts that fall to the ground may be collected. Immature nuts should not be collected as it may result in the production of poor quality kernels.



1. Pits added with fertilizers and manures for fresh planting
2. Staking of young plants (The polythene tape remain around the graft union should be removed soon after planting)
3. Mulching at the base of young plants
4. Weed control using herbicides

Operations for the Month

JUNE

Crop stage Plants remain dormant

Weeding Time for weeding. Sickle weeding or chemical weeding

Chemical weeding : Spray Paraquat @ 2 litres (20% commercial formulation) per hectare (4 - 5 ml per litre of water) and 400 - 500 litres of water is required per hectare. Two to three sprays of Paraquat may be required (first during June / July, second during August / September and third during September / October).

Organic manuring : Apply 30-50 kg compost or dried farm yard manure per tree.

Fertilizer application : Chemical fertilizers (50% of the recommended dose), as shown below, may be applied either in June or July.

1 year old tree Urea - 275g, Superphosphate - 340g, Muriate of potash - 210g.

2 year old tree Urea - 550g, Superphosphate - 680g, Muriate of potash - 420g.

3 year onwards Urea - 800g, Superphosphate - 1000g, Muriate of potash - 625g.

How to apply fertilizers : For **adult trees**, broadcast and incorporate the fertilizers over the entire tree basin (15 cm deep) within a radial distance of 2 to 3 metres within the drip line, leaving 0.5m from the tree trunk. For **young trees**, broadcast and incorporate fertilizers over the entire tree basin (10 cm deep) within the canopy. Weed plantation before fertilizer application. Soil should be moist at the time of application. Choose dry spells between rains. Minimise root injury during application.

Disease control If severe infection of leaf spot disease is noticed, spray Bordeaux mixture 1%

Bordeaux Mixture (1%) For preparation of Bordeaux mixture see page 56.

Fresh Planting : June/July is the time for taking up fresh planting

Varieties : Madakkathara - 1, Madakkathara - 2, Kanaka, Dhana, Priyanka, Sulabha, Dharasree, Anakkayam - 1.

Pit size : 60 cm x 60 cm x 60 cm

Spacing : 7 m x 7 m to 8 m x 8 m

Planting material : Soft wood grafts

Staking, organic manuring (minimum 10 kg per plant) and mulching are required for the freshly planted grafts.



a. Weed control using a tractor mounted grass - slasher
b. Weed control - sickle weeding

Operations for the Month

JULY

Crop stage

Flushing

Weeding

This is the time for weeding. Sickle weeding or chemical weeding may be adopted.

Chemical weeding : Need based. Spray Paraquat @ 2 litres (20 % commercial formulation) per hectare (4-5ml per litre of water) and 400 - 500 litres of water is required per hectare. OR Spray Glyphosate @ 2 litres (40% commercial formulation) per hectare (4-5 ml per litre of water) and 400 - 500 litres of water is required per hectare. Depending on the intensity of weed growth, two to three sprays of Paraquat may be required (first during June/ July, second during August/ September and third during September/ October). If Glyphosate is used, a single spray during July or August may be enough .

Organic manuring

Apply about 30 to 50 kg of compost or dried farm yard manure per tree depending on availability, during June or July.

Fertilizer application

Chemical fertilizers (50 % of the recommended dose), as shown below, may be applied either in June or July.

1 year old tree

Urea - 275g, Superphosphate - 340g, Muriate of potash - 210g.

2 year old tree

Urea - 550g, Superphosphate - 680g, Muriate of potash - 420g.

3 year onwards

Urea - 800g, Superphosphate - 1000g, Muriate of potash - 625g.

How to apply fertilizers : For **adult trees**, broadcast and incorporate the fertilizers over the entire tree basin (15 cm deep) with in a radial distance of 2 to 3 metres within the drip line, leaving 0.5 m from the tree trunk. For **young trees**, broadcast and incorporate fertilizers over the entire tree basin (10 cm deep) with in the canopy. Weed plantation before fertilizer application. Soil should be moist at the time of application. Choose dry spells between rains. Minimise root injury during application.

Fresh planting

: June/ July is the time for taking up fresh planting

Varieties

: Madakkathara-1, Madakkathara -2, Kanaka, Dhana, Priyanka, Sulabha, Dharasree, Anakkayam -1

Pit size

: 60 cm x 60 cm x 60 cm

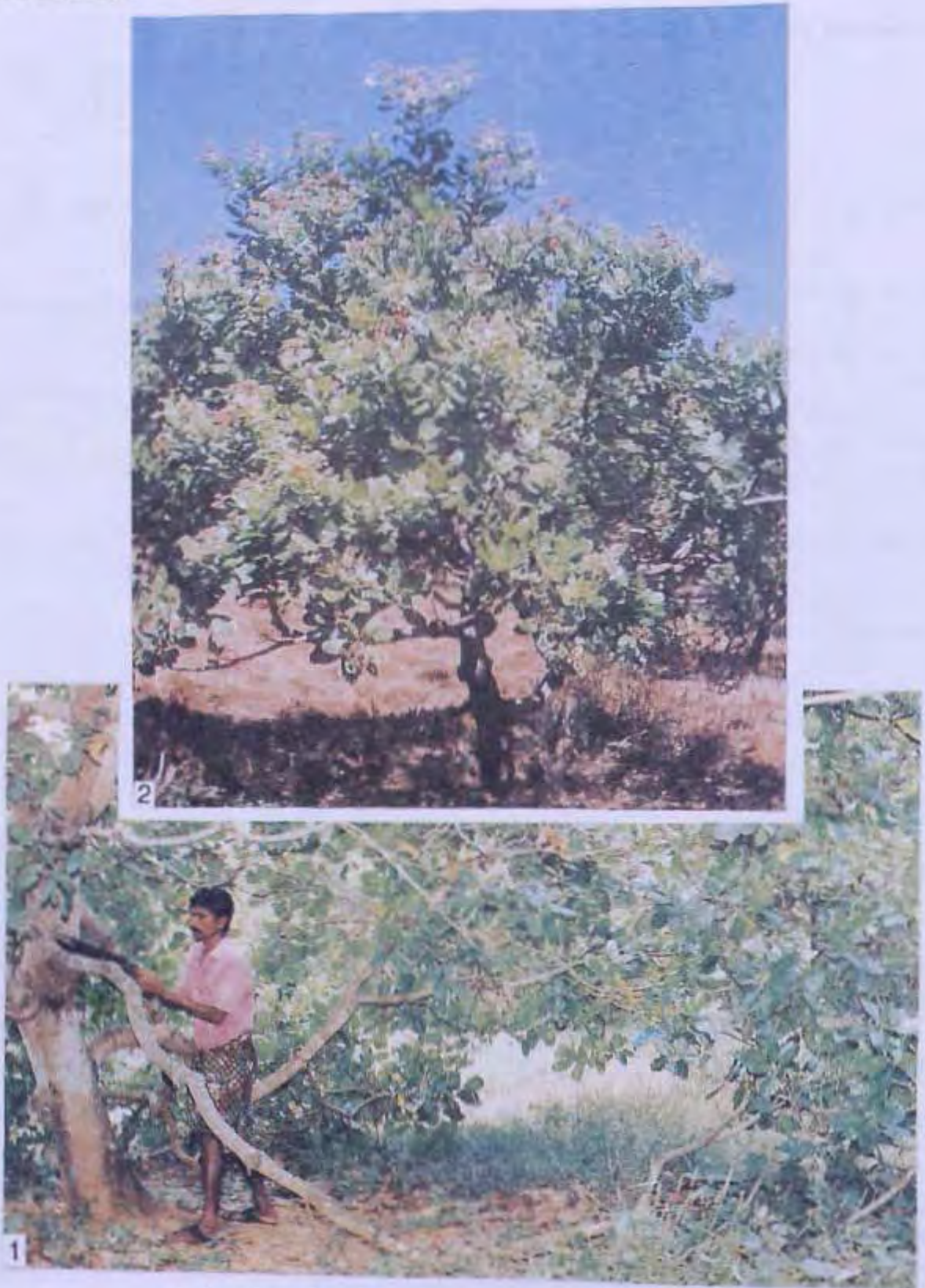
Spacing

: 7 m x 7 m to 8 m x 8 m

Planting material

: Soft wood grafts

Staking, organic manuring (minimum 10 kg per plant) and mulching are required for the freshly planted grafts.



1. Pruning - low lying branches are cut and removed
2. A young cashew tree raised by proper pruning

Operations for the Month

AUGUST

Crop stage

Post harvest flushes mature. Plants remain more or less dormant.

Pruning : This is the time for pruning. Young plants are to be pruned such that one metre clear trunk is available at the bottom. The canopy should open like an umbrella. Low lying branches of trees should not touch the ground. Water shoots and low lying branches should be removed. The wounds result out of pruning may be swabbed with 10% Bordeaux paste.

Bordeaux Paste 10%

For preparation see page 56

Weeding

Need based. Sickle weeding or chemical weeding may be adopted.

Chemical weeding : Spray Paraquat @ 2 litres (20% commercial formulation) per hectare (4-5 ml per litre of water) and 400 - 500 litres of water is required per hectare.

OR

Spray Glyphosate @ 2 litres (40% commercial formulation) per hectare (4-5 ml per litre of water) and 400 - 500 litres of water is required per hectare. Two to three sprays of Paraquat may be required (first during June / July, second during August / September and third during September / October), to check the weed growth effectively. If Glyphosate is used, a single spray during July or August may be enough.

Watch for stem borer : Keep a vigil on the incidence of stem borer. Identify trees showing symptoms of stem borer attack.

Stem borer control : Need based. Extract mechanically by chiselling out the damaged area of the tree and swab that portion with 0.2% Carbaryl (Sevin) solution (Dissolve 4 g of Sevin 50% WP in 1 litre of water) or pour the solution at the tree base.

OR

Apply 75 g Sevidol 4 G per tree, in the soil at the tree base and incorporate. Remove or destroy dead and decaying plant parts to ensure plantation sanitation.



1. Flushing
2. A tree at flushing
3. Method of fertilizer application

Operations for the Month

SEPTEMBER

Crop stage	Flushing starts
Weeding	As shown for the month of July
Fertilizer application	Chemical fertilizers (50% of the recommended dose), as shown below, may be applied either in September or October.

1 year old tree	: Urea - 275g, Superphosphate - 340g, Muriate of potash - 2
2 year old tree	: Urea - 550g, Superphosphate - 680g, Muriate of potash - 4
3 year onwards	: Urea - 800g, Superphosphate - 1000g, Muriate of potash - 6

If single application of fertilizers is preferred, the entire quantity, as given below, may be applied during September or October (skipping application during June).

1 year old tree	: Urea - 550g, Superphosphate - 680g, Muriate of potash - 4
2 year old tree	: Urea - 1100g, Superphosphate - 1360g, Muriate of potash - 8
3 year onwards	: Urea - 1600g, Superphosphate - 2000g, Muriate of potash - 12

How to apply fertilizers: For **adult trees**, broadcast and incorporate the fertilizers over the entire tree basin (15 cm deep) within a radial distance of 2 to 3 metres within the dripline, leaving 0.5 m from the tree trunk. For **young trees**, broadcast and incorporate fertilizers over the entire tree basin (10 cm deep) within the canopy. Weed plantation before fertilizer application. Soil should be moist at the time of application. Choose dry spells between rains. Minimise root injury during application.

Tea mosquito control	Need based spray of one of the following insecticides.
Young trees	: Ekalux 25% EC (Quinolphos) - 10 ml + 5 litres of water OR Dimecron 86% EC (Phosphamidon) - 3 ml + 5 litres of water
Adult trees	: Ekalux 25% EC (Quinolphos) - 20 ml + 10 litres of water OR Dimecron 86% EC (Phosphamidon) - 6 ml + 10 litres of water

The maximum number of sprays per year should not exceed three. The same insecticide should not be used for the subsequent sprays.

Fresh planting	: If irrigation water is available, fresh planting may be taken as per the planting details given on page 43.
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Operations for the Month

SEPTEMBER

Crop stage	Flushing starts
Weeding	As shown for the month of July
Fertilizer application	Chemical fertilizers (50% of the recommended dose), as shown below, may be applied either in September or October.
1 year old tree	Urea - 275g, Superphosphate - 340g, Muriate of potash - 210g.
2 year old tree	Urea - 550g, Superphosphate - 680g, Muriate of potash - 420g.
3 year onwards	Urea - 800g, Superphosphate - 1000g, Muriate of potash - 625g.

If single application of fertilizers is preferred, the entire quantity, as given below, may be applied during September or October (skipping application during June).

1 year old tree	: Urea - 550g, Superphosphate - 680g, Muriate of potash - 420g.
2 year old tree	: Urea - 1100g, Superphosphate - 1360g, Muriate of potash - 840g.
3 year onwards	: Urea-1600g, Superphosphate-2000g, Muriate of potash-1250g.

How to apply fertilizers: For **adult trees**, broadcast and incorporate the fertilizers over the entire tree basin (15 cm deep) within a radial distance of 2 to 3 metres within the dripline, leaving 0.5 m from the tree trunk. For **young trees**, broadcast and incorporate fertilizers over the entire tree basin (10 cm deep) within the canopy. Weed plantation before fertilizer application. Soil should be moist at the time of application. Choose dry spells between rains. Minimise root injury during application.

Tea mosquito control	Need based spray of one of the following insecticides.
Young trees	: Ekalux 25% EC (Quinolphos) - 10 ml + 5 litres of water OR Dimecron 86% EC (Phosphamidon) - 3 ml + 5 litres of water
Adult trees	Ekalux 25% EC (Quinolphos) - 20 ml + 10 litres of water OR Dimecron 86% EC (Phosphamidon) - 6 ml + 10 litres of water.

The maximum number of sprays per year should not exceed three. The same insecticide should not be used for the subsequent sprays.

Fresh planting	If irrigation water is available, fresh planting may be taken up as per the planting details given on page 43.
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1. Power sprayer
2. Knap-sack sprayer
3. Spraying against tea mosquito using a rocker sprayer

Operations for the Month

OCTOBER

Crop stage	Flushing, early varieties may initiate flowering
Weeding	As shown for the month of July
Fertilizer application	Chemical fertilizers (50 % of the recommended dose), as shown below, may be applied either in September or October.

1 year old tree	Urea - 275 g, Superphosphate - 340 g, Muriate of Potash - 210 g.
2 year old tree	Urea - 550 g, Superphosphate - 680 g, Muriate of Potash - 420 g.
3 year onwards	Urea - 800g, Superphosphate - 1000g, Muriate of Potash - 625 g.

If single application of fertilizers is preferred, the entire quantity, as given below, may be applied during September or October (skipping application during June).

1 year old tree	Urea - 550 g, Superphosphate - 680 g, Muriate of Potash - 420 g.
2 year old tree	Urea -1100g, Superphosphate - 1360g, Muriate of Potash -840 g.
3 year onwards	Urea -1600g, Superphosphate-2000g, Muriate of Potash-1250 g.

How to apply fertilizers : For **adult trees** , broadcast and incorporate the fertilizers over the entire tree basin (15 cm deep) with in a radial distance of 2 to 3 metres within the drip line, leaving 0.5 m from the tree trunk. For **young trees**, broadcast and incorporate fertilizers over the entire tree basin (10 cm deep) with in the canopy. Weed plantation before fertilizer application. Soil should be moist at the time of application. Choose dry spells between rains. Minimise root injury during application.

Tea mosquito control Need based spray of one of the following insecticides .

Young trees : Ekalux 25% EC (Quinolpos)-10 ml + 5 litres of water OR
Dimecron 86% EC (Phosphamidon)- 3 ml+5 litres of water

Adult trees Ekalux 25% EC (Quinolpos) - 20 ml + 10 litres of water OR
Dimecron 86% EC (Phosphamidon)- 6 ml + 10 litres of water

The maximum number of sprays per year should not exceed three. The same insecticide should not be used for the subsequent sprays.

Fresh planting : If irrigation water is available, fresh planting may be taken up as per the planting details given for the month of June.

Stem borer control : As per the details given for the month of April



1. Early bearing varieties start flowering
2. Extraction of stem borer larvae using chisel and hammer
3. Swabbing 0.2% carbaryl solution on the affected area of the tree trunk after removing the stem borer larvae and cleaning

Operations for the Month

NOVEMBER

Crop stage

Flushing and flowering

Watch for stem borer : Keep a vigil on the incidence of stem borer. Identify trees showing symptoms of stem borer attack.

Stem borer control : Need based. Extract mechanically by chiselling out the damaged area of the tree and swab that portion with 0.2% Carbaryl (Sevin) solution (Dissolve 4 g of Sevin 50% WP in 1 litre of water) or by pouring the solution at the tree base.

OR

Swab 5% neem oil (50 ml of neem oil + 1000 ml of water + half ml of teepol or 5 g of soap) on the tree trunk upto a height of 1 m. This can keep the stem borer, away for 3 months.

OR

Apply 75 g Sevidol 4 G per tree, in the soil at the tree base and incorporate. Remove or destroy dead and decaying plant parts to ensure plantation sanitation.

Tea mosquito control

Need based spray of one of the following insecticides.

Young trees

: Ekalux 25% EC (Quinolphos)- 10 ml + 5 litres of water OR
Dimecron 86% EC (Phosphamidon)- 3 ml + 5 litres of water

Adult trees

Ekalux 25% EC (Quinolphos)- 20 ml + 10 litres of water
OR Dimecron 86% EC (Phosphamidon) - 6 ml + 10 litres of water

The maximum number of sprays per year should not exceed three. The same insecticide should not be used for the subsequent sprays. Use rocker sprayer with high - tree lance to spray big trees. Power sprayers can also be used effectively .



Early bearing varieties start yielding

Operations for the Month

DECEMBER

Crop stage Flushing and flowering continues, early varieties may start yielding.

Watch for stem borer : Keep a vigil on the incidence of stem borer. Identify trees showing symptoms of stem borer attack.

Stem borer control : Need based. Extract mechanically by chiselling out the damaged area of the tree and swab that portion with 0.2% Carbaryl (Sevin) solution (Dissolve 4g of Sevin 50% WP in 1 litre of water) or by pouring the solution at the tree base.

OR

Swab 5% neem oil (50 ml of neem oil + 1000 ml of water + half ml of teepol or 5 g of soap) on the tree trunk upto a height of 1 m. This can keep the stem borer away for 3 months.

OR

Apply 75 g Sevidol 4 G per tree, in the soil at the tree base and incorporate. Remove or destroy dead and decaying plant parts to ensure plantation sanitation.

Tea mosquito control : Need based spray of one of the following insecticides.

Young trees Ekalux 25% EC (Quinolphos) - 10 ml + 5 litres of water OR
Dimecron 86% EC (Phosphamidon) - 3 ml + 5 litres of water

Adult trees : Ekalux 25% EC (Quinolphos) - 20 ml + 10 litres of water OR
Dimecron 86% EC (Phosphamidon) - 6 ml + 10 litres of water.

The maximum number of sprays per year should not exceed three. The same insecticide should not be used for the subsequent sprays. Use rockersprayer with high - tree lance to spray big trees. Power sprayers can also be used effectively.

Cleaning plantation : Clean plantation by removing dried leaves and weeds to facilitate collection of nuts.

Harvest : Early varieties may start yielding by the end of December. Only mature nuts that fall to the ground may be collected.

Preparation of Bordeaux Mixture (1%)

Dissolve 1 kg of powdered copper sulphate crystals in 50 litres of water. In another 50 litres of water, prepare milk of lime with 1 kg of quick lime. Pour the copper sulphate solution into the milk of lime slowly with continuous stirring. Test the mixture before use for the presence of free copper, by dipping a polished knife in it. If the blade shows a reddish colour, add more lime till the blade is not stained on dipping.

Always use plastic, wooden, earthen or copper vessels for the preparation of Bordeaux mixture. In order to confer sticking qualities to Bordeaux mixture, Rosin-washing soda mixture may be incorporated in the mixture. For preparing this mixture, 10 litres of water out of 100 litres required for preparing Bordeaux mixture, may be used. Boil this 10 litres of water, preferably in an earthen pot and add 500 g of good quality washing soda (sodium carbonate). Continue boiling till the solution becomes slightly dark. Add 1 kg of powdered rosin (Arpoos) in the boiling washing soda solution. Reduce the flame for avoiding frothing, foaming and spilling. Boil the solution for 5-10 minutes till black bubbles appear. Cool down the solution until the temperature reaches below 45°C. The cool mixture (10 litres) is then added slowly to the prepared Bordeaux mixture (90 litres) with vigorous stirring.

Preparation of Bordeaux paste (10 %)

Dissolve 100 g of copper sulphate and 100 g of quick lime each in 500 ml of water separately. Mix together to make one litre of the paste.

Pesticides used for cashew

Insecticides	Generic name	Commercial formulation	
	Endosulfan	Thiodan	35 % EC
	Carbaryl	Hildan	35 % EC
		Sevin	50 % WP
		Sevin	85 % WP
		Hexavin	50. % WP
	Phosphamidon	Dimecron	86 % EC
		JK-midon	85 % EC
	Quinolphos	Ekalux	25 % EC
	Carbaryl	Quinolphos	25. % EC
		Sevidol 4 G	
Lindane granules			
Herbicides			
		Paraquat Gramaxone	20 % EC
		Glyphosate Weed off	41 % EC
		Glycel	

Useful information

Cashew Research Stations

Under Indian Council of Agricultural Research

National Research Centre for Cashew
Puttur - 574 202, DK, Karnataka
Ph. No. 08251 21530 (O), 20992 (R)

Under State Agricultural Universities

1. Cashew Research Station, Kerala Agricultural University
Madakkathara - 680 656, Thrissur, Kerala
Ph. No. 0487 370339
2. Cashew Research Station, Kerala Agricultural University
Anakkayam, Malappuram Dist., Kerala
Ph. No. 04937 67039
3. Regional Agricultural Research Station
Kerala Agricultural University
Pilicode - 671 353, Kasaragode Dist., Kerala
Ph. No. 0499 760632
4. Cashew Research Station, Andhra Pradesh Agricultural University
Bapatla - 552 101, Andhra Pradesh
Contact Ph. No. (08643) 25194
5. Cashew Research Station, Department of Horticulture
Orissa University of Agriculture & Technology
Bhubaneswar - 751 003, Orissa
Ph. No. 0674 425383, 407780
6. Agricultural Research Station, University of Agricultural Sciences
Chintamani - 563 125, Kolar Dist., Karnataka
Ph. No. 08154 52118
7. Zonal Agricultural Research Station, Indira Gandhi Krishi Viswavidyalaya
Jagadalpur - 494 005, Kumharawand, Bastar Dist.
Madhya Pradesh
Ph. No. 077782 36301
8. Regional Research Station, Bidhan Chandra Krishi Viswavidyalaya
Jhargram Farm, PO Jhargram - 721 514, Midnapore Dist., West Bengal
Ph. No. 03221 55593
9. Regional Fruit Research Station, Konkan Krishi Vidyapeeth
Vengurla - 416 516, Sindhudurg Dist., Maharashtra
Ph. No. 02366 62234
10. Regional Research Station, Tamil Nadu Agricultural University
Vridhachalam - 606 001, Tamil Nadu
Ph. No. 04143 60231, 60412

Cashew Developmental Organisations

Directorate of Cashewnut Development,

Ministry of Agriculture,

Department of Agriculture & Co-operation, Kochi - 682 016 (Kerala)

Phone : 0484 373239 (O), 0484 777155 (R) Fax : 0484 373239

The Cashew Export Promotion Council of India

(Sponsored by Govt. of India)

Post Box No. 1709, Chittoor Road, Ernakulam South, Kochi - 682 016, India

Phone : 0484 361459 (O) Fax : 0484 370973

Telex : 0885 6677 CEPC IN Cable : Promotion

Sources of planting material

KERALA

Cashew Nurseries under Government sector

Cashew Research Station, Kerala Agricultural University

Madakkathara 680 656, Thrissur, Kerala Ph.No. 0487 370339

Cashew Research Station, Kerala Agricultural University

Anakkayam, Malappuram Dist., Kerala Ph.No. 04937 67039

Farming System Research Station, Kerala Agricultural University

Sadanandapuram, Kottarakkara, Kollam Dist. Ph.No. 0474 454853

Regional Agricultural Research Station, Kerala Agricultural University

Pilicode 671 353, Kasaragode Dist., Kerala Ph.No. 0499 760554

College of Agriculture, Vellayani - 695 522 Trivandrum

Central State Farm, Aralam, Kannur Dist 670 673

District Agriculture Farm, Thaliparamba, Kannur

Government approved private nurseries

K.K. James, "Agrocrafts"

Kakkanattil House, Piravum 686 664 Ernakulam Dist., Ph. No. 0485 242255

Smt. Annamma Baby, "Agrolinks"

Kakkanattil House, Vazhoor P.O., Piravum 686 664, Ernakulam Dist., Ph.No. 0485 242367

K. Michale George

"Kallivayalil Nursery" Ariyaparambu, Vayyannur P.O., Kolayad, Kannur Dist.,

Ph. No. 0490 - 220726

KARNATAKA

Karnataka Cashew Development Corporation, Medinadka in Puttur Division and Korgi in Kundapura Division and Badla in Kumta Division

National Research Centre for Cashew, Puttur 574 202, Dakshina Kannada, Karnataka

Agriculture Research Station (UAS), Ullal 574 159, Karnataka

Agriculture Research Station (UAS), Chintamani 563 125, Karnataka

Regional Research Station, (UAS), Brahmavar 576 213, Karnataka

Sree Navneetha Nursery, Shri Jayarama Kedilaya, Shibara, P.O. Narimogru, Puttur 574 312, Karnataka

M/s Prakrithi Nursery, Shri. Balakrishna, Idyadi, Savanoor Post, Near Raghavendra Mutt, Kallare, Puttur 574 201.

TAMILNADU

Regional Research Station, (TNAU), Vridhachalam 660 001

State Horticulture Farm, Neyveli, Tamil Nadu

Sillivaichery Reserve Forest Nursery,

Andymadam, (Tamil Nadu Forest Corporation), Trichy- 17

Shri Murugan Nursery, (Shri.A. Dhanavel),

Pudukkurai Pettai, Kuppanatham, Vridhachalam 606 001.

Sree Ranga High-Tech Nursery, (Shri Rangaramanujam), 60, Cuddalore 607 001, SAV District

GOA

M/s Vishal Nursery, Shri Vivekanda Harish Chandra Naik, Nanoda PO, Assonora 403 503

M/s Sagar Nursery, Shri. Anand G. Falari, Sagar Nursery, Nanoda PO, Assonara, 403 503

M/s Siddharth Nursery, 140/7, Angod, Mapusa, Goa

MAHARASHTRA

Regional Fruit Nursery, Nileli, Sindhudurg Dt.

Regional Cashew Nursery at Cattle Breeding Farm, Nileli, Sindhudurg Dt.

Konkan Krishi Vidya Peeth Centres, Private (120 numbers)

ANDHRA PRADESH

Andhra Pradesh Forest Development Corporation, Muthayapalam Reserve Forest, Guntur Dt.

Thummala Penta Cashew Estate, Nellore Dt. Uddandirayani palem Horti. Farm, Guntur

Kunchangi Hort. Farm, Vizag Dt. A.P.

The Horticultural Farm, Mllavalli, Krishna District

The Horticultural Farm, Darasi, Prakasam Dt.

Horticultural Research Station, Aswaraopet

Tribal Welfare Department, Kavali area

ORISSA

Sanapalli site, near Khurda, (Soil Conservation Department), Ranasingh Cashew Farm, Orissa, OSCDC-Bhanganal, Dhenkanal District.

WEST BENGAL

Regional Research Station, Jhargram

MADHYA PRADESH

Dhandevada in Bastar District, Jagadalpur

MANIPUR

Department Cashew nut Farm, Jeiban



Dr. M. Abdual Salam is a cashew expert. Born on 10th May 1952. Bachelor's Degree in Agriculture from Kerala University (1973), Master's Degree in Agriculture (Agronomy) from Kerala Agricultural University (1976) and Doctorate in Agriculture from Tamil Nadu Agricultural University (1984). Brilliant academic record throughout. Awarded the Hon'ble Vice-President Dr. G.S. Pathak's prize for his Ph.D Research. Worked at the University of Aberdeen, UK, as a Visiting Research Fellow under the Commonwealth Fellowship Programme. Guided several students in Agriculture at Masters and Doctoral level and published 10 books and over 133 research papers. Currently working as Head, Cashew Research Station, Kerala Agricultural University, Madakkathara, Kerala, India.

Dr. N. Mohanakumaran is a Horticulturist. Born on 15th January 1940. Graduated in Agriculture (Banares Hindu University (1960), Master's degree in Horticulture (University of Madras 1963) & Doctorate (Indian Agricultural Research Institute 1972). Worked as a Post-graduate Research Fellow at the East West Centre of the University of Hawaii (1963-67). Worked at National Vegetable Research Station, Wellesbourne and Scottish Agricultural Research Institute, Dundee, UK. Visited Philippines, Australia, USA and several countries in Europe and South East Asia. Guided several students in Agriculture at Master's and Doctoral level. Published/edited five books and over 80 research papers. Currently working as the Director of Research, Kerala Agricultural University, Vellanikkara, Thrissur.



P.P. Balasubramanian is a Horticulturist. Born on 13th June 1946. Graduated in Agriculture (1967) and Master's degree in Agriculture from the University of Udayapur, Rajasthan (1977). Worked as Assistant Professor, in the Kerala Agricultural University. Joined as Deputy Director, Development, in Directorate of Cashewnut Development, Cochin (1983) and now continue to head the institution in the capacity as its Director. Published two books and several scientific papers and popular articles in cashew.

