

# e-TRAINING MANUAL

on

## Cashew Production and Post-Harvest Technologies



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**पुत्तुर, द.क., कर्नाटक**

**ICAR - DIRECTORATE OF CASHEW RESEARCH**

**PUTTUR - 574 202, D.K., KARNATAKA**





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## FOREWORD

Cashew is an important foreign exchange earning plantation crop of India. India is the first country to exploit the commercial value of this crop. ICAR-Directorate of Cashew Research (DCR) is the nodal agency for cashew research in the country. The research on cashew was initiated in the early 1950s. Then All India Coordinated Spices and Cashew Improvement Project (AICS & CIP) was started at CPCRI, Kasaragod. Later in 1986 National Research Centre for Cashew (NRCC) was established at Puttur, D.K., Karnataka to take forward the research programmes on cashew and in 2009, NRCC was upgraded as Directorate of Cashew Research (DCR).

The demand for cashew is increasing at both global and national levels. However, the cashew yield levels in India have been low, mainly due to insect pest attacks and lack of proper management of cashew orchards. Thus, it has become imperative to transfer the scientific cashew production technologies to the cashew growers to enhance the cashew productivity and production in the country. Besides, development of value added products of cashew kernel and apples is needed for improving the income of the cashew growers. Towards achieving this, DCR is continuously striving by improving the cashew production and processing through research and extension activities.

I am pleased that ICAR-Directorate of Cashew Research, Puttur in collaboration with Meghalaya Basin Management Agency (MBMA), Govt. of Meghalaya is organizing a National Level Training Programme on “Cashew production and postharvest technologies” during 10-14 February 2020 for the farmers and officials. The training emphasizes on the latest concepts and practices in the field of cashew production and processing for the benefit of stakeholders.

I congratulate the editors and all scientists involved in bringing out this training manual and I hope it will be immensely useful to the trainees, researchers, policy makers and other stakeholders who are engaged in research and development of cashew in the country.

  
[M. G. Nayak]  
Director (Acting)  
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## High Density Orcharding in Cashew

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### Introduction

High density planting (HDP) or Ultra density planting (UDP) is a system of planting in a lesser space than traditional spacing to accommodate more number of plants per unit area to increase the productivity in any kind of horticultural crops preferably with little modification in their packaging practices especially canopy management, nutrient and irrigation requirements. The concept of HDP is always associated with training and pruning operations, where the initial frame work of the plants is to be strengthen with the earlier and excessive vegetative growth are controlled with the later.

### Concept of HDP and UDP

- Maximum utilization of natural resources like solar radiation and land
- To increase the productivity and quality of the produce
- To avoid congenial micro-climate suitable for survival or breeding of pest and disease inoculum by proper pruning operation

### Land preparation

The plating pits are prepared with 1 m<sup>3</sup> size at a distance of 5 × 5 m (HDP) 3 × 3m (UDP) in plains. In case the land is slope, pits are preferably taken up by making contiguous reverse terraces against the slope. The <sup>2</sup>/<sub>3</sub><sup>rd</sup> depth of the pits are filled with friable and fertile soil and remaining <sup>1</sup>/<sub>3</sub><sup>rd</sup> can be applied with 5 kg of well decomposed farm yard manure (FYM).

### Season and method of planting

Grafts of selected cashew variety are planted right at the centre of the pit preferably during the monsoon season (August - September). Planting can be done throughout the year if irrigation facilities are available. The soil should be compacted without air pockets around the root zone followed by life irrigation. Stalking should be provided to the grafts to support



straight growth and mulching with green manures can be made to retain adequate moisture for longer period especially during summer and water scarcity regions. This will help to reduce the number of irrigations.



**Initial stage of ultra density orchard**

### Plant spacing

The plant spacing for conventional method, high and ultra-density planting system for cashew has furnished here.

### Comparison of planting density at different methods of planting

Sl. No.	Methods of Planting	Recommended Spacing	Accommodation of number of plants per hectare
1	Conventional method/ low density planting	8 X 8 m or 7 X 7m	156 or 238
2	High density planting	5 X 5 m or 4 X 4m	400 or 625
3	Ultra Density planting	3 X 3 m or 2.5 X 2.5 m	1111 or 1600

### Varieties suitable for HDP and UDP

All the available varieties are not suitable for high and ultra-density planting. The variety which responds well for pruning is to be selected. Therefore, selection of variety is very important aspect in high and ultra-density planting systems. The cashew varieties having precocious flowering and positive response to pruning are VRI-3, NRCC Sel-2, Ullal-1, Ullal-4 and K-22-1 are most suitable for this kind of planting. The recent hybrid H-130 is most suitable for the purpose having high precocity and good response to pruning. It has very bold nuts (13 g) and long flowering duration. The complete allotted space can be covered in 3<sup>rd</sup> year of planting and potential yield of the unit land can be realized from 3<sup>rd</sup> to 4<sup>th</sup> year of orchard life onwards. The yield in farmer's plot harvested in this method was up to 3 kg/plant



in third year of planting. Even if a yield of 2 kg per plant can bring more than 3 tonnes per ha area which will be much superior over existing orchards having National average yield less than 750 kg/ha.

### **Training and Pruning**

The cashew grafts are allowed to grow without side sprouts in the main stem for upto 40-50 cm from the ground level to ensure the stronger trunk in later years. The growing tip are pinched or nipped off to promote side branches / primary branches and subsequent secondary branches and laterals. Symmetrical and wider angle primary braches at the number of 3-4 are allowed in all four directions. The flowering and fruiting may start from first or second year is depended on the precocious bearing nature of cashew varieties. Pruning is a year wise operation and required to be carried out immediately after harvest (June-July). The recommended height of pruning during first and subsequent years is 1 m from ground level.

### **Aftercare during training and pruning**

- Training must be made in live tissue to facilitate good callus formation for rapid healing
- Sharp tools should be used for implementing training or pruning to avoid damage to bark/phloem
- After training or pruning, 10% Bordeaux mixture paste swabbing for large cut ends or 1% Bordeaux mixture spray for pruned shoots is recommended
- As a preventive measure, the pruned trees are to be sprayed with 0.2%  $\lambda$ -cyhalothrin twice or thrice in the initial 24 months of pruning
- The tender shoots should be protected against Tea mosquito bug attack by spraying  $\lambda$ -cyhalothrin 0.06% (6 ml in 10 L of water)



**Pruning and training of plants in ultra-density**



### Manuring and Fertilizer Application

The annual dose of fertilizers to cashew is to be applied in to two split doses. First split dose at onset of monsoon period and second split dose during post monsoon period when the soil moisture condition is at optimum level. Fertilizers are to be applied 60 cm away from the main stem by making 10-15 cm deep trenches. The fertilizer dose can be modified depending on the soil type and crop requirement based on soil test results. The general recommendation for the crop is as follows.

Table on Fertilizer recommendation for different aged plants

Sl. No.	Age of plants	Urea	Rock phosphate	Muriate of potash (MOP)	Organic Manure
1	One	100 g	150 g	50 g	4-5 kg
2	Two	250 g	200 g	100 g	5-10 kg
3	Three and above	400 g	300 g	200 g	10-20 kg

### Plant Protection measures

There are no major diseases in cashew but some pests cause severe infestation to the crop *i.e.*, Tea Mosquito (TMB), Cashew stem and Root Borer (CSRB), leaf eating caterpillar and leaf minor. The infestation of TMB is severe in ultra-density planting due to emergence of enormous new shoots and panicles and the infestation of CSRB was very less due to less bark growth and stem thickness due to frequent pruning of plants.

#### 1. Tea Mosquito Bug (*Helopaltis antonii*)

The mosquito bug is considered to be the most serious pest of cashew in India, and causes more economic loss to the crop than any other pest. It will cause damage to all the parts such as tender shoots, leaves, floral branches, developing nuts and apples. The TMB can be controlled by spraying 0.06% Lambda cyhalothrin, or 0.15% profenophos or 0.15 % monocrotophus. For better management three sprays is required one at the time of vegetative flush, second at the time of panicle emergence and third at the time of fruit setting.





## **2. Cashew Stem and Root Borer (*Placaederus ferrugineus*)**

This is another major pest in normal density planting but in ultra-high density orchards it was observed very low infestation may be due to less bark growth and stem thickness which is due to frequent pruning of plants. For the control of stem and root borer early detection of incidence is very important. The affected bark should be removed along with the grubs and then swabbing affected area with chlorpyrifos 2 ml/lit.

## **3. Leaf eating caterpillar**

This pest causes more damage during the emergence of new flush. It can be controlled by spraying 0.06% Lambda cyhalothrin or Profemophos 50 EC @ 2 ml/lit.

## **4. Leaf miner**

The caterpillars of this silvery grey moth mine through the tender leaves and severely damage them at the time of new flushes. For controlling spray 0.05 per cent Phosphamidon.

## **Harvesting and Yield**

In ultra-density planting, plants start flowering during first year of planting. If plants are healthy and vigorous harvesting can be done during first year otherwise panicles can be removed in first year for better growth of plant. The 2<sup>nd</sup> year plants yield 1-1.5 kg nuts per plant and 2-3 kg per plant during 3<sup>rd</sup> year and above. Nuts are harvested from fully developed fruits or nuts are collected from the fallen fruits.

## **Conclusion**

The bumper harvest was possible by adopting the technology with specified cashew varieties and management practices developed by the Directorate and adopting the same in their fields. A large number of farmers from Karnataka, Kerala, Tamil Nadu and Andhra Pradesh have adopted this technology successfully. Further, more farmers and growers from within the country and abroad are coming forward with queries for taking up this technology in their fields. More awareness about the technology and financial assistance from government agencies can bring revolution in cashew cultivation thereby achieving the production target of raw nuts in the country within a short span of 4-5 years.

**Future thrust**

There is need for more research on time and intensity of pruning and screening of all commercial varieties for suitability for HDP and UDP. Manure and fertilizer requirements, specific pest management techniques and complete package of practices for the technology need to be developed by experimenting with different cultivars.

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