DIRECTORATE OF CASHEW RESEARCH
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ULTRA DENSITY PLANTING IN CASHEW

Introduction

The potential of crop cashew *(Anacardium occidentale L.)* in the international trade was first realized by India in the early 1900s' through the export of cashew kernels. Presently, India has the largest area under cashew and is also one of the largest producers of cashew in the world. Cashew area in the country is 1.035 million ha with production of 0.670 million tonnes (2015-16). The present level of production is not sufficient to fulfill the processing requirement of cashew industries in the country (2.0 million tonnes). Most of the area under cashew is in degraded, non-fertile land of east coast and west coast, and hilly regions of the country. At present it has very low level of productivity and farmers are getting an income of Rs. <50,000 / ha. Poor productivity and low income of cashew farmers is a serious concern. The required target can only be achieved if the yield level raises up to 2 tonnes per ha which is really difficult with the type of existing plantations and the cultivation practices followed. The area expansion programme under various regions is taken up now on a big way which requires through planning for the achievement of above target of rawnut yield.

Ultra density planting in cashew : A technology option for doubling farmers' income

At this juncture, when the country is looking towards doubling farmers' income, a major technology option available to enhance the productivity of cashew nut and thereby increasing income of cashew farmers is 'Ultra density' planting in cashew. Ultra density planting in cashew @1111 to 1600 plants per ha or more, maintenance of productive canopy by way of pruning and also for obtaining early benefits of crop harvests and higher yield was developed and standardized and demonstrated for the first time in the history of cashew research by this Directorate as early as 2002-03 and known as a technology transferred to farmers field. Traditionally the spacing for planting was recommended at 8M x 8M (150 plants/ha) and of late recommendation of high density at the rate of 4M x 4M (625 plants/ha), but a canopy management technique for maintenance of productive canopy was not known and hence the decline in yield performance could not be stopped even till recently.

The cashew varieties having precocious flowering and positive response to pruning such as **VRI-3, NRCC Sel-2, Ullal-1, Ullal-4** and **K 22-1** were 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 3rd year of planting and potential yield of the unit land can be realized from 3rd to 4th year of orchard life onwards. The yield in farmers plot harvested in this method was upto 3 kg/plant after 3 years of planting. Even if yield of 2 kg per plant can bring more than 3 tones per ha area which will be much superior over existing orchards having national average yield around 750 kg/ha.

The land preparation and planting

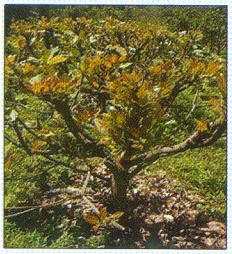
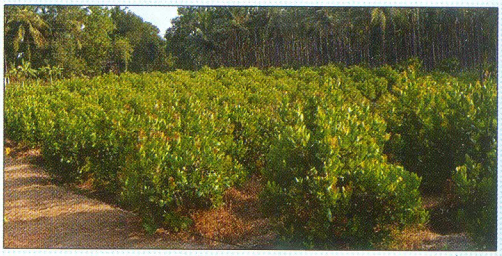
The land preparation can be taken up preferably by making contiguous reverse terraces against the slope at 3 m distance from one another and pits (1 cubic meter size) be opened at 3 m apart. The pits may be filled with fertile soil and compost upto 2/3rd depth of the pit. Grafts of selected cashew variety be planted during the monsoon season.


Initial stage of ultra density orchard


2nd year of orchard life in ultra density

Training and Pruning

Allow the graft to grown straight without any side sprouts upto 0.25 to 0.45 m height from ground level. There after tip bud can be pinched off to force frame work of primary branching and subsequent lateral branches from them. Highly precocious type of varieties will flower and fruit during the year of planting and in other varieties, it may be from second season onwards. Once the first harvest is completed (usually during May-June) first pruning at 1 m height from ground level can be taken up, subsequently annual pruning at same height every year. After the harvest a spray of Bordeaux mixture (1%) be given to prevent the entry of fungal pathogens. Yearly the required dose of fertilizer and manure as local requirement can be given and also plant protection measures against major and minor pets.

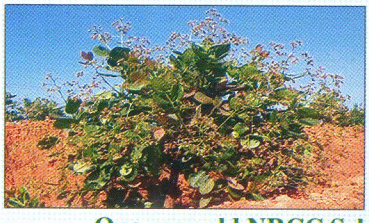



Pruning and training and precocious flowering of plants in ultra density

Manuring and fertilizer requirement

Plant under Ultra density planting system are continuously pruned and new growth is encouraged every year. The plant requires continuous supply of required nutrients for growth, and flowering and fruiting. The plant can be given with following fertilizers and manures preferably in 2 split doses during beginning of monsoon and one month before flowering and fruiting If sufficient quantity of FYM or the organic manures are provided, separate application of micronutrient may not be required. During flowering and fruiting foliar application of micronutrient mixture can help for better fruit set and development. 15-20 kg of FYM/plant can be applied along with fertilizers as given in the table.

Flower Bearing in 1 year old plant under ultra density




One year old NRCC Selection-2 plants in bearing


Former DG's visit to UHD plot

One year old V-4 plants in bearing

Precocious flowering and fruiting in H-130, suitable for Ultra Density

Table 1 : Recommended fertilizer dose

Age of the plants	Urea (g)	Rock phosphate (g)	Potash (g)	Organic manures (Kg)
1st year	100	150	50	4-5
2nd year	250	200	100	5-10
3rd year	400	300	300	10-20

From third year onwards the above dosage can be continued depending on the requirement of the trees. However, this can be modified based on soil test results of the land. The organic matter can also be increased depending on the condition of the soil.

Plant protection measures

The plants under ultra density system will remain more succulent and vigorous due to frequent pruning and manuring. Such plants are more vulnerable for the pest damage particularly tea mosquito bug. When plant produces new flushes and flowers it is required to be protected from tea mosquito damage. Usually to control this pest monocrotophos (1.5 ml/l) or carbaryl (2.0 g) or λ-cyhalothrin (0.6 ml/l) is recommended. However, in this system the new flushes and flowering continues for prolonged period, a fourth round of spray if required can be given. The time of the spray be in the early morning or in the evening hours. Against the wind direction spray should not be taken up.

Table 1: Yield harvested under Ultra Density at DCR field
(Results of 21 plants of variety K-22-1 at 1600 plants/ha)

Year of planting	2004	2005	2006	2007	2008
2003	0.1 Kg	1.7 Kg	2.3 Kg.	2.0 Kg.	1.7 Kg.

Table 2 : The yield performance of Ultra Density under farmers field (at 3M x 3M) in more than 1 acre area.

Name & Address of the farmers	Year of planting	Varieties	Yield in Kg / Plant						
			2011	2012	2013	2014	2015	2016	2017
Sri P. Derana Rai Papanadka Puttur, D. K. District Mobile : 9448953622	2010	NRCC Sel-2 VRI-3 Ullal-3 V-4	*	1.10	**	2.00	2.50	2.00	***
Smt. Satyabhama Manchi, Bantwala Taluk D.K. District Mobile : 91 8971284717	2010	NRCC Sel-2 Ullal-4	*	1.20	2.50	3.20	2.70	2.80	3.10
Mr. Kadamajalu Subhash Rai Puttur Taluk Mobile : 9449106931	2014	NRCC Sel-2 VRI-3	--	--	--	--	0.20	2.40	3.00
Mr. Somappa Rai Govindamoole Darbethadka, Puttur Mobile : 9980548605	2015	VRI-3	--	--	--	--	--	1.20	2.90
Mr. Karunakara Rai Derla Madavu Vill. & Post Puttur Taluk Mobile : 9449682197	2015	VRI-3 NRCC Sel-2 Ullal-1 Ullal-3	--	--	--	--	--	1.00	2.44
Mr. Natesh Moodayoor Paduvannur Village Ishwaramangala, Putur Mobile : 9740449242	2010	VRI-3 NRCC Sel-2 Ullal-3 V-4	****	0.5	1.5	2.7	2.0	2.1	2.5

* Deblossoming was taken in the 1st year.
** Due to faulty pruning and severe tea mosquito attack yield could not be realized.
*** Resorted for thinning out the plants.
**** Ullal - 3 and V-4 have not responded well to pruning.

Conclusion

The results of experiments conducted at the Directorate and on farm trials in the farmers field revealed that at 2nd season of planting upto 1.5 kg / plant and 3rd season onwards about 2-3 kg / plant average yield can be harvested which may bring 12-18 quintals of rawnuts from an acre from 3rd year onwards. This harvest is possible and achieved by farmers under good management and intensive care in the field.

The technology is well taken by the growers and more than 100 farmers in various growing regions in Karnataka, Kerala and Tamil Nadu. More awareness about the technology and financial assistance of NHM if extended for this technology can bring revolution in cashew cultivation and production and the targeted requirement of rawnuts in the country can be made available in short span of 4-5 years.

Cholestrol free cashew kernels for nutritional security

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