



## RESEARCH PAPER

# Adoption of arecanut based cropping system technologies by farmers of Uttar Kannada district of Karnataka

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**Abstract :** The study was conducted in Uttara Kannada district which comes under the jurisdiction of UAS, Dharwad during the year 2022-2023, to study the adoption of arecanut based cropping system technologies of UAS Dharwad by employing *ex-post facto* research design and using simple random sampling technique in Uttar Kannada districts of Karnataka constituting a total sample size of 120 farmers. Majority (69.16 %) of them adopted Sirsi local variety, cent per cent of them planted 12-18 months old seedlings, majority (69.16 %) of them planted seedlings in may-august, large majority of them followed a spacing of 2.7x 2.7, More than half (55.83 %) of them adopted 90x90x90 cm pit size, 39.17 per cent of them followed square and triangle layout of plantation, 36.66 per cent of them followed multiple cropping with banana, large majority (81.66 %) of applied recommended dosage of FYM, more than two fifth (45.00 %) of them followed ring method of fertilizer application, large majority (79.16 %) of them adopted sprinkler drip irrigation, more than half (51.66 %) followed recommended depth of drainage, more than half (57.50 %) of them used Bordeaux mixture spray for bud spot control, more than two fifth (44.20 %) of them dug trenches for foot rot disease control, large majority of them (96.67 %) used phorate granules for spindle bug control, 30.00 per cent of them used dimethoate for mites' control, tender nuts during July-December by majority, ripen nuts were harvested during Dec-March by 49.17 %. Large majority (89.16 %) of them manually harvested the areca nuts. Majority (68.33 %) of them of them adopted kalipak method of harvesting. More than two fifth (41.66 %) of them belonged to medium adoption level category, 30.84 per cent of them belonged to low and 27.50 per cent of them belonged to high adoption level category respectively.

**Key Words :** Adoption, Arecanut based cropping system, Production technology

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## INTRODUCTION

*Areca catechu* L. palm, commonly known as arecanut or betel nut, holds immense commercial significance in India and has far-reaching effects on politics, society, culture, and the economy. Among the

states of India, Karnataka stands first in arecanut production. Karnataka, Kerala and Assam, all three states together account for 88.59 per cent of the total arecanut production in the country. In Karnataka, around 5.40 lakh hectares is under arecanut cultivation, which

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accounts for 57.85 per cent of total arecanut area in India. Among the districts of Karnataka, Shivamogga stands first both in the area (1,00,486 ha) with production of (1,84,730) tonnes of arecanut (Directorate of Economics and Statistics, Karnataka, 2020-2021), followed by Dakshina Kannada, Chikkamagaluru, Davanagere and Tumkuru are leading arecanut producing districts. These districts together account for 83.63 per cent of the total area and 82.10 per cent of the total production of arecanut in the state. Arecanut-based cropping systems in India are highly diversified and adaptable, reflecting the versatility of this crop to thrive in various agro-climatic conditions. In this system, arecanut is typically the primary crop, while coconut, banana, black pepper, cocoa, and various spices serve as supporting or secondary crops. The combination of these two crops not only makes efficient use of land but also provides a diverse income stream for farmers.

## MATERIAL AND METHODS

The study was conducted in Uttar Kannada districts of Karnataka in the year 2022-23 by using *Ex-post facto* research design and simple random sampling technique. 3 talukas from Uttara Kannada district, 4 villages were selected randomly, from each taluka, from each selected village 10 farmers were selected by simple random sampling procedure to constitute a total sample of 120 arecanut growers.

The procedure followed by Hinge (2009) was used to measure the general adoption level of the respondents. Based on the package of practice, 23 crop production practices, four plant protection practices, six harvesting and processing practices were listed. Hence, a total of 33 recommended production technologies were considered for the study. Respondents were asked questions to know whether they have adopted each of recommended practices in arecanut or not. Each adopted practice was scored "1" and non-adopted practice was scored "0". The total score obtained by the respondents from all practices was the adoption score of the individual respondent.

Based on the response obtained, the respondents were classified into low, medium and high categories using mean and standard deviation as a measure of check.

## RESULTS AND DISCUSSION

The data presented in (Table 1) about selection of

variety indicated that two third (69.16 %) of growers adopted Sirsi local followed SAS-1 and other varieties (20.83 % and 15.83 %) the reason for growing of Sirsi local is regionally available and price of seedling is cheaper.

With respect to age and time of planting, cent percent of the arecanut growers adopted 12-18 months old age of seedlings for planting seedlings for transplanting because 12-18 months is pre requisite for proper crop stand.

About 69.16 per cent of them followed May- August planting time. The possible reason for planting in June-Sept might be coincidence of monsoon.

Large majority (90.00 %) of them followed 2.7×2.7m as recommended spacing whereas 20.83 per cent farmers followed 2.4×2.4m to facilitate proper aeration and for easy inter cultivation operations because of their past experiences regarding effect of pit size on root penetration and stability of the plant.

With respect to layout of plantation was followed with equal percent (39.16 %) of them followed square and triangular method whereas 21.66 per cent followed S-W direction planting because it regulates direct penetration of sunlight.

Nearly half (49.17 %) of growers adopted covering stem whereas planting of shade trees for protecting young plant followed by growing nurse crops (27.50 % and 23.33 %) where the strategies adopted by the others to protect crop from sun scorching.

In case of multiple cropping more than one third (36.66%) followed arecanut + banana followed by arecanut + pepper, (32.50%), arecanut + banana + betel vine, (16.66%), arecanut + banana + pepper (15.00%), and others (10.83%) and respectively very least of them followed (02.50%) arecanut + pepper + cardamom.

With respect to nutrient management majority (81.66 %) of them applied recommended quantity of FYM followed by vermicompost (32.50%). Higher education level of farmers, their knowledge about importance of organic manure to maintain soil fertility and lime application to maintain soil pH level and farmers interested towards organic farming are probable reasons for this adoption.

With respect to chemical fertilizer recommended dose of NPK was adopted more in local variety followed by improved variety (39.16% and 20.00% respectively), because higher application of chemical fertilizer causes nut splitting.

Adoption of arecanut based cropping system technologies by farmers

**Table 1: Adoption of improved production technologies by arecanut growers**

Sr. No.	Cultivation practices	f	%
1.	<b>Variety</b>	25	20.83
	SAS-1		
	Sirsi local	83	69.16
	Other varieties (Mangala, Sagara local)	19	15.83
2.	<b>Planting</b>		
	<b>Age of seedlings for transplanting</b>	120	100.00
	12- 18 months old		
	<b>Planting time</b>	83	69.16
	May-august		
	August – September	50	41.67
	<b>Spacing</b>	108	90.00
	2.7 × 2.7 m		
	Other than recommended 2.4 × 2.4 m	25	20.83
3.	<b>Land preparation pit size</b>	48	40.00
	60 × 60 × 60 cm for heavy soils		
	90 × 90 × 90 cm for well drained deep soils	67	55.83
	<b>Layout of plantation</b>		
	Alignment facing S-W direction	26	21.66
	Square	47	39.16
	Triangle	47	39.16
4.	<b>Protection against sunscald</b>	33	27.50
	Planting of shade trees		
	Covering stem	59	49.17
	Growing nurse crops	28	23.33
5.	<b>Multiple cropping</b>	44	36.66
	Arecanut + banana		
	Arecanut + pepper	39	32.50
	Arecanut + banana + betel vine	20	16.66
	Arecanut + pepper + cardamom	3	2.50
	Arecanut + banana + pepper	18	15.00
	Others (coca, turmeric, ginger, coffee)	13	10.83
6.	<b>Organic manure application</b>	98	81.66
	FYM at 20kg/palm/yr.		
	Vermicompost at 8 kg/palm/yr.	39	32.50
7.	<b>Fertilizer application</b>		
	<b>Recommended dose</b>	47	39.16
	Local variety: 100:40:140 g /palm/ year		
	<b>Improved variety:</b>	24	20.00
	150:60:210 g/palm/year		
	<b>Time of fertilizer application</b>	38	31.70
	Irrigated: Feb-March, Sept-Oct		
	Rainfed: April-May, Sept- Oct	46	38.33
	<b>Method of application</b>	47	39.16
	Fertigation		
	Ring method	54	45.00
8.	<b>Lime application</b>	54	45.00
	1kg/ palm, once in two years		
9.	<b>Irrigation</b>	95	79.16
	<b>Method of irrigation</b>		

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9.	Drip irrigation	95	79.16
	Sprinkler irrigation	39	32.50
	Flood irrigation	30	25.00
	<b>Irrigation level</b>		
	175 liters/week/ palm	73	60.83
	16-20 liters/day/ palm in drip irrigation	47	39.16
10.	<b>Depth of drainage: 75 to 100 cm</b>	62	51.66
11.	<b>Moisture conservation techniques</b>	50	41.70
	Growing cover crops		
	Mulching	58	48.33
12.	<b>Major diseases</b>		
	<b>Koleroga / mahali/ bud rot:</b>	30	25.00
	Bunch covering with polythene bags		
	Bordeaux mixture (1%) spray to the bunches	69	57.50
	<b>Yellow leaf disease:</b>	42	35.00
	Remove diseased palms		
	Apply 1 g Phosphatic fertilizer + 2kg neem cake per plant as two applications	45	37.50
	<b>Anabe roga/ foot rot:</b>	53	44.20
	Dig trenches with 30cm width and 60cm depth all around the plants		
	D Drench with 0.3 % Calixin(3ml/l) at 15 l/ palm	29	24.17
	Neem cake 2kg/palm/year	26	21.67
	<b>Nut splitting: Borax spray at 2g/l</b>	48	40.00
	<b>Band / hidimundige: Borax 25g/palm/yr.</b>	45	37.50
	Apply 225g of copper sulphate + lime in equal quantity	36	30.00
	<b>Leaf spot</b>		
	Spray Mancozeb 75 WP 2g/ltr or Copper oxychloride 50 WP 3g/ltr of water	28	23.34
13.	<b>Major pests</b>	25	20.83
	<b>Mites:</b> Dicofol 20EC 2ml/ l spray		
	Dimethoate 30 EC 1.7ml/l	36	30.00
	<b>White or Root grub:</b>	9	07.50
	Collect and destroy beetles		
	Phorate 15 g/ palm twice a year	14	11.67
	Chloropyriphos 20 EC at 7ml/l at 3 l/ palm	13	10.83
	<b>Spindle bug:</b> Dimethoate 1.5 ml/l	18	15.00
	Placing phorate granules in sachets in innermost leaf axil	116	96.67
	<b>Inflorescence caterpillar:</b>	19	15.84
	Remove and burn affected inflorescence		
	Chloropyriphos 20 EC at 2ml/l spray	28	23.34
14.	<b>Harvesting and processing season</b>	80	66.67
	July- Dec for tender nuts		
	Dec- March for ripen nuts	59	49.17
	<b>Method of harvest</b>	107	89.16
	Manual		
	Mechanical	13	10.83
	<b>Method of processing</b>		
	Kalipak / Rashi / tender nut	82	68.33
	Chali / kottapak / ripen nut	57	47.50

\*Multiple responses

Adoption of time of fertilizer application in rainfed is high compare to irrigated (38.33 % and 31.70%).

In case of method of application, ring method was adopted more when compared to fertigation (45.00 % and 39.16 % respectively) because availability of water for dissolving in soil is very less in rainfed so farmers try to apply fertilizer in recommended time only.

More than two fifth (45.00 %) adopted lime application to protect from sunrays.

Majority (79.16%) of growers adopted drip irrigation as the farmers aware of the fact that drip irrigation method saves water and is effective in avoiding weed growth followed by sprinkler and flood irrigation method (32.50% and 25.00% respectively).

In case level of irrigation more than half (60.83%) of growers adopted 175 litres/week/palm followed by 16-20 litres/day/ palm in drip irrigation (39.16 %) reason for this is irregular supply of electricity they provide irrigation in day interval.

Nearly half of the (48.33 %) growers adopted mulching as moisture conservation followed by 41.70 per cent of growers adopted growing cover crops as moisture conservation technique it conserve the moisture and retard the growth of weeds.

More than half (57.50 %) of the growers used to control koleroga by Bordeaux mixture application this might be due to technical guidance received by farmers since most of the farmers had medium level of extension contact and mass media exposure and 25.00 per cent used polythene bags to cover bunch, as it is labour intensive method of plant protection against koleroga.

About 44.20 per cent growers dug trenches with 30 cm width and 60 cm depth all around the plants, followed by drenching with 0.3 % calixin (3 ml/ltr) at 15 ltr/palm and neem cake 2 kg/palm/year to control anaberoga.

In case of nut splitting 40.00 per cent adopted method of spraying borax at 2 g/l.

In case of yellow leaf disease 35.00 per cent of growers adopted method of removal of diseased plant and 37.50 per cent of them adopted method of application of 1g phosphatic fertilizer + 2 kg neem cake per plant as two applications.

About 20.83 per cent of growers sprayed dicofol 20 EC @ 2 ml/ltr and dimethoate 30 EC @ 1.7 ml/ltr (30.00 %) to control mites. This might be due to technical guidance received by farmers since most of the farmers had medium level of extension contact and mass media

exposure.

In case of white or root grub meagre per cent (07.50 %) of growers adopted method of collect and destroying beetle because it is very labour and time intensive method of control followed by application of phorate 15 g/palm twice a year (11.67 %) and applying chloropyriphos 20 EC at 7 ml/ltr and 3 ltr/palm (10.83 %) this might be due to technical guidance received by farmers since most of the farmers had medium level of extension contact and mass media exposure.

In case of spindle bug large majority (96.67 %) of growers placed phorate granules in sachets in innermost leaf axil, since they laid the eggs in leaf axil. So, to destroy them, they placed phorate at leaf axil and convenience of application is the reason.

In case of inflorescence caterpillar 15.84 per cent of growers adopted method of removal and burning of affected inflorescence to stop the spreading of the pest.

In case of harvesting and processing more than half (66.67%) of the growers were harvest in July-dec season to harvest tender nuts to get higher price by processing it to Rashi variety and 49.17 per cent were in Dec- March season to harvest the ripen nuts because ripen nut gets low price.

Majority (89.16%) of growers adopted manual and only 10.83 per cent adopted mechanical harvesting because lack of mechanisation and mechanical harvesting that might cause damage to intercrops. Similarly, majority (68.33%) of the growers adopted kalipak/Rashi method of processing to obtain high price and profit followed by 47.50 per cent were adopted chali method of processing due to non-availability of labours during harvesting for Rashi purpose forces growers to harvest for chali type.

The distribution of overall adoption of arecanut growers in (Table 1a ) showed that two fifth (41.66 %) of grower's medium level adoption followed by low and high (30.84% and 27.50 %, respectively). The possible reason for this might be that majority of growers are

**Table 1a: Distribution of arecanut growers according to their adoption**

Sr. No.	Category	Arecanut growers	
		Frequency	Percentage
1.	Low (<22)	37	30.84
2.	Medium (22-26)	50	41.66
3.	High (>26)	33	27.5
	Mean= 24.12		SD= 4.22

having higher education and high level of extension contact which might have resulted in better knowledge of farmers regarding cultivation practices which in turn resulted in medium level adoption of recommended production technologies by the farmers.

### Conclusion:

It can be concluded that two fifth of the arecanut growers beloned to medium level of adoption category. With respect to adoption of recommended practices, majority adopted Sirsi local variety, 12-18 months old age of seedlings for transplanting, may- august planting time, 2.7×2.7m as recommended spacing, recommended quantity of FYM followed by vermicompost, drip irrigation method, placing phorate granules in sachets in innermost leaf axil for spindle bug control, July-dec season to harvest tender nuts, manual harvesting, kalipak/Rashi method of processing. There is a need to improve production technologies and adoption technologies in arecanut. Thus, the efforts should be made to deliver the required knowledge and skills through training programmes and demonstrations and conduct study tours to observe the profitable cultivation of arecanut in other states and districts.

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