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RESEARCH ARTICLE

Utility pattern of coconut climbing equipment by rural youth of Mandya district Karnataka, India

■ **M. Venkatesha, D. Raghupathi, C.M. Savitha and V.B. Sanath Kumar**

SUMMARY

Premise of research: Timely non-availability of skilled labours for harvesting nuts coupled with fluctuating market prices are the major challenges in coconut cultivation. The scarcity of labour disrupted the harvesting cycle causing loss of income to the growers. The traditional method of climbing coconut tree involved more physical drudgery, risk to the life, time consuming and less effective in harvesting nuts. Hence, a new friends of coconut tree (FOCT) was introduced and has relatively more advantageous over to that of traditional one. Realising this Coconut Development Board (CDB) had organised training programme to impart skills of using FOCT for the rural youths in association with KVKs and National Rural Livelihood Mission (NRLM), GoK. *Methodology:* The survey was conducted in Mandya district, 70 youth were selected randomly as respondents covering all the 7 talukas. Research design adopted was *Ex-post facto* evaluation type. Structured interview schedule was developed, pre-tested in non-sample area. Data were collected by personal interview method and analysed using statistical tests to draw the inference. *Pivotal results:* The findings revealed that majority of the respondents (75.72%) had used the FOCT for self (Personal use) only and all the respondents (100%) used it during *Kharif* season, followed by ¾ of them (78.57%) used during *Rabi* 2/3rd of them (67.13%) used during summer seasons. Further, majority of the respondents (62.85%) did not use the coconut palm climbing equipment for harvesting of tender nuts during *Kharif* season and had used it for harvesting of matured nuts for a period of 1 to 5 days during *Rabi* season. Followed by nearly 3/4th of them (72.86%) did not use the equipment for crown cleaning purpose during *Kharif* as it was not a regular routine activity and used it whenever tree was infested. To conclude that majority of the respondents used the FOCT for self in their gardens and also to some extent for income earning. The findings with respect to association between utility pattern of equipment and social variables, the family size, land holding and educational level found have no significant association with utility pattern of coconut climbing equipment. The socio-economic profile of the respondents was, majority of them had nucleus type of family, had owned marginal land, were professing dairy as a subsidiary occupation for their livelihood and acquired collegiate level of schooling. *Conclusion :* The skill training on coconut climbing equipment usage for harvesting coconuts to generate self employment was organised by Krishi Vigyan Kendra in association with Coconut Board during 2015. The youth entrepreneurs acquired skills by using the equipment to harvest the coconuts and cleaning of crown of coconut tree . Majority of them had used the equipment for self and a few of them used for generating self employment by going outside their gardens. The extent of utility varied from season to season. The utility pattern equipment was not significantly associated with the social

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factors such as family size, land holding and education level. There might be other factors influencing on the utility pattern of the equipment.

Key Words : Coconut climbing , Rural youth, Utility pattern, Season harvesting, Employment

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The coconut palm is being cultivated in more than 80 countries of the world. India had produced 21665 million nuts in the year 2014 from an area of 2.14 million hectare with a productivity of 10122 nuts per hectare and providing employment opportunities to more than 10 million people in the country (Anonymous, 2013). In Karnataka state coconut is the second largest important horticultural crop, occupying 31 per cent of the total area under horticultural crops. The total area under coconut in the state is around 3.33 lakh hectares with the annual production of 1754 million nuts (Anonymous, 2013). Nearly 60 per cent of the coconut produced in the State is utilized as raw nuts for domestic culinary purposes, social, cultural and religious purposes (Jnanadevan, 2015). The main coconut growing districts in Karnataka are Tumkur, Hassan, Chitradurga, Chikkmagalur, Mysore, Mandya etc. (Anonymous, 2015). Coconut palm is a tall tree and harvesting of tender nuts, mature nuts, crown cleaning and other operations involve climbing of it which requires skilled labours. Non-availability of skilled labours for harvesting nuts in time fluctuating market prices are the major challenges in which farmers looses profit in coconut cultivation. Therefore, it is envisaged that the future of coconut industry lies in its mechanization. Before the introduction of coconut climbing equipments, the nuts were harvested manually, climbing the tree using traditional equipments (rope and hook: Fig. A).

Fig. A : Traditional method of harvesting coconut

Fig. B : Chembri joseph model feature

This method involved physical drudgery, requires skill to climb and it is life risking activity, also the efficiency of harvesting was less and time consuming. To address this, many innovations have come into, among them the stepping climber FOCT (Friend of Coconut Tree) proven to be effective compared to the traditional one (Fig. B). Attempts are also made by researchers at Tamil Nadu Agricultural University, ICAR- Central Institute of Agricultural Engineering, Bhopal and a local fabricator from Ratnagiri to develop coconut harvesting equipment based on self propelled hydraulic mast where a person goes up for harvesting coconut. However, to reach tall coconut tree and undulating terrain limits the application of these harvestings are useful apart from the high initial cost. Training is one important extension teaching method through which the hands on skills can be better taught to the farmers (Adivireddy, 1977).

Chembri Joseph model features:

Joseph model has got mainly two assemblies of similar construction. The steel rope wires of both top and bottom assembly needs to be looped with the tree and locked. The users then climb on to the equipment by placing one foot each on both the assemblies holding the handles provided. Standing on one assembly the user lifts the other assembly to loosen the steel rope and raise it by hand. After attaining the comfortable height the user pushes back the assembly with foot so that it gets tightened on the tree. The user has to co-ordinate these two assemblies simultaneously by using hand and legs to climb on coconut trees. This model is available in the market at offer double costs Rs.3800/-. It does not require much skill and with 2-3 days initial training a farmer can easily climb coconut tree.

The Coconut Development Board (CDB) has initiated to organise an innovative training programme friends of coconut tree (FOCT) in association with KVKs and National Rural Livelihood Mission (NRLM), Government of Karnataka to develop a professional group of youth for harvesting of coconuts. With this background the KVK, Mandya has organized the coconut palm climbing training programmes for 220 youths in nine batches from Mandya district. Coconut Development Board (CDB) has provided coconut climbing free of cost to the trainees. The study was conducted to know what extent the FOCT was used for self employment.

Objectives of the study :

– To find out utility pattern of coconut palm climbing equipment by the respondents

– To find out the association between utility pattern of coconut climbing equipment and social variables of the respondents

– To delineate the personal and socio-personal profile of the trainers.

MATERIAL AND METHODS

The study was conducted in Mandya district which has 7 taluks *viz*., Mandya, Maddur, Pandavapura, Srirangapatna (SR.Patna), Nagamangala, Malavalli and Krishnarajapet (KR. Pet). The KVK Mandya has conducted "FOCT- Palm climbing and plant protection" training programme covering 220 youths of the district during 2013-14 to 2014-15. From a sample size of 70 youth representing 7 taluks of Mandya district were selected randomly as respondent through cluster sampling method (Anonymous, 2013). An *Ex-post-facto*, evaluation type of design was adopted. The chi square test was used to find out the association between dependent variable the 'utility pattern of coconut climbing equipment' and the 'socio personal profile' of the respondents. Simple statistical tools such as frequency and per cent were used to analyze the data and to draw the inference (Jayale, 1992).

RESULTS AND DISCUSSION

The results and discussion are presented as per the objectives of the study, under the following headings.

– The Utility pattern of the coconut palm climbing equipment

– Seasonal utility pattern of coconut palm climbing equipment

– Utility pattern of coconut palm climbing equipment for harvesting of tender nuts during *Kharif*, *Rabi* and Summer season.

– Utility pattern of coconut palm climbing equipment for harvesting of matured nuts during *Kharif*, *Rabi* and Summer season

– Seasonal utility pattern of coconut palm climbing equipment for crown cleaning during different seasons

– Association between utility pattern of coconut climbing equipment and social variables of the respondents

– Socio-personal profile of the respondents

The utility pattern of the coconut palm climbing equipment:

The findings of the study (Table 1 and Fig. 1) reveals that majority of the respondents (75.72%) used the coconut palm climbing equipment FOCT in their own garden (Personal use) only, followed by both in their own garden and commercial use (21.44%). Further, the table highlights that, a few respondents (2.86%) used the coconut palm climbing equipment exclusively for commercial purpose. The reasons could be that many of the respondents had their own garden, which required periodical harvesting of nuts and crown cleaning operation throughout the year; as a consequence, they had less time to go outside and use the equipment for commercial purpose in Mandya district. The findings are in tune with that of (Thimmaraju, 1989).

Seasonal utility pattern of coconut palm climbing equipment:

The Table 2 and Fig. 2 reveals that all the respondents (100%) used the equipment during *Kharif* season, followed by 3/4th of them (78.57%) used during *Rabi* and more of than 50 per cent during summer (67.13%) season. This implies that majority of them used the equipment throughout the year for different purposes. The extent of utility was more in *Kharif* season because of frequent nut harvesting activities. Similar findings were reported by (Thamban *et al.*, 2017).

Utility pattern of coconut palm climbing equipment for harvesting of tender nuts during *Kharif, Rabi* and summer season:

The data in the Table 3 and Fig. 3 imply that majority (62.85%) of the respondents did not use coconut palm climbing equipment for harvesting of tender nuts during *Kharif* season in all the taluks. However, some respondents (24.28%) had used for a period of 1 to 5 days followed by a few of them use for 6 to15 days to harvest the tender nuts in case of during *Kharif* season include Mandya, Nagamangala and K R pet taluks.

During *Rabi* season the majority of the respondents (82.86%) did not use coconut palm climbing equipment for harvesting of tender nuts during *Rabi* season in all the taluks. However, some respondents (12.86%) of them used for a period of 1 to 5 days followed by a few of them used for 6 to15 days to harvest the tender nuts (Table 4 and Fig. 4).

During summer season majority of respondents (80.00%) did not use coconut palm climbing equipment for harvesting of tender nuts during summer season. However, some respondents (14.28%) of them used for a period of 1 to 5 days followed by a few of them used for a period of 6 to 15 days to harvest the tender nuts (Table 5 and Fig. 5). Majority of the respondents did not use the equipment because their main occupation was

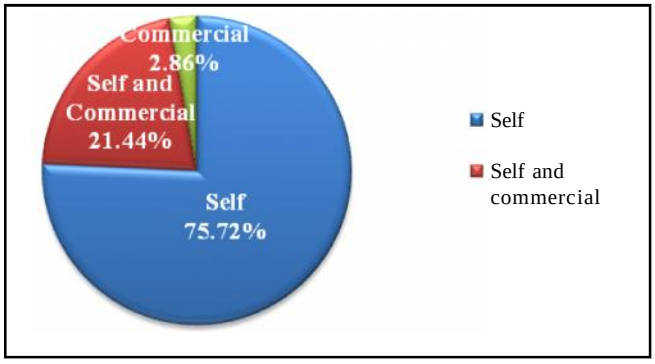

Fig. 1 : Utility pattern of coconut palm climbing equipment by the respondents

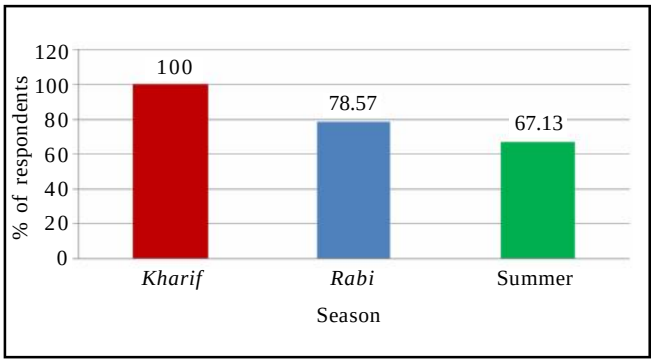

Fig. 2 : Seasonal utility pattern of the coconut palm climbing equipment by the respondents

Table 1: Utility pattern of coconut palm climbing equipment by the respondents **(n=70)**

Sr. No.	Taluk	Purpose			
		Self	Self and commercial	Commercial	Total
1.	Mandya	32 (45.71)	7 (10.00)	0 (0.00)	39 (55.71)
2.	Maddur	3 (4.29)	0 (0.00)	1 (1.43)	4 (5.73)
3.	Pandavapura	8 (11.44)	3 (4.29)	1 (1.43)	12 (17.15)
4.	S. R. Patna	2 (2.86)	0 (0.00)	0 (0.00)	2 (2.86)
5.	Nagamangala	6 (8.57)	2 (2.86)	0 (0.00)	8 (11.43)
6.	K. R. Pet	1 (1.43)	2 (2.86)	0 (0.00)	3 (4.29)
7.	Malavalli	1 (1.43)	1 (1.43)	0 (0.00)	2 (2.86)
	Total	53 (75.72)	15 (21.44)	2 (2.86)	70 (100.00)

Figures in the parenthesis indicate percentage

Table 2 : Seasonal utility pattern and purpose of coconut palm climbing equipment by the respondents **(n=70)**

Sr. No.	Particulars	No	%
1.	*Kharif*	70	100.00
2.	*Rabi*	55	78.57
3.	Summer	47	67.13

agriculture and engaged in carrying out the agriculture activities in most of the days throughout the year in all the seasons. Whenever they find time they used the equipment to harvest the tender nuts. Further, the respondents used the equipment to harvest the matured nuts for income earning selling in the market and did not use to harvest purpose for tender nuts in their own gardens (Jaganathan *et al.*, 2016).

Utility pattern of coconut palm climbing equipment for harvesting of matured nuts during *Kharif, Rabi* and summer season:

It is found that 1/3rd of the respondents (37.14%) has used the equipment for 6 to 10 days, followed by next 1/3rd of them (34.29%) used for 1 to 5 days during *Kharif* season. Very few respondents (around 4%) have used more than 20 days (Table 6 and Fig. 6). Many of the respondents used the coconut palm climbing equipment for harvesting of matured nuts for a period of 6 to10 days during *Kharif* season because they engaged in agriculture as it is major occupation for their livelihood and they found less time to harvest the nuts and they may own less number of palms in their land. The findings are similar to that of Singh and Mridula (2016).

During *Rabi* season the coconut palm climbing equipment was put in to use for a period of 20 days. Majority of the respondents (48.57%) used coconut palm climbing equipment for harvesting of matured nuts in a

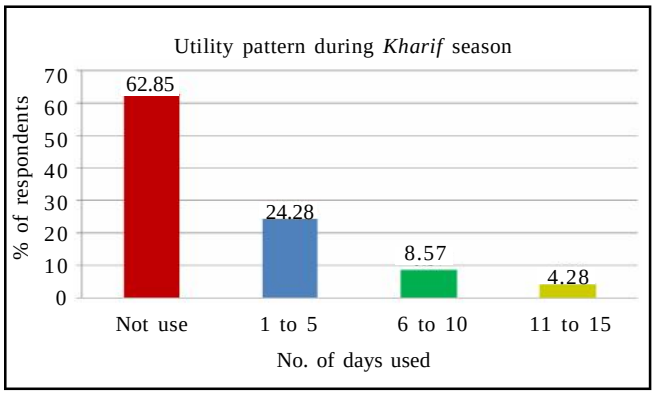

Fig. 3 : Seasonal utility pattern of the coconut palm climbing equipment for harvesting of Tender nuts during *Kharif* season

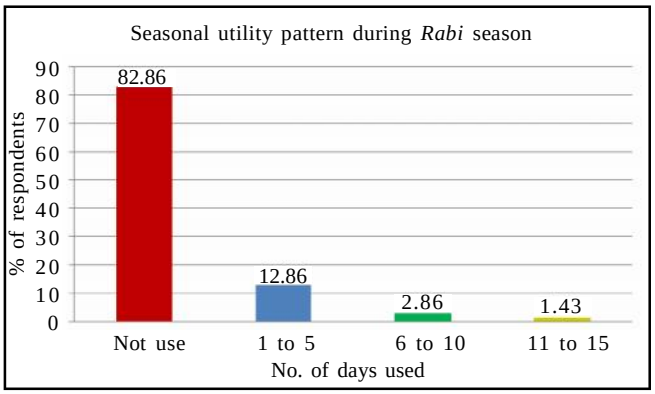

Fig. 4 : Seasonal utility pattern of coconut palm climbing equipment for harvesting of Tender nuts during *Rabi* season

Table 3 : Seasonal utility pattern of the coconut palm climbing equipment for harvesting of tender nuts during *Kharif* season (n=70)

No. of days (Range)	Taluks							
	Mandya	Maddur	Pandavapura	S.R.Patna	Nagamangala	K.R.Pet	Malavalli	Total
	No.	No.	No.	No.	No.	No.	No.	No.
Not use	25 (35.71)	4 (5.71)	11 (15.71)	2 (2.86)	1 (1.43)	0 (0.00)	1 (1.43)	44 (62.85)
1 to 5	11 (15.71)	0 (0.00)	0 (0.00)	0 (0.00)	5 (7.14)	1 (1.43)	0 (0.00)	17 (24.28)
6 to 10	0 (0.00)	0 (0.00)	1 (1.43)	0 (0.00)	2 (2.86)	2 (2.86)	1 (1.43)	6 (8.57)
11 to 15	3 (4.29)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	3 (4.28)
Total	39 (55.71)	4 (5.71)	12 (17.14)	2 (2.86)	8 (11.43)	3 (4.29)	2 (2.86)	70 (100.00)

Figures in the parenthesis indicate percentage

Table 4 : Utility pattern of coconut palm climbing equipment for harvesting of tender nuts during *Rabi* season (n=70)

No. of days (Range)	Taluks							
	Mandya	Maddur	Pandavapura	S.R.Patna	Nagamangala	K.R.Pet	Malavalli	Total
	No.	No.	No.	No.	No.	No.	No.	No.
Not use	28 (40.00)	4 (5.71)	12 (17.14)	2 (2.86)	8 (11.43)	3 (4.29)	1 (1.43)	58 (82.86)
1 to 5	9 (12.86)	0 (0.00)	0 0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	9 (12.86)
6 to 10	1 (1.43)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	1 (1.43)	2 (2.86)
11 to 15	1 (1.43)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	1 (1.43)
Total	39 (55.71)	4 (5.71)	12 (17.14)	2 (2.86)	8 (11.43)	3 (4.29)	2 (2.86)	70 (100.00)

Figures in the parenthesis indicate percentage

period of 1 to 5 days. However, 1/4th of the respondents did not use coconut palm climbing equipment for harvesting of matured nuts. Further, a few of them (around 14%) of the respondents used coconut palm climbing equipment for harvesting of matured nuts in a period of 6 to 10 days (Table 7 and Fig. 7).

During summer season the (Table 8 and Fig. 8) many of the respondents (37.14%) had used coconut palm climbing equipment for harvesting of matured nuts only for 1 to 5 days. However, 1/5th of respondents (21.43%) of them used a period of 6 to 10 days followed by a few of them used for 11 to 20 days to harvest the matured nuts during summer season. However, many of the respondents (35.72%) did not use coconut palm climbing equipment for harvesting of matured nuts during summer season because of less bearing of nuts. Similar findings were observed by Nayak (2014).

Seasonal utility pattern of coconut palm climbing equipment for crown cleaning during different seasons:

The results of the study show that (Table 9 and Fig. 9) majority of the respondents (72.86%) did not use coconut palm climbing equipment for crown cleaning

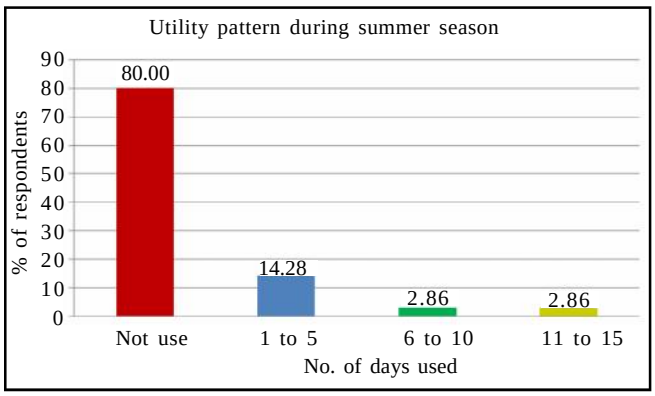

Fig. 5 : Seasonal utility pattern of coconut palm climbing equipment for harvesting of Tender nut during Summer season

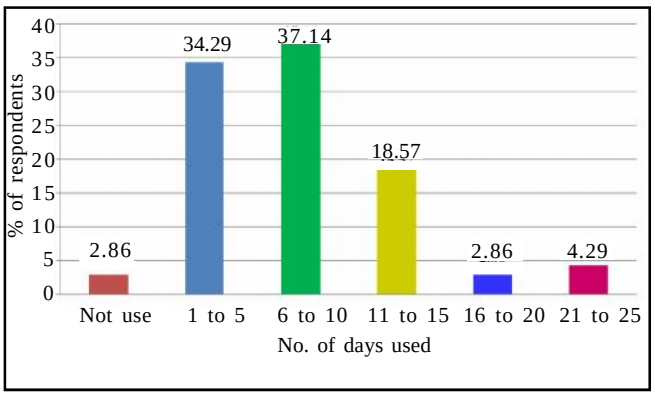

Fig. 6 : Seasonal utility pattern of coconut palm climbing equipment for harvesting of Matured nuts during *Kharif* season

Table 5 : Seasonal utility pattern of the coconut palm climbing equipment for harvesting of tender nuts during summer season (n=70)

No. of days (Range)	Taluks							
	Mandya	Maddur	Pandavapura	S.R.Patna	Nagamangala	K.R.Pet	Malavalli	Total
	No	No.	No.	No.	No.	No.	No.	No.
Not use	28 (40.00)	4 (5.71)	12 (17.14)	2 (2.86)	6 (8.57)	3 (4.29)	1 (1.43)	56 (80.00)
1 to 5	9 (12.86)	0 (0.00)	0 0.00)	0 (0.00)	1 (1.43)	0 (0.00)	0 (0.00)	10 (14.28)
6 to 10	0 (0,00)	0 (0.00)	0 (0.00)	0 (0.00)	1 (1.43)	0 (0.00)	1 (1.43)	2 (2.86)
11 to 15	2 (286)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	2 (2.86)
Total	39 (55.72)	4 (5.72)	12 (17.14)	2 (2.86)	8 (11.42)	3 (4.29)	2 (2.86)	70 (100.00)

Figures in the parenthesis indicate percentage

Table 6 : Seasonal utility pattern of the coconut palm climbing equipment for harvesting of matured nuts during *Kharif* season (n=70)

No. of days (Range)	Taluks							
	Mandya	Maddur	Pandavapura	S.R.Patna	Nagamangala	K.R.Pet	Malavalli	Total
	No.	No.	No.	No.	No.	No.	No.	No.
Not use	2 (2.86)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	2 (2.86)
1 to 5	15 (21.44)	2 (2.86)	2 (2.86)	2 (2.86)	3 (4.29)	0 (0.00)	0 (0.00)	24 (34.29)
6 to 10	12 (17.14)	2 (2.86)	7 (10.00)	0 (0.00)	2 (2.86)	3 (4.29)	0 (0.00)	26 (37.14)
11 to 15	6 (8.57)	0 (0.00)	2 (2.86)	0 (0.00)	3 (4.29)	0 (0.00)	2 (2.86)	13 (18.57)
16 to 20	1 (1.43)	0 (0.00)	1 (1.43)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	2 (2.86)
21 to 25	3 (4.29)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	3 (4.29)
Total	39 (55.72)	4 (5.71)	12 (17.14)	2 (2.86)	8 (11.43)	3 (4.29)	2 (2.86)	70 (100.00)

Figures in the parenthesis indicate percentage

operation during *Kharif* season. However, remaining (27.15 %) of the respondents had used the coconut palm climbing equipment only for a period of 1 to 5 days. Similar trend was also observed during *Rabi* season (Table 10 and Fig. 10) and summer season (Table 11 and Fig. 11). The reason could be that the respondents might have felt that crown cleaning operation console occasional and not a regular activity to be taken up, only during when there was an infestation from the rodent and other pest, crown cleaning is necessary. The clubbed results for all the seasons have shown in the (Table 12 and Fig. 12). The findings are similar to that of Thippeswamy (2007).

Association between the utility pattern of coconut climbing equipment and the social independent variables :

Association between utility pattern of coconut climbing equipment and the family size :

It was found that there was no significant association between utility pattern of coconut climbing equipment and family size (Table 13). It implies that irrespective of family size the respondents had used it without much difference for profit. The possible reasons for this could be the non-involvement of children in farming as they were sent to school for education and

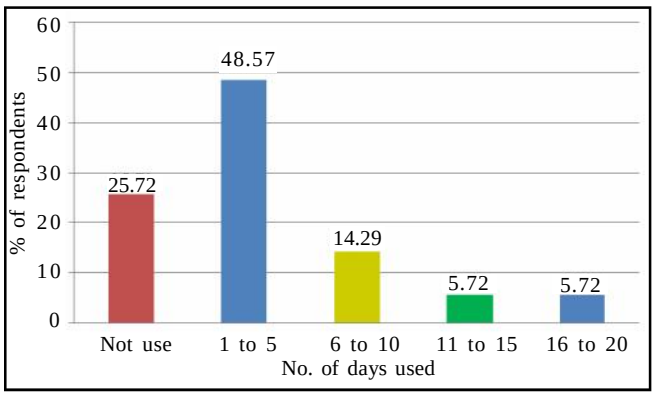

Fig. 7 : Seasonal utility pattern of coconut palm climbing equipment for harvesting of matured nuts during *Rabi* season

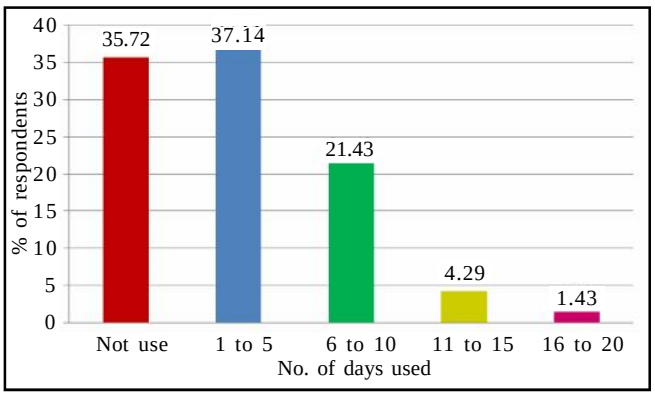

Fig. 8 : Seasonal utility pattern of the coconut palm climbing equipment for harvesting of matured nuts during summer season

Table 7 : Seasonal utility pattern of the coconut palm climbing equipment for harvesting of matured nuts for *Rabi* season (n=70)

No. of days (range)	Taluks							
	Mandya	Maddur	Pandavapura	S.R.Patna	Nagamangala	K.R.Pet	Malavalli	Total
	No.	No.	No.	No.	No.	No.	No.	No.
Not use	8 (11.43)	0 (0.00)	0 (0.00)	0 (0.00)	7 (10.00)	3 (4.29)	0 (0.00)	18 (25.72)
1 to 5	24 (34.28)	2 (2.86)	6 (8.57)	2 (2.86)	0 (0.00)	0 (0.00)	0 (0.00)	34 (48.57)
6 to 10	5 (7.14)	2 (2.86)	2 (2.86)	0 (0.00)	1 (1.43)	0 (0.00)	0 (0.00)	10 (14.29)
11 to 15	0 (0.00)	0 (0.00)	2 (2.86)	0 (0.00)	0 (0.00)	0 (0.00)	2 (2.86)	4 (5.72)
16 to 20	2 (2.86)	0 (0.00)	2 (2.86)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	4 (5.72)
Total	39 (55.71)	4 (5.71)	12 (17.15)	2 (2.86)	8 (11.43)	3 (4.29)	2 (2.86)	70 (100.00)

Figures in the parenthesis indicate percentage

Table 8 : Seasonal utility pattern of the coconut palm climbing equipment for harvesting of matured nuts during summer season (n=70)

No. of days (Range)	Taluks							
	Mandya	Maddur	Pandavapura	S.R.Patna	Nagamangala	K.R.Pet	Malavalli	Total
	No.	No.	No.	No.	No.	No.	No.	No.
Not use	13 (18.57)	1 (1.43)	0 (0.00)	0 (0.00)	8 (11.43)	3 (4.29)	0 (0.00)	25 (35.72)
1 to 5	17 (24.28)	3 (4.29)	4 (5.71)	2 (2.86)	0 (0.00)	0 (0.00)	0 (0.00)	26 (37.14)
6 to 10	7 (10.00)	0 (0.00)	7 (10.00)	0 (0.00)	0 (0.00)	0 (0.00)	1 (1.43)	15 (21.43)
11 to 15	2 (2.86)	0 (0.00)	2 (2.86)	0 (0.00)	0 (0.00)	0 (0.00)	1 (1.43)	3 (4.29)
16 to 20	0 (0.00)	0 (0.00)	1 (1.43)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	1 (1.43)
Total	39 (55.71)	4 (5.72)	12 (17.14)	2 (2.85)	8 (11.43)	3 (4.29)	2 (2.86)	70 (100.00)

Figures in the parenthesis indicate percentage

the adult members dependency in non-agricultural income sources from the cities to supplement the family livelihood. The findings are in tune with that of Nagesh (2006).

Association between utility pattern of coconut climbing equipment and the land holding :

It was found that there was no significant association between utility pattern of coconut climbing equipment and land holding (Table 14). It implies that irrespective of land holding size, the respondents had used it without much difference for profit. The possible reasons could be that the small farmers might have intensively undertaken the coconut harvesting activities both on his farm and in other gardens. In the case of medium farmers they might had taken it up casually without much intensive care, though they had affordable capacity for more inputs and machinery facilities. The similar findings were reported by Latha (2003).

Association between utility pattern of coconut climbing equipment and education level :

The study found that there was no significant association between utility pattern of coconut climbing equipment and education level (Table 15). It implies that the literacy had not played a key role in enhancing the utility pattern. Both illiterates and literate respondents had used it without much difference for profit. The possible reasons could be that it normally utility level does not require much technical skill. The findings are similar lines with that of Thippeswamy (2007).

Socio-personal profile of the respondents :

Family size of the respondents :

The family size is an important factor for sharing of agricultural operations thus reducing production cost under the present situation of increasing farm labour scarcity. In this connection the Table 16 reveals that majority of the respondents (55.72%) had 4 to 5 family

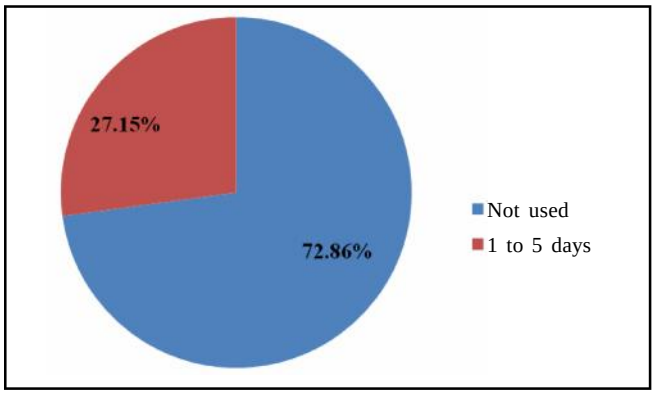

Fig. 9 : Seasonal utility pattern of coconut palm climbing equipment for crown cleaning during *Kharif* season

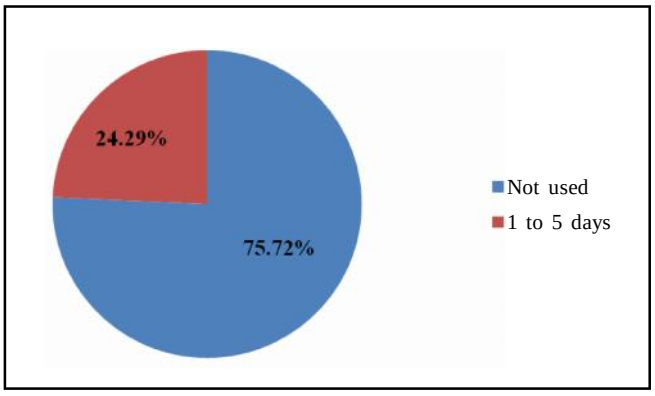

Fig. 10 : Seasonal utility pattern of coconut palm climbing equipment for crown cleaning during *Rabi* season

Table 9 : Seasonal utility pattern of the coconut palm climbing equipment for crown cleaning during *Kharif* season (n=70)

No. of days (Range)	Taluks							
	Mandya	Maddur	Pandavapura	S.R.Patna	Nagamangala	K.R.Pet	Malavalli	Total
	No.	No.	No.	No.	No.	No.	No.	No.
Not used	29 (41.43)	3 (4.29)	8 (11.43)	2 (2.86)	6 (8.56)	3 (4.29)	0 (0.00)	51 (72.86)
1 to 5	10 (14.29)	1 (1.43)	4 (5.71)	0 (0.00)	2 (2.86)	0 (0.00)	2 (2.86)	19 (27.15)
Total	39 (55.72)	4 (5.72)	12 (17.14)	2 (2.86)	8 (11.43)	3 (4.29)	2 (2.86)	70 (100.00)

Figures in the parenthesis indicate percentage

Table 10 : Seasonal utility pattern of coconut palm climbing equipment for crown cleaning during *Rabi* season (n=70)

No. of days (Range)	Taluks							
	Mandya	Maddur	Pandavapura	S.R.Patna	Nagamangala	K.R.Pet	Malavalli	Total
	No.	No.	No.	No.	No.	No.	No.	No.
Not used	30 (42.86)	4 (5.71)	6 (8.58)	2 (2.85)	8 (11.43)	3 (4.29)	0 (0.00)	53 (75.72)
1 to 5	9 (12.86)	0 (0.00)	6 (8.57)	0 (0.00)	0 (0.00)	0 (0.00)	2 (2.86)	17 (24.29)
Total	39 (55.71)	4 (5.71)	12 (17.14)	2 (2.86)	8 (11.43)	3 (4.29)	2 (2.86)	70 (100.00)

Figures in the parenthesis indicate percentage

members (Parents and Children). Further, the table implies dwindling joint family structure and small family norms are becoming the order of the day in the project area.

Land holding of the respondents :

The Table17 indicates that many of the respondents (31.44%) had owned land upto 2.1 to 4.0 acre, followed by one fourth of the respondents had owned 1.1 to 2.0 acres and > 4 acres of land. This implies majority of the respondents had <4.0 acres of land for cultivation.

Subsidiary enterprises of the respondents :

The subsidiary enter prised would supplement the income for livelihood. The Table 18 indicates that majority of the respondents (77.15%) had a dairy as a subsidiary occupation followed by poultry (11.43%). Sheep and sericulture enterprises together on a very small scale were professed as a secondary source of income earning.

Education level of the respondents :

Education plays an important role in learning the new technologies and application of them in their field

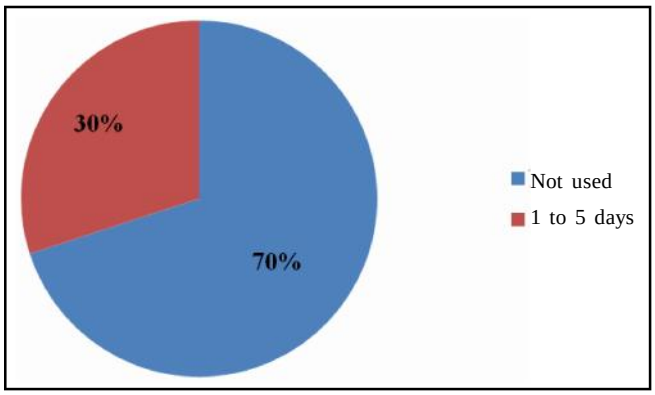

Fig. 11 : Seasonal utility pattern of the coconut palm climbing equipment for crown cleaning during summer season

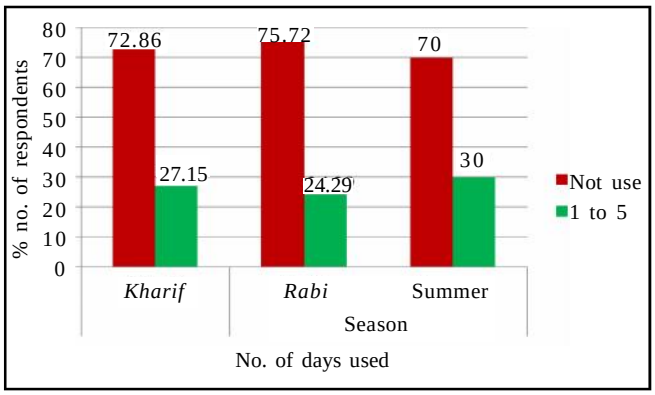

Fig. 12 : Seasonal utility pattern of the coconut palm climbing equipment for crown cleaning during different seasons

Table 11 : Seasonal utility pattern of the coconut palm climbing equipment for crown cleaning during Summer season (n=70)

No. of days (Range)	Taluks							
	Mandya	Maddur	Pandavapura	S.R.Patna	Nagamangala	K.R.Pet	Malavalli	Total
	No.	No.	No.	No.	No.	No.	No.	No.
Not use	26 (37.14)	4 (5.71)	5 (7.17)	2 (2.86)	8 (11.43)	3 (4.29)	1 (1.43)	49 (70.00)
1 to 5	13 (18.57)	0 (0.00)	7 (10.00)	0 (0.00)	0 (0.00)	0 (0.00)	1 (1.43)	21 (30.00)
Total	39 (55.71)	4 (5.71)	12 (17.14)	2 (2.86)	8 (11.43)	3 (4.29)	2 (2.86)	70 (100.00)

Figures in the parenthesis indicate percentage

Table 12 : Seasonal utility pattern of the coconut palm climbing equipment for crown cleaning during different seasons (n=70)

No. of days (Range)	Taluks							
	Mandya	Maddur	Pandavapura	S.R.Patna	Nagamangala	K.R.Pet	Malavalli	Total
	No.	No.	No.	No.	No.	No.	No.	No.
Kharif								
Not use	29 (41.43)	3 (4.29)	8(11.43)	2 (2.86)	6(8.57)	3 (4.29)	0 (0.00)	51 (72.86)
1 to 5	10 (14.29)	1 (1.43)	4 (5.71)	0 (0.00)	2 (2.86)	0 (0.00)	2 (2.86)	19 (27.15)
Total	39 (55.72)	4 (5.72)	12 (17.14)	2 (2.86)	8 (11.43)	3 (4.29)	2 (2.86)	70 (100.00)
Rabi								
Not use	30 (42.86)	4 (5.71)	6 (8.57)	2 (2.86)	8 (11.43)	3 (4.29)	0 (0.00)	53 (75.72)
1 to 5	9 (12.86)	0 (0.00)	6 (8.57)	0 (0.00)	0 (0.00)	0 (0.00)	2 (2.85)	17 (24.29)
Total	39 (55.71)	4 (5.71)	12 (17.14)	2 (2.86)	8 (11.43)	3 (4.29)	2 (2.86)	70 (100.00)
Summer								
Not use	26 (37.14)	4 (5.72)	5 (7.14)	2 (2.86)	8 (11.43)	3 (4.29)	1 (1.43)	49 (70.00)
1 to 5	13 (18.57)	0 (0.00)	7 (10.00	0 (0.00)	0 (0.00)	0 (0.00)	1 (1.43)	21 (30.00)
Total	39 (55.71	4 (5.71)	12 (17.14)	2 (2.86)	8 (11.43)	3 (4.29)	2 (2.86)	70 (100.00)

Figures in the parenthesis indicate percentage

level for their livelihood. The Table 19 reveals that many of the respondents (48.57%) had a education upto college level and above. Considerable percentage of the respondents (34.30%) had an education level upto high school. Only small percentages of the respondents table (2.86%) were Illiterate.

Assets possessed by the respondents :

Majority of the respondents (50%) owned the assets in the form of materials for their agricultural and allied activities (Table 20). Further, all respondents (100 %) owned mobile phones, which is part of the life style know-a-days for communication. More than 3/4th of the respondents had scooters, TV/ radio etc, majority of the respondents (54.28%) had bullock cart and one fourth of the respondents had cycle for carrying the coconut

Table 13: Association between utility pattern of coconut climbing equipment and family size of respondents (n=70)

Family size (no)	Utility pattern of equipment				Chi -square value
	High	Medium	Low	Total	
Small (2-6)	6 (8.75)	7 (10.00)	18 (25.71)	31 (44.28)	0.0933^{NS}
Big (7-11)	7 (10.00)	10 (14.28)	22 (31.42)	39 (55.71)	
Total	13 (18.57)	17 (24.28)	40 (57.14)	70 (100)	

NS: Non significant association Figures in the parentheses indicate percentage

Table 14 : Association between Utility pattern of coconut climbing equipment and land holding of the respondents (n=70)

Land holding (ha)	Utility pattern of equipment				Chi-square value
	High	Medium	Low	Total	
0.1 to 2.0	7 (10.00)	5 (7.14)	15 (21.42)	27 (38.57)	1.902^{NS}
2.0 to 4.0	6 (8.57)	12 (17.14)	25 (35.71)	43 (61.42)	
Total	13 (18.57)	17 (24.28)	40 (57.14)	70 (100)	

NS: Non significant association: Figures in the parentheses indicate percentage

Table 15: Association between utility patterns of coconut climbing education level (n=70)

Education level	Utility pattern of equipment				Chi-square values
	41-45	46-50	51-55	Total	
Illiterates	5 (7.14)	8 (11.42)	8 (11.42)	21 (30)	4.704^{NS}
Literates	8 (11.42)	9 (12.85)	32 (45.71)	49 (70)	
Total	13 (18.57)	17 (24.28)	40 (57.14)	70 (100)	

NS: Non significant association: Figures in the parentheses indicate percentage

Table 16: Family size of the respondents (n=70)

Family members (Range)	Taluks							
	Mandya	Maddur	Pandavapura	S.R.Patna	Nagamangala	K.R.Pet	Malavalli	Total
	No.	No.	No.	No.	No.	No.	No.	No.
2 to 3	5 (7.14)	2 (2.86)	2 (2.86)	0 (0.00)	1 (1.43)	0 (0.00)	1 (1.43)	11 (15.71)
4 to 5	21 (30.00)	2 (2.86)	5 (7.14)	2 (2.86)	6 (8.57)	3 (4.29)	0 (0.00)	39 (55.72)
6 to 7	7 (10.00)	0 (0.00)	4 (5.71)	0 (0.00)	1 (1.43)	0 (0.00)	1 (1.43)	13 (18.57)
8 to 9	6 (8.57)	0 (0.00)	1 (1.43)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	7 (10.00)
Total	39 (55.71)	4 (5.72)	12 (17.14)	2 (2.86)	8 (11.43)	3 (4.29)	2 (2.86)	70 (100.00)

Figures in parenthesis indicates per cent values / Mb

Table 17 : Land holdings of the respondents (n=70)

Land holdings (ac)	Taluks							
	Mandya	Maddur	Pandavapura	S.R.Patna	Nagamangala	K.R.Pet	Malavalli	Total
	No.	No.	No.	No.	No.	No.	No.	No.
Upto 1	5 (7.14)	0 (0.00)	3 (4.29)	0 (0.00)	1 (1.43)	1 (1.43)	0 (0.00)	10 (14.29)
1.1 to 2.0	12 (17.14)	2 (2.86)	1 (1.43)	0 (0.00)	1 (1.43)	2 (2.86)	1 (1.43)	19 (27.14)
2.1 to 4.0	12 (17.14)	2 (2.86)	3 (4.29)	2 (2.86)	3 (4.29)	0 (0.00)	0 (0.00)	22 (31.44)
>4.1	10 (14.29)	0 (0.00)	5 (7.14)	0 (0.00)	3 (4.29)	0 (0.00)	1 (1.43)	19 (27.14)
Total	39 (55.71)	4 (5.72)	12 (17.14)	2 (2.86)	8 (11.43)	3 (4.29)	2 (2.86)	70 (100.00)

Figures in parenthesis indicates per cent

Table 18: Subsidiary enterprises undertaken by the respondents **(n=70)**

Enterprise	Taluks							
	Mandya	Maddur	Pandavapura	S.R.Patna	Nagamangala	K.R.Pet	Malavalli	Total
	No.	No.	No.	No.	No.	No.	No.	No.
Dairy	28 (40.00)	3 (4.29)	10 (14.29)	2 (2.86)	8 (11.43)	2 (2.86)	1 (1.43)	54 (77.15)
Sericulture	2 (2.86)	1 (1.43)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	3 (4.29)
Poultry	5 (7.14)	0 (0.00)	1 (1.43)	0 (0.00)	0 (0.00)	1 (1.43)	1 (1.43)	8 (11.43)
Goat	0 (0.00)	0 (0.00)	1 (1.43)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	1(1.43)
Sheep	4 (5.71)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	4 (5.71)
Total	39 (55.71)	4 (5.71)	12 (17.15)	2 (2.86)	8 (11.43)	3 (4.29)	2 (2.86)	70 (100.00)

Figures in parenthesis indicates per cent

Table 19 : Education level **(n=70)**

Education	Taluks							
	Mandya	Maddur	Pandavapura	S.R.Patna	Nagamangala	K.R.Pet	Malavalli	Total
	No.	No.	No.	No.	No.	No.	No.	No.
Illiterates	0 (0.00)	0 (0.00)	1 (1.43)	0 (0.00)	1 (1.43)	0 (0.00)	0 (0.00)	2 (2.86)
Primary	7 (10.00)	0 (0.00)	1 (1.43)	0 (0.00)	1 (1.43)	1 (1.43)	0 (0.00)	10 (14.29)
High School	10 (14.29)	2 (2.86)	8 (11.43)	0 (0.00)	2 (2.86)	1 (1.43)	1 (1.43)	24 (34.3)
College and above	22 (31.42)	2 (2.86)	2 (2.86)	2 (2.86)	4 (5.71)	1 (1.43)	1 (1.43)	34 (48.57)
Total	39 (55.71)	4 (5.71)	12 (17.15)	2 (2.86)	8 (11.43)	3 (4.29)	2 (2.86)	70 (100.00)

Figures in parenthesis indicates per cent

Table 20 : Assets possession by the respondents **(n=70)**

Assets	Taluks							
	Mandya	Maddur	Pandavapura	S.R.Patna	Nagamangala	K.R.Pet	Malavalli	Total
	No.	No.	No.	No.	No.	No.	No.	No.
Bullock cart	26 (37.14)	3(4.28)	7 (10.00)	0 (0.00)	1(1.42)	0 (0.00)	1 (1.42)	38 (54.28)
TV or Radio	21 (30.00)	3 (4.28)	5 (7.14)	2 (2.85)	8 (11.42)	3 (4.28)	2 (2.85)	44 (62.85)
Scooter	30 (42.85)	4 (5.71)	9 (12.85)	2 (2.85)	8 (11.42)	3 (4.28)	1 (1.42)	57 (81.42)
Cycle	8 (11.42)	3 (4.28)	1 (1.42)	1 (1.42)	1 (1.42)	1 (1.42)	2 (2.85)	17 (24.28)
Tractor	3 (4.28)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	3 (4.28)
Mobile	39 (55.71)	4 (5.71)	12 (17.14)	2 (2.85)	8 (11.42)	3 (4.28)	2 (2.85)	70 (100.00)
Car or Jeep	3 (4.28)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	3 (4.28)

Figures in parenthesis indicates per cent

palm climbing equipment to get employment for their livelihood, as a part of the life style to reach the place and to carry out the work in time.

Conclusion :

The Coconut Board has sponsored the training to impart the skills of coconut harvesting equipment FOCT and the KVK Mandya has organised it for rural youth of Mandya district to provide hands-on-skills of using FOCT for self employment. The findings revealed that the utility of the to harvest tender nuts was relatively more during *Kharif* season. They used for a period of 1 to 6 days during *Kharif* season when compared to *Rabi* and summer seasons. A similar trend was found in case of harvesting matured nuts. Further, it was used very less frequently for crown cleaning purpose as it is done once in a while whenever infestation was noticed. Majority of the respondents used it for self in their garden and less it was used for commercial purpose to earn money. There was no significant association between the utility pattern of coconut climbing equipment with that of family size, land holdings size and education level of the respondents. The socio personal profile of the respondents with respect to family size, majority of them had nucleus type of small family and there was break down of joint family system. With respect to land holding, majority of them owned less than 4 acres of land belonging to marginal and small family category. In case of education, their level of schooling was upto PUC (10+2) and there were few of them were illiterates. Finally, with respect to asset possession almost all the respondents had mobiles phones followed by scooter and radio for communication and

mobility purpose.

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REFERENCES

Adivireddy, A. (1977). *Extension education*. Bapatla, Lakshmi Press, Andhra Pradesh.

Anonymous (1997). Package of practice for fruits and plantation crops. University of Agricultural Sciences, Bangalore. pp. 96.

Anonymous (2013). FOCT: *Coconut palm climbing and plant protection training programme report.* Krishi Vigyan Kendra, V.C. Farm, Mandya, Karnataka.

Anonymous (2013). *Horticulture crops statistics of Karnataka: State at a glance* 2013-14. Department of Horticulture, Lalbagh, Bangalore, 166 pp.

Anonymous (2015). *Mandya district at a glance*. District Statistical Office Mandya. Karnataka.

Jaganathan, D., Thamban, C., Subramanian, P and Jayasehekhar, S. (2016). Production processing and marketing mechanism in coconuts. *Training manual*, CAR-CPCRI, Kasaragod, Kerala, 66 pp.

Jnanadevan, R. (2015). Re-orientation of coconut production to meet the demand for value addition. *Indian Coconut J.*, **1** : 15-17.

Jayale, P.S. (1992). A study on extent of adoption and sustainability horticulture crops advocated by horticultural department. M.Sc. (Ag.) Thesis, Maharashtra Agricultural University, Parbhani (M.S.) India.

Ladaniya, M.S., Wanjari, Vinod and Mahalle, B.C. (2003). Price spread of pomegranate. *Indian J. Agric. Econ.*, **58**(3): 800-811.

Latha, K.B. (2003). A critical analysis of adoption level, economic performance and marketing channels of coconut growers in central dry zone of Karnataka, M.Sc. (Ag.) Thesis, University of Agricultural Sciences, Bangalore (Karnataka) India.

Nagesh (2006). Study on entrepreneurial behaviour of pomegranate growers in Bagalkot district of Karnataka, M.Sc. (Ag.) Thesis, University of Agricultural Sciences, Dharwad (Karnataka) India.

Nayak (2014). A study on knowledge, adoption and economic performance of arecanut growers in north kanara district of Karnataka, M.Sc. (Ag.) Thesis, University of Agricultural Sciences, Bangalore (Karnataka) India.

Rajni, Singh, Satpal and Walia, S.S. (2017). Productivity and economics of improved interventions in existing farming system modules of Punjab. *Indian J. Extn. Edu.*, **52** (1 & 2): 117-120.

Singh, G.R. and Mridula, K. (2016). Technology mission on coconut an overview. *Indian Coconut J.*, **7** : 17-20.

Thamban, C., Subramanian, P. and Jayasekhar, S. ICAR-Central Plantation Crops Research Institute, Kasaragod, (2016). Management of coconut garden during rainy season. *Indian Coconut J.*, **4** : 8-12

Thamban, C., Nair, K.M. and Lijo, Thomas (2017). Enhancing productivity and income from coconut farming in Kerala. *Indian Coconut J.*, **4** : 17-21

Thimmaraju, G. (1989). A study on economic performance of coconut growers in Tumkur district, Karnataka state, M.Sc. Thesis, University of Agricultural Sciences, Bangalore (Karnataka) India.

Thippeswamy, R. (2007). A study on knowledge and adoption of plant protection measures in coconut cultivation by farmers of Chitradurga district. M.Sc. (Ag.) Thesis, University of Agricultural Sciences, Dharwad (Karnataka) India.