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Study on drought management practices in mulberry sericulture in dry agro climatic zones of Karnataka State, India

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Abstract

Sericulture is an agro industry significantly contributing for the rural development throughout Karnataka. Recent droughts affected Mulberry cultivation and Silk worm rearing in many sericultural clusters in the Karnataka. Study was conducted with the sericulture farmers of central and southern dry agro climatic zone of Karnataka to find out the drought management practices adopted. The farmer's wise adoption index was calculated for 30 identified drought management technologies. The study inferred that 34 percent of the sericulturists were medium adopters and 66 percent were low adopters. 70 percent of technologies have low extent of adoption, 7 percent have medium extent of adoption and 23 percent of technologies have high extent of adoption. 76 percent of the farmers are affected by water shortage to carry out their sericultural activities. The study suggests for taking suitable efforts to increase the awareness and to increase the adoption of technologies in an integrated manner for quality linked silk production in the drought areas.

Keywords: Adoption, drought management, mulberry cultivation, silkworm rearing.

Introduction

Sericulture is an agro industry mainly aims to produce quality silk. Mulberry cultivation, silkworm rearing, reeling of cocoons and silk weaving are main divisions of sericulture. Karnataka is the major silk producing state of India. Mulberry cultivation and silk worm rearing are done in all the parts of the state. The improved technologies developed by the research institutes transformed sericulture from the traditional nature of production, which existed earlier, to a vibrant enterprise presently.

The production and productivity of Indian sericulture has therefore increased many folds. However, the quality and quantity is becoming a major concern now days in drought prone areas. Low rainfall, depleting water table, occurrence of drought and scarcity of water for irrigation had affected sericulture in this part. In Karnataka, 46 sericulture clusters are being identified for the rearing of bivoltine silkworm hybrids. It is reported that Sericulture is the most profitable occupation in drought areas[1]. Sericulture practiced in the drought-prone areas is highly profitable on comparing with the food and other commercial crops[2].

Even though there is water shortage, the farmers rear silkworms as continuous activity throughout the year[3]. The quality and quantity of mulberry leaves and silk cocoon productions are severely affected by the drought situations[4]. During drought seasons quality of mulberry leaf yield is reduced which in turn affects the growth of silkworms. The hot and desiccating winds make silkworms weak and more prone to diseases which cause partial or complete death of worms and leads to inferior quality of silk cocoons production[5].

In Karnataka nearly 50 percent of the total area of mulberry is grown under dry climatic zones and increase in leaf productivity during drought periods can have significant increase on silk production[5]. Adoption of Integrated Drought Management technologies will help to mitigate the ill effects of drought[6]. In dry land crops all the technologies should be adopted in integrated manner to get the expected productivity[7]. The extent of adoption of technologies by the farmers is of various levels. Management of drought starts before drought situation arise[8]. Preparedness before drought is required for the drought management. Reacting to drought is more expensive and less efficient than adopting managing actions in an integrated manner. Hence, this study was conducted to find out the extent of adoption of drought management technologies by the farmers at drought prone areas of Karnataka and to find out the technological gaps in the field.

Methodology

The sericulture clusters of central and southern dry agro climatic zones of Karnataka were selected for the study. The average annual rainfall of the study area ranges from 450mm to 600mm. The hydrometric division of India Meteorological Department reports that the rainfalls received in these areas are not uniform and highly uneven. Recurrence of drought is a common phenomenon in this area. From this zone two major sericulture

clusters namely, Ithandahally and Tumkur were selected based on crisis vulnerability. Hundred farmers were selected by simple random sampling design to avoid biasness. The data were collected with the structured interview schedule.

An interview schedule designed constituted the socioeconomic characteristics and thirty drought management technologies. The schedule was pre-tested and necessary modifications were made. Through personal interviews of the sericulture farmers data were collected. The adoption of thirty identified drought management technologies were collected.

Extent of adoption: The farmers were found to adopt the technologies at different extent. They were grouped as, 1, nil adoption when the farmer didn't adopt the technology, 2, partial adoption means the farmer adopt the technology partially or on a limited basis and 3, full adoption means the farmers adopt the technology in full, as recommended. The extent of adoption of the selected farmers was calculated by giving adoption score. Score of 2 was given for full adoption and score of 1 was given for partial adoption and score of 0 was given for nil adoption. Thirty drought management technologies were given equal importance. Low, medium and high adopters were grouped based on their adoption score. The adoption index was computed for each farmer as below:

$$\text{Adoption index} = \frac{\text{Farmer's total score}}{\text{Total possible score}} x\ 100$$

Measurement of Technological gap index

The technological gap in selected recommended practices was measured with the help of technological gap index.

$$\text{Technological gap index} = \frac{\text{R} - \text{A}}{\text{R}} x\ 100$$

Where: T = Total Recommended technology, A = Total number of technology adopted by the farmer.

Measurement of Adoption gap: Farmer wise adoption gap (AG) of drought management technologies and technology wise adoption gap were computed. The AG for each farmer was defined as the proportion of technology not adopted to total recommended technology of drought management expressed in percentage. The following formula was used to compute AG.

Farmer wise AG = (Σ Xi/Xm) x 100

Where: Xi = Total number of technology not adopted by the individual farmer i=1 to 30 items, Xm = Selected recommended technology (30).

The technology wise adoption gap (TAG) was the proportion of respondents, who had not adopted the particular technology to the total number of respondents expressed in percentage.

Technologywise AG = (Σ Yi/Xm) x 100

Where: Σ Yi = Total No. of respondents, who had not adopted the particular technology, i =1 to 100, Xm = Total selected respondents = 100

Results and discussion

Socio-economic profile of sericulturists: Socio-economic characteristics of the sericulture farmers were studied in the area. Ten socio-economic variables were studied and analysed (Table-1) in the selected clusters. The mean age of the farmers surveyed was 56 years and 60 per cent of the respondents were old aged (more than 55 years) group. 52% of the farmers were educated up to high school, 4 per cent up to XII Std, 8 per cent up to degree, 14 per cent up to primary and 22 per cent were illiterates. The farmers have an average experience of the 13.6 years. The mean land holding owned by the farmers were 4.28 ac and planted mulberry in mean land holding of 1.28ac. 76 per cent of the farmers reported insufficient water for irrigation. The farmers in the study area reared 5 to 11 silkworm rearings per annum recording a mean of 6 rearings. Farmers rear 809 ±290/ac DFLs per annum as an average. The farmers rear 100 to 350 DFLS per batch as an average. The average silk cocoon yield of the farmers is 74.86 kg per 100 dfls, with 5.15 standard deviation.

Farmer wise extent of adoption: Adoption levels of individual farmers were collected for 30 identified technologies which helped farmers to mitigate the drought (Table-2). The extent of adoption of 66% of the farmers falls below 30% level of adoption. 34% of the farmers are medium adoptors i.e, between 30 to 60 level of adoption. None of the farmers have high level of adoption. Earlier reported that half of the respondents had medium level, 28.33 percent had low level of adoption and 21.67 percent had high level of adoption respect to scientific management of drought in Agriculture farmers of Ananthapur dist[9]. Special attention is needed to increase the adoption of technologies in mulberry cultivation[10].

Technology Gap index: The frequency of technology gap index falls between 14 and 98. Technologies like plantation of drought resistant mulberry varieties, Green manuring, Bore well recharging, rearing temperature tolerant silkworm hybrids are not adopted by majority of the farmers. Knowledge of the farmers was the most important factor for the variation in the technological gap[11]

Technology wise extent of adoption: To find out the technology gap, the adoption of drought management technology by the farmers were studied for all the 30 technologies recommended by research Institutes (Table-3). Seven technologies have high extent of adoption and two technologies have medium extent of adoption whereas twenty one percent of technologies have low extent of adoption.

Table-1: Socio-economic profile of sericulturists in the study area (N = 100).

No.	Variables	%	Mean	SD
Age (yrs)	Young (less than 35)	6	56	13.4
	Middle (35-55 years)	34		
	Old (> 55yrs)	60		
Education level	Illiterate	22	6	4.16
	Primary	14		
	High	52		
	Higher Secondary	4		
	College	8		
Experience in sericulture (yrs)	less than mean	52	13.6	11.45
	more than mean	48		
Total land holding(ac)	less than mean	62	4.28	2.4
	more than mean	38		
Mulberry Acreage (ac)	less than mean	66	1.28	0.58
	more than mean	34		
Water Availability	Sufficient	24		
	Insufficient	76		
No. of rearing /annum	less than mean	74	6	2.3
	more than mean	26		
Total DFLs brushed/ ac/annum	less than mean	62	809	290
	more than mean	38		
Average Yield (Kg/100 dfls)	less than mean	40	74.86	5.15
	more than mean	60		
Gross returns / ac (Rs)	less than mean	60	66363	34887
	more than mean	40		

SD- Standard Deviation

Table-2: Farmer wise extent of Adoption of drought management techniques.

Category	Level (%)	Number	%
Low	< 30	66	66
Medium	30 - 60	34	34
High	> 60	0	0

Table-3: Technology wise extent of Adoption of drought management techniques.

Category	Level (%)	Number	%
Low	< 30	21	70
Medium	30 - 60	2	7
High	> 60	7	23

Technology adoption in mulberry cultivation: Adoption of all technologies in integrated manner is required to overcome the crisis of drought. Adoption index for these technologies ranged from 2 to 100 for different technologies (Figure-1). Only 2% of the farmers have full adoption of the technology of selection of drought resistant mulberry plant varieties to plant in drought prone areas. 6% of farmers of have full adoption and 80% of farmers have partial adoption in management of pruning schedule of mulberry garden. The maximum of 78% of farmers have full adoption of drip irrigation. The soil moisture conservation technologies like trenching, mulching and green manuring have 26% of full adoption and 4% of full adoption respectively. Forty three percent of farmers practice trenching and mulching which help them to preserve soil moisture. 86% of the farmers are having nil adoption of green manuring. Summer ploughing, opening trenches and planting across the slope had very low level of adoption (2 to 10% only).

The rain water harvesting in mulberry garden also have very low level of adoption. 74 to 94% of farmers have nil adoption of these technologies. Construction of farm ponds and other rain water harvesting structures should be encouraged in drought prone areas to mitigate water shortage[9]. Production of quality mulberry leaves with moisture content is essential for successful silkworm rearing during summer months. Adoption of these technologies will increase the moisture holding capacity of the soil; prevent moisture loss and helps in production of quality mulberry leaves.

Drought management technologies in silkworm rearing: Silkworms are more prone to diseases during hot and dry climate which prevails during drought period. The rearing sheds should be altered in such away to maintain required temperature and humidity. All the technologies should be followed in an integrated manner to harvest successful silkworm crops. Technologies to maintain temperature and humidity in the rearing house have very low adoption, ranging from 3 to 20%. Only hanging wet curtains to increase the humidity is having 76% of adoption.

Low level of adoption affected the health of silkworms and quality of cocoons production. 82 percent of farmers have nil adoption of rearing drought tolerant silkworm hybrids and 48% of have no adoption of early brushing of silkworm eggs. Only 21% of farmers have full level of adoption on increasing the

feeding times during drought months. 36% of farmers have nil adoption of covering the leaves after feeding in drought period. The harvesting of mulberry leaves, transportation of harvested leaves and preservation of shoots has 70 - 100% of adoption. This helped in keeping the mulberry leaves in good condition for the consumption of silkworms.

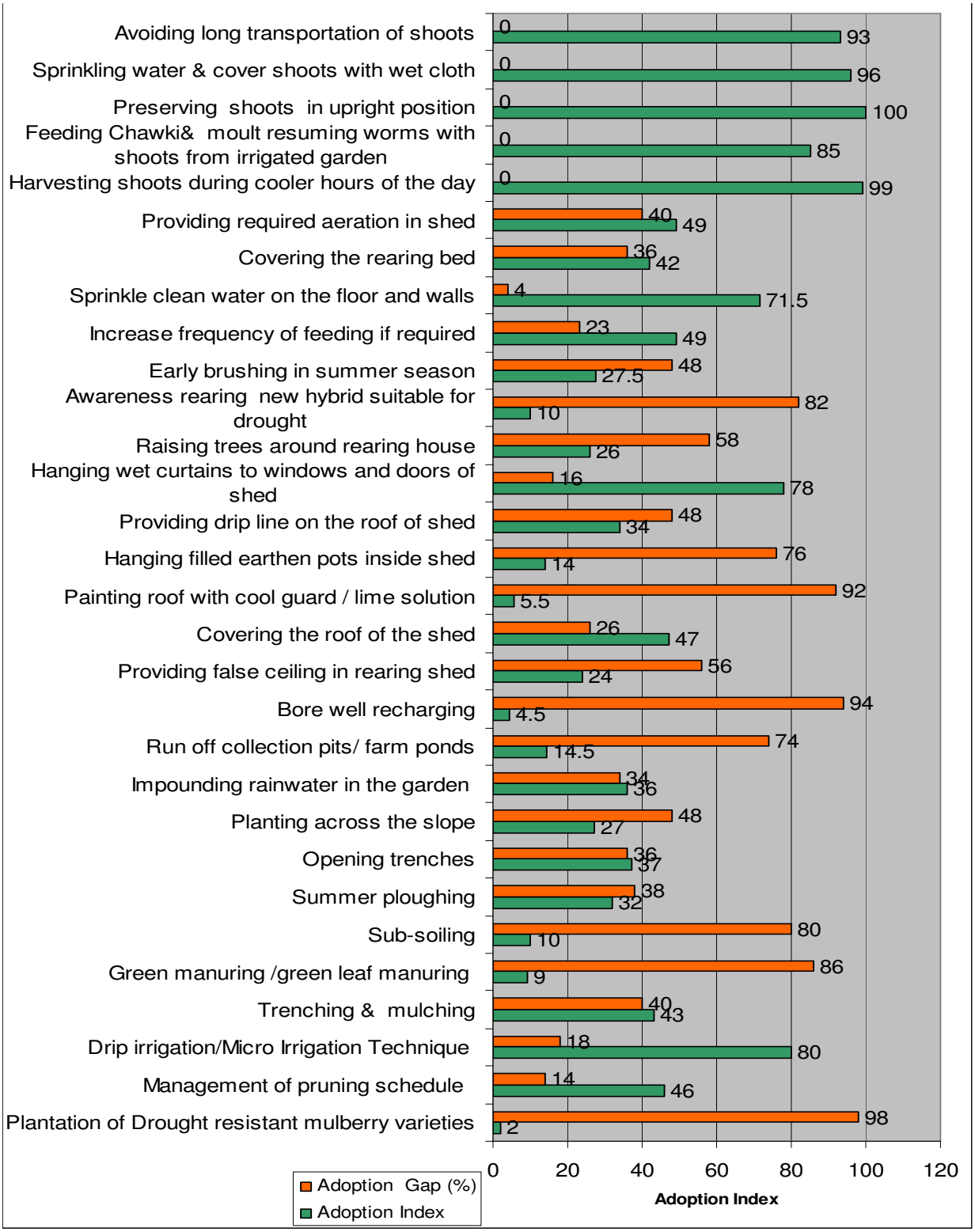

Figure-1: Technology wise Adoption.

Conclusion

The sericulturists of dry agroclimatic zones of Karnataka are having 13years of mean experience and sericulture is the major source of income to them. Seventy six percent of the farmers have less water for irrigation. Intermittent droughts affected the mulberry cultivation and silkworm rearing quantitatively and quanlitatively. Illefects of drought can be solved by adopting all drought management practices in integrated manner. But the adoption of all technologies by the farmers are not encouraging. The soil moisture conservation technologies like green manuring have very low percent of adoption. But the adoption index for trenching and mulching is 43percent which is encouraging. The technologies such as summer ploughing and rain water harvesting in mulberry garden also have very low level of adoption. The important technologies in rearing shed required for temperature humidity maintenance have very low adoption. Technologies such as Harvesting of mulberry leaves, transportation of harvested leaves and preservation of shoots have good percent of adoption. Silkworms are more prone to diseases during hot and dry climate which prevails during drought period. The quality of the silk produced depends on the cocoon produced by the healthy silkworms. The drought management technologies should be followed in an integrated manner to harvest sucessful silkworm crops. The study suggests for taking suitable efforts to increase the awareness and to increase the adoption of technologies in an integrated manner for quality linked silk production in the drought areas.

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