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A comparative analysis on the multivoltine and bivoltine seed cocoon markets in Karnataka

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Abstract

Karnataka leads India in mulberry silk production, supported by a strong network of government-regulated seed cocoon markets that protect farmers' livelihoods. This study compares multivoltine and bivoltine seed cocoon markets during 2023-2024, looking at market capacity, transaction volumes, prices, payments and institutional links. In total, 80 farmers were surveyed across eight regulated markets (four multivoltine and four bivoltine). The results show that farming is led by middle-aged (41-45 years), marginal and small-scale farmers who mostly use subsidies for rearing houses (38.3% in multivoltine and 40.6% in bivoltine). Farmers harvest 6 to 7 crops annually in multivoltine areas and 5 to 6 in bivoltine. High-volume markets like Magadi (multivoltine) and Tumkur (bivoltine) dominate both averaging 400 kg/day in transactions with high farmer participation (1,050 and 1,450 farmers, respectively). These markets have strong support networks: Magadi connects to 20 Government Grainages and 120 Licensed Seed Producers (LSPs), while Tumkur has 22 grainages. Financially, bivoltine cocoons fetched higher prices (Rs. 1,300-1,800/kg) than multivoltine (Rs. 1,200-1,600/kg). Defective (*jaali*) cocoons saw a huge drop in price, selling for just Rs. 200-280/kg (multivoltine) and Rs. 180-258/kg (bivoltine). To offset these losses, the government provides a Rs. 120/kg production incentive, plus a Rs. 225/kg diversion subsidy when cocoons must be sent for reeling. Payments have modernized; online transfers cover 90% of transactions in Magadi and 100% in Hassan. To improve the system, the government needs to upgrade market infrastructure, fix payment delays, and solve major problems for farmers like sudden daily price changes and transit damage (meltage).

Keywords: Seed cocoon markets, multivoltine, bivoltine, market infrastructure, price behavior

1. Introduction

Sericulture is a comprehensive agro-based industry that integrates host plant cultivation and silkworm rearing to produce the cocoons required for raw silk. Mulberry sericulture is a land-based, eco-friendly economic activity that is labor-intensive and provides a good return to farmers. It plays a very important role in the socio-economic upliftment of the rural population (Sreenivasa BT and Hiriyanna, 2014) ^[10]. Owing to its low capital requirement and high labor absorption potential, the sector plays a critical role in strengthening rural economies (Soundarya *et al.*, 2022) ^[11]. Often referred to as the silk bowl of the country, Karnataka sustains cocoon production activity throughout the year across all its districts (Choudannanavar BK, 2015) ^[2]. The state has well-established multivoltine and bivoltine seed areas. They cater to the demand for parental seed cocoons required for the production of Cross Breed (CB) and Bivoltine (BV) hybrid disease-free layings (DFLs) (Chandrashekar and Satish, 2022) ^[3]. To support this extensive production, Karnataka relies on a network of regulated seed cocoon markets.

Seed cocoon markets in Karnataka are broadly classified into multivoltine and bivoltine markets, reflecting differences in silkworm races, production objectives and end-use demand. Multivoltine seed cocoons are generally preferred for their adaptability and year-round availability, whereas bivoltine seed cocoons are highly valued for their

superior silk quality and export-oriented raw silk production, despite facing certain constraints in the adoption of improved technologies (Kumaresan *et al.*, 2019) ^[6]. These economic and biological differences lead to noticeable variations in transaction volumes, price behavior, infrastructure requirements and farmer participation across the two market types.

Previous studies from South India have reported significant seasonal price swings driven by changing weather patterns, supply shifts and varying degrees of market integration (Ramesh, 2015; Halagundegowda *et al.*, 2024) ^[8, 5]. For these markets to function efficiently and ensure farmers get fair prices across different regions, strong spatial integration and clear price transmission are essential (Reddy *et al.*, 2018; Halagundegowda *et al.*, 2021) ^[9, 4]. Furthermore, the technology-driven e-auction platforms have effectively eliminated traditional market malpractices, leading to fair price discovery and providing equal market access for all the farmers (Chandrashekar and Satish, 2022) ^[3].

However, while existing research offers great insights into general production economics and commercial reeling cocoons, there is a major research gap regarding seed cocoon markets. To safeguard farmers from the exploitation of middlemen and private market operators, the Government of Karnataka enacted "The Karnataka Silkworm Seed, Cocoon and Silk Yarn (Regulation of Production, Supply, Distribution and Sale) Act, 1959". Accordingly, all

activities of silk & cocoon are done under the shadow of this Act (Choudannanavar BK, 2015) ^[2]. Therefore, the present study was undertaken to comparatively analyze the seed cocoon markets with the following objectives:

1. To study the socio-economic profile and agronomic practices of the farmers.
2. To evaluate the transaction processes and market capacity of multivoltine and bivoltine seed cocoon markets.
3. To comparatively analyze the price behavior and institutional linkages.

2. Methodology

2.1 Study Area

For the present study, eight government-regulated seed cocoon markets were purposively selected from Karnataka to compare their operational characteristics. These included four multivoltine markets (Magadi, Kunigal, Huliurdurga and Santhemavathur) and four bivoltine markets (Hassan, K. R. Pete, Bengaluru and Tumkur).

2.2 Sampling Procedure

From the selected markets, a total respondents of 80 seed cocoon farmers was selected using a purposive sampling technique. This comprised 40 farmers from multivoltine markets and 40 farmers from bivoltine markets to ensure equal representation for comparison.

2.3 Data Collection and Analysis

The primary data for the study was collected directly from the farmers during 2023-2024 through the personal interview method with the aid of a structured questionnaire. The data covered various factors such as age, educational status, agronomic practices, transaction volumes and pricing. Secondary data regarding market infrastructure and transaction capacity were collected from market officials, the Department of Sericulture. Finally, the collected data were tabulated and analyzed using descriptive statistics and percentages.

3. Results and Discussion

3.1 Socio-Economic and Agronomic Profiles of Farmers

The socio-economic characteristics of farmers play a decisive role in their decision-making and technology adoption (Manjunatha *et al.*, 2020) ^[7]. Across both systems, seed cocoon production is primarily driven by experienced, middle-aged farmers (41-45 years). Educational levels vary slightly; secondary education is common among multivoltine (MV) farmers (27.5%), a key determinant in absorbing scientific practices (Soundarya *et al.*, 2022) ^[11], whereas bivoltine (BV) farmers generally hold high school (25%) or secondary (25%) qualifications. Both groups are overwhelmingly marginal to small-scale producers, with the majority cultivating 1 to 2 acres of mulberry garden (47.5% in MV; 52.5% in BV).

3.2 Sericulture Practices and Technology Adoption

Agronomic practices show strong similarities across both

regions. Farmers heavily prefer bush-type mulberry plantations (85% MV; 90% BV), supported mainly by borewell irrigation (62.5% MV; 65% BV) and DAP fertilizer applications (45% MV; 42.5% BV). For leaf harvesting, the shoot method is widely adopted (70% MV; 62.5% BV) over individual leaf plucking due to labor savings and moisture preservation. Cropping intensity differs slightly: MV farmers typically harvest 6-7 crops annually, while BV farmers average 5-6 crops. Regarding technology, government subsidies are mostly utilized for constructing rearing houses (38.3% MV; 40.6% BV), while the uptake of specialized rearing equipment remains significantly low (11.8% MV; 10.3% BV).

3.3 Market Capacity and Transaction Volumes

An agricultural market's efficiency depends heavily on its handling capacity and farmer participation (Halagundegowda *et al.*, 2021) ^[4]. Magadi emerged as the top MV market, recording 1,050 active farmers, 10 lots processed daily and an average volume of 400 kg/day (4,700 kg/year). Tumkur leads the BV sector, accommodating 1,450 farmers, handling 13 lots and processing 400 kg/day (6,055 kg/year). To preserve cocoon quality and minimize transit meltage when reaching these markets, 50% of producers across both the MV and BV systems rely on private vehicles.

3.4 Price Behavior and Financial Safety

Economically, BV cocoons consistently command higher average prices (Rs. 1,300-1,800/kg) compared to MV cocoons (Rs. 1,200-1,600/kg), reflecting stronger commercial demand. However, defective (*jaali*) cocoons cause a big drop in price, falling to averages of Rs. 200-280/kg in MV markets and Rs. 180-258/kg in BV markets. To overcome these financial losses, the government provides an incentive of Rs. 120/kg for yields exceeding 33 kg per 100 DFLs. Furthermore, if cocoons that don't meet the standard are moved to reeling, farmers receive an additional Rs. 225/kg subsidy.

3.5 Institutional Linkages, Seasonality and Payments

Major markets have dense institutional support networks, though spatial disparities exist. Magadi (MV) has 20 Government Grainages and 120 Licensed Seed Producers (LSPs). In contrast, Tumkur (BV) has 22 grainages, while Hassan (BV) connects to 20 LSPs. Transaction volumes across two types of markets peak during the rainy season (55% MV; 50% BV) due to optimal mulberry foliage growth. Finally, payment methods have successfully modernized; online bank transfers now account for 90% of transactions in Magadi (MV) and up to 100% in Hassan (BV). While this digital shift ensures transparent compensation and eliminates historical malpractices (Chandrashekar and Satish, 2022) ^[3], While this digital shift ensures fair pay and stops past dishonest practices, fixing delayed payment settlements remains a priority for the government.

Table 1: Socio-economic background and farming practices of the surveyed seed cocoon producers

Variable	Category	Multivoltine (%)	Bivoltine (%)
Age (years)	35-40	20.0	17.5
	41-45	30.0	32.5
	46-50	25.0	20.0
	51-55	25.0	30.0
Education level	Illiterate	15.0	20.0
	Primary	20.0	15.0
	High school	17.5	25.0
	Secondary	27.5	25.0
	Degree	20.0	15.0
Irrigation type	Channel	25.0	20.0
	Borewell	62.5	65.0
	Drip	12.5	15.0
Landholding (acres)	< 1 (Small)	45.0	35.0
	1-2 (Marginal)	47.5	52.5
	> 2 (Large)	7.5	12.5
Subsidies	Rearing House	38.3	40.6
	Mulberry Garden	28.5	26.8
	Rearing Equipment	11.8	10.3
Fertilizer type	DAP	45.0	42.5
	Suphala	10.0	15.0
	NPK	10.0	12.5
	FYM	35.0	30.0
Crops harvested per year	5-6	30.0	40.0
	6-7	50.0	37.5
	7-8	20.0	22.5

Source: Primary data collected from farmers through personal interviews using a structured questionnaire.

Table 2: Market infrastructure, transaction volumes, price behavior and institutional linkages of selected seed cocoon markets

Market Type	Market Location	Farmers Connected (No.)	Market Capacity (Lots/day)	Avg. Transaction		Avg. Price: (Rs./kg)		Govt. Grainages Connected	Licensed Seed Producers (LSPs)	Payment method	
				(kg/day)	(kg/year)	Good Cocoons	Defective Cocoons			Cash (%)	Online (%)
Multivoltine	Magadi	1050	10	400	4700	1200	280	20	120	10	90
	Kunigal	300	5	250	3480	1300	250	1	40	08	92
	Huliyurdurga	280	6	300	2500	1600	216	1	10	07	93
	Santhemavathur	540	8	300	2800	1200	200	1	50	12	88
Bivoltine	Hassan	778	12	300	5200	1500	258	5	20	0	100
	K. R. Pete	200	10	250	3500	1700	200	5	20	20	80
	Bengaluru	80	6	150	1500	1300	180	2	0	70	30
	Tumkur	1450	13	400	6055	1800	250	22	18	55	45

Source: Secondary data obtained from official market records and administrative officials.

4. Conclusion

This comparative study of Karnataka's seed cocoon markets shows that while bivoltine cocoons consistently fetch higher prices, farmers in both the multivoltine and bivoltine sectors face very similar challenges. Across both markets, a farmer's background such as their education, experience and farm size directly affects how well they adopt new technology and produce cocoons. Both groups deal with huge price drops for defective (*jaali*) cocoons and sudden daily price changes. To stop traders from exploiting them, the regulated markets provide important support measures, like fitness certification, a Rs. 120/kg production incentive and a Rs. 225/kg diversion subsidy. Despite these supports and the good shift toward online payments, farmers still face problems like transit damage (meltage) during travel, delayed payments and poor infrastructure in low-volume markets. To fix these issues, the government needs to upgrade the facilities in these specific centers. Overall, Magadi and Tumkur showed the most positive results for the multivoltine and bivoltine seed cocoon markets across the study. Ultimately, government interventions to balance cocoon prices with market supply and demand will ensure better economic stability for the farmers.

5. Conflict of Interest

The authors declare that there is no conflict of interest regarding the publication of this research work.

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