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Survey and screening the different mulberry accessions responsible for animal deterrent properties

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Abstract

Human wildlife interaction is a significant challenge in forest-fringe regions, where overlapping requirements of food, space and shelter lead to frequent crop losses. This study surveyed and screened mulberry (*Morus* spp.) accessions for their potential animal deterrent properties in Erode District, Tamil Nadu. A total of 63 mulberry farmers across 24 villages in four major blocks Sathyamangalam, Bhavanisagar, Nambiyur and Thalavadi were interviewed using structured questionnaires. The survey assessed demographic profiles, landholding patterns, mulberry varieties under cultivation and incidences of wild animal intrusion. Results revealed that mulberry cultivation is predominantly male-driven (76%), with middle-aged farmers (35-50 years) contributing the highest share (49.2%). Small landholders (<2 acres) dominated the population (66.7%), reflecting the marginal scale of sericulture. Among varieties, V1 was most widely adopted (47.6%), followed by MR2 (36.5%), while G4 (15.9%) was confined to Sathyamangalam. Nearly half the farmers (47.6%) experienced wild animal intrusion, with Sathyamangalam accounting for 80% of the cases. Seasonal variation showed peak crop damage in summer (70%). Wild boars (*Sus scrofa*) were the most destructive (44.5%), followed by elephants, deer and monkeys. The findings emphasize the spatial and seasonal vulnerability of mulberry fields and highlight the potential of plant-based repellents, particularly alkaloid-rich mulberry accessions, as sustainable solutions to mitigate crop loss and protect rural livelihoods.

Keywords: Human wildlife interaction, mulberry varities, animal deterrent properties, wild boar (*Sus scrofa*), sericulture, plant-based repellents

1. Introduction

Human wildlife interaction refers to the dynamic relationship between humans and wild animals, which can have both positive and negative outcomes. However, in recent years, negative interactions have become more prevalent due to the expansion of agricultural activities into forest areas. Human wildlife interaction poses a significant threat not only to people and animals but also to agriculture, as it leads to crop damage, yield reduction and consequent economic losses (Goumas *et al*., 2020) [1]. These conflicts often arise because the basic needs of both humans and wildlife such as space, shelter and food overlap in shared landscapes (Ayyappan *et al*., 2016) [2].

In India, vertebrate pests are a major challenge for both farmers and communities. The most problematic species include the Asian elephant, wild boar, Indian gaur and Indian peafowl (Sharma, 2022) [3]. While some states permit the culling of crop-raiding animals designated as vermin under the Wildlife Protection Act of 1972, others, such as Tamil Nadu, rely primarily on non-lethal, traditional deterrent measures (Milda *et al*., 2023) [4]. Among these animals, the wild boar (*Sus scrofa cristatus*) has emerged as one of the most destructive pests in agriculture (Marsan and Mattioli, 2013) [5]. To manage such conflicts, a variety of methods have been developed in recent years, including biological approaches (planting thorny bushes along field borders), physical techniques (fencing, crackers and drumming), and chemical approaches (sprays and pellets) (Muralidharan *et al*., 2020) [6].

Animal repellents are substances designed to prevent animals from approaching or feeding on crops by acting through smell, taste or irritation. Traditional practices and modern innovations have been applied against a wide range of crop-raiding species, including elephants, deer, birds, rodents and wild boars (Divekar *et al.*, 2022) [7]. This study specifically focuses on developing a plant based repellent to deter wild boars without causing them harm. Natural repellents derived from plants are environmentally sustainable and reduce conflict between people and wildlife by avoiding risks to non-target species. Among these, alkaloids are of particular importance, as their bitter taste and physiological effects on herbivores make them effective natural deterrents.

2. Study Area

Thalavadi is a hilly town located in the Erode District of Tamil Nadu, India, near the Dhimbham hills. This region lies adjacent to the Sathyamangalam Tiger Reserve (STR). The Sathyamangalam Tiger Reserve (STR) serves as a critical wildlife corridor linking the Eastern and Western

Ghats and supports a rich diversity of flora and fauna. It is also a hotspot for human-wildlife conflict, with the most frequent issues arising from wild boars (*Sus scrofa*), Asian elephants (*Elephas maximus*), and Indian leopards (*Panthera pardus*), which often intrude into agricultural lands. Sericulture is one of the major allied agricultural activities practiced widely across Erode district. At present, 1,948 farmers are cultivating mulberry over a total area of 4,388 acres, contributing to an annual cocoon production of approximately 1,298 MT. This reflects the well-established and productive nature of sericulture in the region. Among all the blocks, Thalavadi block stands out as the highest contributor. With 309 farmers cultivating 725 acres of mulberry, Thalavadi alone accounts for nearly 16% of the total cocoon production in the district. Within the Thalavadi block, the Department of Sericulture operates a Government Large Scale Sericulture Farm located in Madhahalli village.

3. Materials and Methods

A preliminary investigation was undertaken among mulberry farmers residing in the villages surrounding Thalavadi and the STR to assess the extent of crop losses caused by wild boars and other wild animals. These villages are particularly vulnerable due to their proximity to the forest fringe areas (Fig. 1). A field survey was conducted across 24 villages located in four major blocks of the Erode District: Sathyamangalam, Bhavani Sagar, Nambiyur and Thalavadi. These villages were selected based on their proximity to forest fringe areas and reported incidences of wild animal intrusion, particularly wild boars. The survey aimed to document the extent of crop damage in mulberry fields, local mitigation practices, and identify regions with high conflict intensity.

A structured, open-ended questionnaire was designed to collect demographic and agricultural data from mulberry growers. The questionnaire included items related to the farmer's name, age, size of land holdings, and types of wildlife-induced crop damages. Responses were collected from indigenous forest communities in all selected villages (Fig. 2). This method allowed for systematic data collection while providing respondents with the freedom to elaborate on their experiences and perceptions (Alemayehu and Tekalig, 2022) [8].

4. Results

A field survey was undertaken in 24 villages across four major blocks of Erode District of Sathyamangalam, Bhavanisagar, Nambiyur and Thalavadi. These villages were selected due to their location near forest fringes and frequent incidents of wild animal intrusion, particularly by wild boars. The purpose of the survey was to evaluate crop damage in mulberry fields, document existing mitigation strategies, and identify zones with severe conflict.

4.1. Gender distribution pattern of mulberry cultivating farmers

A total of 63 mulberry farmers were surveyed across different villages and blocks. The gender distribution showed that most of the farmers were men, with 48 male respondents (76%) and 15 female respondents (24%). This indicates that mulberry farming in the area is mainly carried out by men, while fewer women are involved in the practice (Table 1).

4.2. Age class distribution pattern of mulberry cultivating farmers

The majority of the farmers (49.2%) were between 35 and 50 years old, showing that middle-aged individuals are more actively engaged in mulberry cultivation. Farmers below 35 years made up 22.2%, while those above 50 years accounted for 28.6% of the total. In Sathyamangalam, a large number of farmers were in the 35-50 (44.5%) and >50 (41.6%) age groups. Bhavanishagar had the highest proportion (77%) in the 35-50 age group, while Nambiyur had an equal share of farmers below 35 and between 35-50 years (both 50%). Thalavadi showed more participation from younger farmers, with 50% below 35 years (Table 2).

4.3. Distribution pattern of mulberry cultivating farmer's status

A total of 63 mulberry farmers were categorized based on their landholding size into small (<2 acres), medium (2.5-4 acres), and large (>4 acres) farmers. The majority were small farmers, accounting for 42 individuals (66.7%), followed by 15 medium farmers (23.8%), and 6 large farmers (9.5%). Among the blocks, Sathyamangalam had the highest number of farmers across all categories, with 22 small, 12 medium, and 2 large farmers, making up 57.2% of the total surveyed. Bhavanishagar followed with 9 small, 2 medium, and 2 large farmers (20.6%). Thalavadi had 10 small and 2 large farmers, but no medium farmers, while Nambiyur had only 2 farmers, one small and one medium (Table 3).

4.4. Varieties under cultivation in the study area

The distribution of mulberry varieties under cultivation across different blocks in the study area reveals that V1 is the most widely cultivated variety, accounting for 47.6% (30 out of 63) of the total plantations, followed by MR2 with 36.5% (23 out of 63), and G4 with 15.9% (10 out of 63), exclusively grown in the Sathyamangalam block. Among the blocks, Sathyamangalam recorded the highest number of cultivated varieties (36), representing 57.2% of the total, with all three varieties present, including 100% of the G4 variety. Bhavanishagar followed with 13 plantations (20.6%), mainly of MR2 and V1. Thalavadi and Nambiyur had relatively fewer plantations, contributing 19.0% and 3.2% to the total, respectively. Notably, G4 cultivation was absent in all blocks except Sathyamangalam (Table 4).

4.5. Occurrence of wild animal interaction

The data on wild animal interactions across the blocks shows that out of the total 63 cases, 30 (47.6%) reported wild animal problems, while 33 (52.4%) did not. Sathyamangalam block reported the highest number of wild animal interactions, with 24 cases (80% of reported incidents), indicating it as a hotspot for such conflicts. Bhavanishagar had 4 reported cases (13.3%), followed by Thalavadi with 2 cases (6.7%), while Nambiyur reported no wild animal problems (Table 5) (Fig. 3).

4.6. Seasonality variation in crop damage incidence due to wild animals

The seasonal variation in crop damage due to wild animals

shows that the highest number of incidences occurred during the summer season, accounting for 70% (21 out of 30) of the total reported cases. Winter and rainy seasons recorded significantly fewer incidents, with 10% and 3.3% respectively. Additionally, 16.7% of the respondents (5 cases) reported crop damage occurring across all seasons (Table 6) (Fig. 4).

4.7. Major crop damaging wild animals

Among the various wild animals reported to cause crop damage, wild boars emerged as the most significant threat, accounting for 44.5% (16 out of 36) of the incidents. Elephants were the next major contributors with 30.5% (11 reports), followed by deer at 13.9% and monkeys at 11.1% (Table 7) (Fig. 5).

Fig 1: Location of study villages in Sathyamangalam block

Fig 2: Survey and Screening the mulberry varieties in forest fringe villages of Erode district

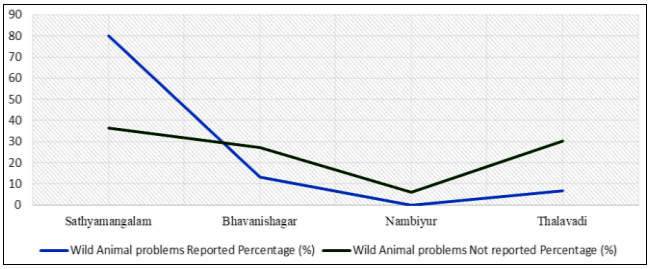

Fig 3: Occurrence of wild animal interaction in the study area

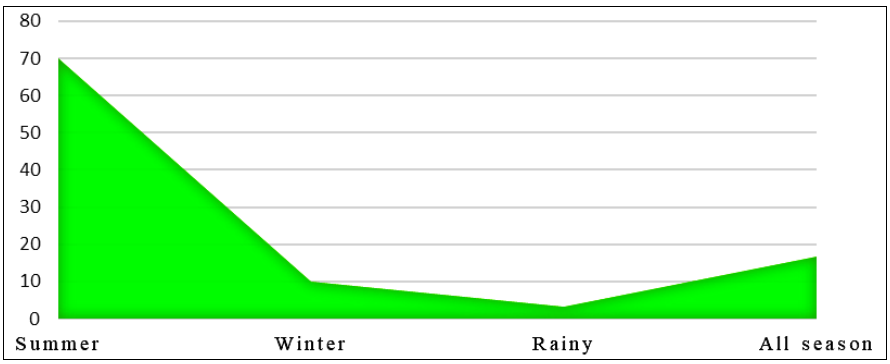

Fig 4: Seasonality variation in crop damage incidence due to wild animals

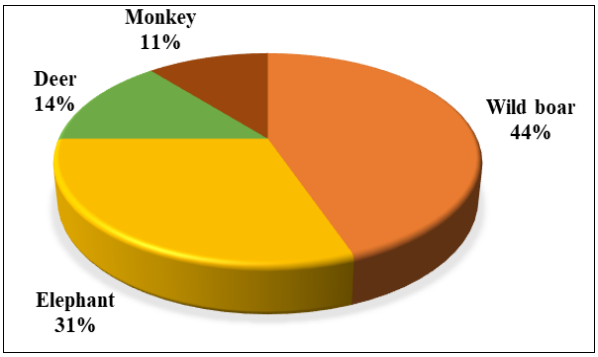

Fig 5: Major crop damaging wild animals in the study area

Table 1: Gender distribution pattern of mulberry cultivating farmers

Sex	Blocks								Total	
	Sathyamangalam		Bhavanishagar		Nambiyur		Thalavadi			
	Numbers	Percentage (%)	Numbers	Percentage (%)	Numbers	Percentage (%)	Numbers	Percentage (%)	Numbers	Percentage (%)
Male	26	72.2	13	100	2	100	10	83.3	51	81
Female	10	27.8	0	0	0	0	2	16.7	12	19
Total	36	100	13	100	2	100	12	100	63	100

Table 2: Age class distribution pattern of mulberry cultivating farmers

Age (in years)	Blocks								Total	
	Sathyamangalam		Bhavanishagar		Nambiyur		Thalavadi			
	Numbers	Percentage (%)	Numbers	Percentage (%)	Numbers	Percentage (%)	Numbers	Percentage (%)	Numbers	Percentage (%)
<35	5	13.9	2	15.3	1	50	6	50.0	14	22.2
35 - 50	16	44.5	10	77.0	1	50	4	33.3	31	49.2
>50	15	41.6	1	7.7	0	0	2	16.7	18	28.6
Total	36	100	13	100	2	100	12	100	63	100

Table 3: Distribution pattern of mulberry cultivating farmers status

Blocks	Small Farmers (< 2 acre)		Medium Farmers (2.5 - 4 acre)		Large Farmers (> 4 acre)		Total	
	Numbers	Percentage (%)	Numbers	Percentage (%)	Numbers	Percentage (%)	Numbers	Percentage (%)
Sathyamangalam	22	52.4	12	80.0	2	33.3	36	57.2
Bhavanishagar	9	21.4	2	13.3	2	33.3	13	20.6
Nambiyur	1	2.4	1	6.7	0	0.0	2	3.2
Thalavadi	10	23.8	0	0.0	2	33.4	12	19.0
Total	42	100	15	100	6	100	63	100

Table 4: Varieties under cultivation in the study area

Blocks	MR2		V1		G4		Total	
	Numbers	Percentage (%)	Numbers	Percentage (%)	Numbers	Percentage (%)	Numbers	Percentage (%)
Sathyamangalam	9	39.2	17	56.7	10	100	36	57.2
Bhavanishagar	8	34.7	5	16.7	0	0	13	20.6
Nambiyur	1	4.4	1	3.3	0	0	2	3.2
Thalavadi	5	21.7	7	23.3	0	0	12	19.0
Total	23	100	30	100	10	100	63	100

Table 5: Occurrence of wild animal interaction

Blocks	Wild animal problems				Total	
	Reported		Not reported			
	Numbers	Percentage (%)	Numbers	Percentage (%)	Numbers	Percentage (%)
Sathyamangalam	24	80.0	12	36.4	36	57.2
Bhavanishagar	4	13.3	9	27.3	13	20.6
Nambiyur	0	0	2	6.0	2	3.2
Thalavadi	2	6.7	10	30.3	12	19.0
Total	30	100	33	100	63	100

Table 6: Seasonality variation in crop damage incidence due to wild animals

Season	Number of incidences	Percentage of incidences
Summer	21	70.0
Winter	3	10.0
Rainy	1	3.3
All season	5	16.7
Total	30	100

Table 7: Crop damaging wild animals

Wild animal	Number of reports	Percentage of reports
Wild boar	16	44.5
Elephant	11	30.5
Deer	5	13.9
Monkey	4	11.1
Total	36	100

Conclusion

The field survey carried out among 63 mulberry farmers across Sathyamangalam, Bhavanisagar, Nambiyur, and Thalavadi blocks revealed that mulberry cultivation is largely male-dominated (76%), with only 24% female participation. Most farmers were middle-aged (35-50 years, 49.2%), followed by those above 50 years (28.6%) and younger farmers below 35 years (22.2%). Landholding patterns showed that 66.7% were small farmers (<2 acres), 23.8% were medium (2.5-4 acres), and only 9.5% were large (>4 acres), reflecting the predominance of small-scale sericulture in the region. Regarding mulberry varieties, V1 was the most widely cultivated (47.6%), followed by MR2 (36.5%), while G4 (15.9%) was restricted exclusively to the Sathyamangalam block. Among the surveyed areas, Sathyamangalam accounted for 57.2% of the total plantations, followed by Bhavanisagar (20.6%), Thalavadi (19.0%) and Nambiyur (3.2%). With respect to wild animal interactions, 47.6% of farmers reported incidences of crop damage, while 52.4% did not face such problems. Sathyamangalam emerged as the major hotspot, recording 24 out of the 30 reported cases (80%), followed by Bhavanisagar (13.3%) and Thalavadi (6.7%), while Nambiyur reported none. Seasonal patterns indicated that crop damage was most severe during summer (70%), compared to winter (10%) and rainy seasons (3.3%), while 16.7% of farmers experienced year-round damage. Wild boars were the most destructive animals, causing 44.5% of incidents, followed by elephants (30.5%), deer (13.9%), and monkeys (11.1%). These findings underline the spatial concentration of conflicts, the seasonal vulnerability of

mulberry fields and the urgent need for eco-friendly deterrents and adaptive wildlife management measures to protect farmer livelihoods in forest-fringe villages.

References

1. Goumas M, Lee VE, Boogert NJ, Kelley LA, Thornton A. The role of animal cognition in human-wildlife interactions. Front Psychol. 2020;11:589978.
2. Ayyappan S, Agrawal PK, Vasudeva Rao V, Tripathi RS. Human-wildlife 'conflict to coexistence' in agro-pastoral landscapes. In: Human Animal Conflict in Agro-Pastoral Context: Issues and Policies. 2016. p. 1-9.
3. Sharma M. Vertebrate crop depredation and its management around Sariska National Park in the Aravallis of India. 2022.
4. Milda D, Ramesh T, Kalle R, Gayathri V, Thanikodi M, Ashish K. Factors driving human-wild pig interactions: Implications for wildlife conflict management in southern parts of India. Biol Invasions. 2023;25(1):221-235.
5. Marsan A, Mattioli S. Il cinghiale (fauna selvatica. Biologia e gestione). Il Piviere; 2013.
6. Muralidharan K, Eswari S, Vijayarani K. Expression of growth differentiation factor-9 from buffalo follicular fluid-a marker gene for fecundity. Dr C Balachandran. 2020;49(2):14-19.
7. Divekar PA, Narayana S, Divekar BA, Kumar R, Gadratagi BG, Ray A, *et al*. Plant secondary metabolites as defense tools against herbivores for sustainable crop protection. Int J Mol Sci. 2022;23(5):2690.
8. Alemayehu N, Tekalign W. Prevalence of crop damage and crop-raiding animals in southern Ethiopia: The resolution of the conflict with the farmers. GeoJournal. 2022;87(2):845-85.