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Pineapple-Based Settled Agriculture: A Case Study of Sialhawk, Mizoram.

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Abstract

Agriculture remains the foundation of rural livelihoods in Mizoram, where shifting cultivation (jhum) has historically dominated. In recent years, however, several communities have transitioned toward settled agriculture due to socio-economic, environmental, and policy-driven changes. This study examines Sialhawk village, one of the state's most prominent pineapple-producing areas (65% of Mizoram's production), to analyze the socio-economic characteristics of households, agricultural practices, and the prospects of settled horticulture. Using a mixed-method approach that combines structured household surveys, interviews and secondary data sources, the study analyses 120 sample households, representing 50% of pineapple-growing families in the village. Results show a significant shift from shifting cultivation to permanent horticulture, driven primarily by market opportunities and the increasing role of the Sialhawk Pineapple Growers Society (SPGS). Pineapple cultivation particularly of the '*Giant Kew'* variety has led to increased income, improved livelihoods, and social development, with notable gains in education, housing, and mobility. Statistical analysis reveals a strong positive correlation between farmer participation, production levels, and household income, demonstrating the centrality of pineapple cultivation to the village economy. Despite these gains, farmers face persistent challenges such as weak market access, limited credit facilities, and inadequate irrigation. The study concludes that while Sialhawk's transition to settled agriculture has been successful, its sustainability critically depends on strengthened market linkages, government support, and value-addition initiatives.

Key Words: Sialhawk, Pineapple Cultivation, Settled Agriculture, Shifting cultivation, Socio-economic development.

1. Introduction

Agriculture forms the backbone of rural livelihood in Mizoram, where shifting cultivation has historically been the dominant agricultural system. However, in recent years, several rural communities have transitioned toward settled cultivation due to socio-economic, environmental, and developmental factors. Sialhawk village represents one of the most prominent examples of this transformation, where pineapple cultivation has emerged as the primary livelihood activity. Located about 180 kms from Aizawl, Sialhawk is widely known for its large-scale pineapple production, supported by favourable climatic conditions, community cooperation and market linkages. This transformation is not merely agricultural but socio-cultural and economic, shaping new forms of livelihood, identity, and sustainability. This study

explores socio-economic profile, and prospects of settled agriculture in Sialhawk, focusing particularly on pineapple cultivation as a key driver of rural development.

The village is widely recognized for its large scale pineapple cultivation and contributes nearly 70% of Mizoram's total pineapple production. Along with neighboring villages such as Tlangmawi, Tlangpui, Chalrang, New Chalrang, Lungtan, Khawhai, and Vangtlang, the region accounts for about 97% of pineapple production in the state, benefiting from favorable climate and soil conditions.

2. Literature Review on Pineapple

The pineapple (*Ananas comosus*) originated in South America, likely Brazil and Paraguay and is now widely cultivated across tropical and subtropical regions. Major producing countries include the Philippines, Indonesia, Costa Rica, Thailand, Brazil, and India. Global production reached 29.4 million metric tons in 2022, with India ranking sixth and contributing about 8% of world output.

Pineapple thrives in humid tropical climates with temperatures between 22°C and 32°C, moderate rainfall (100–150 cm), frost-free conditions, and slightly acidic sandy loam soils (pH 5.0–6.0). Rich in Vitamin C, minerals, fibre, and digestive enzymes, the fruit is consumed fresh or processed and contains minimal fat, sodium, and no cholesterol.

In India, pineapple is cultivated on about 84,000 hectares, producing 1.34 million tonnes annually. Key varieties include *'Kew'*, *'Mauritius'*, and in Mizoram particularly in Sialhawk the '*Giant Kew*' is grown. Major producing states are West Bengal, Assam, Karnataka, Meghalaya, Tripura, and the northeastern states. Despite large cultivation areas, India's average productivity (16 t/ha) remains below the global average (22.58 t/ha).

Planting typically occurs in April–May or August–September, with April–May being ideal for better market prices and fruit quality (Joy, 2010). Irrigation is crucial during dry spells for proper establishment.

The North Eastern Region offers highly favourable conditions due to organic-rich soils and ample rainfall. Since the launch of the Horticulture Technology Mission (2001), the region has seen a 140% increase in pineapple area and production. It now contributes over 40% of India's output, with 90–95% grown organically. '*Giant Kew*' and '*Queen*' varieties dominate, known globally for their sweetness and low fibre content.

3. Objectives

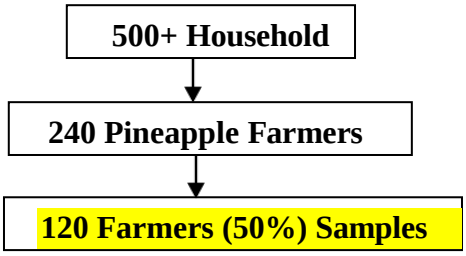
1. To examine the socio-economic characteristics of Sialhawk and assess the processes and prospects of settled agriculture in the village.
2. To analyze the scale, agricultural practices, and livelihood implications of pineapple cultivation as a major component of settled agriculture in Sialhawk.

4. Methodology and Data Collection

The present study adopts a mixed-method approach that combines both quantitative and qualitative techniques to develop a comprehensive understanding of agricultural practices and socio-economic conditions in Sialhawk. Quantitative data were generated through the use of structured questionnaires administered to selected households, while spatial information related to cultivated areas and settlement patterns was recorded using GPS devices such as Garmin Oregon 750 and Garmin Etrex 32X. Qualitative insights were gathered through interviews and informal discussions with local residents, society leaders, accompanied by direct field observations that helped validate and contextualize the information collected.

To ensure representativeness, a Purposive Sampling technique was initially employed to identify households engaged in pineapple cultivation. Following this, Stratified Random Sampling technique was applied based on the different settlement clusters within the village to select 120 household samples, ensuring adequate variation and coverage across the study area. The study draws on both primary and secondary data sources. Primary data consist of responses gathered from the structured household schedules, interviews with key community stakeholders, and detailed field observations. Secondary data were obtained from printed reports, local booklets, souvenirs, youtube and relevant digital and online resources that supplement and support the primary findings.

Sampling Size



5. Study Area

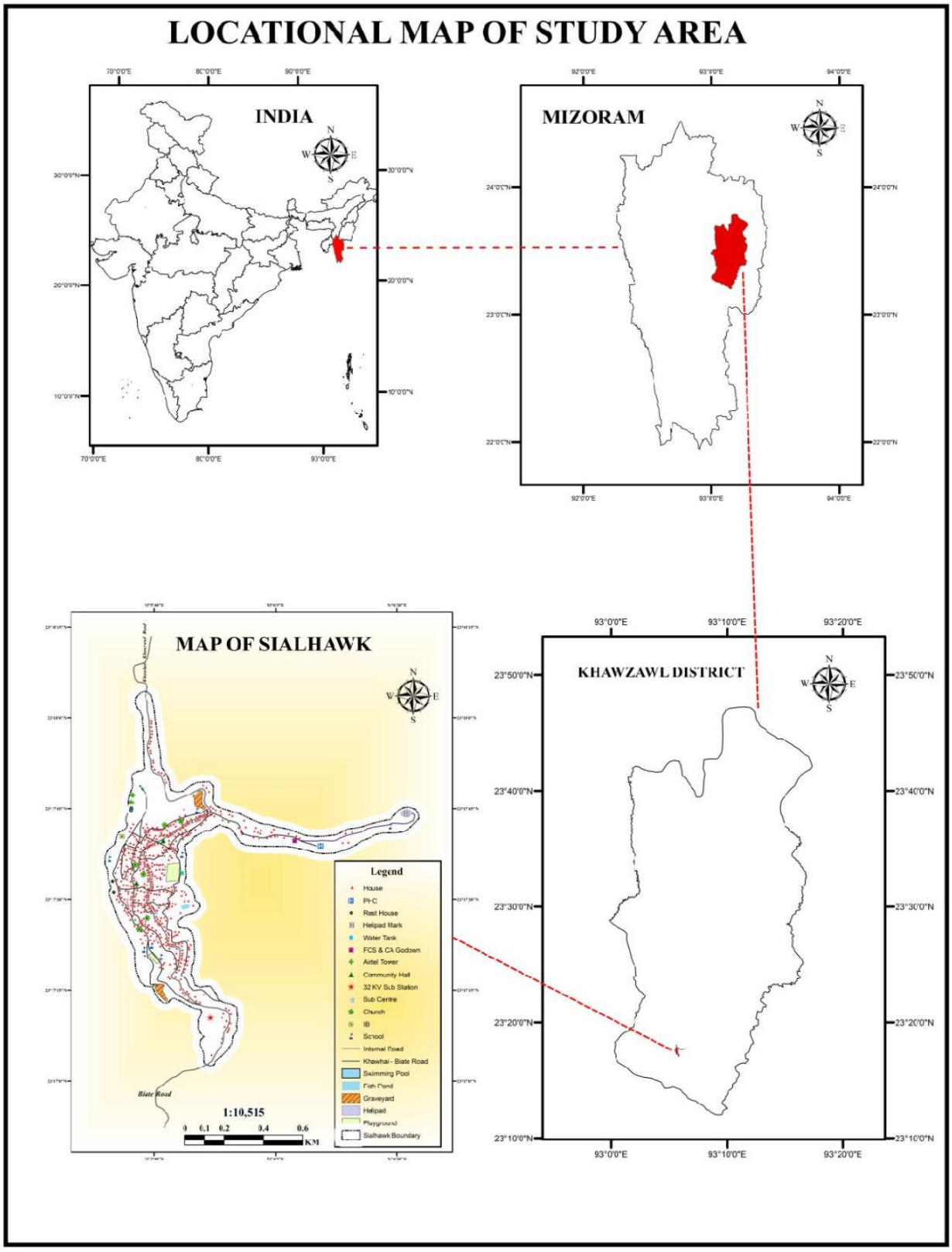
Sialhawk, one of the oldest villages in Mizoram, is located about 180 km from Aizawl within the Tuichangral region of Khawzawl District. Situated at an elevation of about 4,470 feet, the village lies between 23° 17' 06" – 23° 18' 00" N latitude and 93° 05' 34" – 93° 06' 21" E longitude (Primary data, 2024). It is bounded by Khawhai to the north, Tlangmawi to the northwest, Tlangpui to the west, Biate to the south, and Riangtlei to the east.

The origin of Sialhawk is linked to early Hmar settlements in the Khuaihnuai region, who chose the present site after finding a clean, open ground frequented by mithuns; hence the name "*Sialhawk*," where *Sial* means mithun and *Hawk* refers to a clean or previously inhabited place. Oral histories documented by Pu R. Sangkung state that the Hmar community occupied the area long before later Mizo groups. The village was formally established in 1895 by Neihpuithangi, widow of Vuttaia, (son of the prominent Mizo chief Lallula). Historical records by A.W. Davis (1891) also reference Neihpuithangi as leader.

The settlement pattern of Sialhawk is compact and Y-shaped, with a dense central cluster, northern extensions along the Sialhawk–Khawhai road, and a northeastern segment hosting major public institutions such as the PHC, HSS, FCS&CA godown, and helipad. The southern part is more dispersed towards Biate.

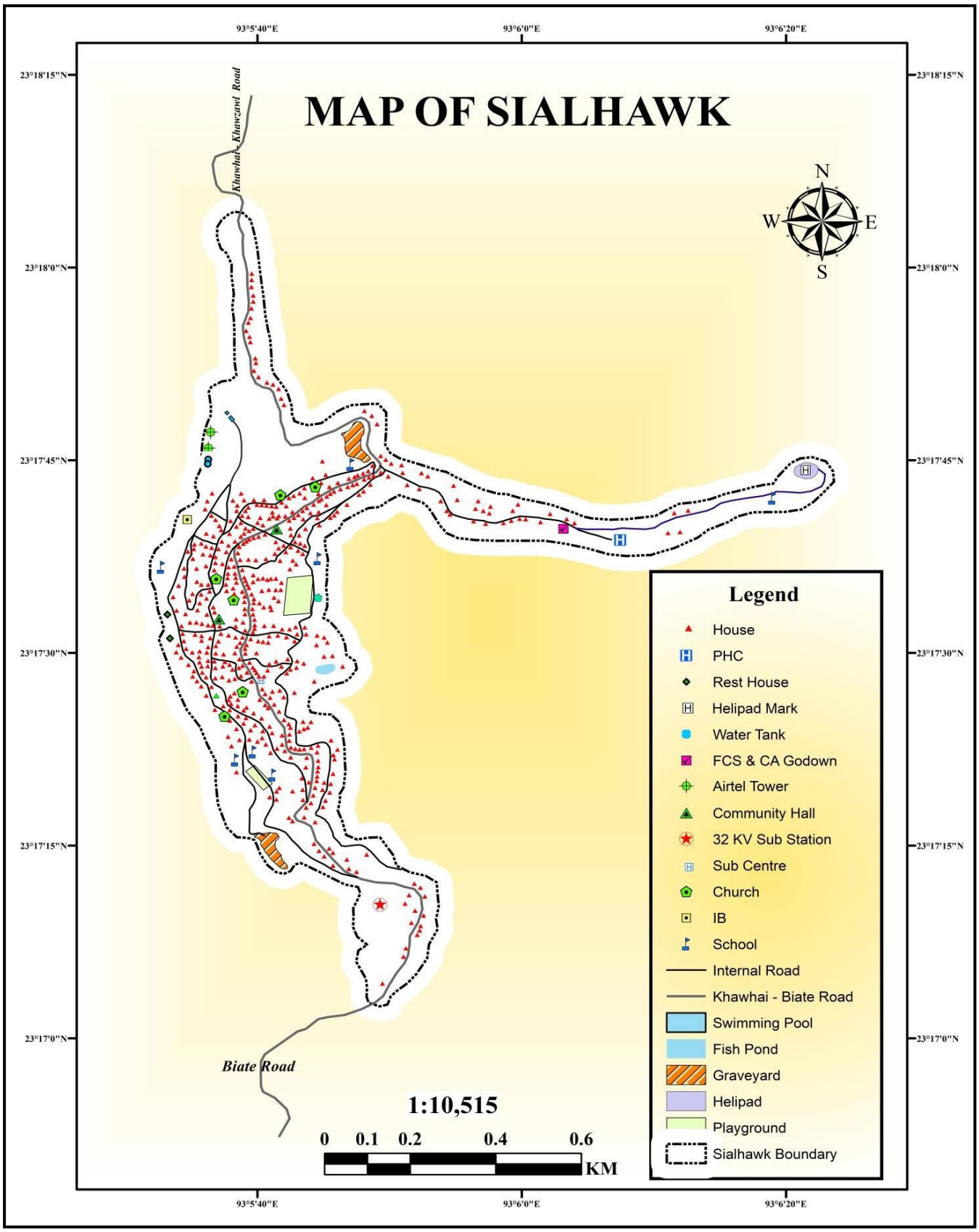
According to Census 2011, Sialhawk had 430 households and a population of 2,279, with a sex ratio of 1,037 and an exceptionally high literacy rate of 99 percent. Most residents belong to the Scheduled Tribe category and practice Christianity. Of the total population, 1,188 individuals were engaged in work, with 91.8 percent involved in main work. The village has essential facilities including Anganwadi Centres, schools up to Higher Secondary level, a Primary Health Centre with two sub-centres, good road connectivity, a Post Office, and stable electricity from a 32 KV power sub-station.

As per Village Development Indicators (2017–2018), households increased to 475, with many families practicing jhum alongside wet rice and horticulture. With improving infrastructure and expanding horticultural activities, particularly pineapple cultivation, Sialhawk is progressing steadily towards socio-economic development.



Map 1: Locational map of study area

Map 2: Map of Sialhawk



6. Pineapple Cultivation at Sialhawk

Sialhawk is one of Mizoram's leading pineapple-producing villages, with ideal topography, climate (18°C–26°C), and soil conditions that make pineapple the primary livelihood for most farmers. Besides pineapple, crops such as orange, lemon, and ginger are also grown. Sialhawk contributes over 65% of Mizoram's pineapple output, and together with seven nearby villages; Tlangmawi, Tlangpui, Chalrang, New Chalrang, Lungtan, Khawhai, and Vangtlang - it accounts for nearly 97% of the state's total production. Sialhawk is a village of roughly 530 families, about 350–380 rely on agriculture, while the rest engage in government or wage-based employment. A major development took place on 17th August 2023, when a foundation stone for a Pineapple Processing Plant - valued at nearly ₹2 crore - was laid under SDG9 to promote industry, innovation, and sustainable livelihoods. The village also celebrates the *Sialhawk Lakhuihthei Kut*, on 12th August, 2022, a festival dedicated to pineapple.

Farmers in Sialhawk faced a major financial setback in 2024 when nearly 4,000 quintals of pineapples - worth about ₹40 lakh - remained unsold and spoiled. According to Kawllianpuia, Secretary of the Sialhawk Lakhuihthei Society, farmers still earned around ₹90 lakh by selling pineapples at ₹10 per kilogram, but a large portion of the harvest went to waste due to poor market access and the absence of government-supported marketing initiatives.

In earlier years, government intervention had helped connect farmers with buyers and prevented such losses. However, in 2024, the withdrawal of this support left farmers to find markets on their own, a task that proved difficult and ultimately inadequate. Members of the Society expressed disappointment, criticizing the state government for not addressing the challenges faced by pineapple growers. On August 19, 2022, Mizoram exported 900 kg of organically grown pineapples to Dubai for the first time. The consignment was flagged off by the then Deputy Chief Minister Pu Tawnluia at Aizawl.

6.1 Sialhawk Pineapple Growers Society (SPGS)

Established in 2017, SPGS has strengthened cooperative farming, boosted productivity, and improved market access. Farmers mainly cultivate the '*Giant Kew'* variety, with an average holding of 2.5 acres per household. According to Pu Kawllianpuia, Secretary SPGS (2024), only around 14 households still practice shifting cultivation, while the majority are engaged in pineapple (240 families) and orange cultivation (100 families), indicating a shift toward permanent and sustainable agriculture. Pineapples mature in about three years, each plant producing around four fruits weighing approximately 1.5 kg. Weeding is done twice a year (July and December), and the main harvesting season occurs from July to September.

About 70% of Sialhawk's produce is supplied to Aizawl, the primary market. Locally, pineapples are sold at around ₹10 per fruit, and one acre of well-maintained plantation can sustain a household basic needs. Even during off-seasons, farmers collectively sell around 1,000 quintals, highlighting the consistency and economic significance of pineapple cultivation in Sialhawk.

7. Data Analysis

As of 2025, Sialhawk has more than 500 households, of which 240 families are engaged in pineapple cultivation. For the present study, 50% of these pineapple-growing households, 120 families were selected as the sample using a purposive random sampling technique.

Among the 120 respondents, 87% are male and 13% female. Educationally, 94% have an education level below matriculation, while only 6% have studied beyond matriculation. About 76% of the respondents reported practicing shifting (jhum) cultivation two decades ago.

Market opportunities emerged as the primary factor motivating farmers to shift from jhum cultivation to settled agriculture, as indicated by 65% of the respondents. Regarding the jhum cycle practiced in the village, 55% reported a cycle of 6–9 years, while 19% practiced a cycle of 9–12 years, indicating that the predominant jhum cycle in Sialhawk ranges between 6 to 12 years.

Table 1. Pineapple Society Members, Production & Income 2017-2025

Year	Members	Production (In Quintal)	Approximate Income (In Lakhs)
2017	100	1800	18
2018	100	2000	20
2019	150	2800	28
2020	150	3400	34
2021	200	6000	60
2022	240	10,000	100
2023	240	12,000	120
2024	240	9000	90
2025	240	11240	112

Source: Secretary, Sialhawk Pineapple Growers Society (2025)

Table 1 shows a steady rise in both the number of pineapple growers and production in Sialhawk from 2017 to 2025, highlighting the village's shift toward commercial horticulture. Membership increased from 100 to 150 between 2017 and 2019, with production rising from 1,800 to 2,800 quintals, indicating expansion of cultivated area and farming experience. A major jump occurred from 2020 onward, especially in 2021, when production nearly doubled to 6,000 quintals alongside 200 active growers, reflecting better coordination through the Pineapple Growers Society and improved market access.

Production peaked in 2022 and 2023 at 10,000 and 12,000 quintals, while membership stabilized at around 240 households—showing that growth was driven more by yield improvement than new participants. The dip to 9,000 quintals in 2024 despite steady membership likely reflects natural production cycles, weather variations, or soil-related challenges. Production rebounded to 11,240 quintals in 2025, demonstrating the resilience and adaptability of Sialhawk's pineapple farmers.

Table 2. Pineapple Society Members, Production & Income 2017-2025				
		Members	**Production (In Quintal)**	**Approximate Income**
Members	Correlation	1	0.95	0.95
	p		<.001	<.001
Production (In Quintal)	Correlation	0.95	1	1
	p	<.001		<.001
Approximate Income	Correlation	0.95	1	1
	p	<.001	<.001	

Table 2 reveals an exceptionally strong and statistically significant relationship among the number of members involved in pineapple cultivation, the total production, and the approximate income generated in Sialhawk. The number of members shows a correlation of **0.95** with both production and income, with p-values below **0.001**, indicating that these relationships are highly significant and unlikely to have occurred by chance. This suggests that as more farmers participate in pineapple cultivation; particularly through collective structures like the Pineapple Growers Society; overall production and income increase substantially. Even more notable is the **perfect correlation (1.00)** between production and income, again with p-values below **0.001**, implying a direct and proportional link between the quantity of pineapple produced and the income earned. This perfect linear association reflects the nature of the pineapple economy in Sialhawk, where income is almost entirely driven by production volume, with little variation from other sources or price fluctuations. Overall, the analysis highlights a tightly interdependent system in which increasing membership strengthens production capacity, and higher production translates directly into higher earnings, underscoring the critical role of collective participation and agricultural output in the village's socio-economic development.

Table 3. Main area of market

S/No	Years	No of respondent	Percentage
1	Aizawl	66	55.00%
2	District headquarter, Khawzawl and others	12	10.00%
3	Local	29	24.00%
4	Others	13	10.83%
	Total	**120**	**100%**
Source: Primary data, 2024			

Table 3 shows the distribution of pineapple farmers according to their primary market area reveals a strong concentration of sales towards Aizawl, which accounts for 55% of the respondents. This dominance highlights the capital city's role as the most profitable and reliable commercial hub, offering better price realization, stable demand, and established buyer networks. In contrast, about 24.17% of the farmers rely on local markets, reflecting situations where transportation limitations, limited access to inter-

mediaries make nearby outlets more practical. Only 10% of respondents sell their produce in district headquarters such as Khawzawl and other nearby towns, indicating that these markets play a relatively minor supporting role, often used by small-scale producers or during peak harvest periods when the Aizawl market becomes saturated. The remaining 10.83% supply to other markets, which may include occasional buyers, outside traders etc.

Table 4. Challenges face by farmers

S/No	Years	No of respondent
1	Access to credit and finnancial support	35
2	Market access for settled agriculture product	38
3	Water availability and irrigation issues	35
4	Others	12
	Total	**120**

Source: Primary data, 2024

The data on the challenges faced by farmers indicates that the transition toward settled agriculture continues to be constrained by several structural and resource-related limitations. Among the 120 respondents surveyed, the most frequently cited challenge is inadequate market access, reported by 38 farmers. This reflects ongoing difficulties in finding reliable buyers, securing fair prices, and integrating local produce into wider commercial networks—issues that directly affect income stability and agricultural sustainability. Access to credit and financial support, mentioned by 35 respondents, represents another major constraint, suggesting that many farmers struggle to obtain loans, capital investments, or subsidies essential for expanding their farms, adopting improved technologies, or managing production risks. Equally significant is the problem of water availability and irrigation, also reported by 35 respondents, highlighting the continued dependence on rainfall and the lack of adequate irrigation infrastructure, which limits productivity and crop diversification. The remaining 12 respondents cited other issues, which may include labour shortages, pest problems, transportation constraints, or limitations in government support.

Table 5. Main benefits from Settled agriculture

S/No	Years	No of respondent
1	Constructing house	26
2	Childrens education	60
3	Own Motor vehicles	15
4	Others	19
	Total	**120**

Source: Primary data, 2024

The transition to settled agriculture has brought several tangible socio-economic improvements to the respondent households. Among the 120 respondents surveyed, the most frequently cited benefit is im-

proved access to children's education, reported by 60 individuals. This indicates that settled agriculture provides a more stable and predictable income, enabling families to invest in education. Another significant benefit is the ability to construct houses, mentioned by 26 respondents. This reflects how steady agricultural earnings help households achieve better housing conditions and improved living standards. Additionally, 15 respondents highlighted that the shift to settled agriculture enabled them to acquire their own motor vehicles, suggesting enhanced mobility, market access, and social status. The remaining 19 respondents identified miscellaneous benefits under the category "Others," which may include improved food security, savings, access to government schemes, or better participation in community activities.

Table 6. Perception on Government or authority take first step for settled agriculture

S/No	Years	No of respondent
1	By providing market chain	110
2	By supplying seeds /sapings	3
3	By supplying insecticides or pesticides	5
4	By providing water and irrigation facilities	2
	Total	**120**
Source: Primary data, 2024		

Table 6 clearly shows that farmers place the highest priority on reliable market support. With 91% of respondents indicating that the government's first step should be to provide a strong market chain, it is evident that assured marketing, stable prices, and dependable buyers are their most pressing needs. This reflects ongoing challenges such as fluctuating prices, difficulty in selling produce, and frequent wastage, especially in rural areas like Sialhawk.

In comparison, very few respondents emphasized input-related support, only 3 mentioned seeds or saplings, 5 pointed to pesticides, and just 2 highlighted irrigation facilities. While these inputs matter, farmers do not view them as the immediate solution for sustaining settled agriculture. Instead, they prioritize income security, which is directly linked to market access.

8. Discussion and Results

The study reveals a profound agrarian transition in Sialhawk, where farmers have steadily shifted from traditional jhum cultivation to more secure and commercially viable settled agriculture, particularly pineapple farming. This transformation has been driven by favourable agro-climatic conditions, collective community efforts, and expanding market opportunities that encouraged households to adopt horticulture as their primary livelihood. While most families practiced jhum in the past, declining yields and growing market access became the key motivators for adopting settled agriculture. Pineapple emerged as

the dominant crop, and between 2017 and 2025, both the number of growers and production levels rose sharply, demonstrating improved farming skills, stronger coordination, and increasing commercialization.

The statistical analysis further strengthens this picture, showing very strong correlations between memberships, production, and income, with production and income displaying a perfect correlation ($r = 1.00$). This indicates that household earnings are directly dependent on production volumes, making pineapple cultivation the central economic driver for the community. Market orientation also plays a critical role, with Aizawl serving as the main marketing outlet for more than half of the farmers. This heavy dependence on a single urban market underscores both the village's reliance and its vulnerability to market fluctuations.

At the same time, farmers face substantial challenges, particularly inadequate market access, limited credit facilities, and water scarcity. These structural constraints continue to hinder the long-term sustainability of settled agriculture. Even though inputs like seeds and pesticides are important, farmers overwhelmingly prioritize the development of a reliable market chain, signalling the need for institutional support to stabilize incomes and minimize losses.

Despite these challenges, the socio-economic gains from settled agriculture are significant. Increased income from pineapple farming has enabled improvements in children's education, house construction, and mobility, reflecting noticeable upgrades in household welfare. Overall, the results and findings highlight that while settled agriculture has greatly improved livelihood security in Sialhawk, sustaining this progress will require stronger market infrastructure, better financial access, and consistent government intervention to support the rapidly growing horticultural economy.

9. Conclusion

The transition from shifting cultivation to settled, market-oriented agriculture in Sialhawk represents a significant agrarian transformation with far-reaching socio-economic implications. The findings demonstrate that pineapple cultivation has become the primary driver of rural livelihoods, supported by favourable environmental conditions, expanding market opportunities, and strong community participation. The substantial growth in production and the strong statistical relationship between production and income highlight the central role of horticulture in enhancing household earnings and improving living standards.

However, the study also reveals persistent structural challenges; particularly inadequate market access, limited credit facilities, and water scarcity that continue to constrain the long-term sustainability of settled agriculture. Farmers overwhelmingly express the need for a reliable and efficient market chain, underscoring the importance of institutional support in reducing losses and stabilizing incomes.

Overall, the shift to settled agriculture has brought measurable improvements in education, housing, and mobility, signalling a positive socio-economic transformation. Yet, sustaining and scaling these gains will require targeted government intervention, stronger market infrastructure, and continued community

engagement. The experience of Sialhawk thus provides valuable insights into the evolving dynamics of agricultural change in Mizoram and highlights the potential of horticulture-led development in similar rural contexts.

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