Sustainability of dragon fruit farming and Livelihood of dragon fruit farmers in Aizawl district of Mizoram, India

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Abstract

This study aims to discuss the sustainability of dragon fruit farming and livelihood of dragon fruit farmers in Aizawl district, Mizoram, India. In the state of Mizoram, the Government had made a tremendous contribution in this field for the development of dragon fruit farming within the Aizawl district. Dragon fruit cultivation had been initialised so that there can be available high value of dragon fruits within the local market and also to promote the sustainability of dragon fruit farming and the livelihood of dragon fruit farmers in Aizawl. The paper focuses on the livelihood of the dragon fruit farmers within Aizawl District and give emphasis on the study of the demographic profile of the respondents, living conditions and also keeping in mind the social capital and financial capital. In this study, four villages within Aizawl District were randomly selected where several dragon fruit farmer's interventions take place. It encompasses the support which the dragon fruit farmers received from the services provided by the government. Also, studies the opportunities and prospects as well as the challenges faced by the farmers and the certain strategies that have been adopted in order to overcome their challenges. The study tries to understand the living conditions of dragon fruit growers especially the role of sustainability of dragon fruit farming and livelihood of dragon fruit farmers in Aizawl District.

Keyword: Dragon fruit, Sustainability, Farming, Livelihood, Mizoram

1.Introduction:

Dragon fruit cultivation in India was first introduced in the late 1990s. Following that, between 2005 and 2017, the area under cultivation was gradually grown from 4 to 400 ha in several states. Farmers from Karnataka, Maharashtra, Gujarat, Kerala, Tamil Nadu, Orissa, West Bengal, Andhra Pradesh, Telangana, and the Andaman and Nicobar Islands were the first to cultivate dragon fruit. Rajasthan, Punjab, Haryana, Madhya Pradesh, Uttar Pradesh, and the North Eastern States are among the states where it is grown. According to recent predictions, India's dragon fruit output will more than double to more than 12,000 MT in 2020, covering an area of 3,000–4,000 ha. These projections are based on firsthand information gathered by the ICAR–NIASM from progressive growers, entrepreneurs, consultants, and officials from state agricultural departments across the country. States like Karnataka, Maharashtra, Gujarat, Telangana, Andhra Pradesh, and West Bengal, which have taken measures to boost commercial production after 2018, are primarily responsible for the significant increase in production and cultivated area. More than 80% of the total 3,085 ha (2,468 hectares) is under fresh cultivation with a plantation age of less than 18 months. Furthermore, these areas' average productivity ranges from 1.5 to 3.1 MT/ha. While the remaining 20% of the crop area (617 ha) is wellestablished and has reached full maturity, with an average production of 8–13.5 MT/ha. Farmers in India who use appropriate cultivation procedures and drip irrigation can get up to 4.5 tonnes of fruit per hectare in the first year after planting, 7.5–10 tonnes in the second year, and 16–24 tonnes per hectare in the third year (Wakchure et, al., 2020).

Dragon fruit can be grown from seed or by cutting the plant in the same way that flowers are cut. When the seed is used to cultivate it, the seed is scooped out of the fruit, washed, and dried overnight. The seed is then easily sown in compost or potting mix, where it germinates in about two weeks. Dragon fruit cultivation from seed can take five to seven years for the plant to bear fruit, which is why it is the least preferred alternative. Propagating a dragon fruit tree, on the other hand, is rather simple. Simply clip off a 30cm part of the tree and leave it to dry for 5-6 days, or until the cut end turns white. Simply insert cut side down in sandy cacti soil and water monthly once it has dried. Within a month, the plant will send out roots and establish itself, after which it will continue to develop and bear fruit for one to three years. (Dalziel, 2019).

2.LITERATURE REVIEW:

There are also many studies on sustainable livelihood as well. Sustainable livelihood encompasses the livelihood practice which entails goal achievements through physical, human, financial, natural and social assets and capitals to have income, production and distribution (see Saha, Singha and Xaxa, 2017; Carney, 1998). Sustainable livelihood also means having a strategy that must be inclusive, connected, equitable, prudent and secure to attempt to go beyond conventional definitions and approaches to poverty eradication (see Krantz, 2001; Gladwin et al., 1995)

Scoons (1998) in his study "Sustainable rural livelihood: A framework for analysis: defines livelihood as the constructed basis of income resources which are derived from the basis of their livelihood resources. According to him, livelihood strategies themselves must not be subject to analysis, and they often consist of combinations of activities which he calls "livelihood portfolios".

Ellis (2000) in his study "Rural Livelihoods and Diversity in Developing Countries" defined that a livelihood offers a more complete picture of the complexity of survival in low-income countries than terms formerly considered adequate like substances, income and employment. He further says that it is the maximization of return per unit of labour. He also mentioned that diversification is a key feature of livelihood strategies. It is defined as the process by which rural families construct a diverse portfolio of activities and social support capabilities in order to survive and to improve their standards of living.

Krantz (2001) in his study "The Sustainable Livelihood Approach to Poverty Reduction" explains the concept of sustainable livelihood is an attempt to go beyond conventional definitions and approaches to poverty eradication. These had been found to be too narrow because they focused only on certain aspects or manifestations of poverty, such as low income.

Gladwin et al. (1995) in their study "Shifting Paradigm for Sustainable Development: Implications for Management Theory and Research" also defines that a sustainable livelihood strategy should be inclusive, connected, equitable, prudent and secure.

Singh and Titi (1995) emphasize that when trying to evaluate whether the results of the project meet the goal of sustainable livelihood it would be useful to have a set of indicators with which to measure the results by. The following are indicators; Food security, Nutritional security, Economic security, Health Security and Educational Security.

Pascua, Pascua and Gabriel (2015) in their study "Dragon Fruit Production and Marketing in the Philippines: Its Status, Constraints and Prospects" has come to the conclusion that, low yield, prevalence of insect pests and diseases, short shelf life of fruits, no standardization of fruit quality, no continuous supply of fruits, problems on marketing among others are identified as the major constraints in the production of the fruit.

Rijal (2019) in his study "Dragon Fruit: Fruit for Future Nepal" has mentioned that the price of Dragon fruit is 3-4 times higher than any other horticulture crops. This has enabled farmers to have a good amount of income from their production and also add value to the agro-tourism in Nepal. He further mentioned that it is beneficial for small landholders and marginal farmers to improve their livelihood. However, he further mentioned that normal Nepalese farmers are unable to invest huge money because agriculture is a risk itself. So, he suggested that the government must also provide subsidy, training, related various extension works through NARC, INGOs, NGOs for better results.

3.OBJECTIVE OF THE STUDY:

1.To study the challenges of sustaining dragon fruit farmers and the strategies employed to manage these challenges.

2. To assess the relationship between the livelihood assets and living conditions of dragon-fruit farmers in Aizawl.

4.METHODOLOGY

Purpose of the study

The study is to find out the sustainability of dragon fruit farming and livelihood of dragon fruit in Aizawl, District, Mizoram. The present study attempts the sustainability of dragon fruit farming and livelihood of dragon fruit farming in Aizawl, District. The study highlights the patterns of dragon fruit farming, livelihood assets, livelihood strategies intersected to develop and sustain the livelihood of dragon fruit farmers.

Data collection

The data were collected within the area of Aizawl, District, Mizoram. Data was collected through face-to-face personal interview with the help of a structured questionnaire through an easy accessibility of dragon fruit farming and livelihood of dragon fruit farmers. Around 50 respondents were selected considering availability at the first sight and discussions were held with farming households on an informal basis.

Data analysis

Data were analyse using Statistical Package for Social Sciences (SPSS version-22) software. The data were used to described through descriptive statistics such as means, percentages, standard deviation and frequencies.

Sampling techniques

The target population was all farmers/growers engaged in dragon fruit farming in Aizawl District, Mizoram. About 50 respondents of dragon fruit farmers/growers is obtained where frame and selection errors can easily be controlled. It easily described and identify the main purpose of sustainability of dragon fruit farming and livelihood of dragon fruit farmers within Aizawl, district. The sampling techniques involves Statistical Package of Social Science (SPSS version-22) which help identify the sustainability of dragon fruit farmers/growers and livelihood of dragon fruit in Aizawl, district, Mizoram.

5. ANALYSIS AND FINDINGS

a. Responses of the participants:

Age plays an important role in horticulture and agriculture production. While collecting the primary data, the age of the principal cultivator in the family has been taken into consideration. To analyze the data, the age group of the respondents has been divided into below 20 to 30 years which has been grouped as young farmers, 31 to 40 years' group as middle-aged farmers, 41 to 50 average age farmers and above 51 to 60 years category as old farmers.

Table 1: Responses of the participants

Age of the Respondents	N	Percentage
20-30	14	29
31-40	17	34
41-50	16	32
51-60	3	6
Total	**50**	**100**

Source: Researchers' Data

It is revealed from the above table-1 that among the dragon fruit farmers, 29 percent belongs to age group below 20 to 30 years, 34 percent are between 31 to 40 years, 32 percent as average age farmers and 6 percent are above the age of 51 to 60 years. The middle age of the dragon fruit farmers is found to be 31 to 40 years with a 34 percentage. It can also be seen that the majority of the dragon fruit farmers are at the average of 41 to 50 with a 32 percentage. It can be seen that 6 percentages can be found at the old age of 51 to 60 years of dragon fruit farmers.

The overall mean age of the farmers under study was found to be between 31 to 40 years. It can be concluded that the middle age group category forms the majority of the farmers who are involved in dragon fruit farming in Aizawl, Mizoram which is represented by 34 percent of the respondents.

b. Relationship between the Livelihood Assets and living condition of the Dragon Fruit Farmer Households

To understand the livelihood assets of dragon fruit farmer in the present study, the physical capital, financial capital and social capital of respondent households are explored.

Physical Capital

The physical capital of the dragon fruit cultivators is probed in the form of amenities owned by respondent households in the present study where different household properties are takin into account. The household amenities observed in the present study are Water Connection, Electricity, Septic Tank, LP Gas, Land, Ration Card, Mobile Phone, Two Wheelers, Four Wheelers and Housing (See Table-2).

Table 2: Physical capital

Sl. No	Household Amenities N=40	Owned	Not Owned
1.	Water Connection	11 (28)	29 (72)
2.	Electricity	40 (100)	0 (0)
3.	Septic Tank	40 (100)	0 (0)
4.	LP Gas	40 (100)	0 (0)
5.	Land	39 (98)	1 (2)
6.	Ration Card	40 (100)	0 (0)
7.	Mobile phone	40 (100)	0 (0)
8.	Two-wheeler	34 (86)	6 (14)
9.	Four-Wheeler	9 (23)	31 (77)
11.	Housing	39 (98)	1 (2)

Source: Computed

All the respondents' households owned ration card, septic tank, mobile-phone, electricity connection and Gas connection in their house. Majority of the respondent households owned Land (98%), two wheelers (85%) and 98% household in the present study live in their own home. In the meantime, 72% households do not have water connection and 77% of respondent's household do not own four wheelers.

Financial Capital

Since most Mizo family are unwilling to share their financial information as they believed to be a taboo, debt and household saving activity especially are not shared openly therefore many of the information may not be accurately measured. However, the financial capital might reflect the pattern and outline of financial capital owned. Financial Capital of Dragon fruit cultivators are probed in terms of the household income and household expenditure

c. Household Expenditure

The monthly household expenditure of the dragon fruit cultivators in the present study observed are expenditure on Food, Electricity, Water, Phone, Clothing Transport, Medication, Religious & Cultural Contribution and others (see Table-3). The pattern of average monthly household expenditure of dragon fruit cultivators in the present study shows that it is highest on expenditure on food (Rs. 5842) followed by Religious & Cultural contributions (Rs. 3482), Electricity bill, Clothing (Rs 1570), Transport (Rs 1355), (Rs. 738), Phone Bill (Rs 643),

medical expenses (Rs 616), and Water (Rs. 553). The dragon fruit cultivator household also have expenditure on other areas (Rs957) not listed above. There are some households which do not have expenditure on phone, clothing and water as they don't own phone and water connection. Family with good health condition do not have expenditure on medication.

Table 3: Household expenditure

	Monthly household expenditure	**N=40**			
Sl. No		**Minimum**	**Maximum**	**Mean**	**Std. Dev.**
1.	Food	1800	20000	5842.5	4872.4
2.	Electricity	150	14200	738.75	2196.0
3.	Water	0	6000	553.75	1121.0
4.	Phone	0	2000	643.75	426.6
5.	Clothing	0	5000	1570	929.9
6.	Transport	200	10000	1355	1592.3
7.	Medication	0	5000	616.25	890.4
8.	Religious and cultural contribution	300	20000	3482.5	3942.9

Source: Computed

d. Amount of dragon fruit harvested in a year

The amount of dragon fruit harvested in a year is classified as Not yet harvested, below 500 kg, 500 kg to 1000 kg, above 1000 Kg (See Table No.3). The average quantity of harvest in a year is 1821kilogram. Most of the dragon fruit cultivators harvested 500 to 1000 kg (35%) followed by Below 500 kg (25%) and only a few harvested Above 1000 kg (15%). In the meantime, some families (25%) have not yet harvested from their dragon fruit cultivation.

Table 4: Amount of dragon harvested in a year

		N=40	
Sl. No	**Particular**	**f**	**Percentage**
1.	Not yet harvested	10	25
2.	Below 500 kg	10	25
3.	500 kg to 1000 kg	14	35
4.	1000 kgs	6	15
	Mean	**1821kg**	

Source: computed

e. Tools used for cultivation

There are several kinds of tool used by the farmers for cultivating dragon fruit which could be categorised as land preparation and weeding tool, irrigation tool and cultivation and harvesting tool (See Table-5). The land preparation and wedding tool used are chempui, tuthlawh, plough, spade, tractor tiller, digging hoe, digging fork, weeding hoe, and hand hoe. Dragon fruit cultivator in the present study owned and uses Chempui (2.5), Tuthlawh (2.7), Plough (1.8), Spade (1.6), and Thirtiang (1.0). As the cultivation of dragon fruit is in the initial stage certain tools viz., Tractor (0.1), Digging Hoe (0.2), Digging Fork (0.3), Weeding Hoe (0.3), Hand Hoe (0.4), were not owned. Irrigation tools observed in the present study are water pipe, water pump, mechanical motor pump set, drip irrigation, sprinkler irrigation and rainwater harvesting pond. Among the irrigation tools Water pipe (1.4), Drip Irrigation (20.8) are used by the farmers where Water pump (0.1), Mechanical Motor Pump Set (0.1), Sprinkler Irrigation (0.8), Rainwater Harvesting Pond (0.7) are not owned. Cultivation and Harvesting tools observed in the present study are Basket, Knife, Secateurs, Basket, Pruning shear, Em, Dawrawn and Iptepui. Among the cultivating and harvesting tools Iptepui (2.7), Secateur (1.8), Basket (9) and Em (1.7) are utilised. On the other hand, basket knife (0.1), Pruning shear (0.3), and Dawrawn (0.6) are not utilised by the farmers.

Table 5: No of tools used for cultivating dragon fruit

	No. of tools	**N=40**		
Sl. No		**Minimum**	**Maximum**	**Mean**
	LAND PREPARATION AND WEEDING			
1.	Chempui	0	6	2.5
2.	Tuthlawh	1	7	2.7
3.	Plough	0	4	1.8
4.	Spade	0	4	1.6
5.	Tractor tiller	0	1	0.1
6.	Thritiang	0	4	1.0
7.	Digging hoe	0	1	0.2
8.	Digging fork	0	2	0.3
9.	Weeding hoe	0	2	0.3
10.	Hand hoe	0	3	0.4
	IRRIGATION TOOL			
11.	Water pipe	0	10	1.4
12.	Water pump	0	1	0.1
13.	Mechanical motor Pump set	0	1	0.1
14.	Drip irrigation	0	400	20.8
15.	Sprinkler Irrigation	0	8	0.8
16.	Rain water harvesting pond	0	4	0.7
	CALTIVATING AND HARVESTING			
17.	Basket knife	0	2	0.1
18.	Secateur	0	5	1.8
19.	Basket	0	20	9.0
20.	Pruning shear	0	3	0.3
21.	Em	0	5	1.7
22.	Dawrawn	0	4	0.6
23.	Iptepui	0	6	2.7

Source: Computed

6. CHALLENGES FACED BY FARMERS FOR SUSTAINABILITY OF DRAGON FRUIT FARMERS

Challenges faced by dragon fruit cultivators observed in the present study are Complex survival chance of Dragon Fruit, Lack of government support, Improper market linkage, Harvest is low, Pest and insect problems, Lack of technical knowhow, Lack of proper training, Insufficient subsidy from the government, Lack of irrigation and water supply, Non remunerative price, Lack of transport facilities, Poor link roads, Lack of information on market, Lack of storage facilities, Lack of agro based industries, Lack of capital, Tools are not available in market, Damaged products in process of transport, High expenditure for maintenance, Topographical problems (See Table-6).

Among the problem faced observed dragon fruit cultivators in the present study strongly agreed that Lack of agro based industries (3.0), Lack of information on market (3.0), Non remunerative price (2.9), Pest and insect problems (2.9), Complex survival chance of Dragon Fruit (2.9), High expenditure for maintenance (2.9), Lack of irrigation and water supply (2.8), Poor link roads (2.8) and Lack of capital (2.8) are problems faced. In the meantime, they also agreed that Lack of government support (2.2), Improper market linkage (2.4), Harvest is low (2.1), Lack of technical knowhow (2.5), Lack of proper training (2.2), Insufficient subsidy from the government (2.7), Lack of transport facilities (2.2), Lack of storage facilities (2.6), Tools are not available in market (2.5), Damaged products in process of transport (2.8) and Topographical problems (2.1) are problems faced.

From the total respondents 32% disagree that there is complex survival chance dragon fruit and 8% also strongly disagree with it, while 32% strongly agree that there is complex survival chance of dragon fruit and 28% agree with it.

Majority that is 62%of the respondents disagree that problem is due to lack of government support and also 8% strongly disagree with it, while 30% of the respondent agree that lack of government support is a problem for them.

Majority that is 60% of the respondents disagree that proper market linkage is a problem and 3% strongly disagree with them. In the meantime30% of the respondents agree that lack of proper market linkage is a problem faced by them also joined by 7% who strongly agree with it.

A majority of 82% of the respondents disagree that low harvest is a problem while 8% agree that low harvest is a problems faced by them. Among the respondents in the present study more than half that is 57% agree and 15% strongly agree that pest and insect problems is a problem faced by them while 28% disagree that pest and insect problem is a problem for dragon fruit cultivators. Lack of technical knowhow is rated as disagree by 55% of the respondents while 45% of the respondents agree that lack of technical know is a problem.

Lack of proper training a problem is disagreed by majority that is 77% of the respondents while 23% agree that lack of proper training is a problem. Insufficient subsidy from the government is a problem agreed by more than half of the respondents that is 55% joined by 5% who strongly agree with it. In the meantime40% of the respondents disagree that insufficient subsidy from the government is a problem faced by them.

Lack of irrigation and water supply as a problem is agreed by majority of the respondents that is 72% of the respondents and 3% strongly agree with it. In the meantime, 25% disagreed that lack of irrigation and water supply is a problem. Non-remunerative price as a problem is agreed by majority of the respondents that is 70% of the respondents joined by 8% who strongly agreed that it is a problem.

In the meantime, 22% of the respondents disagree that non-remunerative price is a problem. Lack of transport facilities as a problem is disagreed by majority that is 75% of the respondents joined by 2% who strongly disagreed that it is a problem. In the meantime22% of the respondents agree lack of transport facilities is a problem and even 2% strongly agree to it. Poor link road as a problem is agreed by majority that is 60% of the respondents joined by 8% who strongly agreed that it is a problem. In the meantime,32% disagree that it poor link road is a problem.

Lack of information on market is a problem agreed by majority of the respondents that is 76% of the respondents joined by 12% respondents who strongly agreed that it is a problem. In the meantime, 12% of the respondents disagree that lack of information is a problem for the farmers.

Lack of storage facilities as a problem is agreed by 45% of the respondents joined by 5% respondents who strongly agreed that it is a problem faced by farmers. On the other hand, half of the respondents which is 50% disagree that lack of storage facilities is a problem.

Lack of agro-based industries is a problem agreed by more than half of the respondents which is 75% of the respondents joined by 10% respondents who strongly agree with it. On the other hand15% respondents disagree with lack of agro-based industries as a problem.

Lack of capital as a problem is agreed by 75% of the respondents joined by 5% respondents who strongly agree with it. On the other hand, 17% respondents disagree joined by 3% respondents who strongly disagree that lack of capital is a problem faced by the farmers.

Non availability of tools as a problem is disagreed by 47% of the respondents joined by 3% respondents who strongly disagree that it is a problem. On the other hand45% respondents agree that Non availability of tools is a problem joined by 5% respondents also who strongly agree with it.

Damaged product in process of transports a problem agreed by majority that is 75% of the respondents joined by 2% respondents who strongly agree that it is a problem. On the other hand23% disagree that damaged product in process of transport is a problem faced by farmers. High expenditure for maintenance as a problem is agreed by majority that is 72% of the respondents joined by 8% respondents who strongly agree with it.

On the other hand22% of the respondent disagree that high expenditure for maintenance is a problem. Topographical problems are a problem disagreed by majority that is 80% of the respondents joined by 5% respondents strongly disagree with it. Only 12% of the respondents agree that they faced topographical problems joined by 3% respondents who strongly agree with it.

Table 6: Challenges faced to sustain the dragon fruit farmers

Challenges faced to sustain the dragon fruit farmers							
Sl. No	**Particulars**	**Strongly disagree**	**Disagree**	**Agree**	**Strongly agree**	**Mean**	**Std. Dev.**
1	Compels survival chance of dragon fruit	3 (8)	13 (32)	11 (28)	13 (32)	2.9	0.98
2.	Lack of government support	3 (8)	25 (62)	12 (30)	0 (0)	2.2	0.58
3.	Improper market linkage	1 (3)	24 (60)	12 (30)	3 (7)	2.4	0.68

4.	Harvest is low	0 (0)	37 (92)	3 (8)	0 (0)	2.1	0.27
5.	Pest and insect problems	0 (0)	11 (28)	23 (57)	6 (15)	2.9	0.65
6.	Lack of technical	0 (0)	22 (55)	18 (45)	0 (0)	2.5	0.50
7.	Lack of proper training	0 (0)	31 (77)	9 (23)	0 (0)	2.2	0.42
8.	Insufficient subsidy from the government	0 (0)	16 (40)	22 (55)	2 (5)	2.7	0.58
9.	Lack of irrigation and water supply	0 (0)	10 (25)	29 (72)	1 (3)	2.8	0.48
10.	Non remunerative price	0 (0)	9 (22)	28 (70)	3 (8)	2.9	0.53
11.	Lack of transport facilities	1 (2)	30 (72)	8 (21)	1 (2)	2.2	0.53
12.	Poor link road	0 (0)	13 (32)	24 (60)	3 (8)	2.8	0.59
13.	Lack of information on market	0 (0)	5 (12)	30 (76)	5 (12)	3.0	0.51
14.	Lack of storage facilities	0 (0)	20 (50)	18 (45)	2 (5)	2.6	0.60
15.	Lack of agro based industries	0 (0)	6 (15)	30 (75)	4 (10)	3.0	0.50
16.	Lack of capital	1 (3)	7 (17)	30 (75)	2 (5)	2.8	0.55
17.	Tools are not available in the market	1 (3)	19 (47)	18 (45)	2 (5)	2.5	0.64
18.	Damage product in process of transport	0 (0)	9 (23)	30 (75)	1 (2)	2.8	0.46
19.	High expenditure for maintenance	0 (0)	8 (20)	29 (72)	3 (8)	2.9	0.52
20.	Topographical problems	2 (5)	32 (80)	5 (12)	1 (3)	2.1	0.52

Source: Computed

6.1 Strategy employed to manage challenges of sustaining dragon fruit farmers

The strategy employed to manage challenges of sustaining dragon fruit farmers in the present study are Preparing own tools, Preparing rain water harvest tank, Adopting traditional style of protection from pest, Selling to the market by self when linkage is not properly organised,

Preparing water ways from stream/river, New techniques were learned from other farmers and friends, Use of internet to acquire new knowledge and methods, Selling through the internet, Developing nursery is needed for self-sufficiency of seeds, Organic manure prepared by self is required when there shortage of supply, There is a need to develop supply chain of seed by individual/society, Depending on rain water, Supports from NGOs are reliable, Use fertilizers for higher products, Use pesticides when plants are infected, and Mixed with other crops for sustenance.

7 SUGGESTIONS

There are suggestions from the study that can be utilised for further study and actions.

1. Storage facility: There is a lack of storage facility for storing the products before it has been brought to the market. The storage would be helpful in such a way that it is accessible for the farmers to store their crops and other farm products to reduce damage due to lack of proper storage.

2. Agro-based Industry: Lack of agro-based industry have impact on the dragon fruit cultivators. A proper packaging and processing industry is much desirable so that damaging of fruits and other products in the course of transportation can be reduced.

3. Rainwater Harvesting: Most of the dragon fruit cultivators practice the use of stream and river water by pipelines and waterways. This cannot sustain throughout the year so that a proper rainwater harvesting pond or a tank would be helpful so that irrigation issues can be addressed.

4. Cooperatives and Associations: A proper action from the part of cooperative societies and association is lacking. A proper functioning cooperative society would be helpful for the farmers themselves so that they could address their own issues by making a proper link to the market and also with a proper profit from their cultivation.

5. Organised market system: A proper organised market system is needed so that the dragon fruit cultivators can have a proper market linkage for the future development both in local market and outside the state of Mizoram.

CONCLUSIONS:

The present study attempts to assess the sustainability of dragon fruit farming and livelihood of dragon fruit farmers in Aizawl District Mizoram. The study also highlights how the patterns of cultivation, livelihood assets, policies, institutions and processes, livelihood strategies interacted to develop the livelihood of the dragon fruit farmers.

The pattern of sustaining dragon fruit farming in Aizawl, Mizoram shows development at a fast rate and many farmers saw it as a good opportunity which resulted in a rapid increase of number of farmers cultivating dragon fruit in recent years. The challenges faced by the dragon fruit farmers were also comprehended systematically and could cope with the support of the government and the coping strategies developed by the farmers which in turn create livelihood opportunity and developed living conditions of dragon fruit farmers in Aizawl, District Mizoram. In the meantime, we should not fail to mention that the farmers are now facing a problem on the storage facility although the rate of production is still not in a large scale. With the expected increase of production and the reality of unorganised local market system it can be assumed that market issue will be a problem in the near future. Once the amount of production is not possible to be consumed in the local market farmers will need to export their product outside and currently there is no plan in this regard. Presently dragon fruit cultivation with a significant amount of support from the government is a good prospect for cultivators. However, sustainability of dragon fruit cultivation as a livelihood option without the support of the government will only be confirmed by future research.

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