Content list available at http://epubs.icar.org.in, www.kiran.nic.in; ISSN: 0970-6429

Indian Journal of Hill Farming

Special Issue 2020, Page 113-120

New Land Use Policy and its Contribution to Sustainable Permanent Agriculture in Mizoram

V.P. Sati

Department of Geography and Resource Management, School of Earth Sciences, Mizoram University (A Central University), Aizawl – 796004, Mizoram

ARTICLE INFO

Article history:
Received 29 September 2019
Revision Received January 2020
Accepted 11 February 2020

Key words:
New Land Use Policy, Permanent Agriculture, Mizoram

ABSTRACT

The New Land Use Policy and its contribution to sustainable permanent agriculture in Mizoram, India require a thorough analysis. Data on crops grow under permanent agriculture has been gathered from the case study of 16 villages of eight districts. A household-level survey was conducted using a purposive random sampling method with sample size 815 households. Area, production, and yield of crops were analyzed and their valuation was carried out. New Land Use Policy of the State Government was evaluated and its future prospect was described. It was established from the fact that crops – paddy, vegetables, and fruits grow under permanent agriculture have substantial future prospects for sustainable agriculture.

1. Introduction

The farming system in Mizoram is quite different than to other mountainous regions of the world in general and the Himalayan states of India in particular. Because, about 86% of the geographical area is forest cover, arable land is significantly less, which is only 5.54%, out of which, a large part of arable land (54%) is under shifting cultivation (Pachuau 2009, Sati 2019). Permanent farming in Mizoram is referred to Wet Rice Cultivation (WRC), which is carried on mainly in valley fills/river valleys and flood plains of the major rivers of Mizoram such as Tlawng, Tuirial, Kaladan, Mat and their sub-tributaries, however, it covers only 3.1% of the total geographical area. As a result, cultivable land, out of the total area under flood plains and valley fills, is very scarce. Arable land under river valleys and flood plains are fertile as they are formed by the sediments, deposited by the perennial rivers. Mat river valley is quite suitable for the cultivation of paddy (WRC) and fish (pisciculture). Besides, all fruits and some vegetables also grow under permanent agriculture.

New Land Use Policy (NLUP) of the State Government, initiated in 1985, aimed to increase the area under permanent agriculture. Constructing of terraced fields was the other major objective. The Government was able to increase land under permanent agriculture partially. It has been noticed that the area and production of crops under permanent agriculture have increased substantially than shifting cultivation during the recent past. In Aizawl district, a proportion of Jhumland has been transferred into terraced fields for permanent agriculture. Mizoram is located in the eastern extension of the Himalaya, is one of the eight sister states of Northeast India. The landscape is spectacular and the climate is feasible. It has rich biodiversity (Champion & Seth 1968, Sati 2015) including agro-biodiversity, which is feasible for cultivating a number of crops – food grains, fruits, and vegetables. The average temperature is 23oC and the average rainfall is 2400 mm. The principal crops grow in Mizoram under permanent agriculture are paddy, orange, lemon, oil palm, banana, and pineapple. The major objective of this paper is to examine NLUP and its contribution to sustainable permanent agriculture in Mizoram. It has also aimed to compare the output of shifting cultivation and WRC. In this paper, the area under permanent agriculture, production, and yield of crops were gathered and analyzed.

*Corresponding author: sati.vp@gmail.com

Data were collected from 16 villages of eight districts and the sample size was 815 households. A purposive random sampling method was used to household-level surveys. Satellite data was collected on permanent agriculture plots in 2011-2015 and maps were digitalized to show the area under shifting cultivation.

Principal Crops Grow under Permanent Agriculture

Paddy

Paddy is grown both under shifting cultivation and permanent agriculture. It is called WRC when paddy grows under permanent agriculture. Out of total study villages, only 10 villages grow paddy and area and production of paddy in these villages is comparatively less than area and production under shifting cultivation. The total area under paddy crop in the study villages was 15.8 ha in 2000, which was reduced to 14 ha in 2017. In the meantime, the production of paddy has increased from 27130 kg in 2000 to 28240 kg in 2017. The highest area under paddy was 4.8 ha in N. Mualthuam village in both years. It was followed by village Bukvannei with 2.4 ha in both years. There was a decrease in the area of paddy in Pehlawn village from 2.4 ha in 2000 to 0.4 ha in 2017. Other villages have less than 2 ha paddy land. Except Pehlawn village, the area of paddy remained unchanged. Production of paddy was the highest in N. Mualthuam village which was 8500 kg in 2000 and 9300 kg in 2017, followed by Neihdawn village (6000 kg in each year) and Sialhau village (4700 kg in 2000 and 5000 kg in 2017). Other villages have less than 4000 kg od production. The average yield of paddy was 1671.9 in 2000 and 1907.6 in 2017.

It has been observed that the yield of paddy crops has increased under permanent agriculture whereas it has decreased under shifting cultivation in the study villages. The figure 1 shows WRC in Mamit district near Lunglei. A marginal farmer plowing field by oxen (B) and other farmers are planting paddy in the field.

Banana

Banana is the major fruit crop of Mizoram. Mizoram is one of the major banana growing states of India (Figure 2). In the study villages, area under banana crop was 6.8 ha in 2000 and in 2017, its area has increased 26 ha. In production, it was 65600 in 2000 and 412300 in 2017. Out of the total study villages, only six villages grow banana. Village Zanlawn has the highest area under the banana crop (3.6 ha) in 2000 and the area was stagnant in 2017 in the village. It was followed by village Thiltlang (1.6 ha) without change in 2017. In N. Mualthuam village, area under banana crop was 0.8 ha in 2000 and it increased to 12.6 ha in 2017. The other villages Thiak and Siachangkawn had 0.6 ha and 0.2 ha land with a slight increase in their area 1 ha and 0.6 ha, respectively. In terms of production of banana, it was the highest in Tualcheng village (38000 kg) in 2000, while, the highest production in 2017 was 304000 in N. Mualthuam. There are three villages – Dapchhuah, Neihdawn, and Theiri - which initiated a growing banana in 2017 only. In terms of yield of banana, it was the highest in Thiak village (21666.67 kg/ha) in 2000 while, it was the highest in N. Mualthuam village in 2017, which was 24126.98 kg/ha. In a nutshell, a yield of banana has increased from 9647.1 kg/ha in 2000 to 15857.7 kg/ha in 2017.

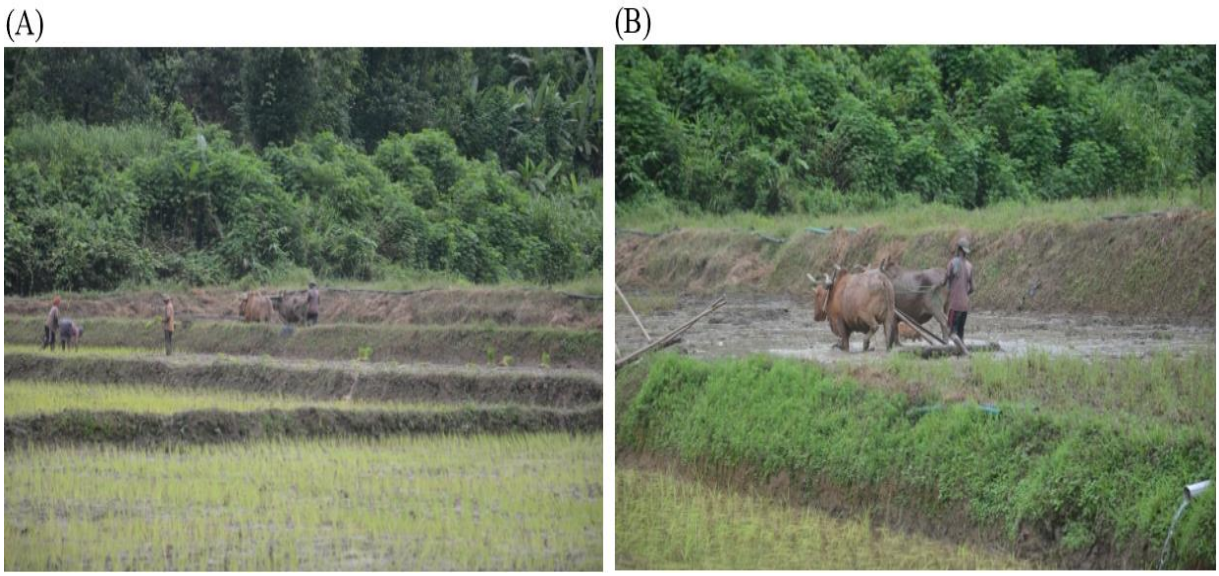

Figure 1. (A) WRC (B) A farmer plowing irrigated field by oxen in Mamit district

Orange

The areas above 800 m in Mizoram have very feasible climatic conditions for growing orange. Recently, the area and production of orange has been increasing in these areas. Among the study villages, orange is grown only in nine villages – N. Mualthuam, Neihdawn, Pehlawn, R. Vanhne Siachangkawn, Sialsir, Thiak, Thiltlang, and Lungzarhtum. Village Thiak has the highest area (6.8 ha) under the orange crop (in 2017), followed by village R. Vanhne (4 ha). Other villages have less than 3 ha area. A large decrease has been observed in the area under the orange crop in village R. Vanhne (0.4 ha in 2017), followed by Thiak village (4.2 ha in 2017). In the meantime, the village N. Mualthuam registered the highest increase in the area of orange, which is from 2.8 ha in 2000 to 19 ha in 2017. Village Lungzarhtum did not grow orange in 2000 whereas, in 2017, 2.4 ha area was devoted to cultivation of orange. There was an increase in area under orange in Neihdawn village whereas in other villages such as Siachangkawn and Thiltlang received a decrease in area. There was no change in area under orange crop in Pehlawn and Sialsir villages. As a whole, the area under the orange crop has increased from 17.8 ha in 2000 to 33.4 ha in 2017 and production has increased from 809850 kg in 2000 to 903300 ha in 2017. Figure 3 shows orange orchard in Siachangkawn village in Lawngtlai district.

Oil Palm Plantation

Figure 4 shows oil palm plantation and its production in the form of fruits, which are used for making oil. The state of Mizoram grows oil palm in its all districts except Champhai. Here, plantation of oil palm started in 2005 in some districts and in other districts, its plantation started in 2007. Since, oil palm needs more than five years to grow and giving output therefore, the production of oil palm plantation in Mizoram is not substantial. In the meantime, the output from oil palm plantation is higher than that of from shifting cultivation and as a result, the marginal farmers have converted their Jhum plots into the cultivation of oil palm plantation. Mizoram has a very ideal location and climate to grow oil palm plantation as it can grow in the sloppy landscape, river valleys and degraded forest land. Further, the climate of Mizoram is tropical and subtropical humid, which is quite suitable for oil palm plantation. This has resulted in increasing the importance of oil palm plantation in the economic development of Mizoram. Area and production under oil palm plantation has increased from 8.8 ha and 23000 kg in 2000 to 61.2 ha ad 146741 kg in 2017. Only, four villages grow oil palm in the study villages. The highest area and production of oil palm was in Nazawl village, which was 4 ha and 14000 kg in 2000 and 46 ha and 72200 kg in 2017, followed by village Bukvannei (32 ha and 9000 kg in 2000 and 4.8 ha and 14000 kg in 2017). Thiltlang village has 1.6 ha area both in 2000 and 2017. In terms of production, it was the same during the period (6000 kg). Village Dapchhuah has initiated growing oil palm in 2017.

(A) (B)

Figure 2. (a) Banana (Serchhip) and (b) Arecanut Bukvannei (Kolasib)

(A) (B)

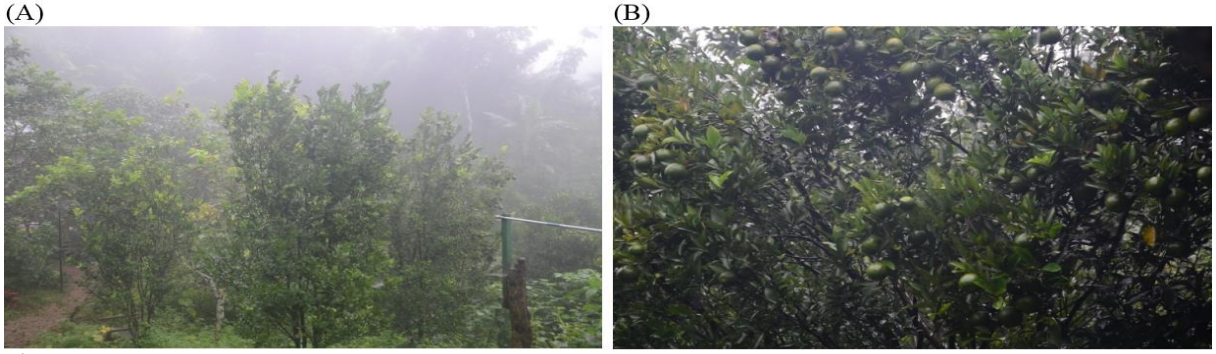

Figure 3. (A & B) Orange Orchard in Siachangkawn village in Lawngtlai district

Lemon

Lemon is one of the major fruits of Mizoram. Its area and production has increased from 4 ha in 2000 to 43.4 ha in 2017. Similarly, its production has increased from 21300 in 2000 to 1402000 in 2017 in the study villages. Its area and production was the highest in Thiak village in 2000, which was 3.4 ha and 20000 kg, respectively. In the meantime, the area and production of lemon were the highest in village Dapchhuah, which was 58.8 ha and 1144500 kg in 2017. In terms of the yield of crops, it has increased from 5325 kg/ha in 2000 to 32304 kg/ha in 2017.

Ginger

Ginger also grows under permanent agriculture whereas its area is very less (1.6 ha) and it grows only in two villages. The area did not increase during the survey period. In the meantime, its production has decreased by about 40%. Yield of ginger has also decreased during the reported period. Chili and mustard also grow in permanent agriculture with just negligible area and production.

Besides, several other corps grow under permanent agriculture such as Areca nut (from palm tree) and pineapple all over Mizoram state.

Area of Principal Crops

The major crops grown under permanent agriculture are paddy (food grain), mustard (oilseed), oil palm (cash crop), ginger (spices) and among fruits orange, banana, and lemon. Table 1 shows the area under principal crops in 2000 and 2017. In 2000, orange is the major crop under permanent agriculture, which has 18 ha areas followed by paddy (16 ha), banana (7 ha) and lemon (4 ha). Area under ginger is 2 ha and under muster, the area is only 1 ha. Oil palm plantation has about 9 ha area. Except area under paddy, which has decreased to 2 ha in the study villages, other crops such as orange, banana, lemon, and oil palm got a tremendous increase in area in 2017. It shows the high future potentiality of these crops. The area under ginger crop in Mizoram is decreasing meanwhile, in the study villages, it is standstill. The mustard crop has the same situation.

Production of Principal Crops

In terms of production of crops grow under permanent agriculture, orange crop leads, which is 809,850 kg, followed by banana 65,600 kg and paddy 27,130 kg (Table 2). Production of other crops such as oil palm (23,000 kg) and lemon (21,300 kg) is comparatively low. In the meantime, ginger (7467 kg) and mustard (44 kg) have the lowest production in these villages. In terms of the mean value of production, it is the highest of orange (101,231 kg) followed by banana (13,120 kg). Mustard and paddy has the lowest mean value of production (22 kg and 2713 kg, respectively). It has been observed that except for the production of ginger, which has decreased to 4033 kg, production of other crops has increased substantially. There has been a slight increase in production of paddy, which has reached 28,240 kg. The highest increase was observed in the production of banana (4,123,000 kg in 2017), followed by oil palm (146,741 kg) and lemon. A slight increase in the production of paddy, orange and mustard were also recorded. In the meantime, the production of ginger has decreased. It has also been noticed that all the study villages do not grow all crops. During the period, a number of villages that grow banana have increased five in 2000 to nine in 2017, therefore, the production of banana increased substantially. The same case is applied with lemon as the number of villages increased from three in 2000 to six in 2017.

Table 1. Area of principal crops under permanent cultivation

Crops	2000			2017		
	Sum	Mean	Std. Deviation	Sum	Mean	Std. Deviation
Paddy (n=10)	16	1.6	1.3	14	1.4	1.4
Ginger (n=2)	2	0.80	0.566	2	0.80	0.566
Orange (n=8)	18	2.22	2.261	33	3.71	5.909
Mustard (2)	1	0.60	0.849	1	0.40	0.000
Banana (5)	7	1.36	1.352	(n=9) 26	2.89	3.801
Lemon (3)	4	1.33	1.793	(n=6) 43	7.23	9.573
Oil palm (n=4)	9	2.20	1.774	61	15.30	20.678

Table 2. Production of principal crops under permanent cultivation

Crops	2000			2017		
	Sum	Mean	Std. Deviation	Sum	Mean	Std. Deviation
Paddy (n=10)	27130	2713	2762	28240	2824	2975
Ginger (n=2)	7467	3733	4148	4033	2016	1861
Orange (n=8)	809850	101231	198745	903300	100366	184002
Mustard (2)	44	22	31.11	499	249.50	118.1
Banana (5)	65600	13120	14841	(n=9) 412300	45811	97533
Lemon (3)	21300	7100	11177	(n=6) 1402000	233666	454064
Oil palm (n=4)	23000	5750	6946	146741	36685	31813

Yield of Principal Crops

The mean value of yield kg/ha was observed. The highest yield was noticed of the orange crop (37970 kg/ha in 2000), which was followed by banana (5844 kg/ha) and ginger (3777 kg/ha). Yield of paddy was only 1839 kg/ha. Lemon has the lowest yield. Yield of ginger from 3777 kg/ha in 2000 to 2263 kg/ha in 2017 has decreased. Similarly, about 10000 kg/ha yield has decreased in terms of the orange crop. The yield of other crops has increased substantially (Table 3).

Table 3. Yield of principal crops under permanent cultivation (Descriptive statistics)

Crops	2000		2017	
	Mean	Std. Deviation	Mean	Std. Deviation
Paddy (n=10)	1839	1681	2098	1649
Ginger (n=2)	3777	2513	2263	726.2
Orange (8)	37970	48915	27867	33776
Banana (5)	5844	7827	10563	7952
Lemon (3)	1647	2316	17072	17668
Oil palm (n=4)	2515	1723	3608	1945

Change in Area, Production and Yield of Principal Crops

Change in area, production and yield of crops from 2000-2017 was analyzed (Table 4). The area of paddy crop has decreased by 11.4% whereas production (4.1%) and yield (14.1%) have increased. Although there was no change registered in the area of ginger yet, its production and yield have increased substantially. Yield of orange has decreased by 40.6% during the corresponding year whereas area and production have increased. The area and production of lemon has increased multifold. In the meantime, its yield did not increase much. The same case is related to oil palm plantation, in which area and production have increased largely while yield did not increase much.

Table 4. Change (%) in area, production and yield of crops (2000-2017)

Crop	Area	Production	Yield
Paddy	-11.4	4.1	14.1
Ginger	0	45.9	45.9
Orange	87.6	11.5	-40.6
Banana	282.4	528	64.4
Lemon	985	6482	506
Oil palm	595	538	43.4

Percentage Share of Area, Production and Yield of Principal Crops

Percentage share of area, production and average yield of crops (2017) that grow under permanent agriculture have analyzed (Table 5). Oil palm stands first in area and production share which is 23.9% and 48.39%, respectively. It is followed by orange (18.3% and 31.17%) and lemon (14.4% and 14.23%). Ginger and banana has the lowest share of area and production. In terms of the yield of crops, the highest yield was obtained from orange (27867 kg/ha), followed by lemon (17072 kg/ha) and banana (10563 kg/ha). Oil palm has 3608 kg/ha yields. Yield from paddy is the lowest *i.e.* 2098 kg/ha while ginger has 2263 kg/ha yield.

Table 5. Percentage share of area, production and average yield of crops (2017)

Crop	Area	Production	Yield
Oil palm	23.9	48.39	3608
Orange	18.3	31.17	27867
Lemon	14.4	14.23	17072
Paddy	7.8	0.97	2098
Ginger	1.1	0.14	2263
Banana	0.5	0.02	10563
Total	180	2897113	10528

Comparison of Area, Production and Yield of Crops Grow under Shifting and Permanent Agriculture

A comparison of area, production, and yield of crops grow under shifting and permanent agriculture was carried out (Figure 5). It was noticed that although the area of crops grows under shifting cultivation is quite higher; production and yield are quite low. For instance, the total area under shifting cultivation in case study villages is 890.4 ha. In the meantime, production is 1172430 kg/ha and yield is 1256.5 kg/ha. On the other hand, the area under permanent agriculture is only 180 ha whereas the production and yield of crops is substantially high *i.e.* 2897113 kg and 10528 kg/ha, respectively.

Area and Production/Household

Area (ha) and production (kg)/household were analyzed (Table 6). Oil palm has the highest area/household (0.31 ha), followed by lemon, which is 0.143 ha. Area/household in other crops is orange 0.078 ha, banana 0.052 ha, paddy 0.22 ha, ginger 0.01 ha, and mustard 0.005 ha. In terms of production/household, lemon has the highest, which is 4673 kg, followed by orange 2130 kg, banana 824 kg and oil palm 733 kg. Paddy has 46.29 kg/household and ginger has 20.17 kg/household. The lowest production/household is of mustard crop, which is 2.49 kg.

Table 6. Per household area (ha) and production (kg)

Crop	Area/household	Production/household
Oil palm	0.31	733
Lemon	0.143	4673
Orange	0.078	2130
Banana	0.052	824
Paddy	0.022	46.29
Ginger	0.01	20.17
Mustard	0.005	2.49

Distribution of Permanent Agricultural Land

The distribution of permanent agricultural land in 2011 and 2015 is shown in Figure 6. The highest land under permanent agriculture is obtained by Champhai district in both years, followed by Aizawl district and Kolasib districts. In Serchhip district, a small area is under permanent agriculture mainly along the Mat River basin. There has been a slight change in area under permanent agriculture in Lunglei district as permanent agriculture has decreased between 2011 and 2015. Scattered and small patches of permanent agriculture can be found in other districts of the state such as Mamit, Lawngtlai, and Saiha.

It has been noticed that WRC is practiced under permanent agriculture, mainly in the valley fills and flood plains where irrigation facilities are available. On the whole, arable plots have decreased in 2015 in Mizoram.

Role of New Land Use Policy in Enhancing Permanent Agriculture

New Land Use Policy (NLUP) was started by the Congress Government of Mizoram in 1985. The major objectives of NLUP were to transform shifting cultivation into permanent agriculture to increase production and yield of principal crops (paddy fruits and vegetables) and self-sufficiency in agriculture. Further, its aim was to convert the sloppy Jhum plots into terraced fields. Besides, the other important objectives were as follows:

- To abolish wasteful shifting cultivation and to ensure that all the farmers must own arable land, which will be the major source of their livelihoods.
- To develop suitable valley fills and flood plains for system rice intensification (wet rice cultivation) to attain self-sufficiency in paddy and vegetables.
- Large-scale forestation programs to sustain biodiversity in and around the village eco-systems. It also copes with climate change and global warming.
- To provide market infrastructure for Jhumias so that they can sell their products at a substantial rate.

Figure 7 shows terraced fields that are converted from sloppy Jhumlands in Aizawl district. Under the NLUP, the government initiative of converting shifting cultivation into terraced permanent agriculture was followed by the Jhumias and they could succeed to make it possible to s certain extent, however, only a few marginal farmers could do it, because terracing sloppy land was expensive. A small patch of shifting plots was converted into terraced cultivation in Aizawl district.

NLUP Components and Allocation

NLUP has worked mainly for its three components and accordingly, its fund was allocated during the period of its implementation. The components were (1) management, administration and capacity building with 72.20 crores (2) development components along with outlay of 1620.15 crores and the last (3) component was infrastructural component for which 1118.78 crores rupees were allocated (Table 7).

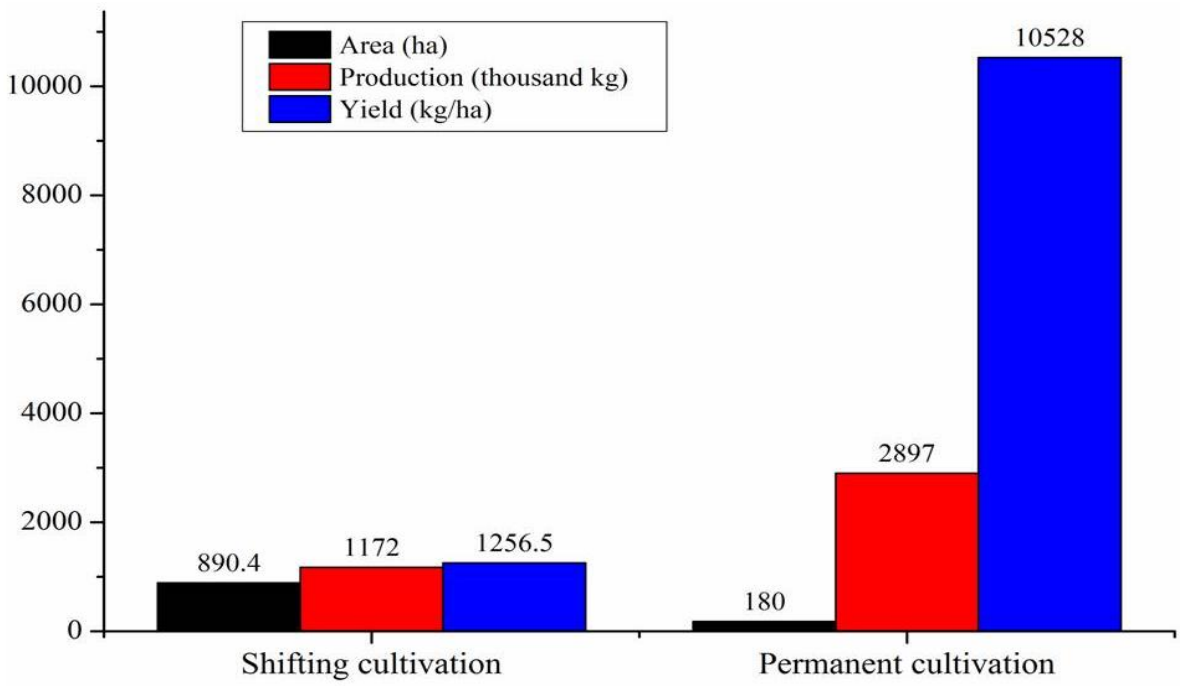

Figure 5. Comparison of Area, Production and Yield of Crops Grow under Shifting and Permanent Agriculture

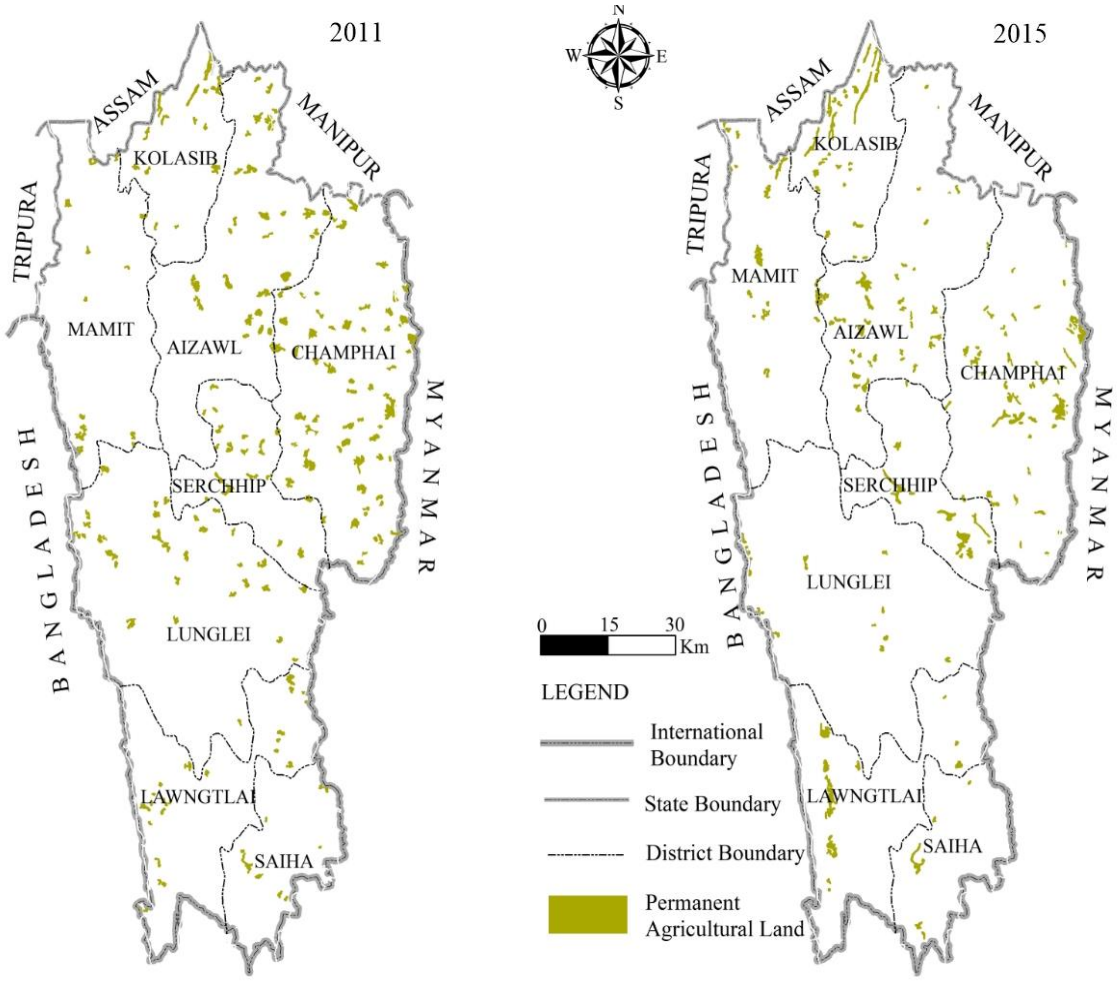

Figure 6. Arable land under permanent agriculture

Table 7. NLUP components and allocation

S. No.	NLUP Components	Allocation (Rs.)
1	Management, Administration and Capacity Building	72.20 Crores
2	Development Component	1,620.15 Crores
3	Infrastructure Component	1,118.78 Crores
4	Total	2,873.13 Crores

Source: Government of Mizoram

The major drawback of NLUP was that instead of transforming shifting cultivation, the State Government distributed cash money to the *Jhumias*. The *Jhumias* did not invest this money in the land because they use the money for other household things and as a result, this scheme was unsuccessful. The second major cause was the shifting of political parties. Mizo Nation Front (MNF) has come into power after Congress's Government in 1999 and they ruled for two consecutive periods. MNF was never in support of NLUP and as a result, this scheme could not be implemented thoroughly. Every 10 years of rule, these two political parties lost the election and as a result, the NLUP program largely affected.

2. Discussion and Conclusion

The overall description of the cultivation of permanent agriculture in Mizoram depicts that area under permanent agriculture is very scarce however, production and yield of crops are comparatively higher than to the shifting cultivation. The recent trend of permanent agriculture was observed that area under its cultivation is increasing This shift of changes in area under permanent agriculture is because of high production and yield of crops grow under permanent agriculture. To attain food security, the area under permanent agriculture should be increased. The principal crops grow under permanent agriculture in case study villages are fruits – orange, lemon, and banana; spices – ginger; oilseed – mustard; cereal – paddy (WRC) and in plantation – oil palm. However, there are several other crops such as varieties of vegetables, pineapple, and jack fruit grows in Mizoram. Agro-climatic conditions in Mizoram are quite suitable for growing varieties of vegetables, fruits, food grains, and oilseeds. There is a need for growing them intensively. Among the principal crops, oil palm, ginger, orange, and banana have high potential to attain food security. Oil palm production has been increasing and its economic viability is high. The area and production of orange and banana have also been increasing. Although ginger area and production are not substantial yet, its yield is higher than the other crops even that grow under shifting cultivation. Area under paddy can be increased as it is the staple food in Mizoram. Market and transportation facilities should be enhanced. Similarly, value addition in vegetable and fruit crops will definitely enhance livelihood and attain food security.

3. References

Champion HG, Seth SK (1968) a revised survey of forest types of India. Delhi Govt Publication, New Delhi

Pachuau R. (2009): Mizoram: a study in Comprehensive Geography. Northern Book Centre, New Delhi.

Sati, V. P. 2019. Shifting Cultivation in Mizoram, India: An Empirical Study of Its Economic Implications, *Journal of Mountain Science* 16(9): 2136-2149, https://doi.org/10.1007/s11629-019-5416-9

Sati, V. P. and Lalrinpuia. 2015. Altitudinal Zonation of Floral Biodiversity and its Conservation Pattern in Mizoram, North East India, In R. B. Singh and P. Prokop (Eds.) Environmental Geography of South Asia, Advances in Geographical and Environmental Sciences, Springer Japan, DOI 10.1007/978-4-431-55741-8_11

(A) (B)

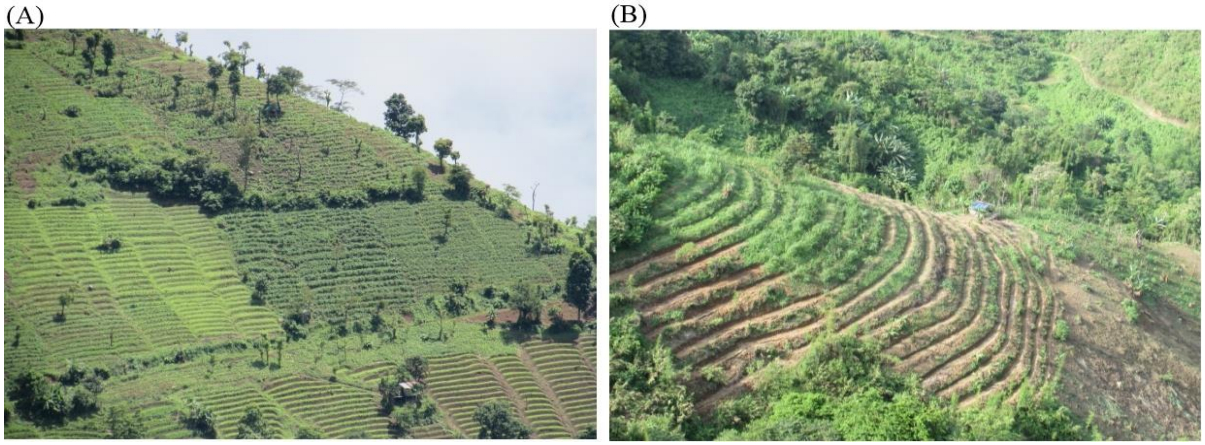

Figure 7 (A&B): *Jhum* lands are converting into terraced cultivation under NLUP