



## Jhum Cultivation: A Threat to an Environment and Soil in Meghalaya

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Jhum cultivation is an agricultural practice which involves clearing and burning of vegetation of an area followed by cultivation of crops for two or more years before abandoning the land to restore its fertility and properties and then shifted to another site to repeat the same practice. Once the abandoned land recovers its fertility, cultivators return back to it for cultivation of the next crop. According to recent estimates during 2015-16, about 0.26% (0.85 m ha) of the total geographical area of India is under jhum cultivation. Out of this, approximately 96% falls under North Eastern Hills (NEH) region.

Meghalaya is covered with forests (Approximately 70 % of the total geographical area). Jhum cultivation is one of the most ancient system of farming practice in the state. It is believed to be originated during the Neolithic period around 7000 BC. It is still practiced in the state among the Khasi, Jaintia and Garo. This system of cultivation is locally known as "Thang Bun" or "Thang Shyrti". It starts with cutting of forest in the months of December to January. Then the debris is left to dry at the open environment and then set fire to the dried debris. Sowing of seeds is done by dibbling method in an intimate mixture of varied crops. The main crops are upland rice mixture with maize, millet, sorghum, tapioca, chillies, turmeric, pumpkin, etc

This cultivation practice is considered destructive to soil and the environment. Not only it destroys forest but also disturb and break the ecological balance in the environment. It destroys forests leading to consequences like ecological imbalance, reduce soil microbial activities and elimination of the water sources. It causes soil erosion that cause rapid loss of soil nutrients which affects the fertility and other properties of the soil and ultimately leads to low productivity.

### Method of Study

According to the study (Shangpliang, 2019) at Byrnihat, located in the Khasi hills of Meghalaya It was observed that, Jhum cultivation is practised by the 'Garos', which is one of the major tribes in Meghalaya. The study mostly focussed on the changes in soil nutrient status under three different jhum cycles of 30, 10 and 5 years and its decline in nutrients status due to various losses through run-off and leaching in the jhum cultivated areas.

In the study, the fertility status of the soil of 30, 10 and 5 years jhum cycles sites were selected. A proper care was taken to ensure similar slope condition, exposure and soil type of different sites under study.

During the study, soil samples were taken from all the three sites five times during a year of study to represent soil conditions:

- i. Before burning the slash just after cutting (-1 day)
- ii. After burning of the slash (1 day)

- iii. During early monsoon (30 days)
- iv. During the mid-monsoon (90 days) and
- v. In the following year (365 days) after cropping

Sites representing forested fallows were 0, 1, 5, 10, 15 and 50 years of age. A 0-year fallow representing a site immediately after one year of cropping and a 50-year fallow which was protected from jhum for the past 50 years respectively were taken into consideration for comparative study. Sampling in each site was based on 10 soil collections. These samples were thoroughly mixed into a composite one to represent that site.

pH was determined using a pH meter in a soil-water suspension of 1:5 ratio. Soil organic carbon was determined using the Walkley-Black method and Kjeldahl method to determine total available nitrogen respectively. while flame emission method was used to determine Potassium and Phosphorus was determined using Spectrophotometer

## Result

**Table 1:** Changes in carbon content (%) during cropping in sites under different jhum cycles (30, 10 and 5 years)

Jhum Cycles	Soil Sampling (Days)	Organic Carbon (%)
30 years	-1	2.49
	1	2.16
	30	2.12
	90	2.03
	365	2.12
10 Years	-1	2.65
	1	2.20
	30	2.03
	90	1.90
	365	2.08
5 Years	-1	1.82
	1	1.74
	30	1.62
	90	1.68
	365	1.78

**Table 2:** Changes in Nitrogen content (%) during cropping in sites under different jhum cycles (30, 10 and 5 years)

Jhum Cycles	Soil Sampling (Days)	Nitrogen (%)
30 years	-1	0.270
	1	0.223
	30	0.214
	90	0.220
	365	0.204
10 Years	-1	0.268
	1	0.223
	30	0.236
	90	0.220
	365	0.223
5 Years	-1	0.220
	1	0.230
	30	0.220
	90	0.212
	365	0.193

**Table 3:** Changes in Phosphorus concentration (%) during cropping in sites under different jhum cycles (30, 10 and 5 years)

Jhum Cycles	Soil Sampling (Days)	Phosphorus (mg/100 g)
30 years	-1	0.90
	1	0.14
	30	2.24
	90	1.04
	365	1.28
10 Years	-1	0.78
	1	0.88
	30	1.54
	90	0.82
	365	0.68
5 Years	-1	0.28
	1	0.30
	30	1.08
	90	0.56
	365	0.44

**Table 4:** Changes in Potassium content (meq/100g) during cropping in sites under different jhum cycles (30, 10 and 5 years)

Jhum Cycles	Soil Sampling (Days)	Potassium (meq/100g)
30 years	-1	0.64
	1	7.95
	30	1.65
	90	0.89
	365	0.66
10 Years	-1	0.51
	1	8.20
	30	1.64
	90	1.20
	365	0.66
5 Years	-1	0.35
	1	2.25
	30	0.82
	90	0.46
	365	0.51

## Discussion

Significant changes in physical and chemical properties are reported after clearing and burning of vegetation. It was observed that, there was a decrease in nutrient content (Nitrogen, Phosphorus and Potassium) of the soil with increase in the intensity of jhum cultivation. Soil and air temperatures increased. This, in conjunction with a reduced soil organic content, influences the flora and fauna of the soil adversely. Microbial population is reported to be completely destroyed in case of an intense fire for two to three days. This deterioration in soil structure leads to erosion losses of fine topsoil and alters the soil moisture regions. Severe depletion of soil fertility due to nutrient imbalance in soils affected by jhum cultivation has been reported along with such factors as reduced organic matter, water holding capacity, and plant nutrients, the addition of ash produced after burning and the generally high pH values of jhum soils exacerbate the depletion. C:N ratios have also been found to be lower in jhum plots at surface and at subsurface than before the cultivation.

Heavy loss of nitrogen from the ecosystem from burning and the degree of erosion is found to be higher in the upper layer of jhum cultivated land respectively.

### Conclusion

From the study conducted we can conclude that Jhum cultivation is highly destructive and causes many threats to the soil as well as the environment. Problems like land degradation, ecological imbalance, reduction in water holding capacity, soil fertility loss, destabilization of slopes and reduction in species diversity may happen if Jhum cultivation continues. This, will ultimately decrease the overall productivity of the land. Therefore, it should be avoided as much as possible.

### References

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