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| Title | Electron Microscope Study Of Clay Minerals Of Some Soils Developed On Pleistocene Madhupur Clay. | | |
| Author(s) Name | ELAHI S. F.; HOSSAIN M. F.; KAMAL A. S. M. M. | | |
| Contact Email(s) | hossainfaruque@hotmail.com; mfhossain@aiub.edu | | |
| Published Journal Name | Journal of the Indian Society of Soil Science | | |
| Type of Publication | Journal | | |
| Volume | 44 | Issue | 3 |
| Publisher | Indian Society of Soil Science, Division of Soil Science and Agricultural Chemistry, New Delhi, INDE (1953) | | |
| Publication Date | 2021 | | |
| ISSN | 0019-638X | | |
| DOI |  | | |
| URL |  | | |
| Other Related Info. | Pages 482-488 | | |
| **Keywords:** | | | |
| Citation: Hossain, Md. Faruque & MFA, TARIK & Khondaker, Md & Hamed, Lamy. (2011). Electron Microscope Study Of Clay Minerals Of Some Soils Developed On Pleistocene Madhupur Clay.. Africa Journal Of Agricultural Research AJAR. | | | |

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| Abstract |  |
| Transmission electron microscope (TEM) study of clay minerals of surface horizons (plough layer) of Gerua and Kalma series developed on Pleistocene Clay of Madhupur was attempted. TEM study was done on a copper grid, air-dried and shadowed with vapour of platinum and palladium following dispersion, sedimentation and decantation method. Hexagonal and irregular shaped particles of kaolinite, vermiculite, illite, and mica in Gerua soil and polygonal, hexagonal, tubular, and irregular shaped particles of kaolinite and mica in Kalma soil were observed. The soil mineral assemblages indicate that chlorite transforms to vermiculite and both randomly and regularly interstratified chlorite/vermiculite by loss of the hydroxide-interlayer sheet. The vermiculite then alters to a high-charge smectite that was found only in the lower horizons in both Gerua and Kalma soils. Smectite is the predominant secondary mineral in all horizons. The size of these particles ranged from 0.5 to 2.0 micron. Distinct white shadows by some particles confirmed the plates to be thick. Thus, the abundant smectite in these soils is of two origins: (i) a high charge phase derived from chlorite transformation that is found in the back slope landscape positions, and (ii) a low charge phase neoformed by precipitation of elements released by serpentine weathering. | |

**Please specify which Sustainable Development Goal (SDG) (s) falls under your research:**

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| Goal 1 | No Poverty | Goal 2 | Zero Hunger |
| Goal 3 | Good Health and Well-Being | Goal 4 | Quality Education |
| Goal 5 | Gender Equality | Goal 6 | Clean Water and Sanitation |
| Goal 7 | Affordable and Clean Energy | Goal 8 | Decent Work and Economic Growth |
| Goal 9 | Industry, Innovation and Infrastructure | Goal 10 | Reduced Inequalities |
| Goal 11 | Sustainable Cities and Communities | Goal 12 | Responsible Consumption and Production |
| Goal 13 | Climate Action | Goal 14 | Life below Water |
| **Goal 15** | **Life on Land** | Goal 16 | Peace, Justice and Strong Institutions |
| Goal 17 | Partnerships for the Goals |  |  |