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Effect of Tillage and Residue Retention on Distribution of Aggregate Associated Soil Organic Carbon

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Abstract—*The type of tillage practices with or without residue retention to the field is one of the important factors controlling the organic carbon distribution vis-à-vis soil aggregate stability. The objective of the present study was to investigate the effect of tillage practices and residue retention under lentil following transplanted rice crop on accessibility of aggregate associated carbon (C) at 0-15, 15-30 and 30-45 cm soil depths. A field experiment was conducted on a clay loam soil in University Research Farm, BCKV under hot and humid subtropics of West Bengal. The applied treatments were- conventional tillage (CT), conventional tillage with mulch (CT-M), minimum tillage (MT), minimum tillage with mulch (MT-M) and no tillage (NT). MT and NT retained standing rice stubbles containing 3.5 t/ha residues, and 4.5 t/ha paddy straw was applied as mulched (M) material. No crop residues were applied on CT. Total aggregate associated C was highest in MT-M, followed by CT-M, MT, NT and CT, respectively. The distribution of aggregate associated organic C was as Mesoaggregated C (MesAC, 0.25-2 mm) > coarse macroaggregated C (CMacAC, 2 mm) > coarse microaggregated C (CMicAC, 0.05-0.25mm) > 'Silt + clay' fraction (<0.05mm) with a significant variation under mulched soil. Results showed a positive and linear relationship between the amount of 'silt + clay' content of the soil and its associated C (R^2 = 0.57; P <0.05). Total aggregate associated C and per cent aggregate stability had a significant positive correlation (R^2 = 0.51; P <0.05) indicating that with the increase of 1% total aggregate associated C, per cent aggregate stability was increased up to 2%. Tillage and residue retention stored maximum amount of*

aggregate associated C that improved macroaggregate structure and facilitated higher aggregate stability.

Keywords:

- Tillage
- Soil Organic carbon
- Aggregate associated carbon
- Residue retention
- Mulch