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Soil quality and production of low land paddy under agrisilviculture systems in acid soil of West Bengal, India

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Abstract
Seven tree species (*Terminalia arjuna*, *Lagerstroemia parviflora*, *Salix tetrasperma*, *Pongamia pinnata*, *Bombax ceiba*, *Bixa oreliana* and *Gmelina arborea*) based agrisilviculture systems were established to test their compatibility with respect to production of rice and physio-chemical status of soil in low land – paddy growing area of North Bengal, India. A gradual increase in biological yield was recorded with increase in distance from tree. Grain yield ranged from 3.21 t ha^{-1} in *Pongamia* at 1 m distance from tree to 4.94 t ha^{-1} at 3 m away from Bixa. Harvest index of paddy in control was higher (34.57) as compared to those intercropped with trees. Presence of trees significantly reduced PAR adjoining tree rows. The lowest PAR (1150 $\mu mols^{-1}m^{-2}$) was recorded at 1 m distance from *Pongamia* tree. The organic carbon content was greater in *Terminalia* (2.15 %) and least (1.19 %) in sub-surface soil layer of *Salix* based system. Microbial biomass carbon was greatest in surface soil of *Terminalia* (526 mg kg^{-1}) followed by *Gmelina* (408.33 mg kg^{-1}) and least in sub-surface soil of *Salix* (280 mg kg^{-1}).

be neutral, beneficial, or potentially detrimental (Ong, 1996). Sharma *et al.*, (2000) observed that the reduction in plant population of wheat crop due to poplar at 0 – 3 m distances from tree line was 34.2% over control. Positive effect of trees had been reported in arid region of Haryana. *Prosopis cineraria*, *Tecomella undulata*, *Acacia albida* and *Azadirachta indica* increased the production of *Hordeum vulgare* (barley). *P. cineraria* enhanced grain yield by 86.0%, *T. undulata* by 48.8%, *A. albida* by 57.9% and *A. indica* by 16.8% over the control (Kumar *et al.*, 1998). Thus, to maximize the potential benefits of tree-based intercropping systems, competitive interactions need to be avoided by proper designing and managing intercropping systems (Thevathasan *et al.*, 2004).

In most parts of eastern region particularly states of Bihar and West Bengal, rice is rainfed and is cultivated during rainy season (June – September). Most of the lands after harvesting paddy are kept fallow. Most of these lands are inundated with water during rainy