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EVALUATION OF ECONOMIC WATER PRODUCTIVITY OF DIFFERENT FARMING SYSTEM UNDER VARIABLE PRUNING INTENSITIES ON SOLE ARABLE CROP (MUSTARD), SOLE TREE (D. SISSOO) AND AGRISILVICULTURE SYSTEM (DALBERGIA SISSOO + MUSTARD)

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ABSTRACT: The present study was carried out to determine the economic water productivity under sole arable crop, sole tree and agrisilviculture land use system in Jabalpur region of Madhya Pradesh. The statistical analysis was carried out in strip plot design, there were 4 treatments and three sub treatments were taken. The main treatments were pruning intensities that was agroforestry where sub treatment was mustard varieties. All the product of the systems was converted in to Mustard equivalent yield, total mustard equivalent yield, mustard Equivalent Water Productivity (MEWP) and economic water productivity. All of these yields were used to determine economic water productivity. The economic water productivity of agrisilviculture in different pruning intensities were P_0 (Rs 2202 ha^{-1} cm^{-1}), P_{25} (Rs 3630 ha^{-1} cm^{-1}), P_{50} (Rs 3024 ha^{-1} cm^{-1}), and P_{75} (Rs 2021 ha^{-1} cm^{-1}) and The economic water productivity of mustard varieties viz. V_1: JM-3 (Rs 2381 ha^{-1} cm^{-1}), V_2: Urvashi (Rs 2116 ha^{-1} cm^{-1}) and V_3: NRCDR-2 (Rs 2028 ha^{-1} cm^{-1}). The three farming system of Economic water productivity of sole arable crop (Rs 1953 ha^{-1} cm^{-1}), sole tree (Rs 2138 ha^{-1} cm^{-1}) and agrisilviculture (Rs 2719 ha^{-1} cm^{-1}).

Keywords: *Dalbergia sissoo, Water Productivity (WP), Mustard Equivalent Yield (MEY)*

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Water is essential for survival of all living beings including from small tiny organisms to big trees and animals. But today, fresh water resources are stretched thin due to the rapid growth in world population, the pressure on water resources is increasing (Rijsberman 2006). The agriculture sector is projected to receive reduced water allocation despite the increasing pressure for more food production (Kijne et al., 2003). Together, the increasing food demand and decreasing water allocation suggest that the agriculture sector has to produce more food with less water (Cai et al., 2010). Increasing water productivity is particularly appropriate where water is scarce compared with other resources involved in production. Higher water productivity reduces the need for additional water and land resources in irrigated and rainfed systems. Reasons to improve agricultural water productivity include: (i) to meet rising demands for food from a growing, wealthier, and increasingly urbanized population in light of water scarcity, (ii) to respond to pressures to re-allocate water from agriculture to cities and ensure that water is available for environmental uses, and (iii) to contribute to poverty reduction and economic growth. There is a clear link between water, poverty reduction and economic growth (e.g., ADB, 2005).

Agroforestry can improve soil fertility, provide fodder, produce tree fruits, expand fuel wood supplies and produce a variety of wood products for farmer's own use and sale without demanding additional land (Kumar 2016). In total agroforestry has potential to maintain higher levels of biodiversity and greater biomass than mono crop or pasture system (Seeta et al., 2016).

Agrisilviculture has the potential to improve water productivity in two ways as the presence of trees may increase the quantity of water used for tree or crop transpiration and may also improve the productivity of the water that is transpired by increasing the biomass of trees and crops produced per unit of water used.

MATERIALS AND METHODS

The details of material used and the methods adopted during the course of study of water productivity under sole arable crop, sole tree and agrisilviculture