Maximizing blue water use efficiency of wheat (*Triticum aestivum*) through irrigation and mulching

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ABSTRACT

A field study was conducted in sub-humid Eastern Ghats region of India to investigate the effect of different soil moisture conservation practices, viz. no-mulch (NM) as a control, ridge and furrow (RF), *Gliricidia* mulch (GM) and *Lantana* mulch (LM) on water productivity, and yield of wheat (*Triticum aestivum* L.) under three levels of irrigation (CPE$_{100}$ = 100%, CPE$_{80}$ = 80% and CPE$_{60}$ = 60%). Total water use by wheat was 270.1–365.6 mm during 2016–17 and 210.4–302.5 mm during 2015–16. Averaging both years, wheat used was 88.35 mm (26.8%) and 44.9 mm (13.6%) more water at CPE$_{100}$ over CPE$_{60}$ and CPE$_{80}$, respectively. Among the irrigation levels, higher water productivity (WP) was observed in CPE$_{60}$ (13.6, 9.8 kg/m$^3$) compared to CPE$_{80}$ (12.8, 9.3 kg/m$^3$) and CPE$_{100}$ (11.3, 8.9 kg/m$^3$) for both years, respectively. CPE$_{60}$ resulted in 5.9 and 15.8% greater WP over CPE$_{80}$ and CPE$_{100}$, respectively. Mulching increased WP by 27.8% in GM and 23.3% in LM treatments compared to NM. Irrigation with mulching treatments, CPE$_{60}$ + GM exhibited WP of 15.9 and 14.7 kg/m$^3$, and CPE$_{60}$ + LM WP of 11.0 and 10.6 kg/m$^3$ during 2015–16 and 2016–17, respectively. On an average, mulching treatment produced additional total WP of 2.2–2.6 kg/m$^3$, green WP of 0.5–0.7 kg/m$^3$ and blue WP of 1.7–2.0 kg/m$^3$ over NM. Thus CPE$_{80}$ + GM could be successfully applied during post-monsoon (*Rabi*) season in wheat production allowing a water savings of 20% without any yield loss.

Key words: Eastern Ghats, Mulch, Rainwater harvesting, Water productivity, Wheat