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Title:

Acacia nilotica based silvipastoral systems for resource conservation and improved productivity from degraded lands of lower Himalayas

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Abstract High population density and unscientific land use practices have induced severe land degradation in fragile Lower Himalayan ecosystem of India. Land cover management had been an effective strategy in managing land degradation through reduction in water, soil and nutrients losses and improvement in soil fertility and quality. *Acacia nilotica* (*Acacia*) based silvipastoral systems with five intercrops viz., *Eulaliopsis binata* (*bhabbar*), *Saccharum munja* (*munj*), *Vetiveria zizanioides* (*vetiver*), natural grasses and no grass were evaluated under a long term study in degraded bouldery lands in Haryana state of India. All grasses resulted in reduction of soil, water and nutrient losses and improved microbial properties. However, their association adversely affected the growth of *Acacia* and the decline varied with grass species. After 11 years of establishment, sole *Acacia* plantation had the maximum height (7.58 m), diameter at breast height (dbh) (21.32 cm) and crown spread (7.41 m). *Munj* produced highest biomass under *Acacia* but most adversely affected its growth resulting in minimum survival (48%), height (7.07 m), dbh (16.23 cm) and crown spread (6.57 m). Yield of all the grasses increased during initial 5-6 years but declined sharply thereafter with maximum decline in *bhabbar*. Detailed investigations established that sharp decline in survival and growth of *bhabbar* was due to shade and not because of nutrient competition or allelopathy. *Acacia* + *Vetiveria zizanioides* proved most effective silvipastoral system for resource conservation and biomass production. It also provided highest NPV (Rs 1.88 lakhs ha⁻¹), B:C (2.37) and IRR (24.70%) as compared to Rs. 6,998 ha⁻¹, 1.05 and 8.76% under pure *Acacia* plantation, respectively.