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Intercropping in almond orchards with grasses/legumes enhanced soil fertility and weed suppression in a temperate region

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Abstract
This study was carried out to evaluate the performance of several perennial temperate forage grass/legume mixtures as a way of natural weed management, soil fertility enhancement and augmentation of forage resource availability in an almond based horti-pastoral system at the experimental farm of ICAR-IGFRI, Regional Research Station, Jammu and Kashmir, India during 2015 to 2018. The treatments consisted of different grasses (tall fescue, orchard grass, little seed canary grass and timothy) and temperate perennial legume (red clover). Ten treatments were arranged in a randomised block design with three replications. The results revealed that canary grass + red clover recorded maximum green (46.90 t/ha) and dry fodder (12.56 t/ha) yields, and crude protein yield (21.48 q/ha) followed by tall fescue + red clover and orchard grass + red clover combinations. Lowest green and dry fodder yields were recorded in timothy grass. Study also revealed that various soil physico-chemical properties were significantly higher under red clover treatment followed by grass/legume combinations, while lowest values were recorded when grasses were grown as sole crop in almond orchard. The major weed flora found in the experimental field was *Anthemis cotula* L.*, Sinapis arvensis* L., *Daucus carota* L.*, Chenopodium album* L.*, Rumex dentatus* L.*, Conyza canadensis* (L.) Cronquist*, Carthamus lanatus* L.*, Tragopogon dubius* Scop.*, Hypericum perforatum* L.*, Plantago lanceolata* L. *and Capsella bursa-pastoris* (L.) Medik. The treatment of canary grass + red clover + almond recorded minimum weed density (10.64 m^{-2}) and maximum weed control efficiency (79.85 %) compared to control plot (natural vegetation, 90.64 m^{2}). Furthermore, a higher weed density and lower weed control efficiency were observed in red clover and timothy treatments. It was concluded that grass/legume intercropping not only augmented forage availability but also it was an effective strategy for suppressing weeds in fruit orchards.

Keywords: Almond, Fodder yield, Grass/legume mixtures, Soil fertility, Weed suppression