

Abstract

Incorporation of legume residues in soil is a low cost option for improving soil fertility, but its effectiveness depends on residue quality. A study was conducted for two seasons (2007 and 2008) to determine the decomposition and nutrient release rates of butter bean, grasspea, common bean and chickpea residues. Chopped legume residues were placed in 2 mm nylon mesh bags and incubated in the soil at a depth of 15 cm. Dry matter weights and composition of residues were determined before incubation and thereafter fortnightly until the 14th week after incubation. Chickpea residues had significantly higher initial % lignin and lignin/nitrogen ratio than butter bean, grasspea and common bean residues. All studied legume residues had similar levels of cellulose, C/N ratio, N, C, P, K, and Ca. Nitrogen concentrations were above the critical values (18-22 g/kg) for net N mineralization in all the legumes whereas P concentrations were below the critical value (2.5 g/kg) for net P mineralization in chickpea and common bean. Dry matter and nutrient (N, P, K, Mg and Ca) disappearance rates of chickpea residues were significantly lower than for grasspea, butter bean and common bean. Grasspea residues had higher dry matter disappearance rates than other legumes' residues. Grasspea and butter bean residues had significantly higher nutrient disappearance rates than common bean residues. Nutrient loss from all the residues was in the order $K > P > N > Mg > Ca$. Butter bean and grasspea crop residues have potential of providing soil N, P, K and Mg in the cold semi-arid region within a growing season.