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## An Integrated Assessment of Potential Legume Cover Crops for the Sustainable Intensification of Smallholder Agriculture in the Dry Corridor of Central America

PABLO SILES<sup>1</sup>, DIEGO VALBUENA<sup>1</sup>, ORLANDO TELLEZ<sup>1</sup>, ELBIS CHAVARRIA<sup>1</sup>, EDWIN GARCIA<sup>2</sup>, DANIEL VÁSQUEZ<sup>2</sup>

<sup>1</sup>International Center for Tropical Agriculture (CIAT), Nicaragua

<sup>2</sup>International Center for Tropical Agriculture (CIAT), Honduras

### Abstract

Smallholder agriculture in the dry corridor of Central America faces soil degradation, feed gaps and low agricultural productivity. The promotion of agricultural innovations to support a sustainable intensification of family agriculture in Central America demands more integral assessments of their benefits. Tropical legume cover crops can be multipurpose including improving soil health, increasing crop yields, controlling pest and weeds, feeding livestock and producing food. Their potential for upscaling depends on the stability and adaptability of aboveground biomass accumulation (ABA) across different environments. This study aimed to conduct an integral assessment of promising legume cover crops combining multi-environmental trials, participatory approaches, analysis of ABA and decomposition rates of five tropical cover crops. *Canavalia brasiliensis*, *C. ensiformis* (jack beans), *Cajanus cajan* (pigeon pea), *Vigna unguiculata* (cowpea) and *Vigna radiata* (mung bean) were evaluated in thirteen environments in El Salvador (2), Honduras (4) and Nicaragua (7) using a randomised complete block design with four replications in each site. In each country a participatory evaluation was conducted with 20–25 farmers to assess the performance of these legumes based on their perception of local indicators. Analyses of variance of ABA after 45 days of sowing were conducted to differentiate the effects of the species (G), environment (E) and their interaction (G×E). Finally, a decomposition experiment was conducted during 60 days in one site to assess the decomposition rate of each of the legumes. The results showed that farmers preferred *C. ensiformis*, *V. unguiculata* and *C. brasiliensis* because of their higher biomass production, weed control, tolerance to pests, root system and rate of decomposition. *C. ensiformis* and *V. unguiculata* were the most stable in terms of a higher ABA in all the environments (1880 and 1509 kg ha<sup>-1</sup>, respectively) and showed the fastest decomposition rates. However, the integrated assessment suggested that *V. unguiculata* and *C. brasiliensis* are promising cover crops in these agricultural systems compare to other promising legume species. More integral assessments of key agricultural components can contribute to develop cropping systems that are more targeted to farmers' needs for a more sustainable intensification of smallholder agriculture in the region.

**Keywords:** Cover crops, litter decomposition, multi-environment trial, sub-humid areas, sustainable intensification