Canavalia brasiliensis: a multipurpose legume for the sub-humid tropics

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Introduction *Canavalia brasiliensis* Mart. ex Benth. ("Brazilian jackbean") is a weakly perennial, prostrate to twining herbaceous legume with a wide natural distribution in the New World tropics and subtropics. In comparison with *C. ensiformis* ("jackbean"), research reports on *C. brasiliensis* are scattered and restricted to studies done in Latin America. The species develops a dense and extensive, deep-reaching root system and subsequently tolerates a 5-6 month dry period. Based on studies that generally were done with only one genotype, it is adapted to a wide range of soils, including very acid, low-fertility soils. Its main use is as green manure, for fallow improvement and erosion control. Due to medium biomass decomposition, nutrient release of *C. brasiliensis* green manure has the potential to synchronise well with the nutrient demand of the succeeding crop and may lead to high N recovery rates. Whereas the high concentration, in *Canavalia* seeds, of antinutritive substances such as toxic amino acids (e.g., canavanin), lectins (e.g., concanavalin Br) and trypsin inhibitors, there is little information on the nutritive value of the herbage of this species (Schloen *et al*., 2004). In order to develop multipurpose legume germplasm for smallholder systems in the sub-humid tropics, we initiated a *C. brasiliensis* germplasm screening experiment and engaged with farmers in Central America to integrate this legume into local maize-bean production systems. First promising results are reported.

Materials and methods *Germplasm characterisation*: The available collection of 53 accessions of *Canavalia brasiliensis* was sown at the onset of the rainy season 2004 at CIAT's research station in Santander de Quilichao near Cali, Colombia. A Randomized Complete Block design with 3 replications was employed. Plot size was 3 m x 2 m. Parameters of evaluation included ease of establishment (soil cover, vigour: rating 1-5 with 5 being the most vigorous), DM yield and forage quality (CP; IVDMD, tannins, fibre and lignin) across seasons; selected accessions were also analysed for canavanin content.

On-farm work: *C. brasiliensis* accession CIAT 17009 was sown in 5 m x 5 m plots in 3 replicates at the end of each rainy season (October) since 2001 in San Dionisio, Matagalpa, Nicaragua, to allow for total plot cover before the onset of the 6-month dry season. In the subsequent rainy season (May), plots were slashed and maize planted into the *C. brasiliensis* mulch. Maize yields and other crop parameters were compared with traditionally fertilised and fallowed maize plots.

Results *Germplasm characterisation*: Three months after transplanting, *C. brasiliensis* accessions were well established with a mean of almost 65% (± 24.7%, range 55-92%) soil cover, and a mean vigour rating of 2.6 (± 1.1, range 2-5). Accessions CIAT 808, 7319, 7648, 7970, 8557, 17008, 17009, 18515, 20095, and 20096 had soil covers of 85% or above and a vigour rating of 4 to 5.

On-farm work: *C. brasiliensis* plots remained green during the dry season producing 3.5-4 t/ha of biomass, and reducing wind/soil erosion and weed pressure. Maize yields after *C. brasiliensis* (5.59 kg/plot) were significantly higher than those after traditional fallow (2.18 kg/plot), and slightly higher than those obtained with traditional fertiliser (5.16 kg/plot). Farmer confirmed good plant establishment, and fast growth and cob development.

Conclusions *C. brasiliensis* is a promising species for use as green manure. Smallholder farmers in Central America appreciate it because of its robustness over a wide range of soils and climates, its biomass production and its green manure effect. Through its dry season tolerance, the legume opens a significant time window for soil improvement without affecting grain production during the rainy season. There might be also a high potential as a dry season feed, but feed values for animals must be determined. Initial observations suggest considerable diversity in the collection.

References

Schloen M, M Peters & R Schultze-Kraft (2004) *Canavalia brasiliensis* Mart. ex Benth. http://www.fao.org/ag/AGP/AGPC/doc/GBASE/Default.htm (in press).