

2-4-2 Maize/Legume Intercropping Trial Update (2016)

Effect of first-season legumes on second-season soil parameters and maize growth

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The IITA¹ 2-4-2 Design:

A cereal–double cowpea system initially developed for the northern Guinea savanna zone

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What is the IITA 2:4 approach?

The 2:4 maize–double cowpea system consists of a repeating sequence of 4 rows of cowpea alternated with 2 rows of maize. Maize and cowpea are planted on the same day. The second cowpea crop is planted after the first has been harvested (about 60 days after planting).

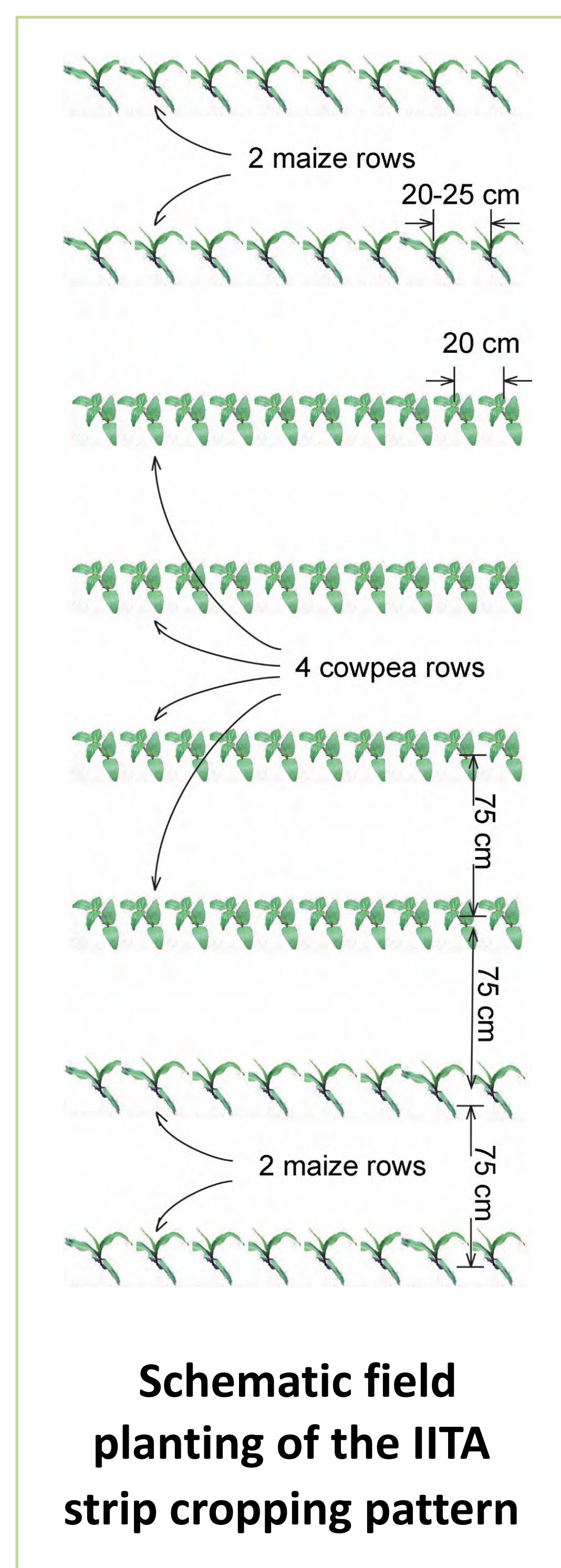
What are some advantages?

- Minimal competition for light between crops.
- Scalable—with crops planted in rows, ox-drawn implements can be used to establish planting bands/furrows for seeding.
- Lower fertilizer requirement, as cowpea occupies most of the space and is less demanding of nutrients than maize.

What are some potential concerns?

- Less land devoted to maize. Returns from the cowpea crop must justify devoting fewer rows to maize.
- Unequal number of cowpea and maize rows make full rotation difficult. Partial rotation is possible by planting maize into two of the rows previously occupied by cowpea.

¹H.A. Ajeigbe, B.B. Singh, A. Musa, J.O. Adeosun, R.S. Adamu, and D. Chikoye. 2010. Improved cowpea–cereal cropping systems: cereal–double cowpea system for the northern Guinea savanna zone. pp 17



ECHO Trial

OBJECTIVE: Gain first-hand experience while evaluating the feasibility of implementing 2-4-2 with other legumes.

TREATMENTS (legumes grown with maize):

Season 1 (2015): Cowpea (*Vigna unguiculata*), jack bean (*Canivalia ensiformis*), and velvet bean (*Mucuna pruriens*)

Season 2 (2016): Same legumes grown in the same plots as season 1, except that 1) velvet bean was replaced with a no-legume control, and 2) cassava was integrated into all three treatments. Also, in season 2, a partial rotation was done, with maize planted into season-1 legume space.



DESIGN: Treatments replicated 3 times in a randomized complete block design.

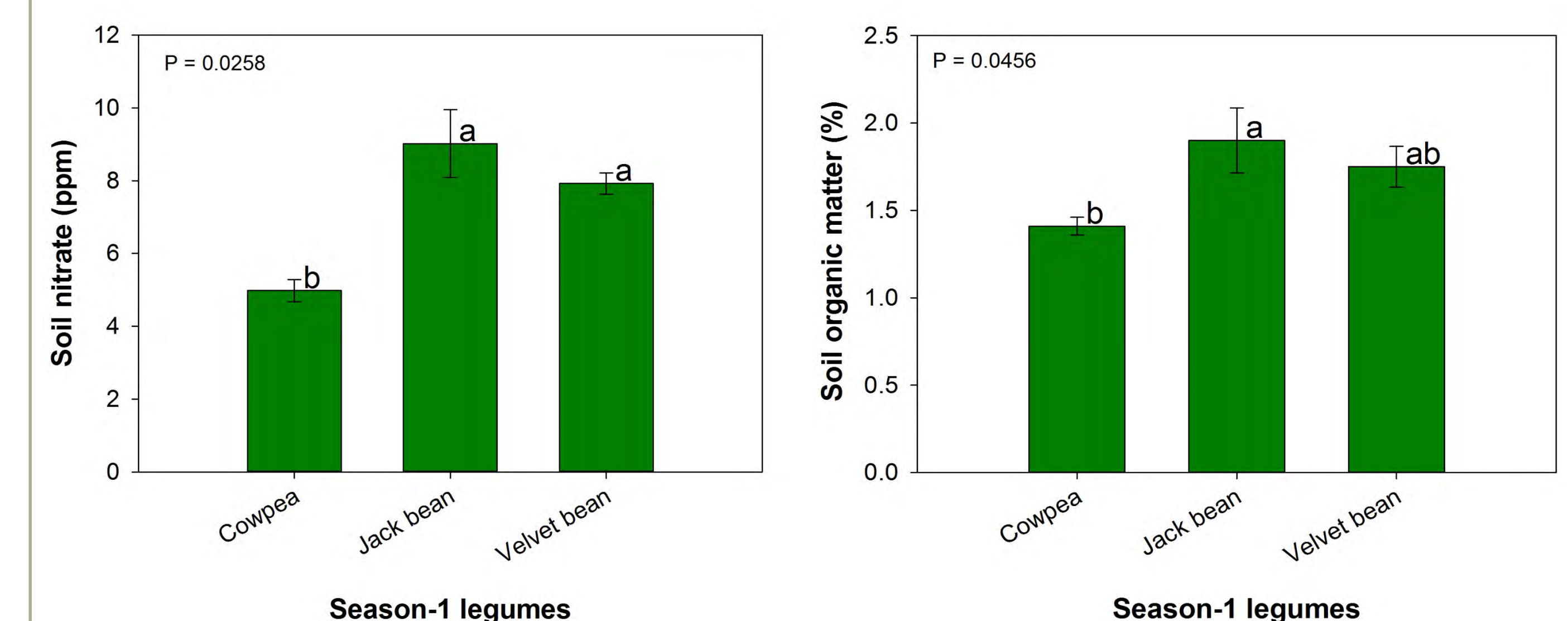
INPUTS: Maize received 23 kg/ha of nitrogen (from NPK fertilizer) and 2 t/ha of compost; legumes and cassava received 1 t/ha of compost; cassava also microdosed with NPK.

RESULTS:

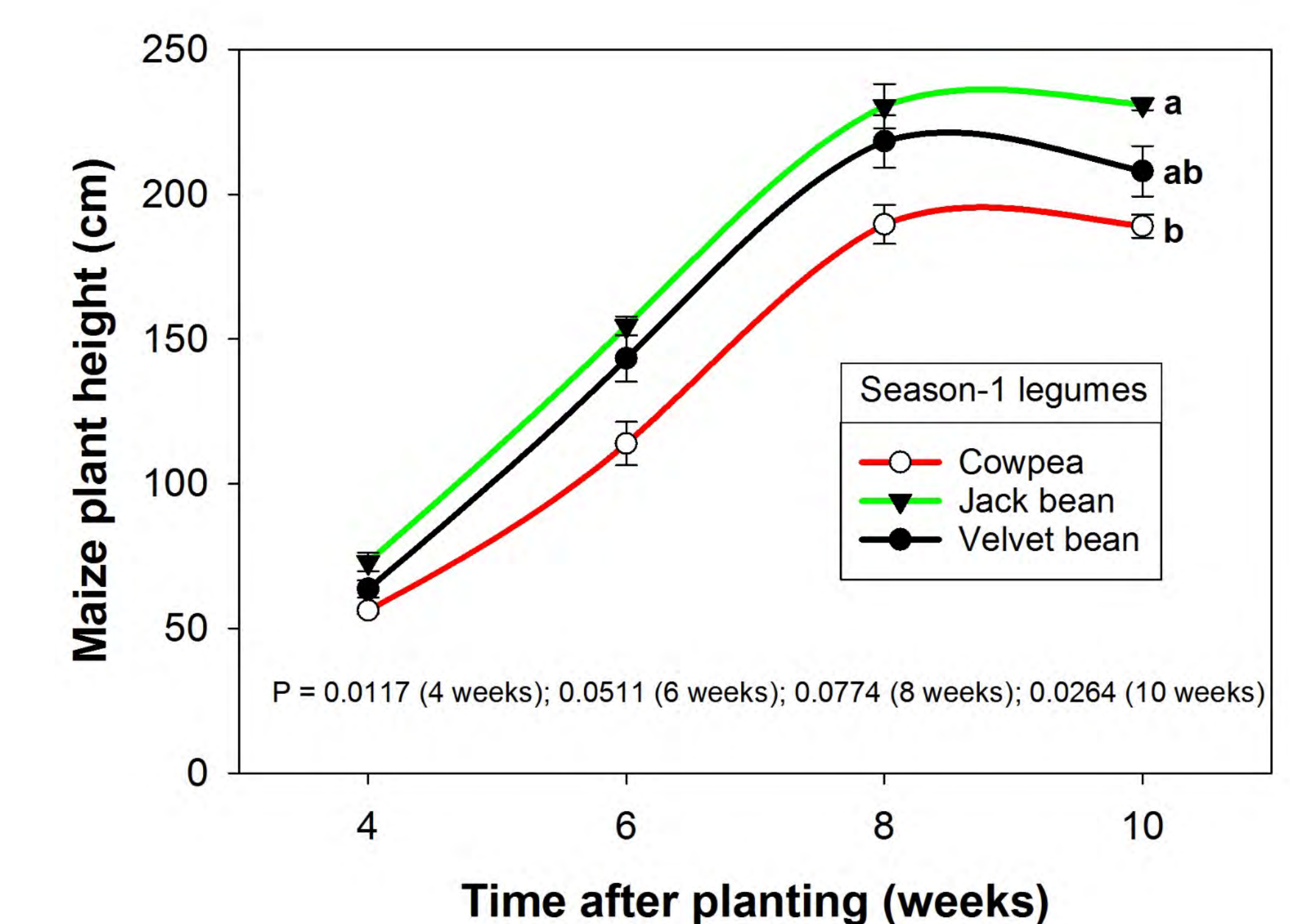
Growth of first-season legumes

Jack bean produced the most (4.3 t/ha) dry matter. Cowpea and velvet bean produced 1.8 and 2.8 t/ha dry matter, respectively.

Soil nitrate/organic matter at the beginning of season 2



Season-2 maize growth from 1st month after planting until tasseling



Conclusions

Soil fertility and subsequent maize growth were apparently influenced by the amount of leguminous mulch produced and left on the ground. Maize grew taller with jack bean than cowpea, likely an effect of higher biomass with jack bean. This intercropping pattern shows promise as a way for farmers to intercrop maize with aggressive legumes.

ECHO staff were introduced to the 2-4-2 system by Dr. B.B. Singh at the Ukulima Farm research station in South Africa in Feb. of 2015. They subsequently planned and conducted this experiment with other legumes at ECHO's campus in North Fort Myers, Florida. First-season results were published in *ECHO Developments Notes* (Issue 133).