

# Best practices of N2Africa Can Improve Biomass and Nutritional Quality for Animal Feed: *The Case of Common bean and Soybean*



N2Africa - Putting nitrogen fixation to work for smallholder farmers in Africa

## Challenges

- ❑ Shortage of animal feeds is the main limiting factors that reduce the animal productivity
- ❑ Feed cost accounts for more than half of the total cost of livestock production.



## Why N2Africa focus on the legume biomass?

- To tackle animal feed problem by improving the biomass productive and nutrition quality of targeted legumes (e.g. soybean has about 35-40% crude protein content)
- The contribution of crop residues as animal feed is estimated to reach up to 30-80% of the total dry matters.

## N2Africa approaches to deliver & disseminate the best fit practices

- N2Africa provided hands-on training for smallholder farmers and encouraged them to try out improved legume varieties and technologies, including i.e. phosphorus fertilizers and rhizobium inoculants.
- N2Africa received feedbacks from farmers ensuring wider promotion of preferred best-fit practices.
- N2Africa mapped, established and functionalized the Public Private-Partnerships (PPPs), promoted effective legume value chain platforms.
- N2Africa linked scientific knowledge with capacity building, women empowerment, and access to input supply and output markets through the PPPs.

# Main Achievements

## Dry biomass yield (haulm and husk dry weight)

- On average, not less than 2.5 tons ha<sup>-1</sup> and 1-1.5 tons ha<sup>-1</sup> dry weight of dry biomass for soybean and haricot bean could, respectively, be harvested under combined use phosphorus fertilizer (P) and inoculants (I).
- Growing soybean and common bean under combined application of P and I were found to produce 24-45% and 13%-36% dry biomass (husk and haulm) yield advantages, respectively, compared to the control (-P-I).
- Use of specific recommended inoculant for soybean and common bean also increase the biomass yield by 10-30% and 14-20%, respectively compared to the control.

## Nutritional qualities improvements

- The crude protein (CP) content of common bean and soybean dry biomass yield increased by 26.3% and 44.3% over the control, respectively, when produced using recommended rate of phosphorus fertilizer and rhizobia inoculation.
- The CP increases also observed for common bean (15.3%) and soybean (30%) when only appropriate inoculants were used.

Legumes	Parameters	Treatments				Level of sig.
		+P+I	-P+I	+P-I	-P-I	
Common bean	CP (%DM)	7.50 <sup>a</sup>	6.85 <sup>ab</sup>	6.72 <sup>b</sup>	5.94 <sup>c</sup>	**
	NDF (%DM)	67.8 <sup>b</sup>	69.0 <sup>ab</sup>	69.9 <sup>a</sup>	69.8 <sup>a</sup>	*
	IVOMD (%DM)	57.8 <sup>a</sup>	56.8 <sup>ab</sup>	55.8 <sup>b</sup>	55.7 <sup>b</sup>	*
	ME (MJ/Kg DM)	8.72 <sup>a</sup>	8.65 <sup>ab</sup>	8.58 <sup>b</sup>	8.58 <sup>b</sup>	*
Soybean	CP (%DM)	6.74 <sup>a</sup>	6.08 <sup>a</sup>	5.30 <sup>b</sup>	4.67 <sup>b</sup>	***
	NDF (%DM)	74.1 <sup>b</sup>	75.3 <sup>ab</sup>	75.5 <sup>ab</sup>	76.4 <sup>a</sup>	*
	IVOMD (%DM)	50.6 <sup>a</sup>	50.2 <sup>ab</sup>	49.4 <sup>b</sup>	49.6 <sup>b</sup>	**
	ME (MJ/Kg DM)	8.82	8.79	8.76	8.74	NS

<sup>a, b, c</sup> Mean values with different letters of superscript within the rows are significantly different at 5% probability level, +P+I= phosphorus fertilizer with inoculation, -P+I= inoculation only, +P-I= phosphorus fertilizer only, -P-I=control, DM: dry matter, CP: crude protein, ME: metabolizable energy, IVOMD: *in vitro* organic matter digestibility



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