



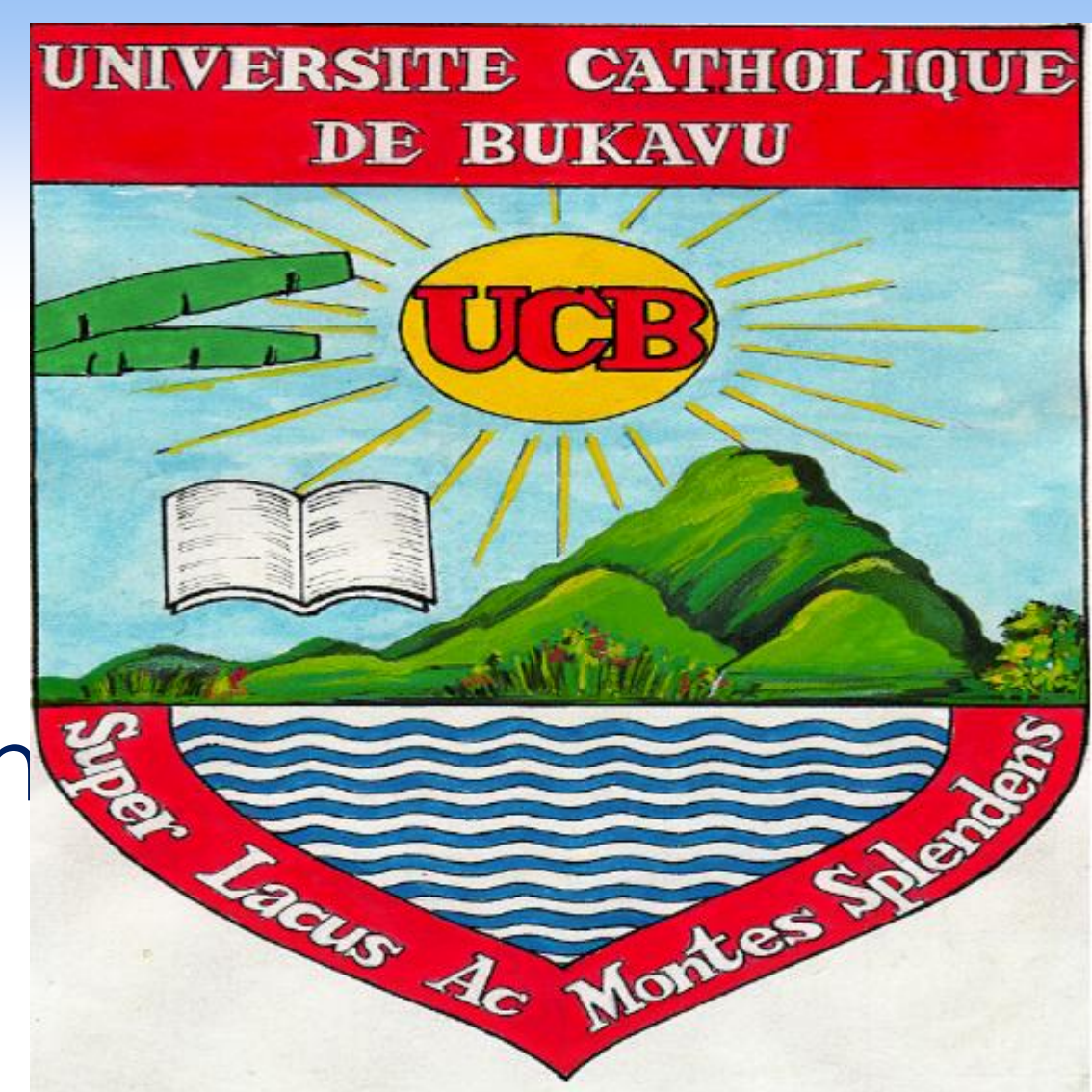
Nutrient requirements of cassava under different management systems in South Kivu, DR Congo

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Background

- Cassava is highly responsive to fertilizer additions and benefits from improved management
- Yet the yield responses of cassava to mineral fertilizers often remain highly variable and are not always clearly related to soil fertility levels
- Compositional nutrient diagnosis (CND) determines nutrient imbalances in cassava

Objective

To investigate and understand factors limiting yield responses of cassava to mineral fertilizers and their interactions with different agricultural management practices in South Kivu

Materials and methods

Two types of experiment:

- Nutrient response trials: treatments included a control, FYM, NP, NK, PK, NPK, NPK+ FYM, NPK+(Ca-Mg-S-Zn) in 2014 (9 fields) and 2015(10)

- Leaf management trials: with two factors including:

- ✓ leaf harvesting regime as main factor with no leaf harvesting (NoH), 2-week interval (2-WI) or 4-week interval (4-WI) starting from 4 month after planting (MAP)

- ✓ Fertilization effect: with or without NPK application as the other factor during 2014 (7 fields) and 2015 (5 fields)



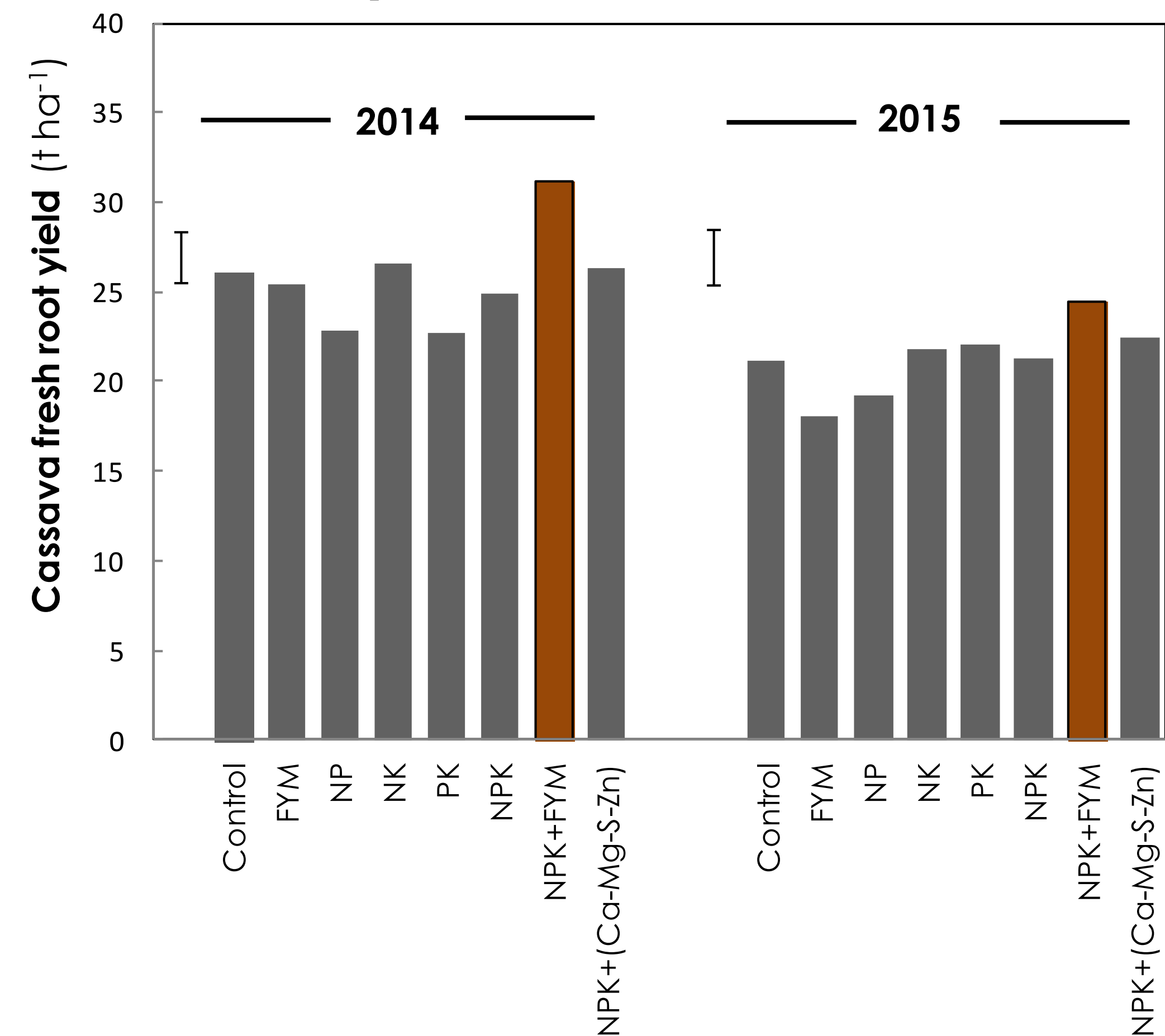
Photo 1: (a) K application at 1MAP, (b) leaf collection at 12MAP

- Multi-locational participatory farmer trials during two years, one farmer field = one replicate design

- Fertilizer rates: 100-22-83 kg N-P-K ha⁻¹ · N and K were split applied as urea and K₂O, respectively while all P was supplied as TSP at planting in both trials. 100-40-10-5 kg Ca-Mg-S-Zn ha⁻¹ and 10t FYM ha⁻¹ were all applied at planting

Results

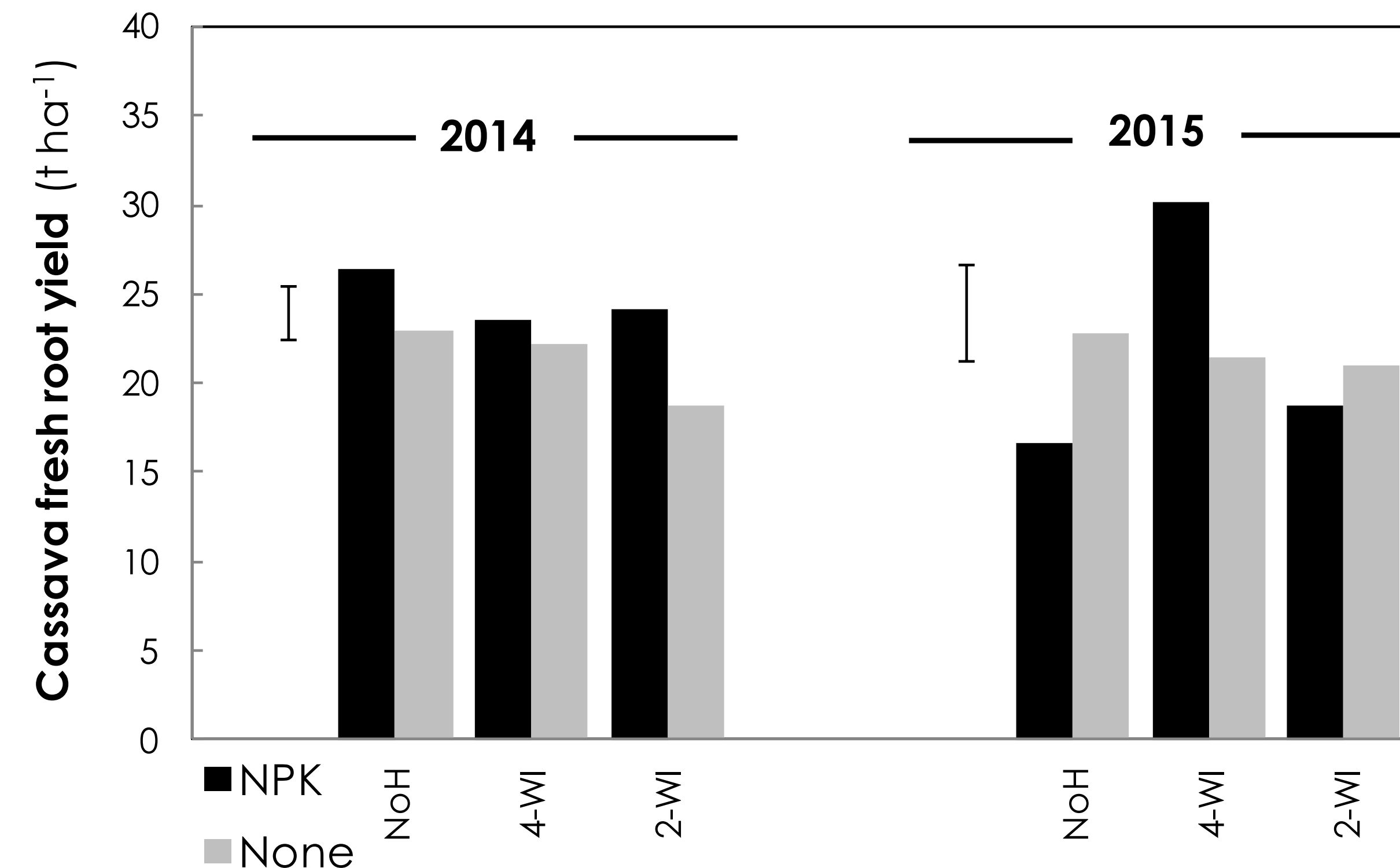
Nutrient response trials: Cassava fresh root yield (t ha⁻¹)



- Fresh root yield increased by 22 %, 25 %, 36 % and 37 % when NPK+FYM applied relative to FYM, NPK, NP and PK, respectively in 2014

- Fresh root yield increased by 35 % and 15 % when NPK+ FYM applied, compared with sole FYM and NPK respectively in 2015

Leaf management trials: Cassava fresh root yield



- NPK increased fresh root yield by 33 % at 2-WI in 2014 and 41 % at 4-WI in 2015
- Root yield increased with 58 % and 54 % with 4-WI relative to NoH and 2-WI when NPK applied in 2015

Nutrient sufficiency ranges for cassava grown in South Kivu

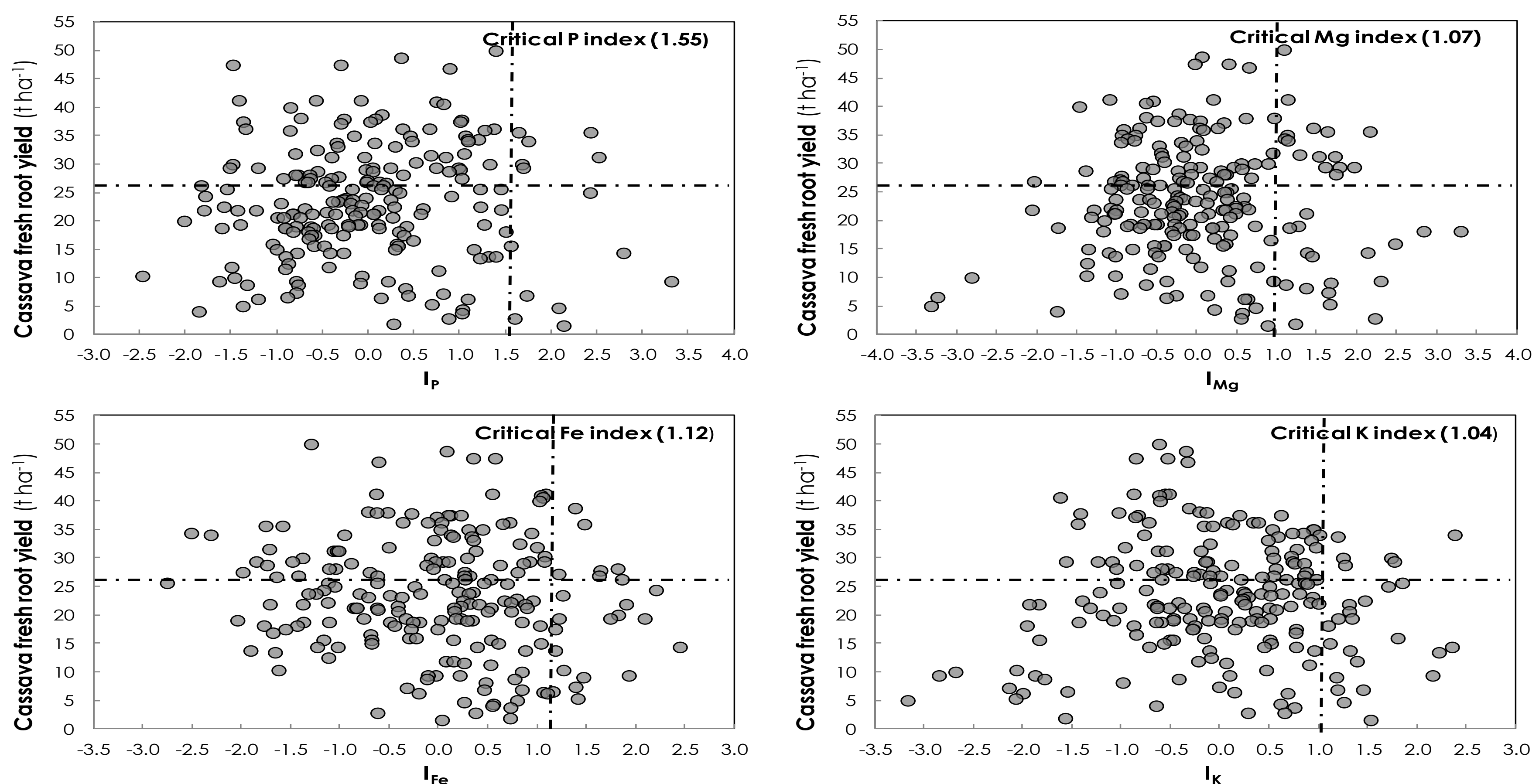


Fig 3: Relationship between cassava leaf nutrients (P, Mg, Fe and K) indexes and fresh root yield (t ha⁻¹)

- CND allows to develop the nutrients indexes to calculate the sufficient ranges

Table 1: Comparison of CND and reference nutrient sufficiency ranges for cassava

Nutrient	CND		Reference	
	Lower	Upper	Lower	Upper
Macronutrient (%)				
N	5.0	6.7	5.1	5.8
P	0.51	0.69	0.36	0.50
K	2.2	3.0	1.3	2.0
Ca	0.84	1.14	0.75	0.85
Mg	0.38	0.51	0.29	0.31
S	0.34	0.46	0.26	0.30
Micronutrient (mg kg⁻¹)				
Cu	12	16	6	10
Zn	63	85	30	60
Mn	368	497	50	120
Fe	192	260	120	140
B	19	25	30	60

‡Reference Source: Reuters and Robinson (1997)

- Except for N and B, CND ranges for other macro- and micro-nutrients are at higher concentrations than in the literature, especially for Mn and Fe

Conclusions

- Mineral fertilizer increased cassava growth and yields when applied with FYM
- Leaf harvesting at 4-week intervals increased cassava yield in 2015 when NPK applied
- P, Mg, Fe and K deficiencies were observed in most applied treatments
- CND is a viable tool for determining local nutrient sufficiency ranges

Acknowledgments

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