Incorporating secondary and micronutrients into fertilizers

John Wendt

International Fertilizer Development Center

Nairobi

Plant nutrition is more than NPK

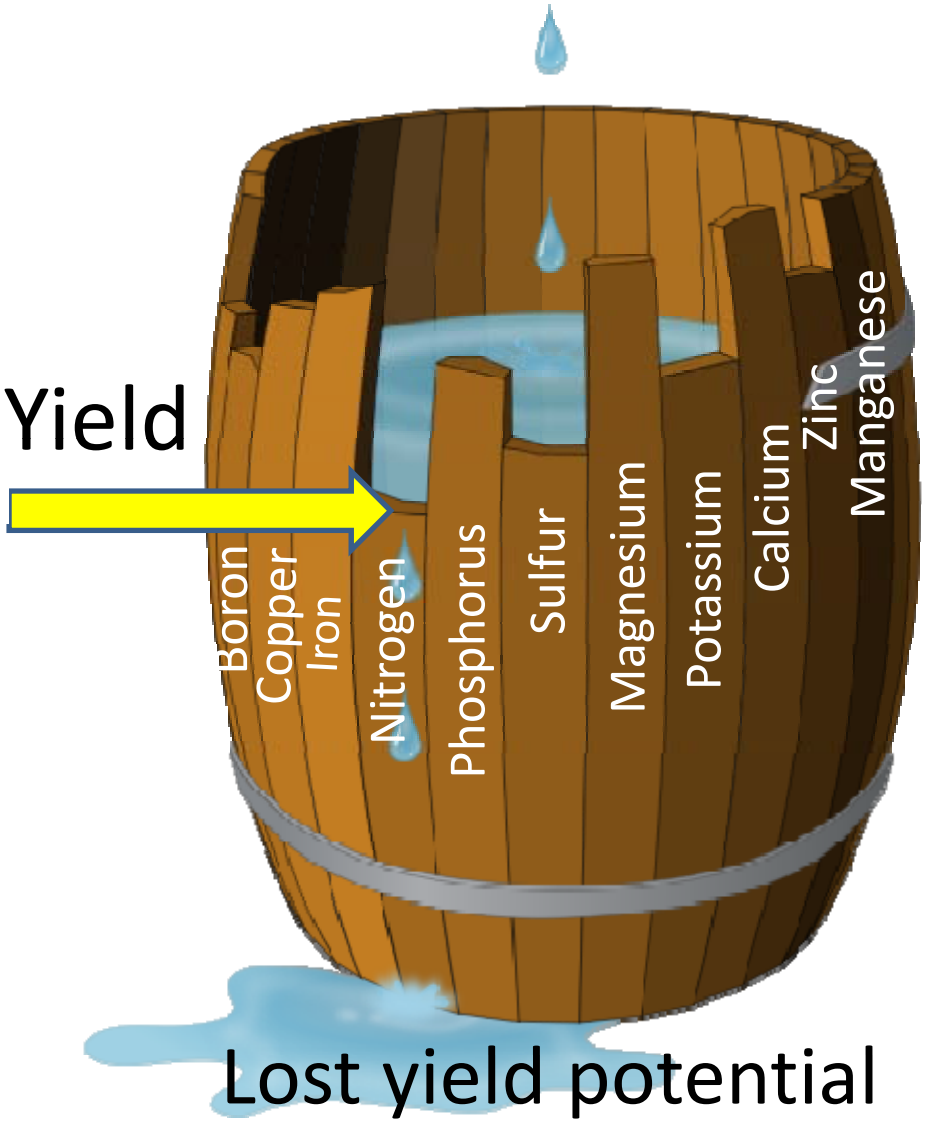
Stunted maize with multiple deficiencies ***after NPK application***

Plants require many nutrients

N, P, and K are required in the largest quantity and are usually the most expensive nutrients

However, they may not be the most deficient

Soils that do not respond to N, P, and K are often deficient in other nutrients

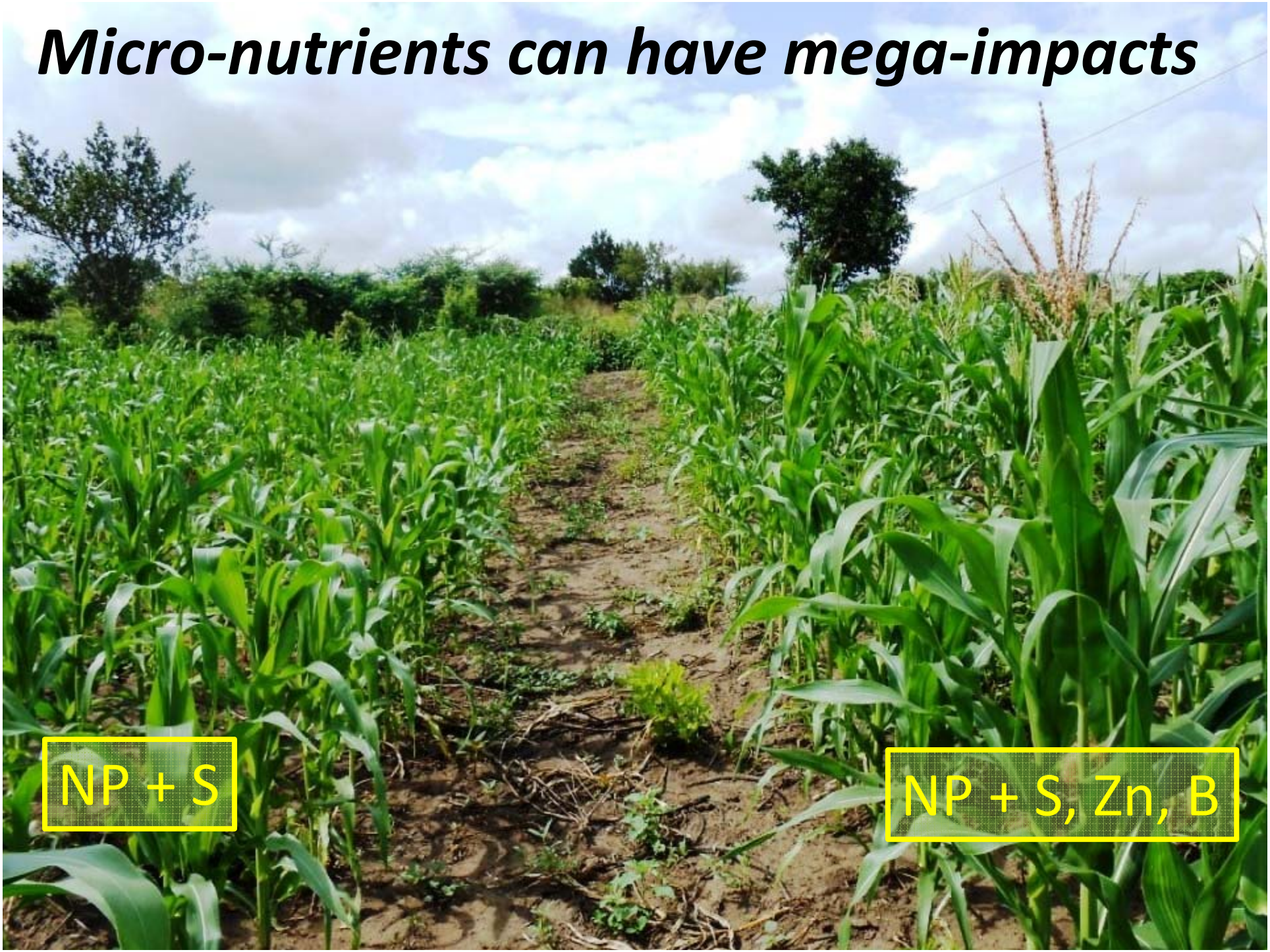


Non-responsive to NPK


Strong response to
NP + S, Zn, B
…maybe these guys deserve a second chance

Percentages of samples falling into the different soil fertility classes					
Property	Very low	Low	Optimum	High	Very High
pH	12	23	24	28	14
P	75	10	11	2	2
K	4	13	70	9	4
S	63	33	4	0	0
Cu	8	19	73	0	0
B	78	12	8	1	0
Zn	22	39	35	4	1
Mn	9	17	68	6	0

Micro-nutrients can have mega-impacts



A balanced fertilizer formula gives farmers an economic response and encourages adoption

Poor fertilizer response discourages farmer adoption, and wastes money

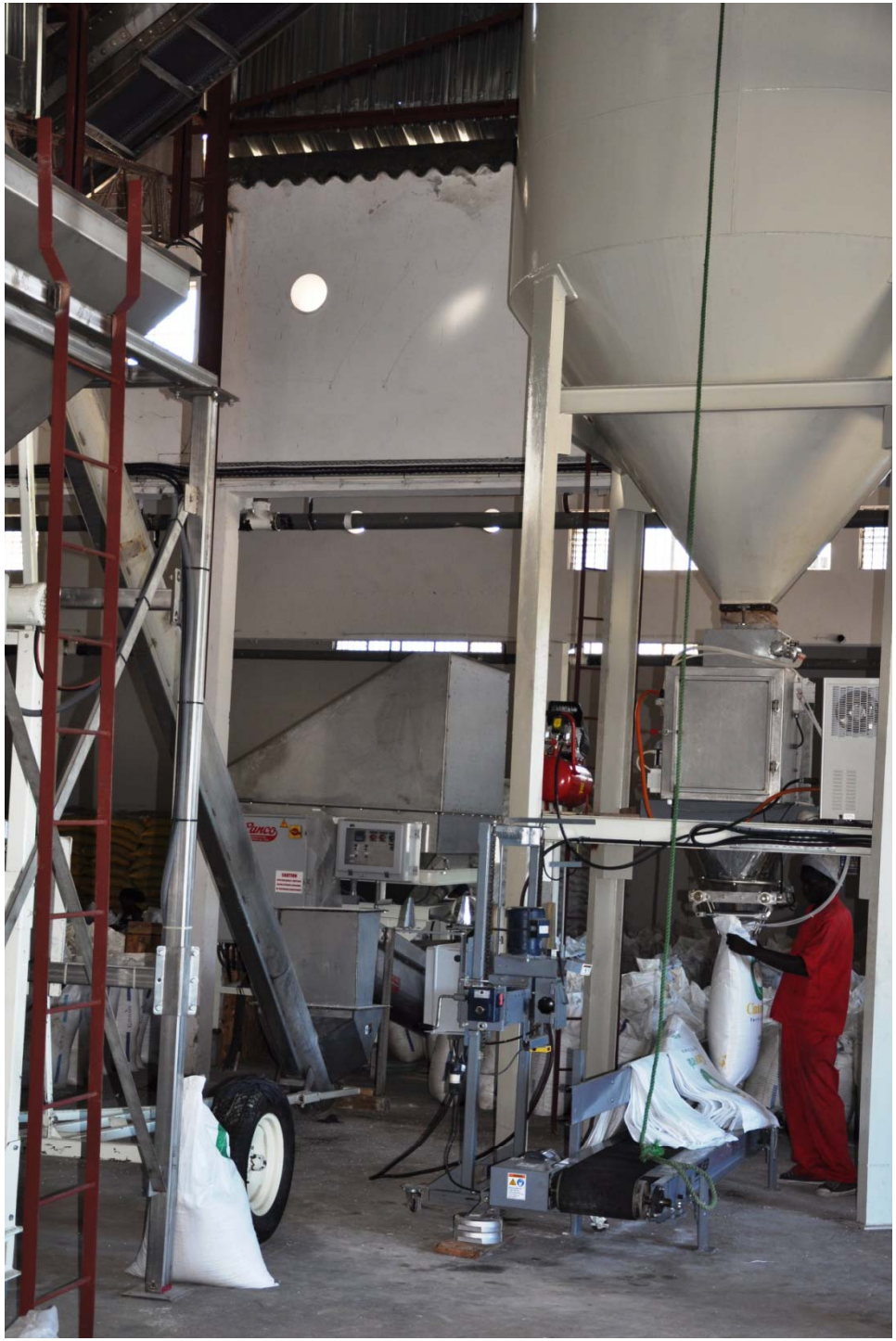
Non-NPK nutrients are not expensive

- 10 kg S/ha = $8-10
- 2 kg Zn/ha = $8-10
- 1 kg B/ha = $7-9

- Costs can often be offset by adjusting quantities of P and K

Emerging blending industry

- Several companies in Mozambique, Kenya, and Tanzania can blend fertilizers targeted to crop and soil requirements
- Large fertilizer manufacturers can make crop-targeted compounds



Which nutrients are necessary?

- Soil and/or plant analyses to identify potential deficiencies (large numbers)
- Farmer field trials (omission design) to confirm ***crop-specific, economic*** nutrient responses
- Scale up to regional or national level
- Can be in conjunction ***with fertilizer subsidy programs***

Summary

- Non-NPK nutrients are often limiting, sometimes severely
- Nutrients such as S, Zn, B, and Cu can ***improve the likelihood of fertilizer response—essential for farmer adoption***
- Infrastructure is in place to supply blends and compounds targeted to crops and soil conditions