Narrowing the maize yield gap in Malawi

Regis Chikowo and Sieg Snapp

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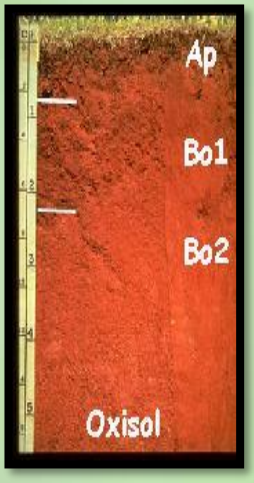
Interacting factors:

1. Diversity in access to resources –land and land quality, inputs,
2. Diversity in ability to process new Ag information linked to literacy, etc
3. A variable natural environment – climatic risk

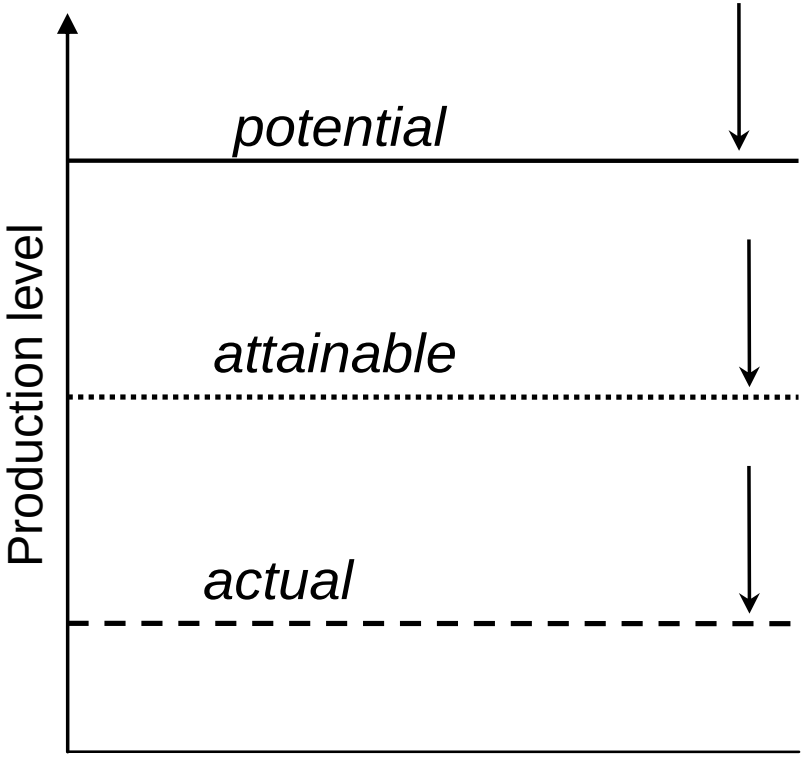
Soil heterogeneity is a barrier to resilient agriculture



- **Poor soil fertility management** results in high **striga** infestation, **low soil C** and **poor yields**

Soil degradation is driving poor agronomic N fertizer efficiency < 8 kg grain kg^{-1} N applied.

Production ecology



Temperature
Radiation
Crop phenology
Crop architecture

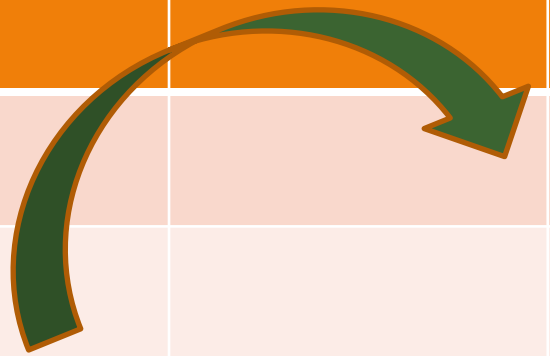
Water
Nitrogen
Phosphorus

Pests
Diseases
Weeds
Pollutants

Good production situation
(good climate/ good soil)

Alarming yield gaps

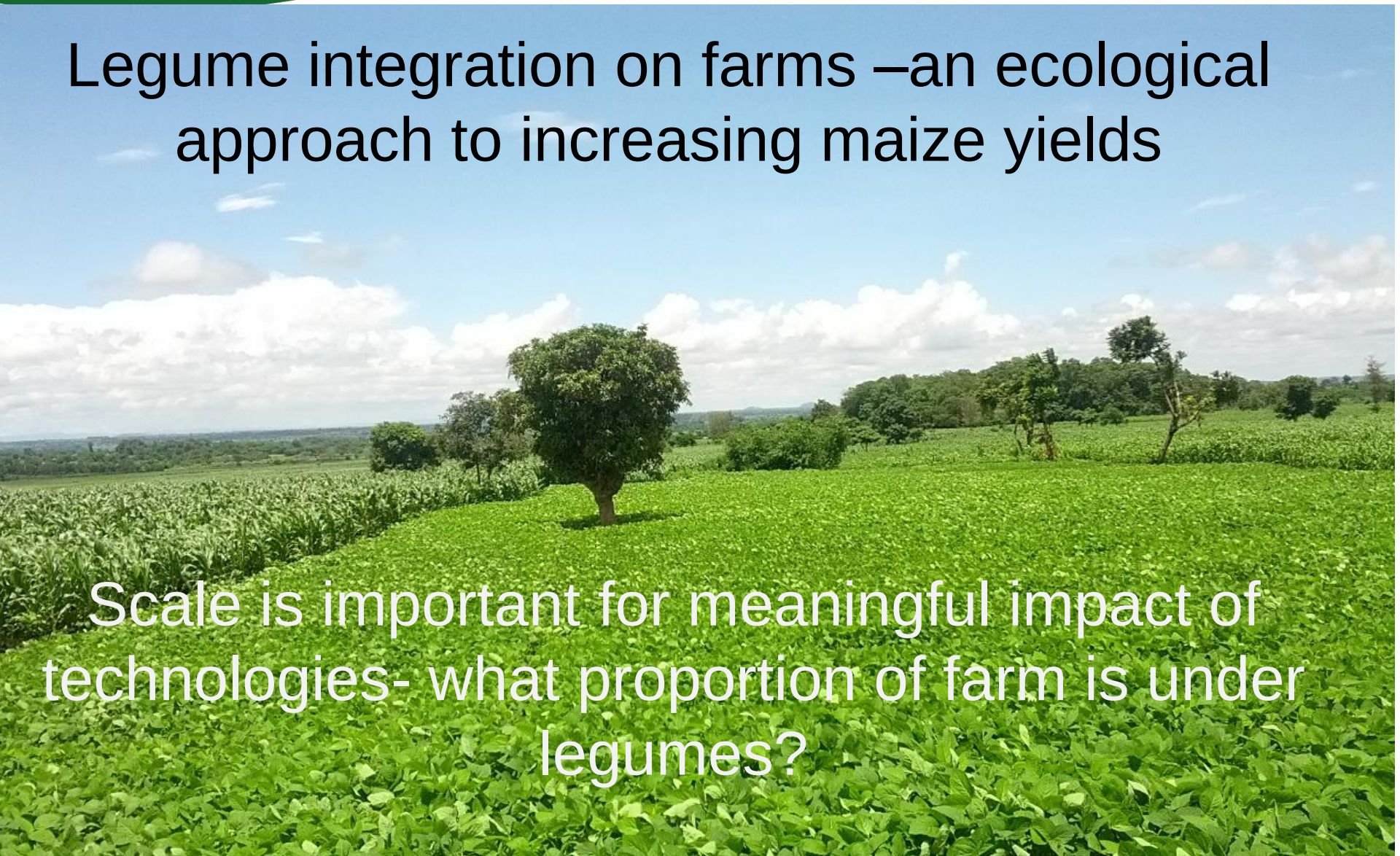
Crop	Actual yields (t/ha)		Farm attainable yields (t/ha)
Maize	1		4+
Soyabean	0.6		1.8+
Groundnut	0.6		1.5+



Fortunately, Malawi still has some fertilizer responsive soils……..

….Increased & timely access to fertilizers has immediate effect

Legume integration on farms –an ecological approach to increasing maize yields



Scale is important for meaningful impact of technologies- what proportion of farm is under legumes?

Double row groundnut => 50 kg/ha N cycling

Sub-optimal legume populations pervasive

– farmers forfeit the ecological benefits of integrating legumes on farms

-crop rotations have paltry effect in this case

Yield stability: managing seasonal variability

Harnessing rainfall -In search for more water use efficiency

Soil moisture deficits

1. Without irrigation, severe drought with rainfed agriculture is imminent disaster!
2. Dry spells – can be managed through
   - ✓ Simple practices that harness maximum rainwater
   - ✓ Early planting to capture bulk of seasonal rainfall

Tied ridges – increasing water residence time for infiltration

- This practice practically mitigates negative effects of dry spells at critical crop growth stages
- 5-10 days moisture can be the difference between success or crop failure

Conclusions

- Poor soil fertility is directly linked to large yield gaps
- **Timely** access and use of fertilizer is a true silver bullet –right should make this a low hanging fruit.
- Scaling grain legumes & tapping into biological N2-fixation is a pathway that offers hope
- In the absence of irrigation infrastructure, simple water harvesting in-situ plus good nutrient management reduces yield gaps

Thank You

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