

**Rob Brook**

Food Security discussion

1 July 2014

# Bangladesh

**160 million people living in an area smaller than England.  
Rice is the main staple – Bangladesh is largely self-sufficient**



**Was the location for British Council grant (2009-13) on linking urban solid waste management with increasing soil organic matter content**

# Rice production in Bangladesh

- **Dependent on several things:**
- **Highly productive modern varieties**
- **2 or 3 crops p.a.**
- **Plenty of rain in the monsoon for flooded rice**
- **Large quantities of fertilizer (0.25 t N/ha urea per crop)**
- **Pumped irrigation during the dry season**
- **Without these Bangladesh would be a huge importer of rice**

# Problem statements

- **Management of solid waste in urban areas is poor**
- **Farmers and soil scientists report that >80% of soils on farms have organic matter levels which are classified as low to very low**
- **Nitrogen fertilizer use efficiency of rice now down to 15%;**
  - **Therefore 85% applied N ends up elsewhere in the environment**
- **Farmers respond by a spiral of ever increasing of higher fertilizer inputs**
- **But rice yields are stagnant, and urea prices have more than doubled over the last few years**



# Turning solid waste into compost

- **Approx 60% of urban solid waste is biodegradable**
- **Allowing for losses during the composting process, national urban solid waste could yield 2 Mt compost p.a.**



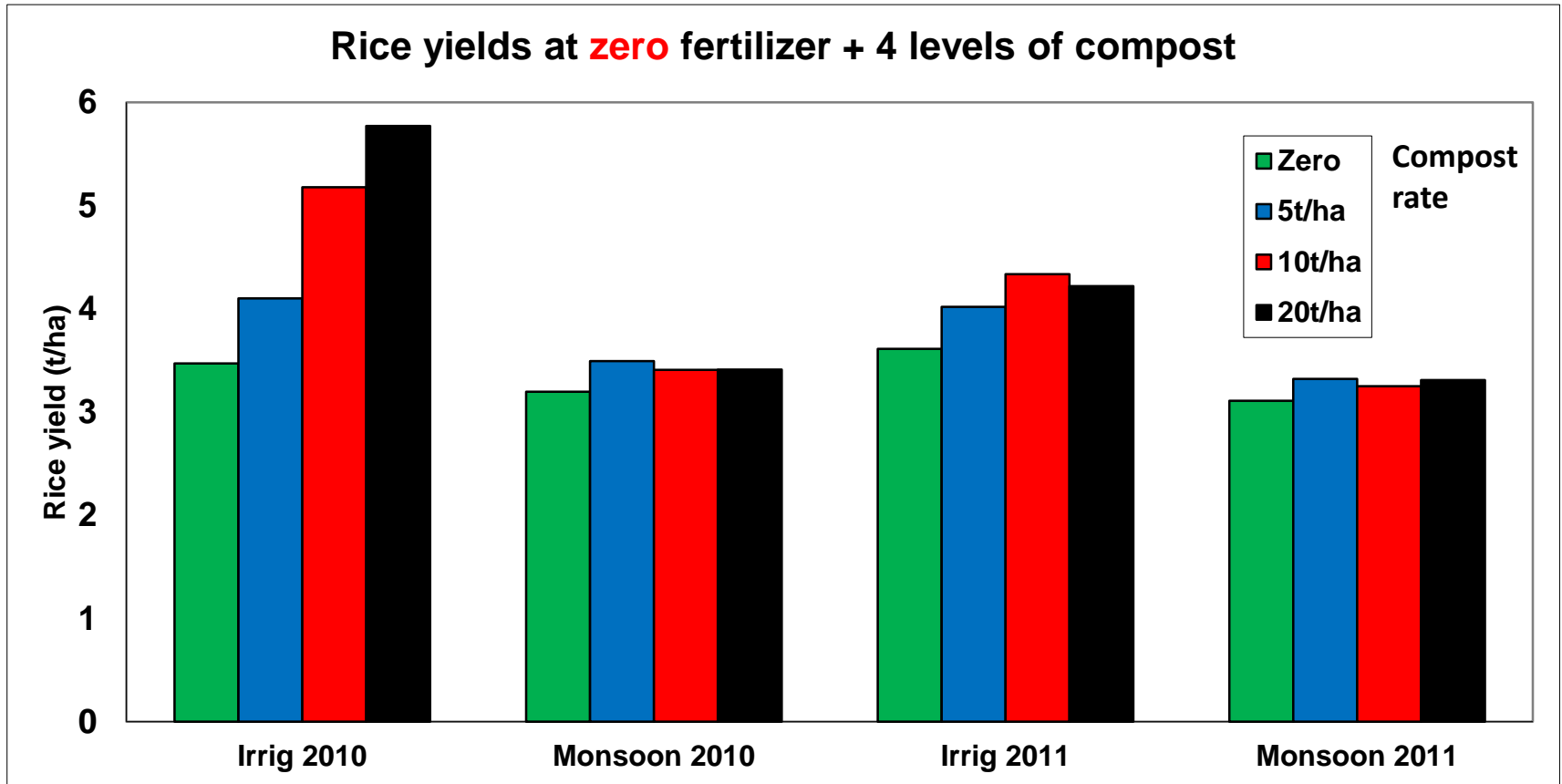
**Eco-park composting facility, Mymensingh**

# Research question: can composted solid waste substitute for nitrogen fertilizers in rice production?



**Demonstration crop of rice growing using 20t compost/ha**

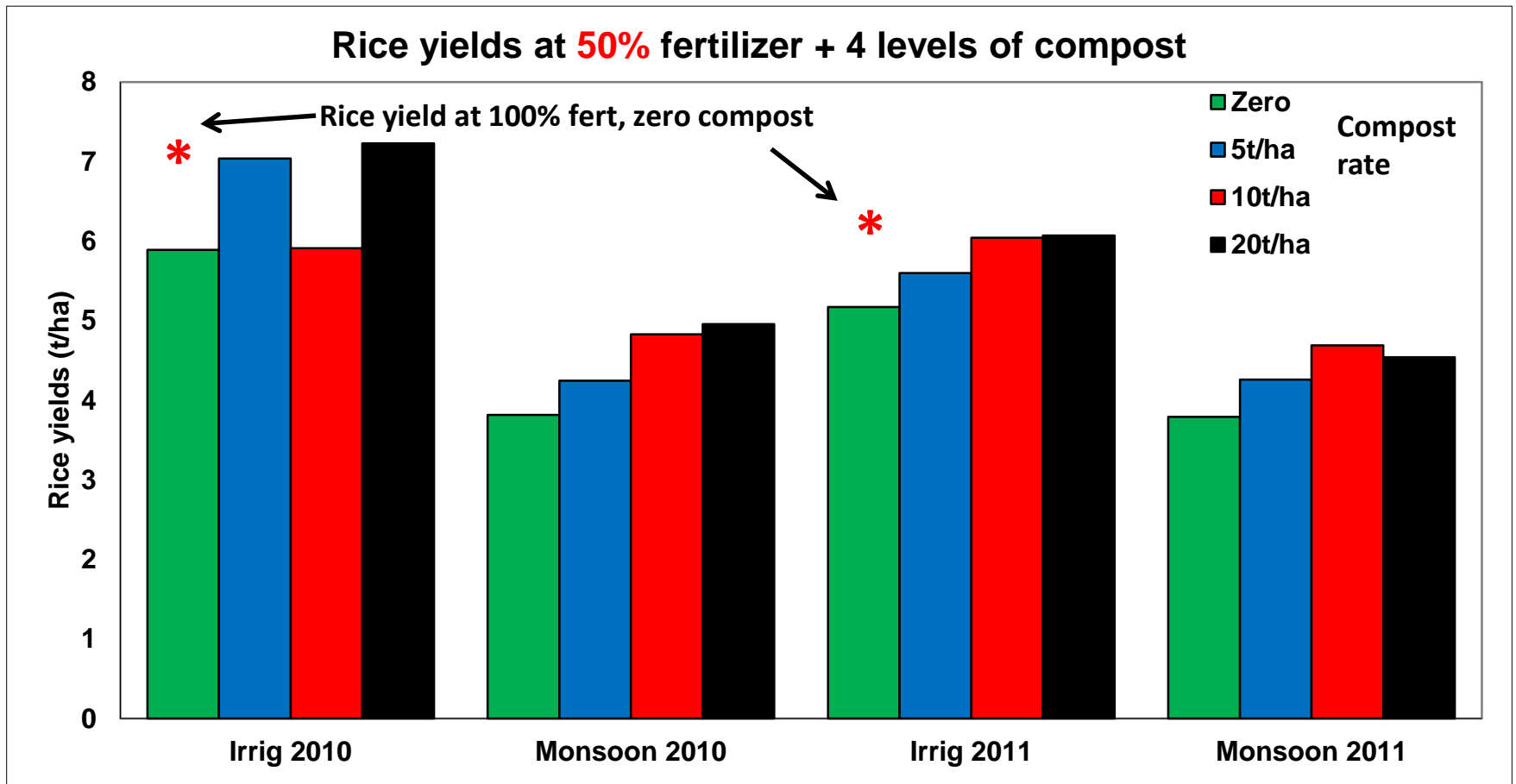
Test 4 levels of compost (0 – 20 t/ha), in combination with 4 levels of fertilizer (0% – 100% of recommended fert applications) over 4 rice cropping seasons



Rice yields in irrigated season are always higher than in monsoon

Good initial response to compost ( $P < 0.05$ )

Response to compost diminished in 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> seasons



**On average, yields higher than for zero fertilizer**  
**Fertilizer reduced the effect of increasing rates of compost**  
**Indications of a slight decreasing trend in yield over time**



**Three year old agroforestry plot. This man used to travel to the city each day for manual work. Now he is a full time farmer, and his wife sells their produce in the city market each day bringing home £1 clear profit for 6 months of the year**

**India: agroforestry for improved livelihoods  
DFID grant 2001-2005**

A man wearing a white t-shirt, a blue and white checkered dhoti, and a white turban stands in a lush agroforestry plot. He is holding two large, bright orange gourds. The plot is filled with various green plants, including tall trees and large-leafed shrubs. In the background, a dirt path leads through the trees. In the foreground, a pile of harvested orange gourds is visible on the ground.



## Current work: James Brockington PhD, funded by ICRAF



**Adoption of agroforestry and links to improved food security and reduced migration. Previously, tribal people used to migrate during the non-agricultural season for manual labour because their food ran out.**

# Food security through agroforestry



**Tribal woman standing in her grain store. Each basket holds 400 – 500 kg of rice or millet; enough for a whole year and sale of surplus. They used to migrate for work but are now permanently settled on their farms.**

# Recent grant seeking activity

- 2011 BBSRC-DFID application on improving rice N use efficiency (application failed)
- Intend applying for Leverhulme grant for studying contribution of agroforestry to all-year food security in India