

Towards a Rice Green Revolution in Sub-Saharan Africa: Evidence from Farmers' Paddy Fields

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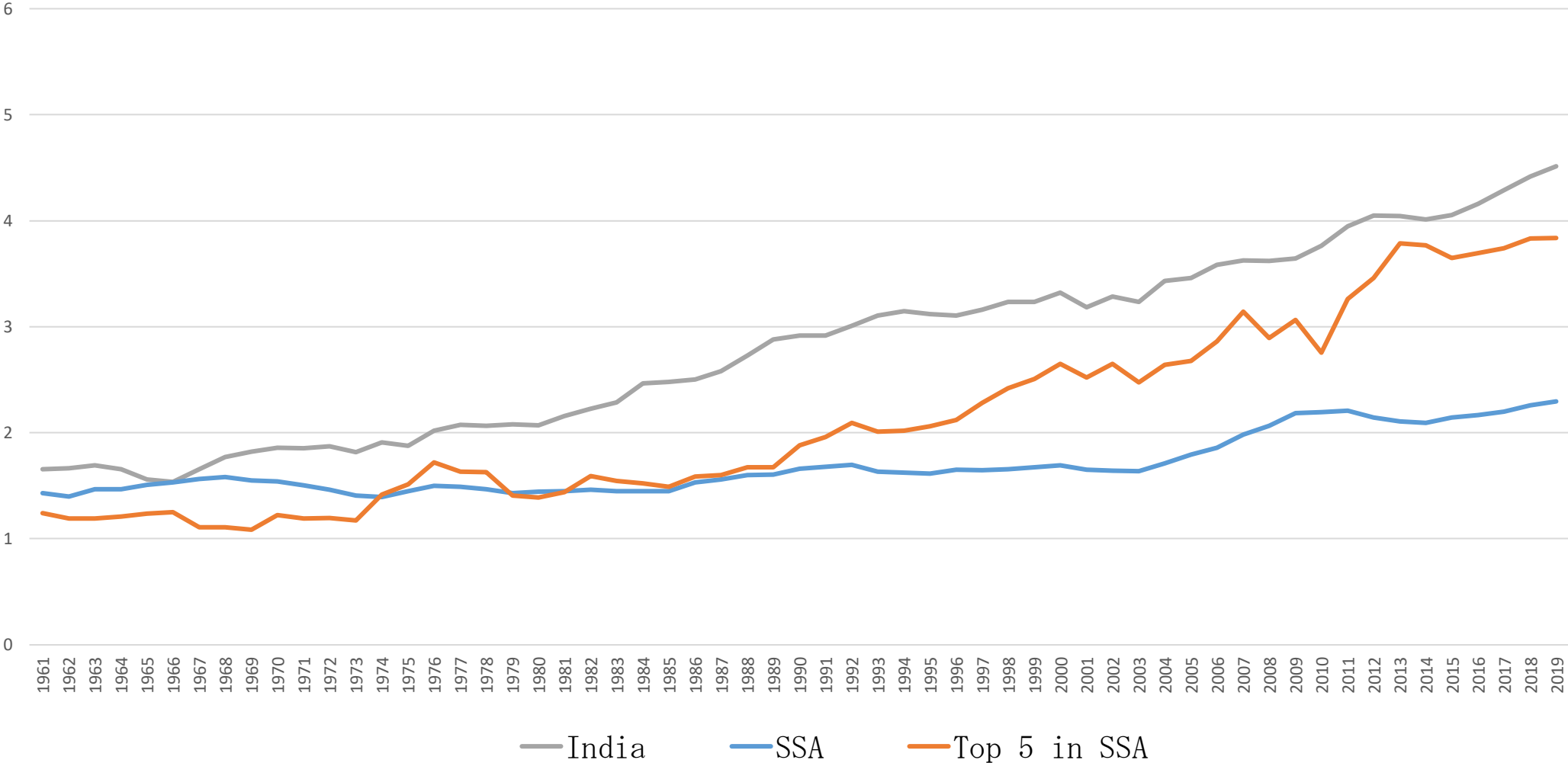
A Major Puzzle

- Why has Green Revolution failed to take place in SSA even now, which is essential to achieve the first and second goals of SDGs, namely “No Poverty” and “Zero Hunger”?
- This is truly puzzling, because Green Revolution took place in tropical Asia a half century ago.

Lowland rice is the most promising crop in SSA

- High potential for transfer of Asian rice technology.
- Abundant endowment of unused marshy land, which is suitable for lowland rice cultivation.
- Extremely favorable irrigated rice growing areas in selected regions.
- African people love rice and, hence, rice consumption increased tremendously.

Figure 1. Changes in Average Paddy Yield in SSA, Top 5 Countries (Kenya, Niger, Senegal, Benin, and Mali), and India (ton/ha)



What can we learn from Figure 1 ?

1. There was small yield gap between India and SSA in the 1960s before Green Revolution → Agro-climate in SSA is not particularly unfavorable.
2. The yield gap widened since the 1970s due to Green Revolution in India.
3. However, the average yield in SSA began increasing since around 2002-03.
4. Moreover, the average yield of top 5 countries has been increasing rapidly since 1990 and almost caught up with that in India.
Therefore, there is no question that Green Revolution has been already taking place at least in the top 5 countries in SSA.

Hypothesis

- SSA has failed to realize rice Green Revolution because of the wrong perception that Green Revolution is “Seed-Fertilizer Revolution.”
- Truth is rice Green Revolution is intensive not only in the use of improved varieties and inorganic fertilizer but, more importantly, in cultivation management (e.g., bund construction, leveling, and straight-row transplanting).

Paddy fields without bund?

No bund → No stored water → Growth of weeds



Paddy field without bund



Another paddy field without bund



Paddy field with bund



Paddy field with excessively large bund

Leveling → Even distribution of water
Straight-row transplanting → Easy weeding



Before and after Leveling



Straight-row transplanting

Well-managed paddy field in Tanzania



Our Project: An Empirical Analysis on Expanding Rice Production in Sub-Saharan Africa Phase 2

- Conducted randomized controlled trial of rice cultivation training offered by JICA in Mozambique, Tanzania, and Cote d'Ivoire. **Confirmed the decisive importance of improved rice cultivation practices in increasing the productivity.**
- Assessment of JICA's rice cultivation training programs in Tanzania and Uganda (see next page). **Confirmed significant and sustainable impacts of rice cultivation training programs on paddy yield, income and profit.**
- Assessed positive impact of improved rice milling methods on the quality of milled rice in Mwea in Kenya.
- Assessed positive contributions of power-tillers to the intensification of rice farming in Cote d'Ivoire and Tanzania.
- Assessed the benefit of large scale irrigation investment in Mwea.

Comparison of yields and the adoption of selected cultivation practices among key farmers, intermediary farmers, and ordinary farmers in irrigated area in Tanzania

	2008	2009	2010	2011	2012
	Before training	Training year	1 year later	2 years later	3 years later
Key farmers					
Yield per ha (ton/ha)	3.07	4.40	4.81	5.34	4.67
Inorganic fertilizer application (kg/ha)	63.4	115.8	137.7	178.3	131.3
Adoption of leveling (%)	46.1	76.9	81.3	86.7	76.9
Adoption of straight row transplanting (%)	23.1	76.9	93.8	93.3	92.3
Intermediary farmers					
Yield per ha (ton/ha)	2.47	2.57	2.84	4.63	3.93
Inorganic fertilizer application (kg/ha)	22.2	49.0	79.1	103.9	95.2
Adoption of leveling (%)	43.5	70.4	74.2	79.2	62.5
Adoption of straight row transplanting (%)	13.0	44.4	64.5	45.8	58.3
Other farmers					
Yield per ha (ton/ha)	2.57	2.67	2.53	3.58	3.67
Inorganic fertilizer application (kg/ha)	46.5	58.3	69.7	85.8	83.2
Adoption of leveling (%)	54.8	64.1	69.0	76.2	66.9
Adoption of straight row transplanting (%)	11.1	19.0	25.8	26.9	36.9
Annual rainfall (mm)	1,027	869	917	1,547	651

Concluding Remarks

- Our research group found that rice cultivation training program improved rice yield significantly and sustainably, sometimes even without introducing new varieties and increasing chemical fertilizer application.
- In my view, the most important strategy to realize rice Green Revolution in SSA is to establish the notion that the adoption of improved cultivation practices in rice farming is an indispensable entry point to African rice Green Revolution.
- It is job of our research team to collect data, analyze them, and publicize the important information to African political leaders, staff in international organizations, and leading agricultural scientists and economists.

Thank you very much for your attention

