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Seed certification and maize, rice, and cowpea productivity in Nigeria

Moderate rather than full seed certification is more optimal, given declining marginal returns to expanding seed certification coverage

ABSTRACT

Despite the potential importance of seed quality to agricultural productivity growth, many governments in sub-Saharan Africa lack the capacity to expand quality assurance systems even where there is expressed interest. This brief summarizes the key insights from a recent study in Nigeria. **The evidence points toward the benefits of pursuing balanced, flexible seed quality assurance systems rather than focusing singularly on expanding rigorous seed certification systems, as the country has done until recently.** These recommenda-

tions are based on findings from the 2010–2018 period in Nigeria: Increased supply of certified seeds of maize, rice, and cowpea had positive effects on farm-level use of certified seeds, yields, and output, but these effects diminished as certified seed supply continued to expand. Moreover, yield gains from certified seeds tend to vary considerably across locations. As certified seed becomes more available to farmers, its use spreads from higher-return farms to lower-return farms, diminishing overall productivity benefits. These results are consistent with the view that singularly expanding rigorous seed certification faces diminishing returns. More balanced, pluralistic systems that also allow for moderate quality assurance, such as quality declared seed (QDS), may be worth trying in Nigeria.



Photo credit: IFPRI.

CONTEXT

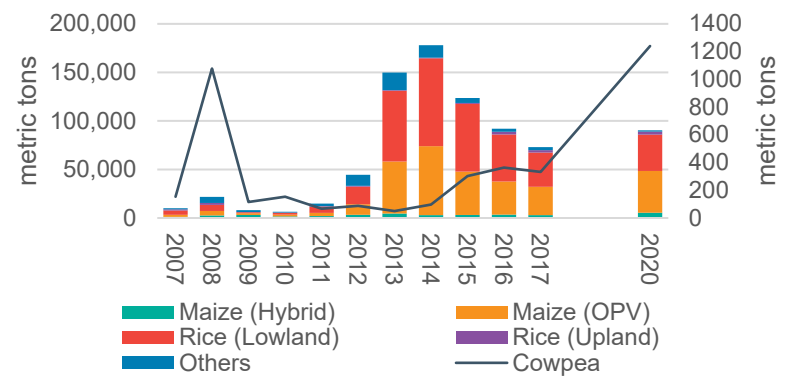
In recent years, the Government of Nigeria and many of the country's seed sector stakeholders have been keen to expand the supply of quality seed, including seed that is certified by the National Agricultural Seeds Council (NASC), an agency of the Federal Ministry of Agriculture and Rural Development that was established in 2007 in line with the 1992 National Agricultural Seeds Act. Over the past 15 years, Nigeria has seen a gradual increase in the supply of certified seeds, albeit with fluctuations (**Figure 1**).

In Nigeria, seed companies have produced most certified seeds. Local governments procure a significant share of these seeds for distribution as part of their agricultural projects, while dealers sell the remaining seeds directly to farmers.

However, the country has pursued a relatively narrow seed quality assurance system, including strict certification standards, but has yet to recognize more intermediate seed classes, such as quality-declared seeds (QDS). To

date, there is little information on the effects of seed quality assurance on use rates, yields, or output, and thus very little insight into the optimal levels and use rates at which seed should be regulated for quality.

Figure 1. Quantity of certified seeds produced in Nigeria



Source: Takeshima et al. (2022).

CHALLENGES AND CONSTRAINTS

Assessments based on the Living Standard Measurement Study-Integrated Survey on Agriculture (LSMS-ISA) and headquarters locations of seed companies producing certified seeds in the 2010–2018 period reveal key patterns in returns to certified seeds for maize, rice, and cowpea in Nigeria.

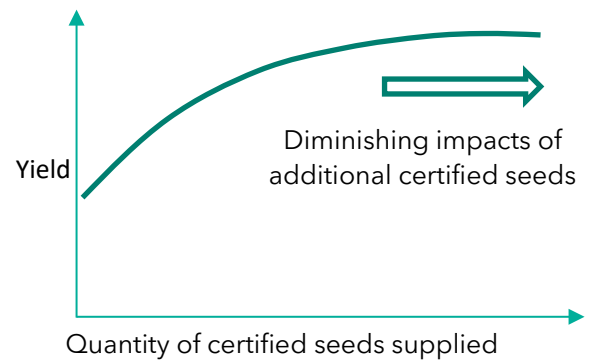
From 2010 to 2018, farm yields increased where more certified seeds were produced (farms in states or LGAs where the headquarters of seed companies were located). However, this was only when the amount of certified seeds produced was modest. As certified-seed production further increased, yields became less responsive and even started to decline in some cases (**Figure 2**).

Several factors may explain this reversal. As more certified seeds were produced, they were sold in more remote areas, where higher delivery costs increased seed prices. Farmers cope with higher certified seed prices by either reducing spending on other inputs or using noncertified seeds, limiting yield growth.

At the state level, where governments procure certified seeds for their programs, increased spending on certified seed procurement probably squeezed public expenditures on other types of agricultural support. This, too, is likely to have limited yield growth once a large amount of certified seeds was produced.

In addition, seed certification in Nigeria has tended to focus on somewhat older varieties without commensurate certification of newer varieties. For example, FARO 44 constituted the majority of certified rice seeds sold in Nigeria during the early 2010s. Yet the variety was introduced in Nigeria in the 1990s, and many of its desirable traits have been surpassed by newer varieties. As a result, the potential returns to using certified seed may be limited by the lower genetic potential of the older varieties, making it inefficient for farm-households to allocate their scarce resources to certified seed rather than other inputs and technologies.

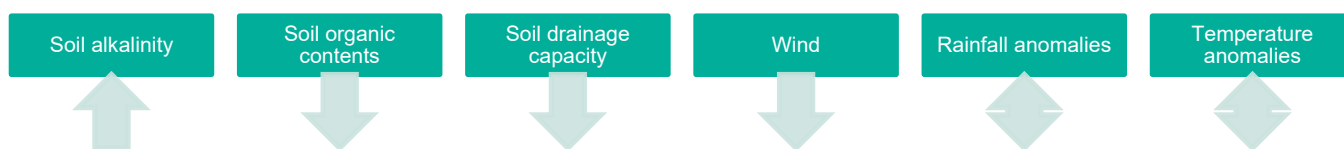
Figure 2. Yields effects of certified seeds - stylized illustration



Source: Takeshima et al. (2022).

The yield benefits of switching to certified seeds from noncertified seeds also vary considerably depending on agroclimatic conditions. Our study finds that for maize, rice, and cowpea, the yield benefits of switching to certified seeds are generally greater in areas with higher soil pH, lower soil organic contents and drainage capacity, and less wind. The yield benefits also vary significantly with rainfall and temperature anomalies (**Figure 3**). Thus, switching from noncertified seeds to certified seeds may be yield-enhancing in more suitable areas but less so when planted in less suitable locations. These results underscore the importance of carefully considering the returns and costs when targeting the extent of seed certification efforts.

Figure 3. Effects of some agroclimatic factors on productivity of certified seeds of maize, rice, and cowpea in Nigeria



Source: Takeshima et al. (2022).

POLICY RECOMMENDATIONS

- ← **Revisit seed certification targets in Nigeria for maize, rice, and cowpea:** Excessive expansion of certified seed production will not necessarily lead to higher use rates or yield outcomes compared with more moderate levels of certified seed production, except when such efforts exclusively target areas/locations that were not previously served by certified seeds. Reallocating some public resources to more decentralized seed production that can better target underserved areas, or to other investments such as agricultural R&D, including on improved varieties, may lead to greater benefits from seed quality assurance in the long run.
- ← **Prioritize spatially the seed certification expansion effort, if this approach is still of policy importance:** Continued research is essential to better identify locations with high returns to certified seeds, in view of agroecological and socioeconomic conditions and currently popular varieties. Once better information is obtained, enhancement of certification capacity and enhancement and deployment of inspectors should be prioritized in those locations. This may encourage seed companies to invest in certified seed production in the same areas. Likewise, enforcement capacity (for example, NASC-led spot checks of certified seeds sold by dealers should be prioritized in those locations. Identifying and prioritizing places where hybrid maize has been more widely adopted may also be worthwhile since certification efforts for these areas can be relatively concentrated. Additionally, it may be worth pursuing a more flexible subsidy scheme to cover the additional transportation costs to more remote areas in the medium run. This would allow more farmers to access certified seeds at the same costs as farmers located close to certified seed production companies.
- ← **Promote more decentralized systems:** Promoting and expanding quality declared seed (QDS) and/or community seed schemes for rice, cowpea, and OPV maize (as in various Eastern and Southern African countries) may be worthwhile. These more decentralized systems can allow for moderate levels of seed quality assurance for varieties more suitable for the local agroecological and socioeconomic conditions.

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