Experience brief #002

Moving toward digital seed certification system in Ethiopia

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This experience brief presents lessoned learned when making efforts to takcle counterfit seed problem in Ethiopia using barcode tagging system to enhance seed certification, traceability, and combat counterfeiting.

Introduction

Seed quality is vital for agriculture, food security, and sustainability. However, Africa faces rising issues with counterfeit seeds, with 20–40% of seeds sold being fake, leading to annual losses of nearly $400M (AGRA, 2020). The spread of counterfeit seeds in the COMESA region has grown by 5% annually since 2008 (African Agriculture Status Report, 2013). Studies show 30–40% of seeds in Uganda, Kenya, and Tanzania are substandard or fake (Longley et al., 2021; de Boef et al., 2014).

Farmers often face issues with counterfeit seeds or using grain instead of certified seeds, leading to poor yields and financial losses (Folarin Sunday Okelola et al., 2023). This also erodes trust in the formal seed system and hinders the adoption of improved varieties. Although Ethiopia lacks comprehensive national data, concerns raised in seed sector meetings and workshops highlight challenges like mislabeled seeds, illegal repackaging, weak market inspections, and unauthorized distribution. These issues stem from certified seed shortages, low farmer awareness, and weak regulatory enforcement, mirroring problems seen in other African nations.

Several African nations are making efforts to tackle seed fraud through innovative technology and regulations (African Union, 2021). Nigeria's SEEDCODEX uses tagging to ensure seed quality (Folarin et al., 2023), while Tanzania's APVS allows farmers to verify agro-inputs via mobile phones (Shao and Edward, 2014). In Kenya, KEPHIS and STAK introduced scratch-off labels with SMS-verifiable codes to confirm certified seeds. Inspired by these efforts, Ethiopia's ESP launched a barcode-based tagging system to enhance seed certification, traceability, and combat counterfeiting. These tools boost trust by improving product verification and transparency.

Objectives, focus and scope

The overall objective of this experience paper is to document Ethiopia's transition toward a digital seed certification system and to share practical lessons from piloting barcode-based seed traceability as a tool to combat counterfeit seed. The paper aims tto guide policymakers, regulators, and practitioners in enhancing seed regulations and ensuring farmers access quality seeds.

Specific objectives

The paper specifically seeks to:

- Document the drivers, sources, and scale of counterfeit seed in Ethiopia.
- Describe the design and implementation of the barcode-based digital seed certification pilot.
- Capture institutional, technical, and operational lessons learned during implementation.
- Highlight challengess encountered and recommend actions for strengthening the system

Key messages

- **Counterfeit seed is a growing threat to Ethiopia's seed system:** counterfeit seed undermines farmer confidence, reduces yields, causes financial losses, and weakens trust in the formal seed certification system.
- **Seed shortages, weak enforcement, and limited awareness drive counterfeiting:** persistent gaps in certified seed supply, low farmer and agro-dealer awareness, poor coordination, and limited regulatory capacity create conditions that allow counterfeit seed to spread.
- **Barcode-based certification offers a practical solution for traceability:** ESP's pilot digital tagging system enables inspectors, seed producers, and farmers to verify seed authenticity and trace certified seed across the value chain using unique identification codes.
- **Sustaining the system requires stronger institutions and further investment:** there is a need for legal enforcement, better logistics, capacity building, high-quality tagging, regulatory autonomy, approval of the illegal seed trade directive, and eventually upgrading to more advanced digital tools such as QR-based platforms.

Key questions

This experience paper is guided by the following key questions:

What is the nature, extent, and drivers of counterfeit seed in Ethiopia?

How was the barcode-based digital seed certification system designed, implemented, and what early impacts have been observed?

What lessons, policy, and institutional actions are needed to strengthen and scale digital seed certification nationally?

Focus and scope

This paper focuses on the practical experience of piloting and expanding a barcode-based digital seed certification system in Ethiopia, emphasizing institutional collaboration, regulatory strengthening, technology adoption, and capacity building as key enablers of innovation in seed quality assurance. It covers the Ethiopian formal seed sector and regulatory environment, counterfeit seed challenges affecting major crops, the design, pilot implementation process, and early expansion of the barcode-based certification system, as well as lessons and recommendations relevant to policymakers, regulators, seed companies, and development partners. The paper does not aim to provide a comprehensive national quantitative assessment of counterfeit seed but instead presents practical implementation experience and emerging evidence to inform policy dialogue and future research.

Rationale for introducing barcode technology

Before the introduction of barcoding technology, in Ethiopia, the national seed certification system relied heavily on paper-based labels and manual verification processes. Although these approaches supported the expansion of the formal seed sector, these labels were easy to copy, and counterfeiters used this loophole to put counterfeit seed on the market undetected. Farmers in Oromia, Amhara, Central Ethiopia, and South Ethiopia frequently reported seed packages with forged labels, and it was very difficult for regulators to trace where the counterfeit seed came from.

In Ethiopia, seed bags are supposed to have one internal tag from the seed company and one external tag from the regulator, issued only after quality tests are completed. However, in some regions, this process was not followed correctly. Some large producers attached both tags before test results were confirmed, which reduced trust in the certification process and created repeated disagreements between regulators and producers. Meanwhile, regulatory authorities maintain that the issuance and control of tags fall exclusively under their legal mandate.

Weak regulatory capacity made the situation worse. The presence of counterfeit seed has been clear, while the mechanisms in place to address the issue remained largely reactive rather than preventive.. Many regions did not have enough inspectors, transport, or resources to monitor seed movement in the market regularly and enforce seed quality standards. The counterfeiters exploited these gaps, especially during peak planting seasons when farmers urgently needed seed.

Although counterfeit seed had been present for many years, it was not widely noticed due to low awareness and its small scale. Today, the problem is more visible, and its impact on farmers is clear. Because of these challenges, the introduction of barcode technology was therefore conceived as a practical, secure, and traceable alternative aligned with Seed Proclamation No. 1288/2023. The system was designed to strengthen regulatory oversight, reduce disputes between regulators and producers, and modernize certification processes while remaining feasible within existing institutional structures.

Understanding the Nature and Extent of Counterfeit Seed in Ethiopia

To inform system design, consultative workshops were held in Bahir Dar and Adama in February 2023, engaging regional bureaus, seed companies, and regulators. These consultations helped characterize the sources, drivers, types, and scale of counterfeit seed in Ethiopia.

Main Sources of Counterfeit Seed

Evidence generated from different stakeholders shows that counterfeit seed originates from multiple actors operating at different points along the seed value chain. These include:

1. Seed producers and companies
2. Traders and intermediaries
3. Farmers (outgrowers) and agricultural experts
4. Agro-dealers, importers/distributors and retailers, and
5. Non-Governmental Organizations (NGOs).

Many counterfeit actors engaged in counterfeit seed trade activities for a range of interconnected reasons, largely driven by quick profit motives (economic incentives) and enabled by regulatory gaps. Actors may rebrand low-quality seed as certified, exploit supply shortages during peak

planting seasons, or resell ordinary grain as seed. Financial pressures and access to authentic packaging materials further facilitates participation in illegal seed distribution.

Limited technical knowledge among agro-dealers and inadequate verification of certification documents by farmers and institutional buyers, for instance, NGOs purchasing seed for distribution programs, can unintentionally contribute to the problem. According to the African Union (2021), seed companies indicate that the main sources of counterfeit seed are seed companies, seed distributors, retailers, and other agents who purchase low-quality seed for the relief programme. Studies in Ethiopia identify traders, agro-dealers, farmers, and private seed producers as the most common sources of seed counterfeiting in that order (Dawit et al., 2025), confirming that the problem is multi-actor in the supply chain and systemic.

Drivers of counterfeit seed

Stakeholder consultations identified several interconnected drivers behind the growing problem of counterfeit seed in Ethiopia. The most critical factor is the persistent shortage of high-quality seed within the formal system. The formal system currently supplies only 10–20% of national seed demand (Meselu, 2019), creating a significant gap that illegal traders exploit. This scarcity makes farmers highly vulnerable to fraudulent seed sellers. Limited awareness and technical capacity among farmers and agro-dealers further increase vulnerability, as many cannot easily distinguish genuine seed from counterfeit products. Weak regulatory capacity and poor coordination among institutions allow illegal practices to continue largely unchecked. A recent study (Dawit et al., 2025) found that 83.3% of respondents identified limited availability of certified seed as a major driver among the three main factors. Similar findings from Tanzania highlight regulatory weaknesses, low awareness, and seed shortages as key contributors to counterfeit agro-inputs (Machibya et al., 2021). Together, these conditions including profit motives create an environment that enables the continued proliferation of counterfeit seed in Ethiopia.

Types of counterfeit seed in the market

Counterfeiters in Ethiopia employ several deceptive practices to penetrate the seed market, many of which are difficult for farmers to distinguish, including:

- Imitation of seed sacks and labels - where counterfeiters use look-alike bags and forged labels of reputable companies-
- Coloring grain to resemble treated seed - forged chemical dressing, in which ordinary grain is colored to resemble treated seed
- Adulteration by mixing certified seed with grain or inferior lots
- Reuse of discarded seed bags and tags
- Mislabeling uncertified seed as certified

Empirical evidence from Ethiopia confirms that artificial coloring, adulteration, label imitation, package reuse, and mislabeling are the most common forms of seed counterfeiting (Dawit et al., 2025). Ethiopia currently lacks a formal national system for tracking and reporting counterfeit seed cases both at company and regulatory levels.

Extent and scale of the counterfeit seed

While a comprehensive national assessment that quantifies the full scale is not yet available in Ethiopia, existing evidence indicates a growing problem. A study in Ethiopia indicates that hybrid maize is the most affected crop, followed by vegetables such as tomato, onion, pepper, and cabbage (Dawit et al., 2025).

In Ethiopia, regional reports illustrate the economic magnitude of the issue. In the Amhara Region, 57 cases of suspected or confirmed counterfeit seed trading were documented between 2017 and 2022, leading to the interception of 12 traders. In the same region in 2021, five counterfeit seed cases were formally identified, all involving hybrid maize, which demonstrating both the concentration of the problem and the focused regulatory efforts in the region. In 2022 alone, counterfeit seed worth 3.3 million ETB was confiscated. Had it been sold to farmers, it would have enough to plant approximately 406 hectares and potentially resulting in complete crop failure or significantly reduced yields.

Across the African continent, reported cases likely represent only a fraction of the real situation due to weak enforcement, low farmers awarness, the dominance of informal market and limited reporting (African Union, 2021). In Ethiopia, most available evidence about counterfeit seed comes from farmer complaints and isolated cases addressed by regional state regulatory authorities, indicating the urgent need for systematic monitoring, documentation and coordinated national response.

Designing and implementing a pilot intervention

Setting Up a Pilot Intervention

Counterfeit seed emerged as one of the priority issues during the 12th National Seed Quality Control Harmonization Platform, held in Hawassa in April 2023. The discussions underscored the urgency of coordinated national action and provided the Ethiopian Seed Partnership (ESP) with renewed momentum to pursue practical solutions. During the platform, the Ethiopian Agricultural Authority (EAA) was formally

tasked with drafting a legal framework targeting illegal seed trade, specifically the Illegal Seed Trade Control Directive, which is currently under preparation.

Following the platform, a series of stakeholder workshops were conducted, leading to a consensus to launch a pilot intervention focusing on hybrid maize, the crop most vulnerable to counterfeiting. Consultations with regional regulatory authorities resulted in the formulation of a detailed pilot implementation plan, while also revealing significant capacity gaps that needed to be addressed.

To support effective implementation, the ESP project provided targeted capacity strengthening. This included the procurement of essential basic equipment and the delivery of skill-building training for 23 inspectors and IT professionals. These interventions helped establish a solid foundation for the successful rollout of the pilot program.

The pilot program was also introduced to the Ethiopian Agricultural Authority (EAA) with the idea of applying it to imported vegetable seeds and one public seed company with the largest seed production volume in the country. However, the EAA did not proceed with implementation even though they receive the capacity building support. The main reason cited was the practical difficulty of managing and tracking the small, diverse, and fragmented seed packages commonly associated with imported vegetable seeds.

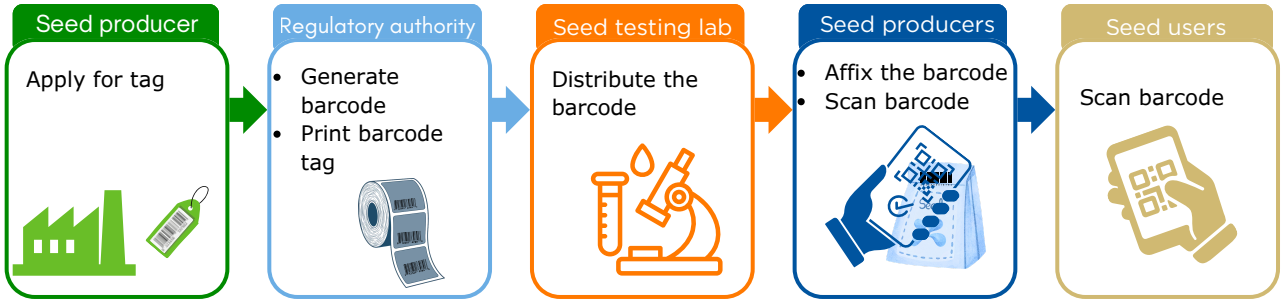
In the digital, barcode-based seed certification system, each certified seed lot receives a unique barcode containing essential information such as crop type, variety, producer, lot number, testing lab and production year. Inspectors can verify barcodes during field inspections or market surveillance, reducing the risk of label duplication.

This Barcode-based digital seed certification system uses regional regulatory authorities digital database system capable of storing barcode information for seed lots. The farmers, seed producers or inspectors can use scanner or widely available smartphones to verify authenticity of the seed. The system was designed with three main objectives: to strengthen traceability and curb counterfeit seed, improve the efficiency of certification processes, and ensure farmers' access to genuine, high-quality seed. Its pilot rollout involved close collaboration with regional regulatory authorities, who received technical training and operational support, and with seed companies and Bureaus of Agriculture, who participated in awareness activities.

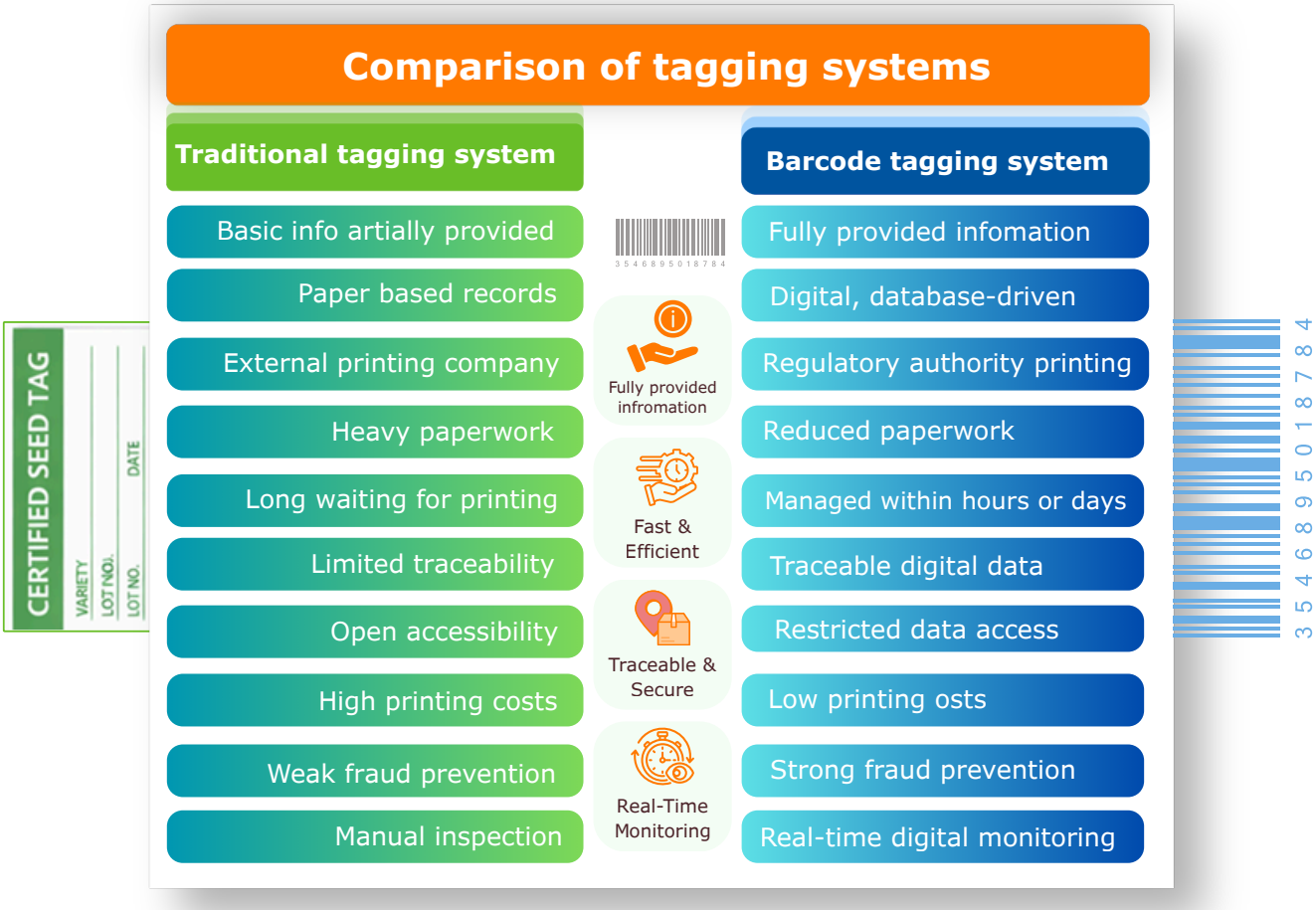
Piloting digital seed certification using barcode

The barcode system was initially piloted in three regions-Oromia, Amhara, and Central Ethiopia where seed inspectors received training on barcode data generation, scanning and coding that helped test the practicality of the system, Both technical and equipment support (barcode printers, scanners, and printing paper rolls) were provided from ESP project. The pilot was started with hybrid maize. The study in Tanzania (Jackson Bulili Machibya etal, 2021) indicates maize as the major crop that is heavily counterfeited in the market.

Regional regulatory authorities assigned two inspectors and an IT expert responsible for generating and printing the barcode labels, with all codes kept strictly confidential to ensure traceability and integrity of the system. Seed producers were charged for the new barcode tags in most regions, while in others the regulatory body covered the costs to encourage adoption. The price of a single barcode tag ranged from 2 to 5 ETB, depending on the region and procurement arrangements. Notably, Amhara and Central Ethiopia demonstrated strong institutional commitment by allocating their own budget midway through the pilot, impressed by the system's advantages-including confidentiality, strong adhesion, time savings, convenience, efficient resource utilization, and reduced printing costs and many others. This proactive investment signaled growing confidence in the technology and reinforced momentum for broader institutionalization.



Digital, barcode-based seed certification process



Comparison of traditional and barcode tagging systems

In 2025, the digital barcode system was expanded to seven regional states, including South Ethiopia, Tigray, South West Ethiopia, and Benshanguel Gumuz. A wide range of seed actors-including public and private seed companies, cooperatives (unions and SPCs), agricultural research institutes, and higher learning institutions (HLIs)-participated in barcode tagging within the pilot regions. The number of engagements with seed companies and seed suppliers by region was as follows: Central Ethiopia (33), Amhara (29), Oromia (15), South Ethiopia (6), Tigray (4), Benshanguel Gumuz (3), and South West Ethiopia (2). The above mentioned figures highlight strong participation by seed companies and demonstrate the growing adoption of barcode technology across diverse institutional actors and regions. The figure below illustrates how barcodes are affixed to certified seed bags by seed companies at different regions.

Dawit et al (2025) recommende that both seed companies and seed regulatory authorities should use modern labeling technologiesto reduce label imitation and ensure proper sealing of approved seed lots. Building on this, Oromia Seed Enterprise is the only seed company that internally uses barcode technology in its maize seed supply system to prevent the circulation of counterfeit seed after receiving technical support from ESP. It used barcode-labeled tags for more than 9,000 quintals of maize seed (personnel communication).

Illustration of barcode tags affixed to seed bags in Amhara and Central Ethiopia

Likewise, the initiative had expanded to cover a total of 16 crops, reflecting the system's growing relevance and acceptance across regions. Adoption patterns, however, varied depending on institutional capacity and regional priorities. Amhara, Central Ethiopia, South Ethiopia, Benshanguel Gumuz and Tigray integrated the barcode system across all major crops, demonstrating strong ownership and readiness to scale digital traceability. Other regions applied the system to a more limited set of crops, focusing on those that aligned with their immediate capacity, operational readiness, or strategic crop priorities. This variation illustrates the flexible and adaptive nature of the rollout.

Table 1. Number of Crops Addressed and Quantity of Certified Seed with Barcode Labeling in 2025

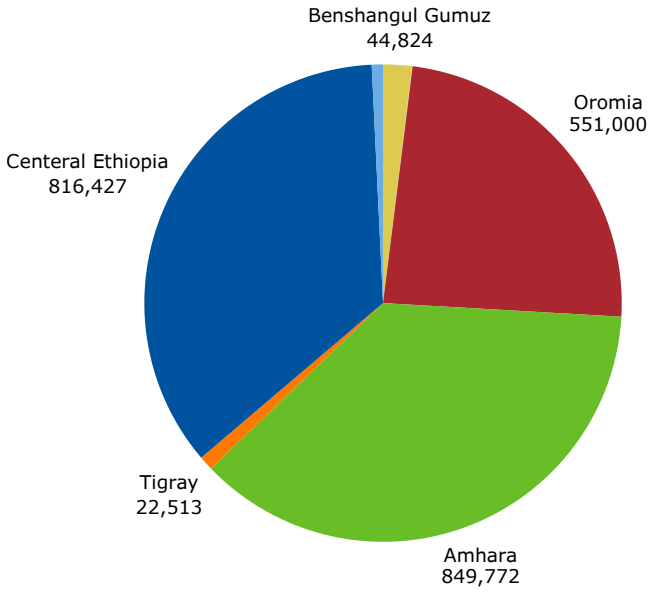
Regions	No. of crops	Quantity of seed	Quantity of certified	Quantity of barcode	Percentage barcode
South West Ethiopia	2	10,544	393.5	787	4
South Ethiopa	6	7,417	2,857.50	17492	39
Oromia	1	1,090,172	68,875	551,000	6
Amhara	15	166,150.60	163,135.03	849,772	98.2
Tigray	6	10,955	8,247.41	22,513	75
Cental Ethiopia	7	127,647.50	127,647.50	816,427	100
Benshangu el Gumuz	2	12,649	5,770	44,824	46
Total	16	1,425,535	376,925.94	2,302,815	26.4

The barcode-based seed labeling system was formally adopted in 2024, marking a major shift toward digital traceability in seed certification. During the second year of implementation, companies collectively utilized more than 2 million barcode tags, representing nearly a twofold increase compared to the initial introduction phase of the year one. Demand for barcode tags varied across regions, with Amhara using approximately 849,772 tags, followed closely by Central Ethiopia with 816,427, and Oromia with about 551,000 (Fig 2). This rapid uptake demonstrates strong acceptance of the system and highlights the growing commitment of regional regulatory bodies and seed companies to modernize seed quality assurance. In nutshell, adoption varied by region, reflecting differences in institutional readiness, budget allocation, and logistical capacity.

In this pilot, inspectors were able to verify seed authenticity both during field inspections and when responding to reported cases, while seed producers appreciated the system's transparency and accountability. The inspectors noticed that the number of complaints and counterfeit cases reduced. Moreover, the pilot provided valuable lessons for refining the system, including the need to upgrade to a QR code–based platform for improved functionality and data management.

Building on these operational improvements, the introduction of barcode technology has significantly improved the efficiency and accuracy of tag estimation by seed companies. Unlike the traditional tagging system, where companies often relied on rough and inconsistent estimates-resulting in either shortages or excess tags-the barcode system enables precise, data-driven planning. Consequently, this reduces unnecessary printing costs, minimizes the administrative burden on regulatory authorities, and saves time and resources by streamlining tag management and verification processes.

In addition to these efficiency gains, seed distributors have noticed stronger trust across the supply chain, as barcode-based seed traceability reduces disputes between suppliers and customers through clear and verifiable product identification. This increased transparency has also led to greater vigilance regarding seed authenticity, as demonstrated, for example, by the refusal in Central Ethiopia region to accept seeds labeled with the old tagging system



Barcode-based seed labeling use per region

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Lessons learned and pathways to action

Lessons learned

The Ethiopian experience shows that technology-driven seed certification can greatly strengthen regulatory functions when combined with institutional commitment.

Clear problem definition and institutional commitment accelerate adoption: The experience showed that when an intervention is clearly defined, practical, and addresses a visible problem, government institutions adopt it quickly and confidently. A joint problem-identification process played a critical role in shaping the initiative. Workshops conducted in Bahir Dar and Adama in 2023/2024 brought together key stakeholders from regulatory authorities, seed producers and Bureaus of Agriculture (BoA). During these workshops, participants jointly identified the major seed quality challenge affecting hybrid maize and vegetable crops as the widespread presence of counterfeit seed. The group agreed on the need to explore innovative solutions and collectively set the agenda, solution pathway, and implementation methodology. This shared ownership created strong alignment from the beginning. As a result, the barcode system was institutionalized in a remarkably short time because its purpose which is strengthening seed traceability and reducing counterfeiting was easy to understand, and the operational steps were straightforward. This clarity, combined with strong commitment from regional authorities who recognized the system's value, enabled rapid uptake and integration into routine certification processes.

Joint planning fosters ownership and sustainability: The pilot demonstrated that sense of ownership depends heavily on the degree to which public institutions participated in the planning and review of the innovation. Regions that showed strong leadership including allocating budgets, assigning staff, and championing the system were able to expand and maintain barcode use beyond the initial crop for support.

Early capacity building is critical for credibility and effectiveness: Early and targeted technical and infrastructural capacity building and government institutions willingness to invest in the new approach is essential to build confidence in the the system and to minimize opportunities for counterfeit seed. Accordingly, initial capacity strengthening remains central to the effectiveness and credibility of digital seed certification systems.

Pilot-based scaling allows learning and adaptation: The pilot approach to introducing the barcode system which starting with a limited number of regions and crops allowed regulators to test feasibility, identify challenges, and adjust procedures before expanding nationwide. This incremental scaling enabled practical learning on issues such as tag cost, confidentiality, printing processes, and coordination with seed companies.

Barcode effectiveness depends on seed company tag quality: We learned that the effectiveness of the current barcode labeling system relies on the quality and proper attachment of the seed company's own tag. Poorly fixed or low-quality company tags can detach easily, with which the barcode code label also lost. Ensuring that seed producers use durable, well-secured quality tags is therefore a critical requirement.

Pathways to action: Addressing key challenges in combating counterfeit seed

Though significant efforts was made, systemic and operational challenges hindering effective control of counterfeit seed in Ethiopia. The effort toward a fully functional system is not without its challenges. From the experience of ESP in piloting digital seed certification using barcode technology, the following points have been recommended to strengthen the system in Ethiopia.

- Improving user friendliness of the system. The barcode system's simplicity is central to its successful implementation, as it requires minimal technical skills and fits easily into existing certification workflows. However, continuous user feedback through providing a free phone line (SMS) and periodic system updates will ensure that the platform remains practical, intuitive, and aligned with the day-to-day needs of certification staff and seed sector stakeholders.
- Building the capacity and awareness of legal bodies for effectively identifying and impeaching counterfeit seed cases. Limited understanding of seed regulations combined with the absence of legal experts in some regional regulatory authorities, weakens enforcement whenever counterfeit cases emerge. For example, the counterfeit seed case detected in Oromia region did not receive adequate legal backing, creating room for offenders to continue their activities particularly in the Rift Valley. Without sufficient legal knowledge and technical expertise, seed inspectors struggle to interpret seed laws, prepare prosecutable case files, and follow proper reporting procedures, resulting in frequent case failures and minimal accountability. Strengthening legal capacity, improving reporting mechanisms, and establishing dedicated legal support within regulatory structures are therefore crucial to closing these gaps.
- Strengthen enforcement mechanisms to ensure compliance with seed regulations: Strengthening enforcement mechanisms is critical to curbing the circulation of counterfeit seed. Currently, inconsistent regulatory actions, weak coordination among enforcement bodies, and poor collaboration between regulatory authorities, seed companies, and local institutions such as BoAs undermine effective control. The lack of decisive action against offenders and limited follow-up create accountability gaps that allow counterfeit seed to persist in the market. USAID (2016) notes that inadequate sanctions from public authorities contribute significantly to the growing problem of fake seeds. A more coordinated, committed, and transparent enforcement system is needed to ensure consistent compliance with seed regulations and to protect farmers' access to genuine, high-quality seed.
- Strengthening institutional autonomy to reduce undue political influence in seed regulatory processes:-Sometimes political leaders intervene in certification decisions-such as pressuring inspectors during peak planting seasons to approve seed lots that have not fully met standards, simply to demonstrate responsiveness to farmers' demand. Inspectors during peak planting seasons to approve seed lots that have not fully met standards, simply to demonstrate responsiveness to farmers' demand. Inspectors are also urged to accelerate tag issuance before laboratory results are released, particularly for large seed companies. Such interference compromises the integrity of the certification system, leads to inconsistent enforcement across regions, and increases the risk of substandard or counterfeit seed entering the market.
- Exapanding certified seed supply:-Counterfeiters are most active when certified seed supply is at high-demand and hybrid varieties are insufficient during peak planting periods. In such moments, farmers are under pressure to plant quickly and often lack the time or options to verify authenticity at local markets. This shortage-driven vulnerability creates an environment where counterfeit seed easily penetrates the system. Evidence shows that counterfeit activity increases in markets where supply is fixed and demand is unmet (Nosal & Wallace, 2007). Expanding certified seed production, improving timely distribution, and strengthening supply chains are therefore essential to limiting the space in which counterfeiters operate.
- Strengthening logistical capacity to improve regulatory enforcement:-Efficient monitoring and control of counterfeit seed is heavily constrained by the limited logistical capacity of regulatory authorities. In many reported cases, inspectors could not reach sites where counterfeit seed incidents occurred because transport was insufficient. These delays often allowed counterfeiters to evade enforcement before regulatory officers arrived. Both federal and regional authorities consistently highlight that such logistical shortages weaken not only counterfeit seed control but also routine regulatory functions, including field inspections, follow-up monitoring, and broader enforcement activities. Enhancing transport availability, and operational mobility is therefore essential to improving the responsiveness and effectiveness of seed regulatory systems.
- Approval delays for the illegal seed trade directive under Article 15(1c) of Seed Proclamation No. 1288/2023 hinder effective enforcement by federal and regional authorities. Without finalized operational mechanisms, seed quality inspections and actions against counterfeit seeds remain inconsistent, allowing counterfeiters to exploit regulatory gaps. Prompt finalization of the directive is crucial to ensure consistent enforcement and uphold the integrity of the seed regulatory system.

Conclusion

The pilot of barcode-based digital seed certification demonstrates that digital tools can strengthen seed traceability when backed by strong institutional commitment. The system proved practical, cost-effective, and easy to integrate with the existing certification system, enabling quick uptake across multiple regions and crops. Its introduction improved transparency/traceablity, reduced incidents related to cereal crops counterfeit seeds, and served as an eye-opener for broader technology-driven innovations in combating counterfeit seed.

The experience also underscored that the success of digital certification depends on initial capacity building, and willingness to investt, and close collaboration among regulatory bodies, seed companies, and regional institutions. However, sustaining the system requires addressing gaps in legal enforcement, ensuring consistent and high-quality tagging by the seed companies, upgrading to more advanced digital tools such as QR-based platforms, scratch-off system and strengthening regional regultory institutional capacity. Overall, the experience provides a strong foundation and a promising pathway toward a modern, reliable, and technology-enabled seed certification system that protects farmers, genuine seed producers, and contributes to national efforts to reduce counterfeit seed.

References

African Union 2021. The seed sector in Africa. Status Report and Ten-year Action Plan (2020-2030): A Summary African Union Commission.

Africa Agriculture status report, 2013. Focus on staple crops:Nairobi Kenya: AGRA. https://agra.org/wp-content/uploads/2017

AGRA, 2020. Framework for Seed System Investments in AGRA Countries: A Guide for the Design of Country Seed Strategy and Investment Plan.

Dawit Tsegaye Sisay, Abdo Woyema, Rebeka Gebretsadik and Fisseha Teshome. The Emerging Challenge of Seed Counterfeiting: Empirical Evidence from Ethiopia Ethiop. J. Agric. Sci. 35(1) 106-125 (2025).

D. Shao and S. Edward 2014. Combating Fake Agro-Inputs Products in Tanzania using Mobile Phones. International Journal of Computer Applications (0975 – 8887) Volume 97– No.17,

East Africa.net, 2012. Tanzania Govt, farmers cautioned against imported fake pesticides, in eastafrica.net.

Folarin, S. O., Akinbode, S. O., Uteh, A. S., Onwuka, C., & Oladej, S. O. (2023). Impact of the new agro-certification system (seedcodex) on nigerian seed industry and crop farming wbjaerd, vol. 5, no. 1 (1-120)

Longley, C., S. Ferris, A. O'Connor, M. Maina, J.C. Rubyogo, and N. Templer. 2021. Uganda seed sector profile. a feed the future global supporting seed systems for development activity (S34D) report. https://cgspace.cgiar.org/server/api/core/bitstreams /

Machibya, J. B., Kadigi, I., & Njeru, J. 2021. The causes and detrimental effects associated with the use of 'fake' inputs and seeds to the smallholder farmers in Tanzania Volume 1 Number 1 : https://www.researchgate.net/publication/354248198

Meselu, Y.K. 2019, A review on the seed sector of Ethiopia: Prospects and challenges of faba bean seed supply. South Asian J. Dev. Res. 1, 44–54.

Nosal, E., and N. Wallace. 2007. A model of (the threat of) counterfeiting." Journal of Monetary Economics 54(4): 994–1001.

TASAI 2019. Access to Seeds Index 2019. Synthesis Report

USAID, 2016. Nigeria early generation seed study. Country report. Feed the Future: Building Capacity for African Agricultural Transformation (Africa Lead II), Context Network and Sahel Capital. USAID, Washington DC.

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