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RESEARCH ARTICLE

SEED SYSTEMS AND FARMER ACCESS TO QUALITY SEEDS IN SOMALIA: A REVIEW OF CURRENT STATUS, CHALLENGES, AND STRATEGIC OPPORTUNITIES

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Abstract

Seed systems play a critical role in ensuring agricultural productivity, food security, and rural livelihoods, especially in fragile states like Somalia. Despite the centrality of agriculture to the Somali economy, the seed sector remains underdeveloped, with limited access to quality seeds for most farmers. This review examines the current status, challenges, and strategic opportunities of seed systems in Somalia using secondary data from published reports, institutional assessments, and international development organizations. The review highlights the dominance of informal seed systems, the lack of a regulatory framework, low availability of certified seeds, and the overdependence on humanitarian seed aid. However, emerging efforts by local seed enterprises, NGOs,and international agencies show promising progress toward building a more resilient and inclusive seed system. Strategic interventions such as strengthening community-based seed systems, developing national seed policies, supporting local seed enterprises, and investing in adaptive research are essential for transforming Somalia's seed sector. This paper provides evidence-based recommendations for stakeholders to design sustainable seed system models that enhance seed quality, accessibility, and agricultural resilience in Somalia.

Introduction:-

Seeds form the cornerstone of agricultural productivity, food security, and rural livelihoods. As the primary vehicle of genetic potential and crop improvement, seeds represent the first link in the food chain. In Somalia, agriculture remains a dominant sector, providing livelihood for over 70% of the population. However, Somalia's seed systems are underdeveloped and fragmented, largely constrained by decades of conflict, weak institutional capacity, poor infrastructure, and a lack of effective seed policies and regulatory frameworks [1].

Historically, seed has played a central role in the domestication of plants and the evolution of agricultural systems worldwide. The significance of seeds is tied not only to their biological function in propagation but also to their contribution to technology transfer through improved varieties and hybrids [2]. However, in fragile contexts like

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Somalia, where formal seed production is minimal, the majority of farmers rely on informal sources such as own-saved seeds, local markets, and community seed exchanges. These seeds often lack quality assurance, leading to low yields, increased vulnerability to pests and climate stress, and food insecurity.

According to McGuire and Sperling [3], informal seed systems dominate in many low-income countries, accounting for more than 80% of total seed used by smallholders. Somalia is no exception. The country's formal seed sector remains embryonic, with limited private sector engagement, minimal access to certified seed, and weak research-extension-farmer linkages. Meanwhile, the informal seed sector continues to be vital for seed security but lacks the capacity to ensure the delivery of high-quality planting materials.

Despite these constraints, emerging efforts by international organizations, NGOs, and local initiatives are laying the groundwork for more resilient and responsive seed systems in Somalia. Strengthening community-based seed production, introducing quality declared seed (QDS), and developing national seed policies are among the proposed strategies. This review examines the structure, challenges, and opportunities within Somalia's seed systems, drawing on regional experiences and best practices to suggest viable pathways for reform and development.

Literature Review: -

Overview of Somali Agriculture: -

Somalia's economy is deeply rooted in agriculture, which contributes approximately 65–70% of total employment and supports the livelihoods of the majority of the population [4]. The country's agroecological zones vary from arid and semi-arid environments to riverine areas with moderate fertility, providing suitable conditions for diverse farming systems. Key crops include sorghum, maize, sesame, cowpeas, and various vegetables. Livestock production also remains central to Somali livelihoods and contributes substantially to export earnings.

Despite the importance of agriculture, Somalia faces chronic challenges that hinder agricultural growth. These include prolonged conflict, political instability, displacement of populations, lack of basic infrastructure, and weak public institutions. Recurrent droughts, land degradation, and flooding exacerbate the vulnerability of rural communities. Among the most critical constraints to agricultural performance is the lack of access to quality seed. Most Somali farmers rely on informal seed systems, often saving seed from previous harvests or exchanging seed within their communities. While this approach helps preserve genetic diversity and local crop adaptation, it offers little assurance in terms of seed purity, germination rates, or disease resistance [1][5].

The formal seed system in Somalia remains underdeveloped. There is no comprehensive national seed policy, and institutional capacity for seed research, certification, and regulation is weak or non-existent in most regions. Furthermore, Somalia lacks private seed companies and public seed enterprises that are active in commercial seed multiplication and distribution. Emergency seed aid programs led by humanitarian organizations have filled some gaps, especially during times of crisis. However, such interventions are not sustainable and often disrupt local seed markets and traditional systems of seed exchange [3].

In recent years, progress has been made through donor-funded projects and technical support from international organizations. The Food and Agriculture Organization (FAO) has implemented emergency seed security assessments and seed distribution programs. The Somali Agriculture Technical Group (SATG) has worked to introduce improved crop varieties, establish farmer field schools, and promote community-based seed production [5]. Some universities and local NGOs are now participating in crop variety trials and seed multiplication activities in regions such as Lower Shabelle and Puntland.

However, major challenges persist. There is no seed certification system, and research institutions lack access to advanced breeding technologies and skilled personnel. Coordination among stakeholders is minimal, and seed policies at both federal and regional levels are either fragmented or absent. Without policy coherence and investment in seed infrastructure, these efforts are unlikely to lead to systemic transformation.

Strengthening Somalia's seed sector will require a multi-pronged approach: investing in institutional capacity, enabling policy environments, promoting public-private partnerships, and integrating formal and informal systems to ensure farmers have reliable access to seeds that meet their agroecological and livelihood needs.

Importance of Quality Seeds for Agricultural Development:-

Quality seed is universally recognized as the most critical input in agricultural development. It directly determines the potential productivity of a crop, its adaptability to changing climatic conditions, and its resistance to pests and diseases. Improved seed varietieswhether high-yielding, drought-tolerant, disease-resistant, or nutritionally enhancedform the foundation upon which modern agricultural systems are built. Without access to quality seed, the effectiveness of other inputs such as fertilizers, irrigation, and crop protection measures is severely diminished [6].

According to the Food and Agriculture Organization (FAO), up to 50% of yield increases in developing countries can be attributed to the adoption of improved seed varieties combined with enhanced agronomic practices [1]. This means that even in resource-constrained environments, gains in productivity can be realized by improving seed quality and availability. Moreover, quality seeds contribute to the resilience of farming systems by enabling farmers to respond better to climate variability, soil degradation, and emerging biotic threats such as pests and diseases [3].

Functional seed systemsencompassing the full chain from variety development and seed multiplication to storage, certification, distribution, and farmer adoptionare therefore essential to national agricultural strategies. These systems may be formal, involving regulated breeding programs and certified seed production, or informal, based on farmer-saved and exchanged seeds that are not subjected to formal quality control. Both systems can coexist and complement each other, particularly in fragile and diverse agroecological contexts where seed needs vary across regions and seasons [7]. In countries affected by conflict or institutional fragility, like Somalia, strengthening seed systems becomes a crucial lever for recovery, food security, and rural development. Investing in seed systems not only improves farm-level productivity but also creates opportunities for rural entrepreneurship, job creation, and innovation across the agricultural value chain [8].

The Seed System in Somalia: -

The seed system in Somalia encompasses the full range of institutional, organizational, and farmer-level activities involved in the development, multiplication, storage, distribution, and marketing of seed within the country. These systems are fundamental to agricultural productivity, food security, and rural development. In Somalia, seed systems remain largely informal, but both formal and informal seed systems coexist to varying degrees across different regions [1][5]. Most Somali farmers, particularly smallholders, rely on informal mechanisms to access seed. These include farm-saved seed, neighbour-to-neighbour exchanges, and purchases from local markets. While this system ensures continuity and local adaptation of crop varieties, it often lacks proper quality control and is susceptible to yield loss, pest infestation, and genetic degeneration over time [3].

Somalia’s seed systems can be broadly categorized into two types: the informal seed system, which dominates the national seed supply, and the emerging formal seed system, which is still under development and primarily supported by external partners. Unlike countries with robust institutional frameworks, Somalia lacks a national seed policy, a seed law, or regulatory bodies to certify seed quality or standardize seed trade practices [9].

Though the formal seed sector is limited, growing efforts have been made to introduce improved seed varieties through donor-funded programs and pilot initiatives by local and international NGOs. Organizations such as the Somali Agriculture Technical Group (SATG), the Food and Agriculture Organization (FAO), and ICRISAT have initiated seed trials, multiplication projects, and capacity-building programs in selected regions such as Lower Shabelle, Puntland, and Jubbaland [5][1].

In practice, Somalia does not yet formally recognize an intermediary seed system, such as community-based seed enterprises or seed producer cooperatives, which are common in other countries like Ethiopia. However, similar models are emerging under different names, such as community seed multiplication groups and farmer field schools, which perform roles that bridge the gap between formal and informal systems. These actors often operate with technical support from NGOs and may multiply improved varieties for local distribution at affordable prices [8].

The informal and formal seed systems in Somalia both play essential roles in sustaining agricultural livelihoods. Given the country's fragile contextmarked by prolonged conflict, displacement, and weak public institutionsan inclusive approach that strengthens both systems is necessary. Recognizing and formalizing intermediary actors, developing supportive seed legislation, and promoting public-private partnerships could help bridge the gap between local seed demand and the supply of quality seed, thereby enhancing productivity and resilience in Somalia’s farming communities.

Formal Seed System in Somalia: -

The formal seed system in Somalia refers to the regulated framework under which seed production, certification, and distribution are conducted with the involvement of public institutions, research bodies, and development partners. Although formal seed systems in other countries are often well-structured and supported by national seed enterprises, Somalia's formal seed sector remains in its infancy. This system is expected to function through variety development, registration and release, seed multiplication, quality control, certification, and marketing of genetically improved and high-quality seeds. However, most of these components are either weak or missing in Somalia's current seed sector landscape [1][2].

In the Somali context, the formal seed system is not yet supported by comprehensive national seed laws or a dedicated seed authority. Government institutions such as the Ministry of Agriculture and Irrigation (MoAI) have limited capacity and infrastructure to regulate or coordinate seed production and distribution. Unlike Ethiopia or Kenya, Somalia lacks public seed enterprises at both the national and regional levels that can multiply and distribute certified seeds to farmers [3].

The current formal seed activities are primarily driven by international organizations such as the Food and Agriculture Organization (FAO), World Food Programme (WFP), and International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), among others. These partners support variety trials, small-scale seed multiplication, and emergency seed distributions across regions such as Lower Shabelle, Bay, and Puntland. The seeds are typically sourced externally or through selected local multipliers who receive technical training and supervision. Yet, in the absence of a legal framework, certified seed standards, and seed testing laboratories, these efforts remain fragmented and unsustainable [4].

Additionally, Somalia has not yet developed a private seed sector. There are very few, if any, domestic seed companies operating independently. Private involvement in seed production is minimal and largely confined to donor-supported pilot projects or relief-based input distributions. For a functioning formal seed system to emerge, Somalia must develop national seed legislation, support the establishment of local seed enterprises, and invest in institutional capacity for research, quality assurance, and seed certification [5].

The role of Somali universities and research centers is also critical. Some institutions, such as Somali National University and Puntland State University, are engaging in limited crop research and seed trials. However, they require significant technical and financial support to contribute meaningfully to variety development and breeder seed production.

In summary, the formal seed system in Somalia is in a foundational stage and heavily dependent on external actors. Building a resilient formal seed sector will require national policy development, capacity building for regulatory institutions, and the promotion of public-private partnerships to ensure the availability, accessibility, and sustainability of quality seeds.

Informal Seed System in Somalia:-

The informal seed system in Somalia refers to the traditional practices of seed selection, saving, exchange, and distribution carried out by farmers, communities, and local traders outside any formal regulatory or certification framework. Unlike formal systems, this sector operates without official seed quality standards, certification protocols, or government oversight. Nonetheless, it remains the primary source of seed for the majority of Somali farmers, especially in rural and conflict-affected regions [1][2].

In the Somali context, informal seed systems are largely community-based and shaped by local customs, seasonal needs, and agroecological conditions. Most farmers in Somalia rely on saved seeds from previous harvests, seed exchanges with neighbours and relatives, or purchases from local markets, especially in areas such as Lower Shabelle, Bay, Gedo, and parts of Puntland and Galmudug [6]. This system also includes traditional grain merchants, small-scale seed sellers, and community leaders who facilitate seed flows during planting seasons. Although the varieties are often adapted to local conditions, they are typically unimproved, have low genetic purity, and may be susceptible to pests, diseases, and climate variability [4].

Due to the lack of functional seed laws and institutional capacity in Somalia, there are no official mechanisms for seed certification, testing, or labelling within the informal system. Instead, farmers make selections based on

phenotypic traits such as yield, drought tolerance, or grain quality. While this allows for preservation of landraces and genetic diversity, it also limits productivity potential and increases the risk of seed degeneration over time [7].
One of the notable features of Somalia's informal seed system is its resilience. It is flexible, decentralized, and relatively low-cost. During times of crisis such as drought, flooding, or conflict-induced displacement it has proven to be a critical source of seed recovery. Farmers can quickly access seed through family networks, local traders, or humanitarian distributions, especially when formal channels are unavailable. This system is therefore indispensable in fragile contexts and plays a key role in maintaining agricultural continuity [8][5].

Efforts are now underway by organizations such as FAO Somalia, SATG, and several local NGOs to improve the quality and reliability of informal seed systems. Strategies include the introduction of community seed banks, farmer-managed seed enterprises, and training in participatory varietal selection (PVS). These interventions aim to build bridges between the informal and formal systems, enhancing farmer access to improved yet locally accepted seed varieties while preserving autonomy and affordability [6].

In summary, Somalia's informal seed system remains the dominant and most accessible seed source for smallholder farmers. Despite its limitations in quality assurance and scalability, it offers significant advantages in terms of adaptability, affordability, and social embeddedness. Strengthening this system through technical support, local seed production capacity, and integration with formal initiatives can lead to more resilient and inclusive seed security strategies in Somalia.

Role of Farmers, NGOs, Private Sector, and Government in Somalia's Seed System:-
A resilient and productive seed system depends on the coordinated roles of key stakeholders: farmers, non-governmental organizations (NGOs), the private sector, and government institutions. In Somalia, where seed system development is at an early stage, each actor plays a distinct and evolving role in shaping seed availability, quality, and accessibility.

Farmers:-
Somali farmers are the cornerstone of the country's seed system. They are the primary custodians of local seed diversity, particularly in the informal seed system, which supplies over 80% of the seed used nationwide [1]. Farmers perform essential functions such as selecting, saving, storing, and exchanging seed within communities. These practices preserve landraces and traditional knowledge about local crop adaptation, particularly for key crops like sorghum, maize, cowpea, and sesame. However, the seed saved by farmers is often recycled for many years without renewal, leading to reduced seed vigor, susceptibility to pests and diseases, and overall lower productivity. Despite these challenges, Somali farmers have demonstrated adaptability and resilience by integrating new varieties introduced through NGOs and donor programs when such options are available and trusted [2].

Non-Governmental Organizations (NGOs):-
NGOs are among the most influential actors in the current Somali seed landscape. Given the absence of a fully developed formal sector, NGOs have stepped in to support emergency seed distributions, promote the adoption of improved crop varieties, and train farmers in community seed multiplication and participatory varietal selection (PVS). Organizations such as the Somali Agriculture Technical Group (SATG), in partnership with ICRISAT and FAO Somalia, have played leading roles in introducing improved varieties, especially in southern Somalia. Projects like farmer field schools and seed fairs have also been instrumental in building farmer capacity and improving access to diverse seed sources [3][4]. NGOs are also promoting community seed banks and small-scale local seed enterprises, which serve as intermediaries between the formal and informal systems. These efforts help build resilience, particularly in drought-prone and conflict-affected regions.

Private Sector Companies:-
The private seed sector in Somalia remains underdeveloped. There are currently few, if any, formal domestic seed companies, and private sector involvement in seed multiplication, marketing, or processing is minimal. However, local agro-dealers and input suppliers sometimes act as informal seed sellers, especially in urban and peri-urban markets. The potential for private sector development exists, particularly in high-demand areas like vegetable seed, which is often imported and sold without regulation. With an enabling policy environment, investment incentives, and access to improved germplasm, the private sector could play a more dynamic role in advancing Somalia's seed security [5]. Public-private partnerships, such as out-grower schemes and contract seed production, can be leveraged to stimulate entrepreneurship, create jobs, and improve seed availability at local levels.

The Role of Government:-

The Somali government, through the Ministry of Agriculture and Irrigation (MoAI), plays a vital and growing role in regulating and coordinating the country's seed system. Although its influence was historically limited due to prolonged conflict and institutional collapse, the government has recently taken major steps toward restoring agricultural oversight and building a sustainable regulatory framework. One of the most significant developments is the re-establishment of the Somali Agricultural Regulatory Inspection Service (SARIS) in 2024. SARIS serves as a semi-autonomous authority under the MoAI, responsible for regulating agricultural inputsparticularlyseedand enforcing standards for quality, safety, and compliance [6].

SARIS aims to:

- Certify and license seed producers, processors, and dealers;
- Conduct inspections at seed multiplication sites, processing units, and market outlets;
- Enforce seed testing and certification protocols, including germination, purity, and moisture content;
- Regulate the import and export of seed, in coordination with customs and quarantine departments;
- Lead the development of a national seed database, supporting traceability and transparency.

The reactivation of SARIS reflects the government's intention to shift from reliance on emergency seed aid to a more structured, market-driven seed sector. It also positions the state to monitor seed quality across formal and informal markets and prevent the circulation of counterfeit or low-quality seeds, which have previously undermined farmer trust [7].

In parallel, the Ministry of Agriculture and Irrigation, with technical assistance from development partners such as FAO, USAID, and the World Bank, is drafting Somalia's first National Seed Policy. The policy outlines a pluralistic vision that supports both formal and informal systems, encourages private sector growth, and promotes equity in seed access for smallholder farmers. It is expected to clarify mandates across federal and state governments, streamline variety release procedures, and establish rules for seed certification, registration, and marketing [7][6].
Efforts are also being made to decentralize seed governance, empowering regional ministries (e.g., Puntland, Southwest, Galmudug) to oversee seed trials, demonstrations, and multiplication at the local level. This federal approach is critical given Somalia's governance structure, and it enhances context-specific implementation of seed strategies [8].

Despite this progress, Somalia's public institutions still face major challengesincluding limited infrastructure, a shortage of trained staff, and inconsistent funding. To overcome these barriers, the government continues to rely on multi-stakeholder partnerships with international NGOs, technical agencies, and universities to provide training, equipment, and research support [3].

Challenges in Accessing Quality Seeds in Somalia:-

Access to quality seed is essential for agricultural productivity and food security. However, Somalia faces significant constraints that hinder farmers' ability to obtain improved seed varieties. These challenges are rooted in weak institutional frameworks, underdeveloped infrastructure, and prolonged humanitarian crises.

Inadequate Seed Laws and Regulatory Frameworks:-

One of the most pressing challenges is the absence of comprehensive national seed legislation. Somalia lacks a fully developed legal framework to regulate the production, certification, importation, and marketing of seeds. Without formal seed laws, there is no institutional mechanism to enforce quality standards, monitor seed purity, or prevent the circulation of counterfeit and substandard seed products. The regulatory vacuum has discouraged private investment in the seed sector and left farmers vulnerable to unverified and often low-quality seed sources. Although progress has been made with the recent re-establishment of the Somali Agricultural Regulatory Inspection Service (SARIS) and the drafting of a National Seed Policy, these initiatives are still in early stages and require operational capacity, legal enforcement, and coordination at both federal and state levels [6][7].

Low Availability and High Cost of Certified Seeds:-

In Somalia, certified seeds are both scarce and expensive, particularly in rural and conflict-affected regions. The formal seed sector is underdeveloped, with limited public and private seed enterprises engaged in large-scale seed multiplication or certified seed distribution. Most improved seed varieties are imported by humanitarian agencies or NGOs on a project basis, which does not ensure year-round availability or market-based pricing [3][9]. For

smallholder farmers, the cost of certified seeds is often prohibitively high due to logistical constraints, lack of bulk distribution networks, and limited domestic production. This forces many farmers to fall back on low-cost but low-quality informal seeds, reducing yield potential and crop resilience.

Limited Agricultural Research and Extension Support:-
Somalia's capacity for agricultural research and extension services is severely limited. The country lacks well-resourced public agricultural research institutes capable of conducting variety development, breeding trials, and seed performance evaluations. Existing universities and technical colleges have minimal involvement in applied agricultural science due to lack of funding, laboratories, and trained personnel [8]. Moreover, extension services critical for disseminating information about improved varieties and seed technologies are fragmented or absent in many rural areas. The disconnect between research, extension, and farmers prevents the widespread adoption of improved seeds and modern farming practices [1][2].

Overreliance on Emergency Seed Aid:-
Since the collapse of Somalia's central government in the 1990s, the country has depended heavily on emergency seed aid provided by humanitarian organizations. While seed aid plays an essential role during crises such as droughts or conflict-related displacements, it is not a sustainable long-term strategy. Repeated cycles of free seed distribution have undermined local seed markets, discouraged farmer-led seed production, and delayed the development of a self-reliant seed sector. Farmers have grown accustomed to aid-based systems, which has in some areas reduced their motivation to invest in quality seed or participate in community seed enterprises [10][11].

Opportunities and Strategic Interventions:-
Despite persistent challenges, Somalia's seed sector presents a number of promising opportunities that can be harnessed to improve farmer access to quality seeds, strengthen resilience, and boost agricultural productivity. These opportunities reflect both grassroots innovations and national efforts toward policy reform, supported by regional and international partners.

Emerging Local Seed Companies:-
A key opportunity lies in the emergence of local seed enterprises and independent seed multipliers. Although Somalia currently lacks a fully commercialized seed industry, recent donor-supported projects and NGO-led initiatives have encouraged selected farmers and cooperatives to engage in the multiplication of improved seed varieties. These small-scale enterprises often operate under training and supervision from technical agencies and have shown potential to produce and distribute seeds locally at affordable prices. Local seed enterprises can address regional seed demand, reduce reliance on imports, and tailor seed production to agroecological needs. These businesses also offer opportunities for rural employment and entrepreneurship. If supported with access to breeder seed, training in seed production techniques, and linkages to markets, they can form the backbone of a decentralized and resilient formal seed sector [1][2].

Community-Based Seed Systems:-
In the absence of strong formal institutions, community-based seed systems (CBSS) have emerged as a reliable and flexible source of seed for Somali farmers. These systems are rooted in farmer-to-farmer exchange, local knowledge, and informal norms, but are now being strengthened through formal interventions. Projects led by the Somali Agriculture Technical Group (SATG) and FAO Somalia have established community seed banks, farmer field schools, and local seed multiplication plots. Community seed systems offer the advantage of being location-specific, socially embedded, and responsive to farmer preferences. With minimal investment, these systems can be enhanced to include basic quality standards (e.g., quality-declared seed or QDS), storage facilities, and varietal testing. Such systems not only maintain biodiversity but also ensure timely and culturally appropriate seed access during planting seasons [1][3].

Regional and International Support:-
Somalia's seed sector has received consistent technical and financial assistance from regional and international development partners. Organizations such as the Food and Agriculture Organization (FAO), International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), and SATG have implemented seed-related projects aimed at improving farmer access to improved varieties and increasing local seed production capacity. For example, FAO has conducted seed security assessments and facilitated emergency seed distributions, while also supporting long-term seed system development. ICRISAT, in collaboration with SATG, has introduced drought-tolerant crop varieties such as improved sorghum and millet, particularly suited to Somalia's semi-arid climate. These

interventions are helping build seed resilience and foster regional cooperation in germplasm exchange, capacity development, and applied research [3][4]. The growing alignment between international donor goals and national agricultural strategies presents a unique opportunity for sustained transformation of the seed sector.

Policy Development and Seed Sector Reform:-

One of the most significant opportunities lies in ongoing policy reform and the development of a National Seed Policy led by the Somali Ministry of Agriculture and Irrigation (MoAI). With support from FAO, USAID, and other partners, Somalia is drafting a policy that outlines a clear vision for a pluralistic, inclusive, and regulated seed system. This will address seed certification, quality assurance, variety release procedures, and roles of public and private actors. In addition, the re-establishment of the Somali Agricultural Regulatory Inspection Service (SARIS) is expected to provide institutional support for seed regulation, including inspection, certification, and monitoring of seed trade and production [3]. These developments aim to create a stable environment for investment, standardization, and accountability in seed sector development. If fully implemented, these reforms will bring Somalia in line with international standards and unlock opportunities for regional trade and private sector participation.

Recommendations for Strengthening Seed Systems in Somalia:-

1. Establish National Seed Policy & Regulation: Develop and enforce a national seed policy and law with clear roles, standards, and support for SARIS.
2. Empower Farmer-Led Seed Systems: Strengthen community seed banks, farmer field schools, and PVS to improve access and preserve agro-biodiversity.
3. Support Local Seed Enterprises**:** Promote small-scale seed businesses with training, inputs, and market links, implement flexible certification like QDS.
4. Invest in Research & Climate-Resilient: Varieties**:** Revitalize R&D institutions, partner with ICRISAT/CIMMYT, and breed drought-tolerant, locally adapted varieties.

Conclusion:-

A well-functioning seed system is the cornerstone of sustainable agricultural development, food security, and climate resilience. In Somalia, where over two-thirds of the population depend on agriculture for their livelihoods, the seed sector remains underdeveloped, fragmented, and heavily reliant on informal systems and emergency aid. This review has highlighted the current status, critical challenges, and emerging opportunities that define the trajectory of Somalia's seed systems.

The informal seed system continues to dominate, supplying the majority of seed used by smallholder farmers. While it provides accessibility and preserves local genetic diversity, it lacks quality assurance, making farmers vulnerable to low yields, pests, and climate-related risks. The formal seed system**,** although in its infancy, is gaining ground through NGO-led pilot programs and institutional efforts such as the re-establishment of the Somali Agricultural Regulatory Inspection Service (SARIS)**.**Nevertheless, the lack of a national seed law, limited research and extension capacity, and the high cost and low availability of certified seed remain major obstacles.

Encouragingly, there are several strategic opportunities for seed system transformation. These include the rise of community-based seed enterprises, growing support from international organizations such as FAO and ICRISAT, and ongoing national efforts to draft and implement a comprehensive National Seed Policy. The integration of formal and informal systems, combined with investment in seed research and climate-resilient varieties, can lay the foundation for a pluralistic and inclusive seed sector.

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