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Research Application Summary

Cowpea seed systems in Ghana: Challenges and prospects

Afutu, E.
University of Cape Coast
Corresponding Author: emmanuel.afutu@ucc.edu.gh

Abstract

Cowpea (*Vigna unguiculata*), the second most consumed legume in Ghana, has production deficit to meet consumption demands, a challenge which is fundamentally due to the traits of cowpea genotypes developed locally compared to consumer preferences for traits such as large, white or cream-seeded cowpea mostly imported from neighbouring countries. One way of increasing the demand for seeds of improved cowpea vairieties is through the development of farmer and consumer-preferred varieties that also possess multiple desirable traits and serve the needs of farmers, such as for intercropping. The need to develop consumer and farmer-preferred varieties, also known as market oriented varieties, calls for studies which interract with these key industry players to identify their preferences for some specific traits to be found in new and improved varieties rather than plant breeders only inviting farmers during the final variety release stage by which time farmers are forced to choose varieties out of the ones present at the time of release. The seed system in Ghana should to have private sector involvement and this would be a win for all industry players. However, there is a need to regulate these private sector players to ensure that set standards are maintained and farmers are not exploited. Though the cowpea seed system in Ghana is faced with a number of challenges, it still shows a high potential if there is increased government funding and strict enforcement of regulations rather than the over reliance on donor agencies for such exercises.

Key words: Farmer-preferred varieties, Ghana, plant breeding, quality seed, seed policy, *Vigna unguiculata*

Resume

Le niébé (*Vigna unguiculata*), deuxième légumineuse la plus consommée au Ghana, souffre d'un déficit de production, qui fait que la production nationale n'arrive pas à satisfaire la demande. Ceci constitue un défi, essentiellement due aux caractères des variétés de niébé développées localement, qui ne sont pas en adéquation avec les préférences des consommateurs pour des caractères tels que grosses graines, graines blanches ou crèmes, etc, les variétés ayant ces caractéristiques devant être importées des pays voisins. Un moyen d'accroître la demande en semences améliorées de niébé consiste à développer des variétés préférées par les agriculteurs et consommateurs, des variétés possèdant les caractéres désirés et qui répondent aux besoins des agriculteurs tels que la culture associée. La nécessité de développer des variétés préférées par les producteurs et consommateurs, variétés connues sous le vocable de variétés axées sur le marché, nécessite des études faisant interagir les principaux acteurs, en vue d'indentifier leurs préférences pour certains caractères

spécifiques. Une telle approche vaut mieux que l'approche traditionelle où le sélectionneur associe les producteurs seulement à la fin du processus d'amélioration ou en phase de diffusion, étapes auxquelles les producteurs n'ont d'autres choix que de prendre parmi les variétés à eux présentées. Le système semencier au Ghana devrait envisager l'implication du secteur privé, ce qui serait bénéfique pour tous les acteurs de la chaîne de valeur. Cependant, il est nécessaire de réglementer ces acteurs du secteur privé pour s'assurer que les normes établies sont maintenues et respectées, afin d'éviter que les produteurs ne soient exploités. Bien que le système semencier de niébé au Ghana soit confronté à un certain nombre de défis, il continue d'exhiber un potentiel élevé si les organes publiques renforcent leurs soutiens financiers et l'application stricte des réglementations en vigueur plutôt que de continuer avec la dépendance absolue sur les organismes donateurs.

Mots clés: Variétés préférées par les producteurs, Ghana, sélection variétale, semences de qualité, politique semencière, *Vigna unguiculata*

Introduction

The seed of any crop is an indispensable factor for agricultural production in any country. The low productivity in agricultural systems in Sub-Saharan Africa is due to the absence of high quality seeds (Asare *et al.,* 2016). The notion that the seed is the most important input in any crop system paves way for the development of an efficient seed system where institutions involved in the sustainability of the enterprise mutually coordinate till good quality seeds are eventually released to the farmer (Etwire *et al.,* 2016). Understanding the seed system of any crop is one way to monitor the performances of the key stakeholders engagement to ensure an effective seed delivery system for enhanced agricultural productivity.

In order to have an effective seed system, the Government of Ghana has made reforms to its seed laws so that it conforms to international standards. The National Seed Law of Ghana provides a legal framework to the safeguard the development of the seed industry through variety development, inspection, conditioning and marketing so as to enhance agricultural development for food security (Aidoo *et al.,* 2012). The seed system in Ghana encompasses plantation crops such as cocoa and oil palm as well as prominent grains and legumes such as maize, millet, groundnut, cowpea, soybean, among others, (Asare *et al.,* 2016). Funding for most seed development comes from international donor agencies and the Government of Ghana for national research institutions with the manpower and expertise to develop new and superior genotypes to suit consumption demands (Egbadzor *et al.,* 2013). Cowpea is the second most consumed legume in Ghana but has a production deficit to meet consumption demands (Egbadzor *et al.,* 2013). This is fundamentally due to the traits of cowpea genotypes developed locally compared to consumer preferences for traits such as large, white or cream-seeded cowpea mostly from imported cowpea grains from neighbouring countries (Egbadzor *et al.,* 2015). The availability of certified cowpea seeds to the farmer is achieved through input dealers and other farmers (Etwire *et al.,* 2016).The selection of a particular variety for cultivation by farmers is influenced by recommendations from other farmers, advertisement or market demand for certain genotypes. Breeders, extension agents and farmers make their contributions toward the development of new cowpea lines that suit both farmers and grain consumers.

Components of the seed system in Ghana. The seed systems in Ghana as outlined by Etwire *et al.* (2016), comprise three main components, viz., formal, informal and a quasi-formal seed system. On the other hand, Aidoo *et al.* (2012) subdivided the formal seed system into three with the first being a mixed seed system which is the most integrated and organised of the systems and it merges the activities of stakeholders such as breeders from public research institutions, the Grain and Legumes Development Board, private seed producers (SeedPAG), the Seed Inspectorate Division of the Ministry of Food and Agriculture and private agro-inputs dealers. The second seed system comprises some public institutions that produce seed and plant propagules of superior varieties for sale whiles the third system involves private commercial seed companies either involved in the production of seeds or the marketing of imported seeds for food crops. According to Etwire *et al.* (2016), unlike the formal seed system, there is little or no supervision in the informal seed system and is characterised by farmers having access to seed varieties that have been multiplied and distributed at the local level through exchanges, gift or purchase. Seed acquisition by farmers through the informal seed system is the most predominant avenue, yet, it does not necessarily involve the development and distribution of superior genotypes but is generally associated with farmer saved seeds and on-farm seed multiplication by most indigenous farmers (Ghana National Seed Policy, 2013).

Participatory cowpea crop improvement and seed programme. The cowpea seed system in Ghana has evolved into a more participatory one in which farmers' preferences are now pivotal to cowpea breeding programs, allowing farmers to dictate cowpea traits they favour rather than researchers imposing new breeds of cowpea lines on farmers (Egbadzor *et al.,* 2013). Cowpea farmers in Ghana typically agree that cowpea varietal traits that need the most urgent improvement are insect pest resistance, drought tolerance and yield. It has been suggested that most of the popular Ghanaian cowpea varieties are inferior to those varieties imported from other West African counties into Ghana (Egbadzor *et al.,* 2015). Though the preferences for traits such as seed size and colour of improved varieties vary across the country, most Ghanaian farmers and cowpea dealers prefer large cream-seeded cowpea varieties instead of the black-seeded varieties. Hence, the use of researcher-farmer-consumer participations to select cowpea lines for better performance is now key for breeding programs undertaken recently in Ghana (Mabaya *et al.,* 2017). This approach is expected to lead to the development of what is known as market-oriented varieties, thus paving the way to realise the full benefits that are intended for releasing improved cowpea varieties.

The socio-economic benefits of cowpea as a tool for poverty eradication in Sub-Saharan Africa demand that cowpea varieties have multiple uses by the farmers. Recent regional cowpea breeding programmes that involve collaborations between institutions like the International Institute for Tropical Agriculture (IITA), Council for Scientific and Industrial Research (CSIR) and the West African Centre for Crop Improvement (WACCI) mainly focus on cowpea lines that are adaptive to sole cropping. However, the preference for varieties suitable for intercropping with cereals such as maize, sorghum and millet by farmers should propel breeders to select for lines that perform better as intercrops. This would give more options to farmers to select cowpea lines that they need for use as either intercrops or monocrops. These objectives notwithstanding, call for the selection of lines

that have multiple genetic resistance to pest and diseases that hinder cowpea productivity in the region (Coulibaly *et al.,* 2010; Yirzagla *et al.,* 2016).

Accessibility to cowpea seeds. Just like for ineffective seed systems in most West African countries, the demand for seed is relatively low in Ghana. Most farmers in Ghana tend to keep the best portions of their harvest for the next planting season regardless of its genetic purity. In most cases, the only preconditions that cause a typical Ghanaian farmer to request for seeds are due to non-performance of available varieties and the quest to try other varieties upon recommendation or advertisement, or when the farmer's available seed stocks are lost after a disaster (Niangado, 2010). The 2013 National Seed Law passed in Ghana stipulates that adequate quantities of breeder seeds need to be produced so that they can be multiplied as foundation seeds to meet demands for registered seeds upon the release of a variety. However, due to the low demand for new and improved varieties, there is little investor confidence in this seed sector, thus resulting in only few private companies engaging in seed multiplication and marketing of certified cowpea seeds. Generally the seed systems in Ghana for the different types of crops (legumes, cereals, vegetables, etc.) are faced with the challenge of low demand, however, the situation is worse for the cowpea seed system (legumes) particularly because legumes are predominantly self-pollinating and thus are not easily adulterated in genetic potentials as compared to cross pollinated species such as maize. One sure way of increasing the demand for seeds of improved cowpea vairieties is through the development of farmer and consumer-preferred varieties that possess multiple desirable traits and serve the needs of farmers, such as for intercropping.

The need for a vibrant public seed production body in Ghana has been a pre-independence dream but only became a reality in 1979 upon the establishment of the Ghana Seed Company (GSC). The privatization of this venture some decade later contributed to the involvement of certain NGO's like the Sasakawa Global 2000 which support small-scale seed producers, many of whom were contractors for the defunct GSC. These groups mostly obtain the foundation seeds from the Grains and Legumes Development Board (GLDB) and return the seeds they produce to the board for cleaning, grading and packaging. In 2005, most of these producers were the new generation private companies which emerged from entrepreneurs to form the Seed Producers Association of Ghana (SEEDPAG) responsible for selling certified seeds to input dealers and then farmers (Tripp *et al.,* 2013). About nine private companies are actively involved in cowpea seed production and or marketing. They have nine active breeders and the availability of foundation seeds for cowpea has been rated as 68% (Mabaya *et al.,* 2017).

Cowpea seed policy and legislation in Ghana. In Ghana, the Crop Research Institute (CRI) is responsible for cowpea breeding and development in the south while the Savannah Agricultural Research Institute (SARI) is mandated to develop varieties suitable for the northern savannah regions. These two institutions (CRI and SARI) together with the GLDB are responsible for about 32% of foundation seeds available to seed companies in Ghana. In 2012, three cowpea varieties were released and no new varieties were released again until three years later. Most of these public breeding programs were sponsored partly by the Government and donor agencies. The average age of cowpea varieties sold on the market is about 14 years with a release time of about 36 months. THIS contradicts the

allowable stipulated release time of between 12 and 24 months. The release is approved by the National Variety Release and Registration Committee (Tripp and Mensah-bonsu, 2013; Mabaya *et al.,* 2017).

In 2013, the Ghana National Seed Policy was enacted to back a 1991 MOFA Task Force that enforced the Seeds (Certification and Standards) Regulations Decree of 1972 to regularize the operations of the seed industry and its possible privatization. Part three of the Plants and Fertilizer Act 2010 (Act 803) is exclusively for seeds. The seed regulations of Ghana are parallel to the ECOWAS seed regulations except that the ECOWAS regulations have more elaborate quality control, certification and marketing which calls for a review of the Ghanaian version. Under the Agriculture Policy Support Project (APSP) funded by the United States Agency for International Development (USAID), about 20 more seed inspectors were trained to add to existing 32 inspectors nationwide for the Ghana Seed Inspectorate Division (GSID). This was part of the effort to deal with the low number of seed inspection officers and empower private seed companies to conduct their own seed inspection services (Mabaya *et al.,* 2017).

Constraints to cowpea seed production in Ghana. The constraints to cowpea seed production in Ghana can be categorized into biotic, abiotic, socio-economic, socio-cultural and policy (Coulibaly *et al.,* 2010) and these together restrict the production and or accessibility of cowpea seeds to the farmer (Aidoo *et al.,* 2012) and interrupt the functions of set structures in the cowpea seed industry (Etwire *et al.,* 2016). The constraints affect all the stakeholders of the cowpea seed industry in Ghana.

The biotic stresses include insect pests, parasitic weeds and diseases transmitted by pathogens such as viruses, bacteria, and fungi whiles abiotic factors include erratic rainfall, soil infertility, and soil temperatures. These are characteristic of the major cowpea production centres of the savannah regions of Ghana. The socio-economic challenges arise from the fact that most of the populace engaged in farming are illiterate and generally poor and have limited funds to access certified seeds, and as such, they tend to often obtain seeds as gifts or through exchanges. Due to the low levels of education of most of these farmers, they hardly understand the need to buy new seeds season after season as the price for certified seeds of superior genotypes is generally the reluctance by farmers to purchase seeds regularly from input dealers. There is also the socio-cultural challenge which relates directly to farmer preferences. For example, in recent times, there is an increase in taste for big cream coat seeds in Ghana whkich are generally imported from other West African countries. Hence, in order not to lose market to these seed importers, most seed farmers have adopted the cultivation of the consumers' choice by planting these imported seeds which have not been properly introduced to Ghana as seeds but as grains.

The other challenge relates to policy due to the absence of a regulatory body to enforce the functions of the national seed law and its subsidiary operations, thereby hampering the development of the cowpea seed industry. The presence of uncertified seed dealers, the limited number of seed inspectors and other professionals for effective extension support services affect the development of the industry (Aidoo *et al.,* 2012). Also, the inadequate coordination between stakeholders have contributed immensely to the shortage of foundation seeds of some released varieties (Ghana National Seed Policy, 2013).

Stakeholders engaged in cowpea seed value chain. The cowpea seed industry is made up of public and private institutions whose collaborative efforts result in a successful cowpea seed value chain. In Ghana, the two agricultural research institutions under the Council for Scientific and Industrial Research (CSIR) mandated to develop new varieties are the Crop Research Institute (CRI) and Savannah Agricultural Research Institute (SARI). Together with the West Africa Centre for Crop Improvement, the universities and the International Institute for Tropical Agriculture (IITA), research and breeding programs are undertaken. The National Variety Release and Registration Committee supervise variety release and registration. Foundation seeds are produced and processed by the Grains and Legumes Development Board and other private seed companies which are mostly offshoots of the collapsed Ghana Seed Company. These afore mentioned institutions together with the Department of Agricultural Extension services organise education, training and extension services for farmers. Farmers finally access certified seeds from seed companies and agro-inputs dealers (Mabaya *et al.,* 2017).

Strategies for a better cowpea seed system. Ghana has sought to minimize the inefficiencies in cowpea seed delivery systems by adopting the Plants and Fertilizer Act 2010 which seeks to apportion seed multiplication and marketing to the private sector through institutionalization of certain roles and the discharge of other operations for communal benefits (Poku *et al.,* 2018). Private sector participation in the seed industry is a win affair for all and therefore needs proper coordination and supervision by assigned national institutions. This policy aims to foster a vibrant seed system where farmers will have access to certified seeds from credible sources in Ghana. Limitations in the Plants and Fertilizer Act 2010 have been reviewed and sent to Parliament for adoption so as to meet the seed quality and certification standards of ECOWAS (Mabaya *et al.,* 2017).

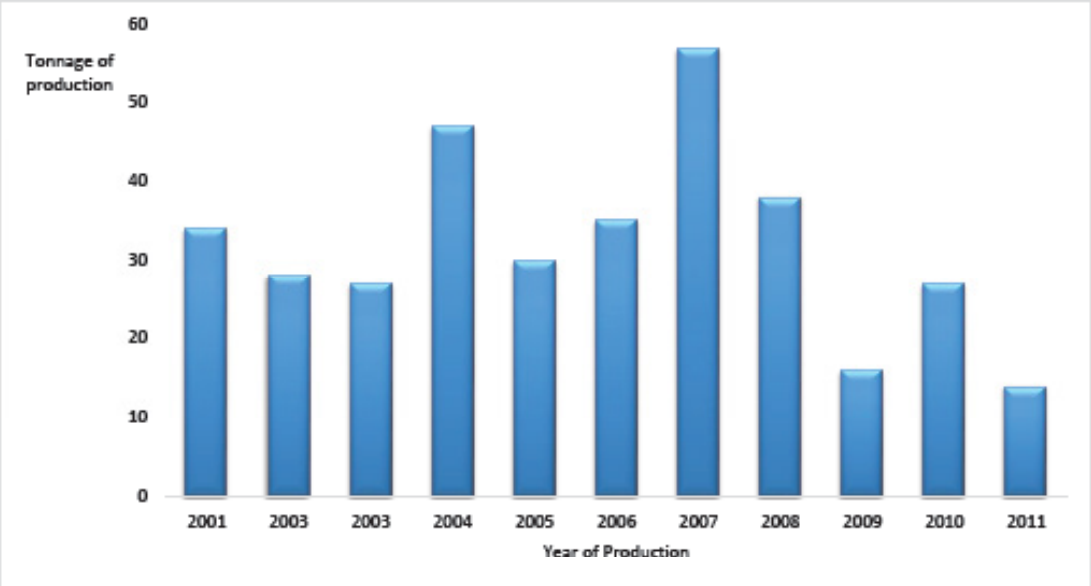

Figure 1. Certified cowpea seed production in metric tonnes

Owing to the fact that funding for most breeding programs are predominantly provided by donor agencies and partly by the Government of Ghana, the agricultural research institutions in Ghana are somewhat handicapped in resources. Therefore the Plant and Fertilizer Act 2010 challenges the government to have full commitment towards the seed industry through special funding mechanisms such as Parliamentary grants, donations and gifts by the Government devoid of compromising conditions as well as monies approved by the Finance Ministry aimed at developing the seed sector.

Participatory breeding programs which involve both consumers' and farmers' contribution to the development of cowpea varieties with traits predominantly proposed by the two groups would improve success of the industry as farmers easily adopt such varieties for use than those varieties exclusively engineered by breeders and imposed on farmers (Egbadzor *et al.,* 2015). This will help breeders select varieties with complementary phenotypic and yield qualities without compromising farmers' agronomic practices on-farm.

Conclusion

The demand for big cream-coat cowpea varieties is high and therefore breeders and farmers alike must agree on the preferred traits for future cowpea selection programs. This is the way for Ghanaian breeders to compete favourably in the cowpea seed industry, where imported varieties are preferable to the Ghana bred varieties. Despite the challenges, the cowpea seed system in Ghana has a high potential which can be realised if the Government pays more attention to the development of consumer and farmer-preferred superior varieties and the Government funds R&D activities in the cowpea seed sector, rather than the State's over reliance on donor agencies for such exercises. There is also the need to train more professionals to handle the operations of the seed industry for a sustainable agriculture and seed security.

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References

Aidoo, R., Quansah, C., Akromah, R., Obeng-Antwi, K., Adu-Gyamfi, K., Lampoh, J. and Subedi, A. 2012. ISSD Briefing Note –Ghana Seed Sector Assessment (September) pp.1–5.

Asare, B. R., Afari-sefa, V. and Muilerman, S. 2016. Access to improved hybrid seeds in Ghana: implications for establishment and rehabilitation of cocoa farms. pp. 1–13. https://doi.org/10.1017/S0014479716000247.

Coulibaly, O., Alene, A. D., Abdoulaye, T., Aitchedji, C., Ousmane, B., Tefera, H. and Boahen, S. 2010. Baseline assessment of cowpea breeding and seed delivery efforts to

enhance poverty impacts in sub-Saharan Africa. Andhra Pradesh, India: ICRISAT. 82pp.

Egbadzor, K. F., Offei, S. K., Danquah, E. Y., Kotey, D. A., Gamedoagbao, D. K., Dadoza, M. and Ofori, K. 2015. Farmer participation in selection within segregating populations of cowpea in Volta Region, Ghana. Agriculture and Food Security. pp. 1–7. https://doi.org/10.1186/s40066-015-0037-1.

Egbadzor, K.F., Yeboah, M., Offei, S.K., Ofori, K. and Danquah, E.Y., 2013. Farmers key production constraints and traits desired in cowpea in Ghana. *Journal of Agricultural Extension and Rural Development* 5 (1): 14-20.

Etwire, E., Ariyawardana, A.and Mortlock, M. Y. 2016. Seed delivery systems and farm characteristics influencing the improved seed uptake by smallholders in Northern Ghana. *Sustainable Agriculture Research* 5 (2): 27–40. https://doi.org/10.5539/sar.v5n2p27.

Mabaya, E., Adzivor, S. Y., Wobil, J. and Muyoga, M. 2017. Ghana Brief 2017 - The African Seed Access Index, (December). Available at: https://tasai.org/reports

National Seed Policy. 2013. Republic of Ghana. Accra, May 2013. 102pp.

Niangado, O. 2010. Varietal development and seed system in West Africa: Challenges and opportunities. Second Africa Rice Congress, Bamako, Mali, 22–26 March 2010. Innovation and Partnerships to Realize Africa's Rice Potential. Available online at: http://www.africarice.org/workshop/ARC/0P1%20Niangado%20fin.pdf

Poku, A., Birner, R. and Gupta, S. 2018. Why do maize farmers in Ghana have a limited choice of improved seed varieties? An assessment of the governance challenges in seed supply. *Food Security* 10 (1): 27-46.

Tripp, R. and Mensah-bonsu, A. 2013. Ghana's Commercial Seed Sector: Ghana strategy support programme. International Food Policy Research Institute. Working paper. 20pp.

Yirzagla, J., Atokple, I. D. K., Haruna, M., Kusi, F. and Muntari, A. 2016. Scaling out cowpea production in northern Ghana community seed production scheme. Pan-African Grain Legume and World Cowpea Conference, 28th February - 4th March, 2016. Livingstone, Zambia.