

# Ghana

## Groundnut

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### Introduction

Groundnut occupies the largest cultivated land covered by legumes in Ghana on an area of 353,376 ha (Source: SRID-MoFA 2011). Legumes occupy 15% of the total land area under cultivation in Ghana. Of this groundnut covers 60% of the total area. Over the years (1985–2007) the growth rate of groundnut declined in yield (–0.7%) while production increased (6.1%). Ghana exported 3701 tons of groundnut valued at US\$ 2 million (Source: FAOSTAT 2010).

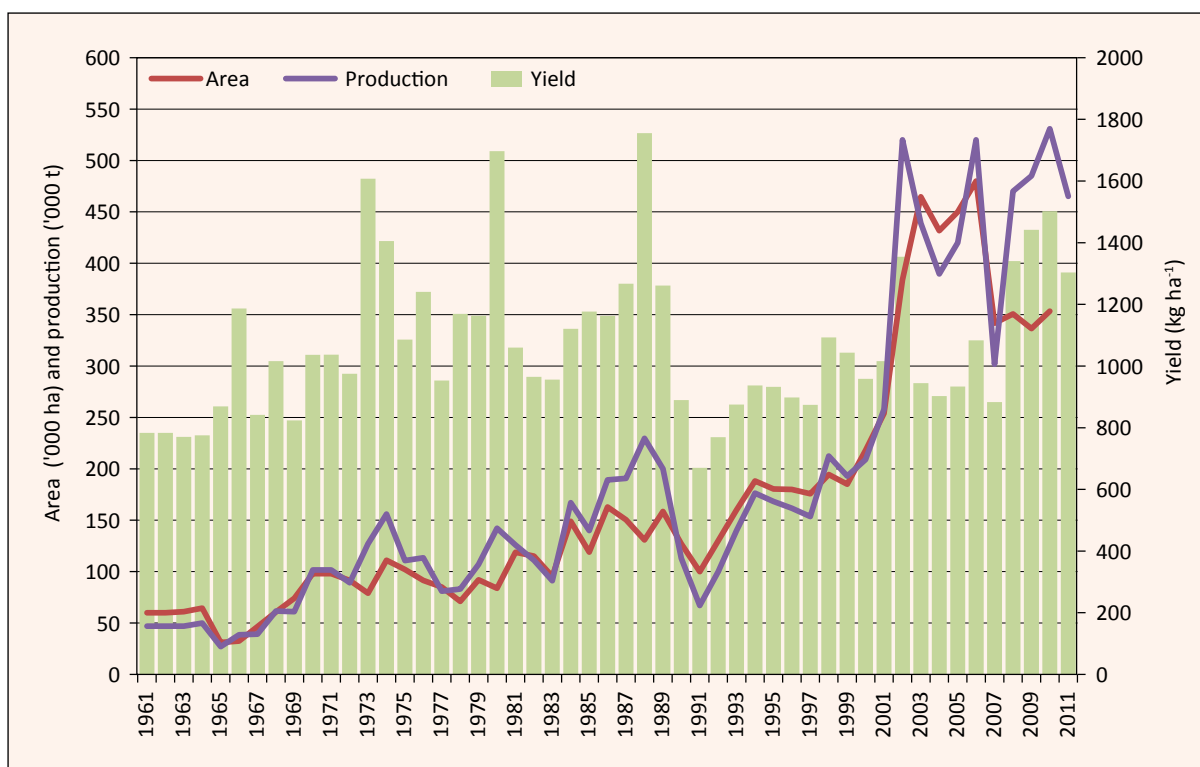
Generally groundnut is intercropped with sorghum, pearl millet, maize and cassava. In few areas it is grown in pure stand or on ridges. Besides generating income for farmers, groundnut provides an inexpensive source of high quality dietary protein and edible oil which has helped in reducing malnutrition in the country. Groundnut protein is fast becoming important as food and feed sources in Ghana, where protein from animal sources are not within the means of the majority of the populace. It is an important source of biologically fixed nitrogen and provides fodder to farm animals in drier savanna areas.

The major biotic and abiotic constraints are foliar diseases (early and late leaf spots), rust, rosette, low soil fertility and erratic rainfall. In the northern part of Ghana where majority of the crop is produced, cultivation is done by mainly women in smallholder farms under rainfed conditions. The area and production statistics are presented in Table 1 and Figure 1.

Parameter	Value
Average area (ha)	347,791
Average production (t)	450,592
Average yield (current) (kg ha <sup>-1</sup> )	1,294
Average yield (2015) (kg ha <sup>-1</sup> )	1500
National demand (t)	293
Expected growth in production (%)	3
Proportion of production sold (%)	60

### Research and development

Research on groundnut in Ghana is conducted by CSIR institutes specifically Savannah Agriculture Research Institute (SARI) and Crops Research Institute (CRI). This research is done in collaboration with the universities. In previous years SARI has collaborated with ICRISAT and this has resulted in the release of many good varieties including four new varieties in 2005 alone. These varieties are Kpanieli, Nkatiesari, Gusie Balin and Edorkpo-Munikpa. Other varieties such as Manipintar, Chinese, Sinkarzei, F-Mix, etc were all released before 1990.



**Figure 1. Trends in area, production and yield of groundnut in Ghana (1961–2011).**

## Constraints to groundnut production

The major constraint to the adoption of these varieties has been the availability of improved seed and accessibility to the resource-poor farmer due to the poorly developed seed systems. The most common and widely adopted variety is Chinese. The high adoption is mainly due to its ability to produce more pods in a relatively short time (90 days) compared to other varieties. However, it is highly susceptible to early leaf spot and late leaf spot.

## Socioeconomic constraints

- Lack of improved varieties
- Lack of inputs such as fertilizers and improved seeds
- Land tenure system not favorable to women
- Lack of appropriate machinery for expanded planted area
- Poor market access and credit facilities

## Organizational constraints

Improving the adoption of superior varieties by farmers require a rapid dissemination of improved varieties and agronomic practices. Usually this is through farmer field schools and demonstrations. It is also essential to link farmers to markets and credit institutions to acquire farm equipment and inputs (seed, fertilizer and pesticides). An efficient and sustainable crop improvement program especially in molecular breeding is also required to ensure that the time required for variety development is reduced. In most cases these activities cannot be done due to administrative issues with funds and in some cases personnel for the various activities.

## Perspectives for TL-II Phase 2

Baseline surveys will be conducted in the major groundnut producing agroecologies to provide first-hand information on the situation of groundnut production and limitations in the current system. This information will be handy in the future when instituting measures to overcome the problems and improve the livelihoods of resource-poor farmers.

It is expected that the national program will be enriched with new diverse materials from ICRISAT for local selection and adaptation in different agroecologies. New superior varieties will be identified through this collaboration together with farmers through participatory variety selection (PVS). Such varieties will satisfy important production requirements such as tolerance to foliar diseases, early maturity, dual-purpose (grain and fodder), etc.

The national program has developed and released a range of varieties with various attributes. These are still on the shelf and need to be known by the farmers. Resources from this phase will be used to establish farmer participatory varieties (FPVs) trials at key sites to identify farmer preferred traits and varieties. Field demonstrations and open days will be adopted in the FPVs trials and this will ensure that more farmers are introduced to improved varieties in the target agroecologies. A range of seed multiplication and delivery schemes will be tested and it is believed that a well-built informal seed system will be established in farming communities to supply seeds to farmers. Efforts will be made to produce breeder seed of selected varieties to produce foundation seed that will ensure availability of other classes of seed. Capacity building (human and infrastructure enhancement) is crucial for an efficient breeding program. Capacity building needs will be assessed and improvements made where most needed.

## Groundnut agroecologies in Ghana

Groundnut is an important oilseed crop and is grown in all the agroecologies, from the dry savannah regions to the moist forest areas and the coastal savannah zone along the coast. Almost 85% of the area under groundnut cultivation and the bulk of the production is from the Guinea Savanna and Sudan Savanna zones in the northern region. These zones represent 30% of the total land area of Ghana and harbor 17% of the population of about 24 million (according to the 2010 census provisional figures).

Groundnut occupies a total of 148,000 ha in the Sudan Savanna agroecology (annual rainfall <1000 mm) (Fig. 2). In the Guinea Savanna agroecology (annual rainfall 900 to 1100 mm) the crop occupies a land area of 126,481 ha. A total of 43,356 ha in the transitional agroecology (annual rainfall up to 1300 mm) of Ghana is cultivated with groundnut. Though the crop is grown in other ecologies, the area occupied is not significantly large enough to be considered as a major growing area.

## Seed system

### Current situation

Though variety development requires a lot of investments, adoption rate by farmers are low especially in Sub-Saharan Africa. This is largely due to poor and inefficient local seed systems. Groundnut in Ghana like other legume crops suffers from a poorly developed seed system and a general lack of interest by the private sector to engage in commercial production. As a result of the inbred nature of the crop, farmers are able to recycle their seeds with little or no segregation in the offspring. This does not encourage them to return to seed producers to acquire new seed which is usually at a cost. This accounts for the general lack of interest by the private sector to engage in legume seed production as profit is generally low.



- Sudan Savanna zone (148000 ha under groundnut cultivation)
- Guinea Savanna zone (126481 ha under groundnut cultivation)
- Transitional zone (43356 ha under groundnut cultivation)

**Figure 2. Groundnut cultivation zones in Ghana.**

### **Alternative to the current “seed system”**

- Interested farmers in the various farming communities will be identified and partnered to produce seeds. The partnership will involve the supply of improved seeds either as foundation or breeder seed. Training will also be organized for such selected farmers on how to produce seeds to meet the required standards for certified seed. Such farmers will be encouraged to use appropriate packaging that preserves seed quality. The packages will also be of small and portable sizes so that the farmers can buy some for their plots.
- The seed farmers (producers) will be allowed to recycle the seeds for three years after which they will have to return to the institute to get new stock. A monitoring system will be put in place to

ensure that seed fields are inspected at various stages to obtain the necessary purity for certified seed. This strategy will ensure that seeds are available and accessible to the resource-poor farmers. Cost of transporting seeds to farmers will be reduced and seeds will be cheap and affordable to the majority of farmers in the community.

This strategy is expected to cover over 20% of the total land area grown to groundnut in each agroecology in Ghana. To achieve this, a total of 2023 tons of seed will be required for the Guinea Savanna agroecology. The Sudan Savanna and the Transitional agroecology will require 2368 tons and 693 tons of improved seed respectively to cover 20% of the total land area cultivated with groundnut. Achieving this will not be an easy task and requires a lot of partnership and work. The following partners have been identified and it is believed that the activities of these partners will ensure that this target is achieved.

### Strategic partners and their roles

CSIR-SARI is instituting measures that will ensure that a lot more farmers are exposed to improved varieties. In collaboration with the partners given in Table 2, CSIR-SARI aims to cover 20% of the total area occupied by groundnut in the various agroecologies with improved varieties.

**Table 2. Strategic partners and their role in the seed system.**

Strategic partner	Role
CSIR (Savanna Agricultural Research Institute)	Conduct research to test and adapt new varieties in the Guinea and Sudan Savanna agroecologies; organize PVS and demonstrations to select new varieties for the various agroecologies and introduce improved varieties to a lot more farmers
CSIR (Crops Research Institute)	Conduct research to test and adapt new varieties in the Forest and Transitional agroecologies; organize PVS and demonstrations to select new varieties for the various agroecologies and introduce improved varieties to a lot more farmers
ICRISAT	Provide enhanced groundnut germplasm on request and technical backstopping in human resources development, knowledge sharing and communication
Ministry of Food and Agriculture (MoFA)	Formulation of agricultural policies, provision of extension services and technology transfer; also undertakes inspection of seed fields for certification through its Seed Inspection Unit
National Varietal Release Committee	National body mandated to assess a variety before it is released
Grains and Legumes Development Board	Mandated to produce and distribute quality foundation seed to registered seed growers for the production of certified seed to farmers
Seed Producers Association of Ghana (SEEDPAG)	An association of seed growers that receives foundation seed from the Grains and Legumes Development Board to produce certified seed for farmers
Farmer-based organizations (FBOs)	Test and adopt improved varieties and management techniques in partnership with research and MoFA.
NGOs	Strengthening farmers' associations
Private sector (market intermediaries and emerging small-scale seed enterprises and processors)	Processing and commercialization of seed and products

## **Opportunities available for the new system to be effective**

Groundnut is a very important crop in Ghana being cultivated in most agroecologies in the country. The seed system approach will use farmers identified in the various communities to produce and market improved seeds.

- The importance here is that the seed will be produced very close to the target farmers and will not require bulk transport. This will make the seed cheaper, available and accessible to the majority of farmers. This method is also expected to improve adoption among farmers as it will appear that the technology they are adopting is coming from one of their own.
- The seed policy in Ghana requires that certified seeds are sold at a higher price compared to grain. This will be enough motivation to get people to be involved in the production of seed as they can earn twice the money than that obtained from a field grown for grain with the same level of inputs.
- Groundnuts and processed products are on high demand. For example, Ghana Nuts is a nut and seed factory specializing in value addition for both local and export markets. There is also high demand for livestock feed which is made from the residue of the processed nuts.
- Varieties specially adapted to each agroecology will be identified and recommended for adoption. Partners including MoFA and research institutes (SARI, CRI) have qualified personnel with the requisite skill to ensure that varieties that are released are available and accessible and conform to the required purity standard at all times. Other partners like the Variety Release Committee will recommend the final release of each superior genotype as a new variety.
- The Grains and Legumes Development Board is a creation of the government under MoFA. The board receives breeder seed from researchers and multiplies them. It then supplies foundation seed to private seed growers to produce certified seed.

## **Significance of the planned activities in the strategy**

The seed production plan is presented in Tables 3, 4 and 5.

The use of improved seeds will ensure that yield per unit area is increased using the same set of inputs. It will ensure food security and increased income. Increased income from the sale of groundnut would reduce environmental degradation as wood cutting and charcoal burning activities for income generation will get reduced. The haulms are good fodder for livestock, which in turn will produce manure to enhance soil fertility and animal productivity.

Resistant varieties to biotic and abiotic stresses will enhance optimal use of natural resources and avoid indiscriminate use of pesticides. The promotion of a wide range of varieties will enhance genetic diversity of the crop thus promoting biodiversity. The use of improved varieties coupled with measures to minimize aflatoxin contamination will lead to better quality products (contamination free) and thus safeguard consumers' food-safety. Early-maturing (less prone to end-of-season water shortages) and drought tolerant varieties will help farmers to cope better with climate change.

With the projected rate of growth (ROG) of 3% in production and an increase in national demand by 1.9%, Ghana is expected to export about 48,000 tons of groundnut by 2015 (Source: Abate et al. 2012). This will contribute a substantial sum of money to the economy. Achieving this will require the use of improved seeds and therefore the need for this strategy to be implemented cannot be underestimated.

**Table 3. Groundnut seed production plan for Ghana.**

Ecology	Demand (ha)	Varieties available	Seed available (t)	Breeder seed (t)	Foundation seed (t)	Seed for 20% adoption (t)
Southern Guinea Savanna	223080	Nkatiesari	0.1	55.7	446.16	3569
		Kpanieli	0.019			
		Edorkpo-Munikpa				
		Gusie-Balin				
Northern Guinea Savanna	104470	Nkatiesari		26.12	208.94	1671.52
		Edorkpo-Munikpa				
		Gusie-Balin				
Derived savanna	17610	Chinese		4.4	35.22	281.76
Forest zone	8216	Adepa		2.1	16.4	131.5

**Table 4. Groundnut seed production (t) goal.**

Seed class	2012	2013	2014
Breeder seed	0.87	6.96	55.7
Foundation seed needs	6.97	55.77	446.16
Certified seed needs	55.77	446.16	3569.00

**Table 5. Potential quantities (t) of groundnut seed (of different classes) produced by stakeholders.**

Stakeholder	Breeder seed	Foundation seed	Certified seed
SEEDPAG			3000
CSIR-SARI	40		
Grain and Legumes Development Board		446.16	
FBOs			600
PCRSP	15.77		

# Cowpea

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## Introduction

### Importance of the crop in Ghana

Cowpea (*Vigna unguiculata*) is the second most important legume crop in northern Ghana after groundnut. An average of 143,000 tons is produced annually on about 156,000 ha. Ghana is the fifth highest producer of cowpea in Africa. Ghana ranks fourth highest in the world, after Peru, Cameroon and Uganda for cowpea yields (Fig. 1). It also has the fastest growing production of the crop in Africa. Annual rates of growth for cowpea area, yield and production for the period from 1985–87 to 2005–07 were –0.1%, 39.6% and 39.8%, respectively. It has been projected that the rate of growth of cowpea production during 2010 to 2020 would be 11.1%.

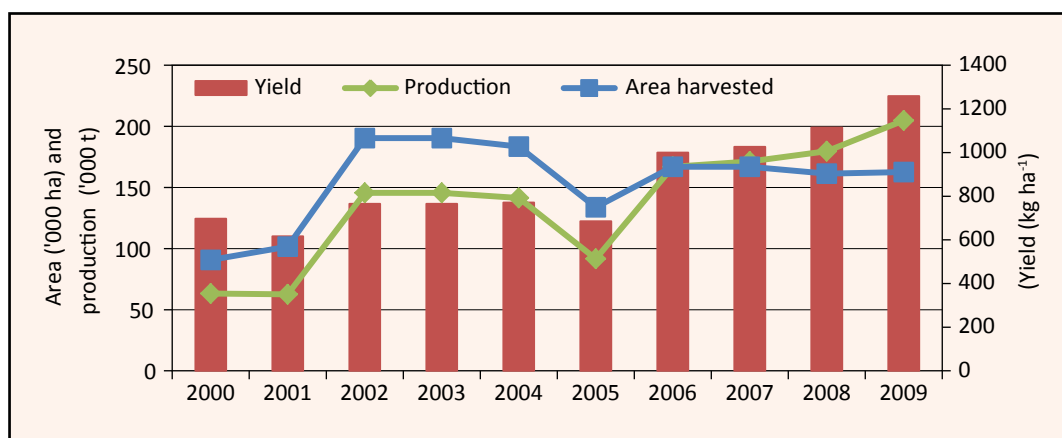


Figure 1. Cowpea area, production and yield in Ghana during 2000 to 2009 (Source: MoFA 2010).

The dry grain with about 23–25% protein serves as a cheap source of protein for both rural and urban consumers whereas livestock benefit from the residue left over after the grain is harvested. Rural families that make up the larger part of the population of northern Ghana derive food, animal feed and cash income from cowpea production. The major biotic constraints are insect pests and diseases, nematodes and parasitic weeds particularly *Striga* (*S. gesnerioides*), which can cause yield losses ranging from 15% to 100% depending on the level and severity of infestation and susceptibility/resistance of the variety. The abiotic constraints are drought and low soil fertility.

### Cowpea contribution to national GDP, farmer income, food and nutrition security

Cowpea is an important crop in Ghana. Cowpea demand is increasing because of high population growth mainly in the urban areas. Farmers store and sell more than 60% of the produced cowpea when prices go up during the off-season (Source: CORAF/WECARD Cowpea Report, 2011).

The gross domestic product (GDP) of the country is US\$ 409 per capita per year (Source: Mishili et al. 2007). Farmers receive total net income of GH¢ 673.462 or US\$ 481 per ha of cultivated cowpea (Source: PRONAF 2010). The per capita consumption of cowpea in the country is about 9 kg per year (Source: Coulibaly et al. 2010).



Cowpea is an important source of food for the population. Processed products (cowpea flour, cowpea cake, cowpea fritters, different dishes with cowpea, cowpea chips, etc) are sold in village markets and well appreciated by consumers.

Households generate annual income of about GH¢ 760–800 through increased production due to two or three production cycles per year of improved cowpea varieties. For the whole of northern Ghana an additional income of GH¢ 15 million to GH¢ 16 million is generated yearly, of which at least 40% goes to women farmers. The fertility of the soils in Ghana is expected to increase as a result of increased production of cowpea varieties with high biological nitrogen fixing ability and resistance to *Striga gesnerioides*. This will reduce the amount of money spent on inputs such as chemical fertilizers resulting in increased income of smallholder farmers and increased productivity of both legume and cereal crops bringing about reduction of hunger and food insecurity in the country. Malnutrition and infant mortality are expected to drop significantly through increased consumption of cowpea from the current level of 9 kg per capita to 15 kg per capita by more households. The expected increased production and per capita consumption should lead to improved nutrition and livelihood.

## Research and development

### Variety development

Conventional breeding of cowpea has been in place since the 1970s. But full-fledged research started at CSIR-SARI in 1981, using local diversity and elite lines obtained from IITA. Characterization and evaluation of the assembled materials were carried out. The germplasm pool in the early breeding program had emphasis on higher yields and earliness. Hence varieties that were introduced or developed were early maturing with improved yields compared to the local types, until recently when these varieties were overridden by other important traits such as, seed coat color, cooking ability, intercropping, drought tolerance and *Striga* tolerance (Table 1). Variety development is a well established scheme in research, where on average each variety has taken 6 to 8 years in its development.

### Major constraints to cowpea production in Ghana

The major constraints to cowpea production include social, biological, physical and technological environments. These are:

- Biotic stresses: Insect pests (aphids, flower thrips, *Maruca*, pod sucking bugs, bruchids), diseases (bacterial, fungal and viral), *Striga* and *Alectra*.
- Abiotic stresses: Drought, heat, low soil fertility
- Lack of inputs such as fertilizers, appropriate insecticides and improved seed, poor agronomic practices
- Lack of appropriate machinery for expanding planted area

### Planned Phase 2 activities and their contribution to national efforts

In TL-II Phase 2, we plan to bring about major impact through improved cowpea technologies that would be implemented especially in the important cowpea production environments or agroecologies. At the end of this project it is expected that productivity of cowpea should reach at least  $>1.5 \text{ t ha}^{-1}$  and the national productivity should increase from 0.6 in 2011/12 to  $0.9 \text{ t ha}^{-1}$  by 2014/15.

**Table 1. Characteristic features of common cowpea varieties developed by the Ghanaian research system.**

Official name of release	Year of release	Source of the material	Genetic background (parentage, pedigree, ancestry)	Area of potential coverage (ha)	Area of actual adoption estimate (ha)	Spillover national boundaries	Average yield potential on-farm (kg ha <sup>-1</sup> )	Varietal traits (selected characteristics)
Marfo-tuya	2002	SARI cross	Sumbrisogla/518-2	3,176	1,500	Yes	600	High fodder/grain yield
Padi-tuya	2008	SARI cross	SARC 3-122-2	5,335	2,600	Yes	400	High grain yield, erect, vines good for fodder
Songotra	2008	IITA	IT97K-499-35	12,706	6,500	Yes	600	High grain yield, <i>Striga</i> resistant, high fodder yield
Zaayura	2008	SARI cross	SARC 4-75	1,588	800	Yes	600	Resistant to aphids, high fodder and grain yields
Baawutawuta	2008	IITA	IT95K-193-2	1,588	800	Yes	400	High grain yield, <i>Striga</i> resistant
Apagbaala	2002	SARI cross	Prima/TVU 4552//CBE	5,335	2,600	Yes	600	High fodder/grain yield, susceptible to <i>Striga</i> and aphids
IT94K-440-3	NR <sup>1</sup>	IITA	IT94K-440-3	-	-	-	400	Resistant to aphids and thrips
IT97K-499-38	NR	IITA	IT97K-499-38	-	-	-	350	Good grain yield, early maturing, combined resistance to <i>Striga</i> and <i>Alectra</i>
IT97K-499-39	NR	IITA	IT97K-499-39	-	-	-	350	Good grain yield, early maturing, combined resistance to <i>Striga</i> and <i>Alectra</i>
Bengpla	1992	IITA	IT83S-818	1,018	500	Yes	400	High grain yield, early maturing (55–60 days)
Vallenga	1985	IITA	IT82E-16	1,018	500	Yes	350	High grain and fodder yields, vines, good for fodder

1. NR = Not officially released.

### Expected outcomes from Phase 2 cowpea improvement for production and productivity

Cowpea farmers and farm practitioners will have higher income. The national cowpea production will increase to more than 265,000 tons with productivity of 0.9 t ha<sup>-1</sup>. There would be an excess production over the national demand which should allow for export to other countries.

## Agroecologies for cowpea cultivation in Ghana

Cowpea is mainly grown in the Savanna zone (Derived savanna, Southern Guinea savanna and Northern Guinea savanna) of northern Ghana, which constitutes about 41% of Ghana's landmass. Figure 2 depicts cowpea production area and yield in Ghana.

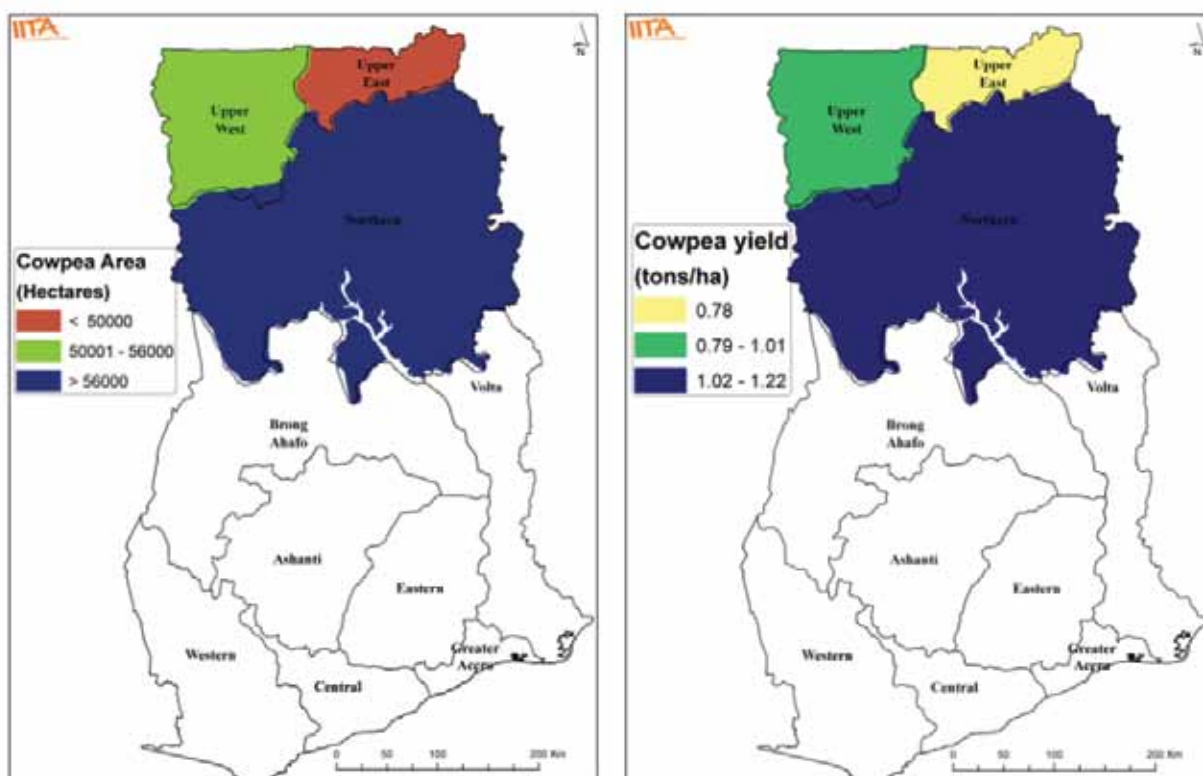


Figure 2. Cowpea production areas and productivity in Ghana.

## Seed system for cowpea

The Seed Producers Association of Ghana (SEEDPAG) is coordinating and managing the production, distribution and marketing of seeds of various crops. A new seed law was enacted in 2011 that paved the way for establishment of more private seed companies which will make the seed industry more competitive and efficient. Cowpea breeder seed will be produced mostly by CSIR-SARI and CSIR-CRI while foundation and certified seeds will mostly be handled by Grains and Legumes Development Board, SEEDPAG and farmer-based organizations. However, as business entities, these enterprises work in more than 85% of the cases with the staple crops, which are mostly cereals (maize, sorghum, millets and rice). Therefore, legumes in general and cowpea in particular have about 25% seed demand shortfall that needs to be met.

The private sector as is common with self-pollinated crops is poorly involved in cowpea seed production. Hence the alternative cowpea seed system pathway appears to be the informal seed system.

## Ghanaian seed system strategy (2012–14)

With all functional key stakeholders in place, the seed production (informal seed system dominated) strategy of Ghanaian cowpea is projected.

Area: 158,337 ha

Seed rate (mean): 20 kg ha<sup>-1</sup>

National demand: 3,167 t (2012–14)

Capacity to deliver 20% area: 31,667 ha  $\approx$  630 tons

Target of productivity: 1.5 t ha<sup>-1</sup> at intervention sites and 0.9 t ha<sup>-1</sup> at national level

Total production target: >161,500 tons

## **Opportunities, constraints, partnership and seed production plan**

The target is to cover 20% of each important cowpea agroecology in Ghana with improved seed.

### ***Opportunities***

- Well developed informal seed system experience and existence of certified associations
- New law that enhances innovative seed system
- Availability of suitable varieties at major production areas (>9)
- Sufficient land mass suitable for cowpea (millions of ha)
- Increasing consumption level/culture in the country

### ***Constraints***

- Dominated by informal system that has technical and infrastructural gaps
- Certification process is not clear for informal seed system
- Complete absence of mechanization at all steps
- Unpredictability of market price
- Lack of quality seed at all times in an adequate quantity by variety of demand

### ***Partners and their role***

- Ministry of Food and Agriculture (MoFA): Formulation of agricultural policies, provision of extension services and technology transfer
- Women In Agricultural Development (WIAD): Conduct training of trainers (TOT) on various recipes of cowpea
- IITA: Provide improved cowpea germplasm on request and technical backstopping in human capacity development, knowledge sharing and communication
- Universities: Conduct training of project staff at masters and PhD levels and assist in the development of improved varieties
- Farmers' organizations: Test and adopt improved varieties and management techniques and production of grains for the processing industry
- NGOs in agriculture: Strengthen farmers' associations and promote the utilization of cowpea
- Seed Producers Association of Ghana (SEEDPAG): Production, distribution and marketing of seed

- Ghana Agro-dealers Association: Facilitates the acquisition of agro-chemicals for crop production
- Private sector (market intermediaries and emerging small-scale seed enterprises and processors): Processing and commercialization of seed and products.

### Seed production plan

Cowpea seed production plan for Ghana is presented in Tables 2 and 3.

**Table 2. Seed production in different agroecologies in Ghana.**

Ecology (Demand ha)	Variety demand	Yield (kg ha <sup>-1</sup> )	Breeder seed in 2012		Foundation seed in 2013		Certified seed 2014	
			Area (ha)	Production (t)	Area (ha)	Production (t)	Area (ha)	Production (t)
Southern	Marfo-tuya	1000	0.033	0.033	1.315	1.315	52.6	52.6
Guinea Savanna (105264)	Padi-tuya	1000	0.066	0.066	2.632	2.632	105.2	105.2
	Songotra	1000	0.115	0.115	4.605	4.605	184.1	184.1
	Zaayura	1000	0.033	0.033	1.316	1.316	52.6	52.6
	Baawutawuta	1000	0.033	0.033	1.316	1.316	52.6	52.6
	Apagbaala	1000	0.049	0.049	1.974	1.974	78.9	78.9
Derived Savanna (41876.949)	Bengpla	1000	0.033	0.033	1.304	1.304	52.25	52.25
	Apagbaala	1000	0.079	0.079	3.14	3.14	125.4	125.4
	Vallenga	1000	0.019	0.019	0.79	0.79	31.35	31.35
Northern Guinea Savanna (11678.404)	Padi-tuya	1000	0.007	0.007	0.292	0.292	11.678	11.678
	Songotra	1000	0.013	0.013	0.511	0.511	20.437	20.437
	Zaayura	1000	0.005	0.005	0.219	0.219	8.759	8.759
	Baawutawuta	1000	0.005	0.005	0.219	0.219	8.759	8.759
	Apagbaala	1000	0.005	0.005	0.219	0.219	8.759	8.759
Total			0.496	0.496	19.853	19.853	793.392	793.392

**Table 3. Certified seed production (t) plan over three years.**

Variety	2012	2013	2014
Apagbaala	168.764	189.623	213.059
Baawutawuta	48.603	54.610	61.359
Bengpla	41.388	46.503	52.25
Marfo-tuya	41.664	46.814	52.6
Padi-tuya	92.579	104.021	116.878
Songotra	162.014	182.038	204.537
Vallenga	24.833	27.902	31.35
Zaayura	48.603	54.610	61.359
Total	628.448	706.121	793.392

The seed delivery will be handled mainly in a seed revolving or seed loan approach until the bigger impact and demand are established. The higher demand will then be satisfied by seed growers that eventually grow along with the technology promotion. And by 2014 at least 50% of cowpea farmers at national level will get seed access through the informal seed system arranged at accessible points in a decentralized way. Effective monitoring and support to validate seed quality in a decentralized manner will be served by the Seed Inspection Unit (SIU) of MoFA, mandate research centers and SEEDPAG, and enterprises affiliated to the seed scheme in a contractual agreement.

## **Vision of success for cowpea in Ghana**

Highest productivity of cowpea of 2 t ha<sup>-1</sup> will be obtained at national and global levels that attributes to the wealth of producer farmers with significant contribution to the home food consumption. The overall production aims at satisfying the national demand to significantly contribute to the GDP with significant amount of exports and/or agro-processing.