

A MONTHLY BULLETIN OF THE TROPICAL LEGUMES II PROJECT

About the Bulletin

The Bulletin of Tropical Legumes is a monthly publication of the Tropical Legumes II (TL II) project, funded by the Bill & Melinda Gates Foundation, and jointly implemented by the International Crops Research Institute in the Semi-Arid Tropics (ICRISAT), the International Center for Tropical Agriculture (CIAT) and the International Institute of Tropical Agriculture (IITA) in close collaboration with partners in the National Agricultural Research Systems of target countries in Sub-Saharan Africa and South Asia. TL II aims to improve the livelihoods of smallholder farmers in drought-prone areas of the two regions through enhanced grain legumes productivity and production.



Cowpea farming in Ghana

Cowpea is the second most important legume in Ghana after groundnut. An average of 143,000 MT is produced annually on about 156,000 ha making Ghana the fifth highest producer of cowpea in Africa (Figure 1). Ghana has the fastest growing production of the crop in Africa. Annual rates of growth for cowpea for area, yield and production for the period from 1985-1987 to 2005-2007 were -0.1%, 39.6%, and 39.8%, respectively. It has been projected that the rate of growth for the period between 2010 and 2020 would be 11.1% for cowpea.

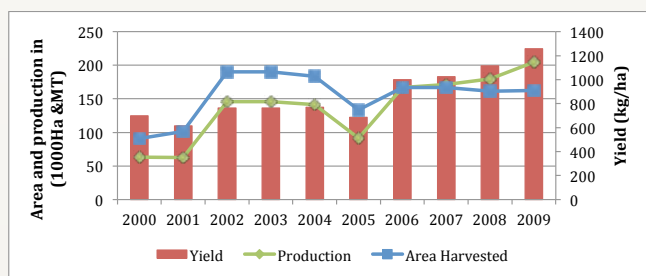


Figure 1: Cowpea Area, Production and Yield in Ghana 2002-2009 (MoFA, 2010)

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 from its production, food, animal feed and cash income.

The major constraints to cowpea production in Ghana are biotic and abiotic factors such as insect pests (aphid, flower thrips, maruca, pod sucking bugs, bruchid), diseases (bacterial, fungal and viral), Striga (*S. gesnerioides*) and Alectra which can cause yield loss ranges from 15 to 100% depending on the level and severity of infestation, susceptibility/resistance of the variety, drought and low soil fertility. Lack of inputs such as fertilizers, insecticides and improved seeds, poor cultural practices and lack of appropriate machinery for expanding planted area are other constraints experienced.

Cowpea is an important crop in Ghana due to its contribution to national GDP, farmer incomes, food and nutrition security. 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 (CORAF/WECARD cowpea report, 2011). The Gross Domestic production (GDP) of the country is \$409 per capita per year (Mishili et al., 2007). Farmers receive total net income of 673.462 GHc/ Ha or \$481 of cultivated cowpea (Ghana report PRONAF, 2010). The per capita consumption of cowpea in the country is about 9 kg each year (Coulibaly et al., 2010).

Cowpea is mainly grown in the Savanna zones (Derived savanna, Southern Guinea savanna and Northern Guinea savanna) of northern Ghana, which constitute about 41% of Ghana's landmass (Figure 2).

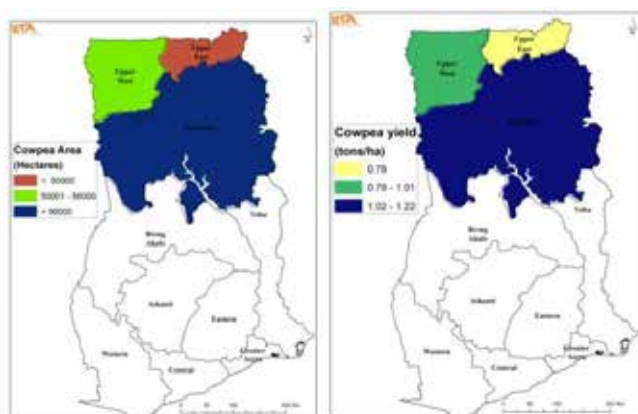


Figure 2: Cowpea production Area and Productivity in Ghana

Cowpea is an important source of food for the population. Processed products (cowpea flour, cowpea cake, cowpea fritters, dish with cowpea, cowpea chips...) 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 cycles production per year of improved cowpea varieties. For the whole of northern Ghana an additional income of between GH¢ 15 to GH¢ 16 million is generated yearly, at least 40% of this directly going 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. This will reduce the amount of money spent on inputs such as chemical fertilizers resulting in increased incomes of smallholder farmers and increase productivity of both legume and cereal crops and bring 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 of Cowpea in Ghana

Conventional breeding of cowpea has been in place since the 1970s though full-fledged research undertakings started at CSIR-SARI in 1981, using local diversity and elite lines from IITA collection. 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 over the local types, until recently when these were overridden by other important traits such as field and storage pests, seed coat color, cooking ability, intercropping, and drought and *striga* tolerance (Figures 3 - 5). Variety development is a well-established scheme in research, where on average each variety has taken 6 to 8 years in its development. Table 1 gives the characteristics of features of the cowpeas varieties that have been developed by the Ghanaian research system.



Figure 3: Insect pests are the greatest constraint to cowpea production. As can be seen in the photograph above, nymphs of a pod sucking bugs devastating the pods.



Figure 4: TL-2 Scientists from Ghana and IITA jointly evaluating cowpea varieties at the Savanna Agricultural Research Institute near Tamale Ghana



Figure 5: Heat and drought stress are major constraints to cowpea production in Ghana. Here varieties are being evaluated under appropriate field conditions for drought and heat stress

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

| Official name of release | Year of release | source of the materials | Genetic background (parentage, pedigree, ancestry) | Area of potential coverage (ha.) | Area of actual adoption estimate (ha.) | spillover national boundaries | Average yield potential kg/ha (on-farm) | 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, Striga resistant, high yielding |
| 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 yields, striga resistant |
| Apagbaala | 2002 | SARI cross | Prima/TVU 4552//CBE ⁺ | 5,335 | 2,600 | Yes | 600 | High fodder/grain yield, susceptible to striga and aphids |
| IT94K-440-3* | NA | IITA | IT94K-440-3* | - | - | - | 400 | Resistant to aphids and thrips |
| IT97K-499-38* | NA | IITA | IT97K-499-38* | - | - | - | 350 | Grain yield, early maturing, combined resistance to Striga and Alectra |
| IT97K-499-39* | NA | IITA | IT97K-499-39* | - | - | - | 350 | Grain yield, early maturing, combined resistance to Striga and Alectra |
| 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, viney |

*NA not officially released

In TLII phase II, there are plans to bring about major impact through improved cowpea technologies that would be implemented especially in the important cowpea production environments or agro-ecologies. At the end of the project it is expected that productivity of cowpea should reach at least 1.5+ t/ha and national productivity will increase from 0.6 (now) to 0.9 t/ha by 2014. The outcomes of phase II will be cowpea farmers and farm practitioners with higher incomes, increased national cowpea production greater than 265,000 MT and productivity of 0.9t/ha. There would be an excess production over the national demand which should allow for export to other countries.

Seed systems for cowpea in Ghana

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 breeders' seeds will be produced mostly by CSIR-SARI and CSIR-CRI while foundation and certified seeds will mostly be handled by Ghana grains and legumes 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, millet and rice). Therefore, legumes in general and cowpea in particular have about 25% seed demand shortfall that need to be filled. 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. Table 2 presents seed production in different agro-ecologies in Ghana through 2014.

Table 2: Planned Seed Production (tons) in different agro ecologies in Ghana

| Seed Production (tons) | | | | | | | | |
|------------------------|----------------|-----------------------|--------------|----------------|-------------------------|----------------|---------------------|----------------|
| Ecology | Variety demand | Breeder seeds in 2012 | | | Foundation seed in 2013 | | Certified Seed 2014 | |
| | | Yield (kg/ha) | Area (ha) | Production (T) | Area (ha) | Production (T) | Area (ha) | Production (T) |
| 1. S. G. Savanna | Marfo-tuya | 1000 | 0.033 | 0.033 | 1.315 | 1.315 | 52.6 | 52.6 |
| 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 |
| | Baawut-awuta | 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 |
| 2. Derived Savanna | 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 |
| 3. N.G. Savanna | Padi-tuya | 1000 | 0.007 | 0.007 | 0.292 | 0.292 | 11.678 | 11.678 |
| 11678.404 | 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 |
| | Baawut-awuta | 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 | 19.85 | 19.85 | 793.39 | 793.39 |

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 already 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 the ministry of food and agriculture (MoFA), mandate research centers and the Seed Producers Association of Ghana (SEEDPAG), enterprises affiliated to that seed scheme in a contractual agreement.

News and Events

| Event | Date | Venue | Host Institution | Participants |
|--|------------------|------------|------------------|---|
| TL – 2 Management meeting | Jan 2013 25 – 24 | Nairobi | ICRISAT | TL-2 Objective Leaders and Regional Principal Investigators |
| CRP 3.6 on Dryland Cereals Implementation Workshop | Feb 2013 05 – 04 | Patancheru | ICRISAT | Collaborating CG Centres, NARS, ARIs, Develop. partners |
| Launching of CRPs on Grain Legumes & Dryland Cereals | Feb 2013 06 | Patancheru | ICRISAT | Collaborating CG Centres, NARS, ARIs, Develop. partners |
| CRP on Grain Legumes Implementation Workshop | Feb 2013 08 - 07 | Patancheru | ICRISAT | Collaborating CG Centres, NARS, ARIs, Develop. partners |
| ICRISAT Global Planning Meeting | Feb 2013 15 11- | Patancheru | ICRISAT | All ICRISAT staff, NARS and .Collaborating partners |