African Coffee Renaissance Summit

Summit Proceedings
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AFCA
AFRICAN FINE COFFEES ASSOCIATION

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The problem

Africa's coffee production has declined precipitously in the last four decades from nearly 30% of world production to only 13% in 2012/13. Coffee farm profitability has declined to the point that farmers are abandoning coffee as a crop.

Technology as a solution

To move the needle on coffee in Africa, we must do it collaboratively, and with good science. Two central factors limiting the productivity and profitability of coffee in Africa are infertile soils and the coffee plant itself—the age of the tree, and it's genetic potential to resist disease and produce fruit. By focusing on these two technologies, we can increase both the productivity and profitability of coffee farms.

Variety focus: The renovation of coffee plantations can be done efficiently and profitably if producers adopt more productive varieties that are resistant to major diseases, have a good level of cup quality, and are well suited to their farming systems (for example, smallholders likely require varieties with "stability" traits, meaning they can tolerate certain lower-input practices or inconsistently applied good agricultural practices).

Soil focus: A coffee variety with high potential to produce good, abundant fruit will not produce enough fruit consistently over time if it doesn't get the nutrition it requires. Therefore, soil fertility, conservation, and nutrition are critical components of any technological solution to the problem of profitability.

On-farm demonstration trials

Business-driven science

WCR's proposal is to achieve two goals simultaneously through the installation of hundreds of on-farm demonstration trials throughout Africa:

1. Increase profitability through the introduction of new technologies—varieties and soil treatments—at a large enough scale that the farmer will see and feel a significant monetary return.
2. Aggregate results over years and locations to recommend more effective, climate-smart technologies for extension and to inform future research.

Features

Common design

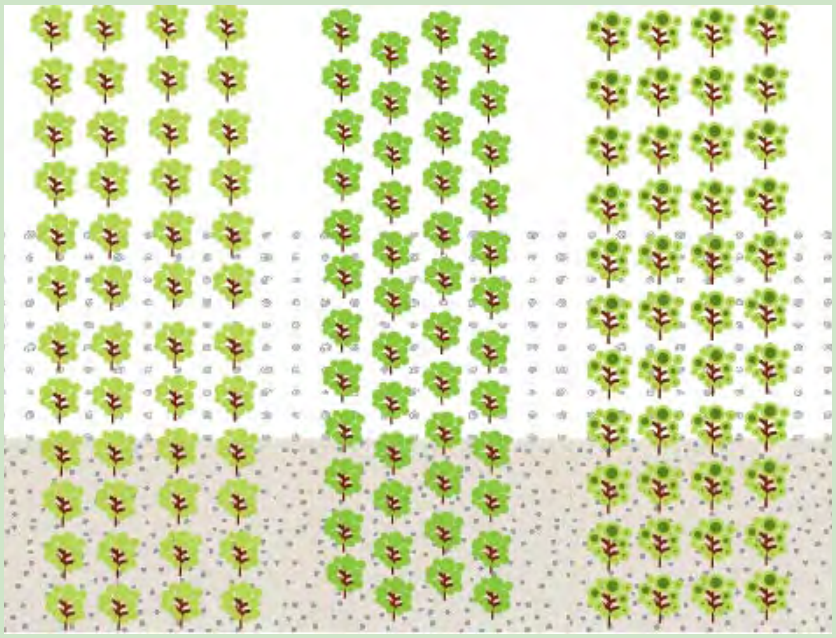
The trial plots would have a common design to make them comparable and statistically valid.

Profitability focus

The trial plot should be sufficiently large to impact farmer profit (1,000m^2-5,000m^2). Where farms are too small for this to be practical, we may look to cooperative land or focus on smallholders who planned to renovate their plantations anyway.

Farm selection

We will be selecting farms that currently implement good agronomic coffee practices or have an interest in doing so.



Big enough to make a difference

Plots will be 1,000m^2-5,000m^2—large enough so that the farmer feels real profitability returns.

Trial design will compare a farmer's existing variety (A) with one to two improved varieties (B, C), and existing soil treatment practice (X) with one to two other practices (Y, Z).

Risk mitigation

In all cases, we will be testing treatments that experts agree will result in higher yields that will immediately benefit the farmer. To keep risk low, treatment costs will be subsidized and the program will cover the lost production income for land used in the plot for two years. Farmers are expected to provide labor. Farmers will recieve technical assistance for the first two years and training to calculate total return on investment and profit from each technological treatment compared to existing practice.

In countries where technologies have been fully validated, we will take the best ones directly to farmer fields. For these trials, the primary goal is demonstrating to farmers the significant gains from new technologies, building a demand for the technology that can be met through the WCR conduit of partners.

In countries where final validation figures are missing for a given technology, for example the performance of F1 hybrids in Africa, we will partner with larger private farms or through government research stations who have agreed to take on the risk. The goal of these trials will be to get the final validation figures and associated return on investment.

Trial results

How will they be used?

The big-picture goal is to significantly increase coffee yields in Africa and profitability for farmers. Results from the on-farm demonstration trials move us toward that goal by:

- Driving demand for improved varieties, creating conditions for a sustainable coffee seed sector
- Driving demand for private sector engagement by fertilizer companies
- Providing critical financial data for renovation programs funded by banks and credit organizations (e.g., by demonstrating/documenting returns in investment for the financing of certain varieties or soil treatments)
- Analyzing data from the plots to monitor disease, climate effects, quality, and other factors over space and over time, resulting in better, more profitable, climate-smart recommendations for companies, NGOs, governments, etc.
- Increasing the ability for producers to make informed decisions about managing their farms
- Informing regional and country-level recommendations for varieties and soil treatments

Problem focus: Soils

The problem

- Soil nutrient mining has been taking place for decades and soil fertility has become an increasingly big problem.
- Organic inputs (manure, compost, mulch) exist, but their availability is limited and declining due to reducing farm size.
- Variability in soil fertility is high in African countries, and many coffee growing areas fall in the infertile areas.
- The central areas of Burundi, Rwanda, Kenya (and to a lesser extent Uganda) have problems with acidity as a major limiting factor.

The challenges

- Fertilizer use is generally low. Access to markets is a key problem and costs are high. Although there are some areas and groups that have experience with fertilizers, it is not generalized at the national or regional level.
- Quality of fertilizer is also a problem in open market economies like Uganda.
- In several areas (e.g. Ethiopia, RDC) there are still conflicting ideas about the need and use of fertilizer. Some groups advocate strenuously against fertilizer use.
- Awareness of the importance of soil fertility and fertilizers is generally lacking—there are still many misconceptions, including many about cost and proper use. Improperly applied fertilizer (e.g., more = better, even if the wrong type) can be a waste of limited farmer resources and lead to incorrect ideas about the efficacy of plant nutrition.
- The existing experience of fertiliser use from scientists (e.g. Cropnuts, IITA, AFSIS) and implementing partners (e.g. Technoserve, Volcafe) is often not sufficiently available to next-users (extension) and end-users (farmers)

The way forward

- Once sites for trial/demo plots have been identified for the country, conduct soil analyses to determine two soil treatments that have been proven to significantly increase yield. Where possible, make use of the existing, high quality, scientific knowledge on soil fertility constraints, as well as good diagnostic tools and labs/teams. Consolidate data and expertise and fill gaps.
- The treatments should be affordable and accessible to the farmer.
- Incorporate liming options (quantity, type, mode of application) using locally sourced lime deposits where possible.
- Streamline recommendations for fertiliser use:

  Integrated fertiliser use with local organic inputs where possible.

  Build on existing partners (Yara, HRNS, Technoserve, NARS, CROPNUTS, IITA) to develop recommendations on what and how to test.
- Success requires integrating soil improvement within current good agricultural practices. It's not a 'stand-alone' solution.
- Country-specific expert review of the recommendations prior to implementation.

Problem focus: Varieties

The problem

- The varieties planted in farmer fields are older, traditional varieties that are typically tall types, extremely susceptible to rust and CBD, and low yielding.
- In East Africa, only three countries—Kenya, Ethiopia, and Tanzania—have created new varieties in recent years that are resistant to major diseases, have a good level of cup quality, and have "stability" traits (meaning they can tolerate certain lower-input farming practices).
- Other countries have no or little access to improved varieties; there is an absence of infrastructure for the well-organized, fair exchange of varieties in the region.
- There is no comprehensive and clear information (e.g., a catalog) describing potentially useful varieties and their availability for Africa.
- There is no organized seed sector that could produce and distribute seeds of improved varieties on a commercial scale. Similarly, there is limited technical assistance available to help promote and distribute seeds even if the technical capacity for producing them were in place.

The challenges

- African coffee farmers are overwhelmingly small holder farmers.
- Some farmers prefer tall varieties and others prefer dwarf varieties.
- Access to small farmers is difficult e.g. long distance, poor roads, no infrastructure.
- Predominantly small farm size.
- Many African farmers do not practice good agronomic husbandry.

The way forward

Varieties used in the demo-trials will possess the following characteristics:

- Latest-generation, high yielding F1 and pureline varieties
- CBD and rust resistant
- Good to very good quality cup
- Stable (they can handle inconsistent maintenance, management)

For Kenya, Tanzania, and Ethiopia, the national coffee breeding programs will identify two of the most interesting and high performing varieties based on advanced trial performance tests.

For Rwanda, Burundi, Uganda, Zambia, Zimbabwe, and Malawi, varieties will be proposed by a group of regional breeders and WCR's breeding team. These varieties will fall into two groups: (1) those validated for smallholders, which will have been validated in national trials for assurance of their performance, and (2) those with higher ROI potential/higher risk, such as new F1 hybrids from Latin America, which will be tested through private farms, cooperatives, and government organizations.

Seedlings will be made from sterile seed in sterile conditions, so there is no risk of contamination.

In addition to improved varieties, WCR will also include climate-smart technologies, like grafting quality F1 hybrids onto drought-stable Robusta rootstock.

As a necessary complement, WCR will develop the Variety Intelligence program for Africa. This is a two-pronged program to (1) create and disseminate a catalog of varieties for farmers and other decision-makers, (2) verify nurseries that follow best practices to ensure plant health and test for the genetic purity of their plants to ensure farmers are getting what they pay for.

Finally, WCR has begun work on regional breeding program for Africa that integrates new selection targets (e.g., CBD, rust resistance, stability, and quality) that will act as the major pipeline for variety development in the region.

Overall challenges

- African countries are much more diverse in their approach to coffee than regions like Central America—there is wide variability in farming systems, use of inputs, access to technical assistance, market access, regulatory environment, and other key factors (see Annex 1). While many coffee buyers tend to view Africa as broad region that offers interchangeability for their sourcing strategy, solutions to productivity problems may necessarily need to take place at the country level.
- Many of the coffee growing regions are in highly populated areas with small farms. Pressure from cities and other agricultural enterprises will continue to increase.
- In almost all African countries, coffee farming is dominated by smallholdings varying in size from half a hectare to 10 hectares per farm. With a few exceptions, smallholdings are generally poorly developed owing to limited profits and lack of access to credit.
- It is impossible to quickly respond to all challenges in this region. They are too numerous and difficult. We must adopt a pragmatic attitude and give priority to those areas we can successfully intervene.

Breeding and Genetics Workshop, held prior to the Coffee Renaissance Summit at the Coffee Research Institute Kenya.

Top from left: Ashenafi Ayano (Ethiopia), Benoit Bertrand (WCR), Christophe Montagnon (WCR), Celestin Gatarayiha (Rwanda), Chrispine Omondi (Kenya), Emma Sage (SCAA), unknown, Joseph Kimemia (Kenya), Hellen Kasalu (Zambia), Samuel Kamau (AFCA), Mario Fernandez (CQI). Middle from left: Rose ___ (CRI Kenya), Gilbert NDUWAYO (Burundi), Paul Mulemangabo (DRC), Tim Schilling (WCR), Caleb Mahoya (Zimbabwe), Ezechiel NDUWIMANA (Burundi), Jane Cheserek (CRI Kenya). Bottom from left: Wambui Waigano (AFCA), Hanna Neuschwander (WCR), Christopher von Zastrow (Starbucks)

Next steps

Over the coming months, WCR will work with AFCA, national coffee research institutes, and the private sector to:

1. Seek country-specific proposals from governments, privates and NGOs on types of demonstration trials to be used.
2. Develop action plans by country, and solicit feedback and input
3. Multiply varieties in sterile conditions and send to acclimatization partner. Obtain soil treatements.
4. Begin execution of demonstration trials in 2016.

Summit attendees

Ashenafi Ayano, Jimma Agricultural Research Center, Ethiopia
Paul Bebbington, OLAM International
Benoit Bertrand, CIRAD/World Coffee Research
Bridget Carrington, Atlantic (USA), Inc.
Nancy Cheruiyot, Coffee Development Fund Kenya
Jeremy Cordingley, Crop Nutrition Sciences
Anneke Fermont, Volcafe, Kyagalani Uganda
Mario Fernandez, Coffee Quality Institute
Celestin Gatarayiha, National Agriculture and Export Development Board Rwanda
Elijah Gichuru, Coffee Research Institute Kenya
Mette Marie Hansen, Dormans
Carol Hemmings, Technoserve
Cyprian Ipomai, Taylor Winch
Cheserek Jerono Coffee Research Institute Kenya
Samuel Kamau, African Fine Coffees Association
Hannington Karuhanga, Savannah Commodities Uganda
Helen Kasalu, Research Zambia
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Ambrose Kirobi, Coffee Management Services, Kenya
Fred Kong'ong'o, East Africa Trade & Investment Hub
Ishak Lukenge, Star Café, Inc.
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Varun Mahajan, OLAM International
Caleb Mahoya, Research Zimbabwe
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Ezéchiel Nduwimana, InterCafe Burundi
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Jane Onoka, International Finance Corporation, World Bank Group
Emma Sage, Specialty Coffee Associaton of America
Tim Schilling, World Coffee Research
Hannington Sebaduka, International Finance Corporation, World Bank Group
Paul Seward, FIPS-Africa
Piet Van Asten, International Institute of Tropical Agriculture
Chrisopher Van Zastrow, Starbucks
Vitalis Wafula, Yara Fertilizer
Lusike Wasilwa, Kenya Agricultural and Livestock Research Organization
George Watene, 4C

Annex 1: Summary of country data

	Farming system	Main varieties	Market sector	Yield (tons/hectare	Farm size	Producers	Processing	Future plans	Challenges
Burundi	Monoculture, open sun with some shade	Arabica Bourbon-type. 6 distributed through extensionists: J2/1257, BM 139, BM 71, Mi 68, Mi 49 and MiBB	21,700 tons, provides 60-80% of foreign export income	Very low	200-300 trees	600,000 smallholders	Fully washed	Double current production by 2021	Soil fertility, extreme yield variability (low/high cycle), very old trees
DRC	Exclusively intercropped (beans, soy, arachide, niebe)	Robusta + Arabica. Main Arabica: BMJ, K16, Hybride Mulungu, Hybride Abyssinie		Very low				Current improvement plan expired in 2015	Pests and diseases; soil fertility; plantation abandonment; lack of financing; farmers mostly male and aging
Ethiopia	Forest, 10% Semiforest, 35% Garden, 50% Plantation, 5%	37 pure lines released, selected from wild genotypes, selected for specific areas	350,000 tons/year. ~200,000 tons exported—30% of export earnings nearly 50% consumed in country 700,000 ha total land in coffee.	.6-.7 t/ha Range: Forest (.25 t/ha) Plantation (.6-1 t/ha)	Very small	20 million people earn livelihood from coffee, (25% of population), nearly all (92%) are smallholders		Maintain 8% agricultural production growth	Deforestation, climate change, declining coffee profitability, low yields, access to inputs, credit, seed multiplication, lack of research funding
Kenya	Open sun	SL 34, SL 28, K7, Ruiru 11, Batian	50,000 tons (down from 130,000 in 1987/88). Mostly exported. Internal consumption growing 2.5%/year 2% of GDP, 8% export earnings, 25% labor force. 110,000 ha under cultivation (down from 170,000 since 2000)	.35 t/ha	2 ha for smallholders (80% of all producers), larger estates (about 3,000 total)	700,000 households earn livelihood from coffee	Generally fully washed	Double production by 2020	Minimal use of inputs, diseases and pests, age of trees and age of farmers

Rwanda	Exclusively mono-culture	BM 139, BM 71, Jackson 2/1257. Some Harrar, Pop 3303/21	16-000- 20,000 tons (55,000 ha total)	.6-.7 t/ha	.5 ha	400,000 smallholders	42% fully washed	"Increase productivity" (no target given), maintain focus on quality	Poor soil fertility, low use of inputs, aging trees, pests and diseases—leaf rust, antestia bug, berry borer
Uganda	Shade, intercropped (banana, legumes)	Robusta (75%)—mostly open pollinated good quality clones. Arabica (25%)—SL14, SL28, KP423, PK162	210,000 tons, nearly all exported 20% export income. 312,000 ha total in cultivation 2% in country consumption	.4 t/ha	.2 ha	8 million (25% of population) earn livelihood through coffee. 1.32 million producing households.	Arabica washed, robusta dry processed	None provided	Low use of inputs, inputs not widely available, lack of credit
Zambia	Large estates, full sun	Catimor (90%), SL28 (10%)	200 tons (down from 6000 in 2002), expected to increase to 2000 in 2017. 30-50 tons internal consumtion	3 t/ha	3 farms 13-20 ha, 1 farm 70 ha, 1 farm 1,300 ha = total area 1418 ha	5 large estates and 0 smallholders in 2015 (from 75 large and 500 small in 2000),	Fully washed	There is no improvement plan for coffee in Zambia	Lack of long-term financing, lack of research, limited irrigation, high labor costs, high fuel cost
Zimbabwe	Monoculture, full sun	Catimor 129 (50%) Catimor F6(40%) SL28 (5%) Yellow and Red Catuai, Costa Rica 95, K7 (<2%)	550 tons 20 ton consumed in country	2 t/ha on large farms .7-1 t/ha on small farms	<2 ha, some 10-100 ha	1000 smallholders, 6 medium (6-10 tons), 3 large farms (20+ tons)	90% fully washed, 10% natural	Increase production to 20,000 metric tonnes by 2032—bring 15,000ha into production (5,000 smallholders, 500 medium scale, 100 large scale farms)	