

# Transforming agriculture in Africa with technology

**The 4R Solution: Transferring a Canadian-made innovation to smallholder farmers in Sub-Saharan Africa**

by **Garth Whyte**, President and CEO, Fertilizer Canada

**Agriculture is the backbone of the African economy. Increased local food production is critical to alleviating poverty and hunger in this mostly rainfed agricultural system in the region. The International Fertilizer Association's (IFA) study shows that Africa is the fastest growing fertilizer consuming market. In 2016, the average application rate was 14 kg/ha and it is forecasted to go up to 22kg/ha by 2022.**

To fertilize effectively and achieve the benefits of an abundant and healthy crop as well as economic return for smallholder farmers and large-scale farms, the 4R Nutrient Stewardship (Right Source at Right Rate, Right Time, Right Place) of fertilizer use is a scientific way of achieving this. 4R Nutrient Stewardship is a Canadian innovation, however, it is easily adaptable to local soil conditions and farming systems, making this project ideal for adoption by smallholder farmers to increase crop yields and profitability.

Apart from economic profitability and crop yield, the 4R Solution also offers a balanced nutrient management decision that meets environmental goals. Nitrogen fertilizer is an important driver of nitrous oxide emissions, but it is also the main driver

of yield in modern high production systems. Through careful selection of nitrogen fertilizer sources, rates, timings and placement practices, the nitrous oxide emissions per unit of crop produced can be substantially reduced, in some cases by up to half. The practices that reduce nitrous oxide emissions also tend to increase nitrogen use efficiency and the economic return on fertilizer dollars.

Farmers implementing 4R Nutrient Stewardship set out goals and indicators to measure progress. This allows for ongoing monitoring of the farms' performance and enables reporting if necessary. The goals and indicators can be changed to respond to specific objectives and concerns and to adapt to local situations.

Besides efficient fertilizer use, smallholder farmers, who provide a majority of the food supply, will need the right resources, technology and training to boost yields. In particular, women, who make up the majority of smallholder farmers, require opportunities such as access to financial services, food storage, effective transportation, knowledge of best practices and a retail system (seeds and fertilizer) to overcome barriers. Studies have shown that when women have the same access to resources as men, their farm yield increases by 30% and reduce global hunger by 17%. At the same time, use of financial and extension services by both men and women closes the gender gap by 80%.

## 4Rs Around the World: The 4R Solution

*"In fact, Africa's smallholders are more than capable of feeding the continent - so long as they boost their yields by using the latest agronomic practices in combination with appropriately adapted seeds and fertilizer".*

Kofi Annan

*"Food and the Transformation of Africa: Getting Smallholders Connected", Foreign Affairs February 2016*

Bringing 4Rs to Sub-Saharan Africa will improve productivity by closing the gender gap and optimizing yields, increase prosperity by enhancing agricultural extension capacity and promote sustainability by decreasing environmental footprint.

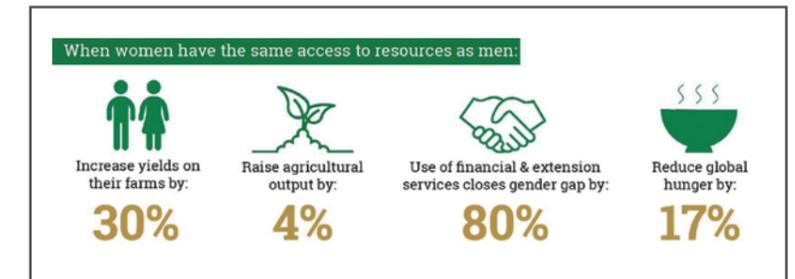
## Leveraging 4R Stewardship with innovative Canadian partnerships and technical expertise

On 9 April 2019 the Hon. Marie-Claude Bibeau, Minister of Agriculture and Agri-Food Canada, launched the 4R Solution Project at a reception jointly organized by Fertilizer Canada and the Canadian Federation of Agriculture in Ottawa, Canada.

Fertilizer Canada, in partnership with the Cooperative Development Foundation of Canada (CDF) and the International Plant Institute (IPNI) Canada, successfully secured CAD15 mn in funding from Global Affairs Canada, for its 4R Solution Project (4R - NSP) in Ethiopia, Ghana, and Senegal. The five-year project will demonstrate how adoption of 4R principles leads to increased income and profits for 80,000 smallholder farmers, 50% of which are women.

"Improving the socio-economic opportunities for smallholder farmers, particularly women, is the core of the Government of Canada's efforts to enhance prosperity in Sub-Saharan countries," said the Hon. Marie-Claude Bibeau, Minister of Agriculture and Agri-Food. "With this project, our government is providing CAD15 mn of funding to bring a Canadian innovation in agriculture - 4R Nutrient Stewardship best management practices - and the development expertise of the Co-operative Development Foundation of Canada to address food security and economic wellbeing of smallholder farmers in Ethiopia, Ghana and Senegal."

The 4R Solution project is an innovative partnership that will leverage Canadian expertise in co-operative enterprise development and gender equality. In partnership with CDF Canada, Fertilizer Canada and IPNI Canada will work alongside technical experts on the shared-value approaches of Canada's world class



(From left to right) Victor Neagu, Co-operative Development Foundation of Canada, Tom Bruulsema, at International Plant Nutrition Institute, Fertilizer Canada's Vice President, Policy and Programs, Cassandra Cotton, Executive Vice President, Clyde Graham, followed by The Hon. Marie-Claude Bibeau, Minister of Agriculture and Agri-Food, Fertilizer Canada's Vice President, Public Affairs, Catherine King, and President and CEO, Garth Whyte

fertilizer industry. The combined expertise will deliver sustainable results in food security and economic growth through a holistic project that takes a gendered approach to production, marketing and financial access for smallholder farmers, particularly women.

The project is built with scale in mind and as such, supports policy and programme engagement with relevant stakeholders at the national, regional and global levels to inform and promote the uptake and scaling up of the 4R approach.

"The shared-value approach reinforces partnerships with local implementing partners, smallholder enterprises, governments, the private sector and academia, said Garth Whyte, President & CEO of Fertilizer Canada. "By the end of the project, it is anticipated that women and men smallholder farmers, co-operatives and other smallholder farmer-owned enterprises will increase the productivity and profitability of targeted cash and food crops. Supported by a policy and extension environment where newly

certified public and private, women and men, and agriculture extension agents, will all have the knowledge and tools required to demonstrate and promote 4R principles."

## Alignment with UN Sustainable Development Goals (SDGs)

The 4Rs were developed in Canada but can be applied to any farming system in the world. 4Rs have proven to not only address the environmental aspect of sustainability, but can also positively impact social and economic aspects such as gender equality (SDG 5) and decent work and economic growth (SDG 8), consequently fulfilling the SDGs such as no poverty, zero hunger, life on land, life on water and partnerships for the goals. The 4R Solution also aims to meet the specific agricultural development priorities in each targeted country by promoting sustainable agriculture development of smallholder farmers through improved farm productivity and profitability. Internationally, good nutrient use and access to quality inputs is a key component of the

UN Sustainable Development Goal 2, which includes a target to double smallholder agricultural productivity, especially for women, by ensuring access to productive resources and inputs such as fertilizer. Regionally, the project aligns with the African Union's 2006 'Abuja Declaration on Fertilizer for the African Green Revolution', which sought to quintuple good fertilizer usage in Sub-Saharan Africa.

#### Gender equality and 4R Solution

A gender-focused 4R Solution pilot project in Kenya, implemented by the International Plant Nutrition Institute (IPNI), reported that 70% of women farmers were positively impacted by the 4R interventions. They showed improvements in their farm yield and income, the increased yield made them food-sufficient and the additional income helped them to attend to other household needs such as school fees and non-farm household items. 4R Nutrient Management tools such as extension materials have been designed to address the low level of literacy among women farmers in Africa in general. Fertilizer application tools have also been adapted so that it takes less time for women farmers to apply the fertilizer in the field giving them the time needed for household activities.

One of the key lessons integrated into the current 4R Solution project is transforming women's capacity to engage in increased sustainable agricultural production and improved farm management. Thus, the project focuses on underlying gender issues such as a decision-making agency at home and in public, access to inputs and peer role models, fundamental literacy and numeracy skills.

In addition to placing special emphasis on improving women's access to financial resources and agricultural technologies, as well as programming to address literacy, gender-based violence and masculinities, the project combines 4R Nutrient Stewardship to improve yields with conservation agriculture to improve climate change adaptation and to reduce land degradation. Conservation agriculture also reduces labour requirements,



making it possible for women to farm more land or have more time to engage in other activities. The project will work to increase representation of women in leadership positions in agriculture extension services and in co-operatives which are in themselves schools for democracy that provide safe spaces for women and men to develop confidence to speak out for their rights in the larger community.

#### Alignment of Government of Canada priorities

The 4R Solution project is a viable means for Canada to help some of the most vulnerable countries mitigate and adapt to the adverse effects of climate change, as well as building low-carbon economies. Developed in partnership with Canadian industry, different levels of government, researchers and farmers, the 4R Nutrient Stewardship framework is a science-based, made-in-Canada fertilizer management system which enables farmers to improve yields and profitability while increasing environmental sustainability.

This project aligns with three pillars of the Government of Canada's Feminist International Assistance Policy, Gender Equality and the Empowerment of Women and Girls, Growth that Works for Everyone and Environment and Climate Action as

well as the Government of Canada's Official Development Assistance (ODA) priorities of Food Security and Sustainable Economic Growth.

Supporting the objective of making Canada the world's second largest player in agriculture, the 4R Solution positions Canada as a leader in climate change adaptation for smallholder farmers. The 4R Solution can also help Canada work towards closing the gender gap in agriculture, which will not only improve the economic well-being of women and girls but can increase yields by 20-30%.

The 4R Solution Project is currently in its implementation phase in Ghana and Ethiopia. Local partners, Government ministries and other international organizations have shown interest, and some are already implementing projects in those countries for potential collaborations. The partnership between CDF Canada and Fertilizer Canada reflects the organisations' commitment to improving food security, promoting climate smart agriculture and supporting the United Nations Sustainable Development Goals. It further supports Fertilizer Canada's strategic goal to achieve official endorsement of the 4R Nutrient Stewardship framework as the Canadian and global standard for sustainable nutrient application and climate smart agriculture. ■



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