

Educating a new generation of African soil professionals

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This policy brief draws on the experience of AGRA's Soil Health Programme, which aims to increase income among African smallholder farmers, improve food security and reduce poverty by promoting integrated soil fertility management practices.

AFRICA'S SOILS are anything but uniform: they vary widely in their chemical, physical and biological characteristics, as well as in their history and current use. Blanket fertilizer recommendations are inappropriate: one soil may be acidic and need liming, while another nearby may be deficient in phosphorus. At the same time, soils have been depleted by continuous cropping and poor management. Erosion and the nutrient depletion are the rule.

Africa lacks the soil professionals and institutions needed to overcome these problems. It needs a critical mass of skilled specialists who understand Africa's soils and are skilled in integrated soil fertility management. They will require the right equipment and institutional setting to do the research and analysis needed to understand, map, diagnose and improve the soils. They must be trained in the right techniques, and provided with the equipment and suitable institutional settings.

Three major types of interventions are required:

- Train soil scientists and technicians
- Strengthen soil institutions and promote research
- Redesign soil curricula.



TRAIN SOIL SCIENTISTS AND TECHNICIANS

Years of neglect of soil-related professions mean that Africa has few professionals who can do research, design and manage projects, test soils, advise farmers, help steer policy and teach the next generation about this fundamental resource. The New Partnership for Africa's Development (NEPAD) estimates that only 2% of Africa's agricultural scientists are in the soil sciences. This matters. It reduces the chances that Africa will be able to reach goals in the areas of food security, climate change, biodiversity and water conservation – all of which are heavily dependent on the soil.

An emphasis on other aspects of agriculture means that university soil departments fail to attract large numbers of talented students. Technicians and extension workers have to learn skills ranging from crop management and pest control to extension methods and marketing. Soils tend to lose out.

In addition, the soil professions, from university faculty to technical staff, are dominated by men. This imbalance is despite the fact that the majority of Africa's farmers are women. It ignores the potential that women could bring to the profession, and creates biases in the subjects researched and the clientele served.

Various types of soil professionals are required. Graduates with PhD and master's degrees are needed to conduct research, identify and solve soil-related problems,

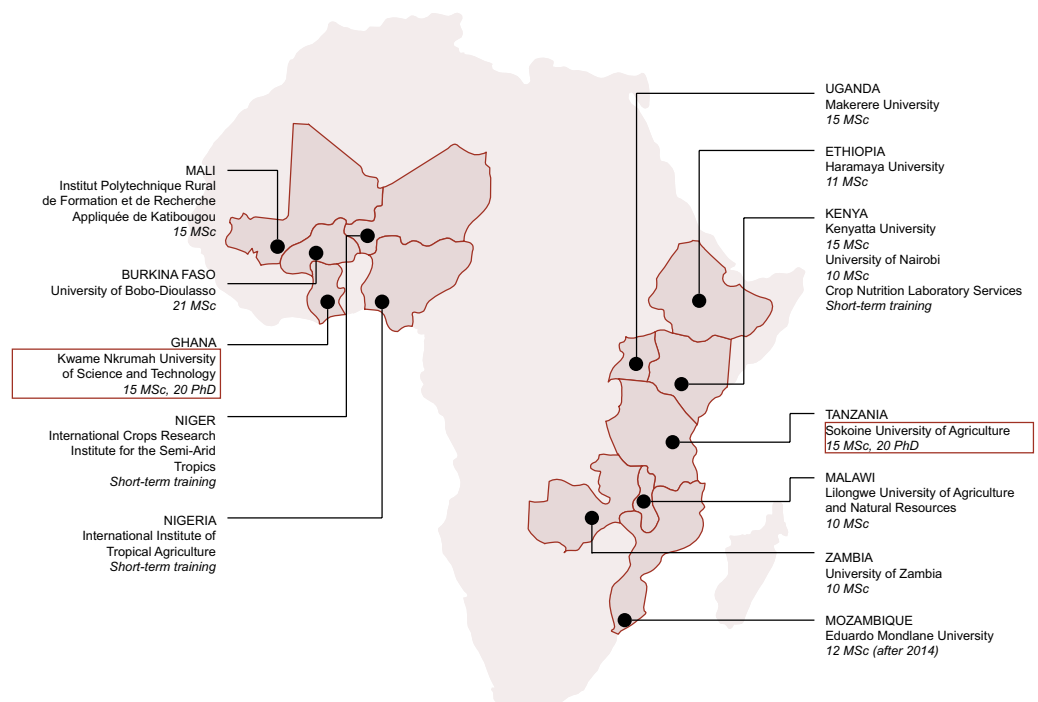
train others, and work on interdisciplinary teams. Graduates in agronomy and general agriculture need to strengthen their skills in soils, especially in integrated soil fertility management. Technicians are required to staff soil laboratories, manage testing services, operate specialized equipment, and advise farmers.

Solutions

Scholarships for soil students Students, especially those from poor, rural areas with a background in farming, may be attracted to soil science but unable to pay for their studies. Targeted scholarships can make the difference. Universities should dedicate funds for scholarships to support qualified students, especially at the master's and PhD levels. They should seek sponsorships from the private sector and other funding sources. They should generate funds to support students by offering and charging for services such as soil analysis and fertilizer advice.

Links with employers Actual and potential employers of soils specialists include extension agencies, input suppliers, regulators and ministries of agriculture. University soil departments should reinforce their links with these employers to help them upgrade existing staff and recruit new personnel. They need to convince these employers of two things: the value of a soil science degree specializing in soil fertility management, and the need to sponsor staff to earn such a degree.

AGRA supported ten universities to train 113 MSc and 40 PhD students in soil science and agronomy. The PhD training was done at two regional hubs: **Kwame Nkrumah University of Science and Technology** in Kumasi, Ghana for West Africa, and **Sokoine University of Agriculture** in Tanzania for Eastern and Southern Africa.



AGRA has helped develop fertilizer regulatory agencies in Ghana (the Plant Protection and Regulatory Services Directorate) and Tanzania (Tanzania Fertilizer Regulatory Authority).



Training hubs Because of the scarcity of skills and the need for specialist equipment, it makes sense for training in soil science to be focused at a few specialized centres in each region or country. These centres can then train staff of other organizations in the region or country.

Two-step training University soil departments can train trainers in integrated soil fertility management, who in turn train their colleagues.

Training extension staff More extension and NGO staff should be trained in soil fertility management. Courses should be designed for young people to give them the skills needed to work in extension or private advisory firms.

Support for women and families Universities and employers should make extra effort to attract women to the field of soil science. They should be ready to offer additional support that female students may require, such as child care and support with accommodation.

Research supervision Students should be encouraged to do research on problems faced by farmers in their home areas. Research sites must be selected carefully to permit effective supervision and ensure adequate institutional support.

STRENGTHEN SOIL INSTITUTIONS AND PROMOTE RESEARCH

Healthy soils depend on strong institutions: university soil departments, public and private soil-testing laboratories, and regulatory services that check the quality of fertilizers.

With ageing equipment and inadequate staffing and supplies, these institutions cannot adequately fulfil their functions. They cannot train students in the required skills; they cannot meet farmers' demand for soil tests and advice on fertilizer applications; and they cannot ensure that the fertilizers that farmers buy meet quality standards.

Solutions

Staff recruitment and retention Soil institutions must recruit and retain qualified staff. A series of measures are needed: increased funding for staff, revised job descriptions, upgrading of existing staff and hiring of new personnel, and a review of pay scales and employment conditions.

Generating resources The institutions should seek ways to generate income, such as by offering soil-testing services and charging clients for test results and advice, or providing short-term training on a fee basis.

Appropriate equipment Soil laboratories must be suitably equipped. For some, that means bringing them up to international standards. For others, it means ensuring they have adequate basic equipment and supplies, speeding up testing services, and

An AGRA-funded project run by Ahmadu Bello University trained farmers as local extension agents in 29 pilot villages in nine states in Nigeria. The focus was on teaching 60,000 smallholder farmer households about integrated soil fertility management.



improving procedures to refer samples to better-equipped laboratories. Staff must be trained in how to operate the equipment and (just as important) how to maintain it.

Research Solving Africa's soil problems will take home-grown research. Universities and research institutes must strengthen their research programmes on soils to find cost-effective ways to solve fertility problems, boost soil organic matter, conserve water and improve yields.

Quality control Effective regulation is needed to ensure fertilizer quality. Regulatory agencies must be strengthened and should work closely with associations of input dealers to ensure quality control. Many national laws and policies regarding inputs exist, but farmers and input dealers are not aware of them. Laws should be translated into local languages, disseminated, and enforced.

Private laboratories Farmers are likely to demand more soil testing and advice on fertilizer applications. The private sector should be encouraged to offer such services. Regulatory agencies should be equipped to ensure that they are offering sound advice.

THIS BRIEF

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REDESIGN SOIL CURRICULA

Soil science curricula at African universities are outdated; they are based on curricula developed in Europe and North America, and are not suited to African conditions. Plus, they neglect relatively recent topics such as integrated soil fertility management, as well as skills such as training and interacting with farmers. Training for extension workers and technicians also tends to neglect soil-related issues.

Solutions

Curriculum revision University curricula should be redesigned to incorporate new concepts and techniques such as integrated soil fertility management, geographical information systems and climate change. They should be expanded the scope to cover previously neglected areas, such as agribusiness and communication and writing skills. Curricula should be shared among institutions across the continent to ensure common standards and to avoid duplication of effort.

Focus on soil fertility Integrated soil fertility management should be an integral part of general agriculture courses. The aim should be for all agriculture students to be familiar with the concepts and techniques it promotes.

Non-degree training It is vital that extension workers, agricultural technicians and school teachers understand how to conserve and manage soil using integrated soil fertility management techniques. The content and duration of courses for such professionals could be standardized within a region to reflect the needs of specific stakeholders. Universities can offer such courses on a regular basis for a fee. Some courses can be put online.

MORE INFORMATION

AGRA and IIRR. 2014. *Investing in soil: Cases and lessons from AGRA's Soil Health Programme*. Alliance for a Green Revolution in Africa, and International Institute of Rural Reconstruction, Nairobi.

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