Access to fertiliser snapshot

Feedback from Christian Aid, Practical Action, Garden Africa and Self Help Africa

We are encouraged that the BBA project is planning to measure and compare the regulations and policies of governments that would address the critical issue of low soil fertility facing most African smallholder farmers. However, we feed that the analysis underpinning the Access to Fertiliser snapshot makes assumptions that are not borne out by recent evidence on soil fertility. It assumes that the only way in which farmers can increase productivity or replenish soils that have been mined of nutrients is through the increased application of synthetic or mineral fertilisers.

Overdependence on synthetic fertilisers has been a significant driver of a number of negative externalities that are now undermining the productive basis of soils and associated downstream ecosystem services and driving climate change. These include:

- Direct reductions in soil resilience (to droughts, floods, etc) through degradation of soil structure and acidification that reduces cohesion (flood vulnerability) and moisture retention capacity (drought vulnerability) and promotes widespread creation of sub-surface hardpans which increase waterlogging risk and limit soil permeability, root growth and thus crop yields
- 30-80% of nitrogen when applied as chemical fertiliser is lost into the atmosphere and groundwater (typically at the higher end in tropical and sub-tropical ecosystems due to the higher temperatures and more intensive rainfall e.g. 77% in India). As well as representing a significant economic loss to small-scale farmers who typically pay many times the developed-world price for chemical fertiliser (e.g. 6 times in Uganda), this increase in reactive nitrogen in the biosphere contributes to climate change through emissions of nitrous oxide, a long-lived greenhouse gas, which makes up 9% of GHG climate forcing (isotope testing has shown that almost all the increase in atmospheric N_2O is derived from chemical fertiliser use).
- Increased nitrogen concentrations in groundwater have negative human health outcomes and creates hypoxic dead zones in downstream fresh and marine ecosystems, which have increased from 10 to 600 locations since 1960, covering over 200,000 km² of coastal fisheries.

Degradation of soil structure through depletion of organic matter that increases outgassing of carbon, especially when temperatures rise, turning soils from carbon sinks to sources of atmospheric carbon.

A number or recent studies have shown that more integrated soil fertility management practices have outperformed chemical fertiliser application in increasing and sustaining crop productivity on soils that were previously nutrient-depleted. These practices have been particularly effective in rain-fed agriculture systems where climates are becoming drier and warmer – which is the case for much of Africa. The results have been especially pronounced among potentially viable low income smallholder farmers in developing countries.

Studies across 198 projects for 360 reliable yield comparisons found that sustainable, agro-ecological modes of farming generated yield enhancements averaging 79%. FAO studies in Malawi and Zimbabwe have shown that techniques such as conservation agriculture incorporating micro-dosing

(highly targeted use of small amounts of chemical fertiliser) increased yields by 175% and returns to labour by 55%. After Hurricane Mitch in Central America, agro-ecological/organic farmers suffered 20-40% less soil loss, reduced recovery time and reduced economic losses. FAO meta-studies of the profitability of organic smallholder production found that they outperformed conventional farming in all cases.

Integrated soil fertility management is defined as a set of soil fertility management practices that include the integrated use of mineral fertilizers, organic inputs and improved germplasms combined with the knowledge on how to adapt these practices to local conditions which are aimed at optimizing efficient agronomic use of the applied nutrients and thereby improving crop productivity.

It comprises a number of practices, only one of which is the judicious application of mineral fertiliser mixes. Other practices include the use of biological processes to enrich soils, intercropping and/or rotation with nitrogen-fixing species, and the application of compost, manure and mulches, which can be procured on the farm, through informal exchange, or on the formal market.

This definition of ISFM emphasizes the need for 'local adaptation' because we need to take into account **variability**:

- between farms, in terms of farming goals, and objectives, size, labour availability, ownership of livestock, importance of off-farm income: and
- in the amount of production resources (i.e. land, money, labour, crop residues and animal manures) that different farming families are able to invest in the fields in their farm.

The ISFM definition places emphasis on the importance of using often scarce resources like fertilizer and organic inputs efficiently while reaching economic goals that are achievable for each farm household[1].

If the World Bank, along the lines of the indicators proposed in the snapshot, were to focus most of its efforts on encouraging governments to deregulate the formal fertiliser sector as a means to promote access to synthetic fertilisers, the most likely outcome would be an uptake in synthetic fertiliser use by the *least* risk adverse farmers – mostly medium to large scale market oriented farmers - with immediate productivity gains. However, experience in more developed agricultural systems have shown that their farming enterprises will become less financially and environmentally sustainable over time given that they will need more fertiliser for the same or reduced yields over time. Continuous fertiliser use will, over time, deplete soil carbon, lead to nitrous oxide emissions, and can result in nitrate pollute of water resources. Conversely, evidence demonstrates that on land with, by default, historically low levels of synthetic fertiliser use, the majority of farmers experience increased and sustained yields when moving to organic fertilisation. These methods not only build soil organic matter for increased and more efficient nutrient uptake, but also improve soil structure for increased nutrient and moisture retention – essential when considering the resilience of smallholder farmers in rain fed dry lands [2]

[1] CAB International, 2012 - Africa Soil Health Consortium: Handbook for Integrated Soil Fertility Management

[2] International Journal of Agricultural Sustainability, 2013 Vol. 11, No. 3, 193 –215, http://dx.doi.org/10.1080/14735903.2012.724925

Even if African governments were to reform the regulatory environment to ensure better synthetic fertiliser distribution and fewer obstacles to imports, the majority of farmers will still not be able to access these. This is because most smallholders are resource-poor and therefore very risk-adverse. They cannot absorb the massive volatility in synthetic fertiliser prices – sometimes doubling from one year to the next – and which are set to continue. A number of studies, validating the experience in our programmes, have found that resource poor farmers make investment decisions primarily based on the *stability* rather than the *absolute value* of input and output prices. Encouraging a more plural approach to fertility, both in terms of extension advice on biological alternatives and local sourcing for decentralised distribution by farmers and agri-dealers would go some considerable way towards increasing productivity, ensuring stable yields, and protecting the environment.

In addition, if encouraged to give priority to these indicators over other reforms, governments will be less inclined to develop and implement regulations, laws and policies that will promote access to fertilisers or soil fertilisation practices that are more environmentally and financially sustainable.

The African Smallholder Famers Group, of which we are members, has developed a framework which sets out indicators to measure how well government policies and regulations enable smallholders to participate in formal markets. It is based on an extensive literature review and our collective experience of working with smallholder farmers in most African countries. We would strongly recommend that the BBA and Deep Dive access to fertiliser indicators incorporate the following indicator questions drawn from our framework:

- Are soil fertility management policies and processes based on evidence of soil nutrient imbalances and/or deficiencies as measured by an effective system of regular soil testing available to all small-scale farmers, their organisations and other relevant technical advisory staff?

- Are incentives available to encourage wider distribution of affordable fertilisers to the poorest and lowest productivity farmers and quality advisory services on their correct application, including micro-dosing techniques?

- Are advisory services on soil fertility guided by (a) appropriate evidence of the relative cost-benefit of different sources of soil fertility enhancement and (b) an appropriate balance between a focus on soil nutrients and a focus on soil structure?

- Does the government allocate sufficient funding for research and extension services specifically aimed at supporting integrated soil fertility management, including catchment level land use planning and the design and implementation of cost-effective soil erosion control measurements that minimise both soil loss in-situ and negative downstream impacts?

- With regards to fertilizer, does the government allocate sufficient funding to the application of the four best management practices, commonly referred to as the 4Rs or four ‘rights’ of fertilizer management: to apply the right source of nutrient at the right rate, at the right time and in the right place to meet crop demand. These 4Rs help to improve the recovery fraction of fertilizer and therefore contribute to improved agronomic efficiency.

- Are climate advisory services available (such as short-term, seasonal and long-term forecasts) that facilitate farmer decision-making on short to long-term soil management measures (from the timing of soil fertility management measures intra-seasonally to investments in long-term soil conservation measures)?

- Are ground and river water monitoring systems in place to provide early warning of excessive leaching of nutrients and facilitate preventive measures aimed at reducing the risk of eutrophication impacts and human health damage downstream?

- Are incentives available to private enterprises and other entities providing integrated soil management services and organic fertilisers to smallholder farmers?

- Are incentives available to support farmers during the transition to and the adoption of agro-ecological practices and techniques to enhance soil structure and nutrition?

- A~~a~~re incentives available to encourage wider distribution and marketing of affordable biological/organic fertilisers and quality advisory services on their correct development & application?

- Are regulations in place to protect soil and promote fertility – ie: preventing burning, promoting contour ploughing, minimum tillage, rotation systems, cover crops & mulching.

- Does the government allocate sufficient funding for research and extension services specifically aimed at supporting integrated soil fertility management?

- Are incentives available to private enterprises and other entities providing integrated soil management services and organic fertilisers to smallholder farmers?

- Are smart subsidies or other incentives available to support farmers during the adoption of agro-ecological practices and techniques to enhance soil fertility?