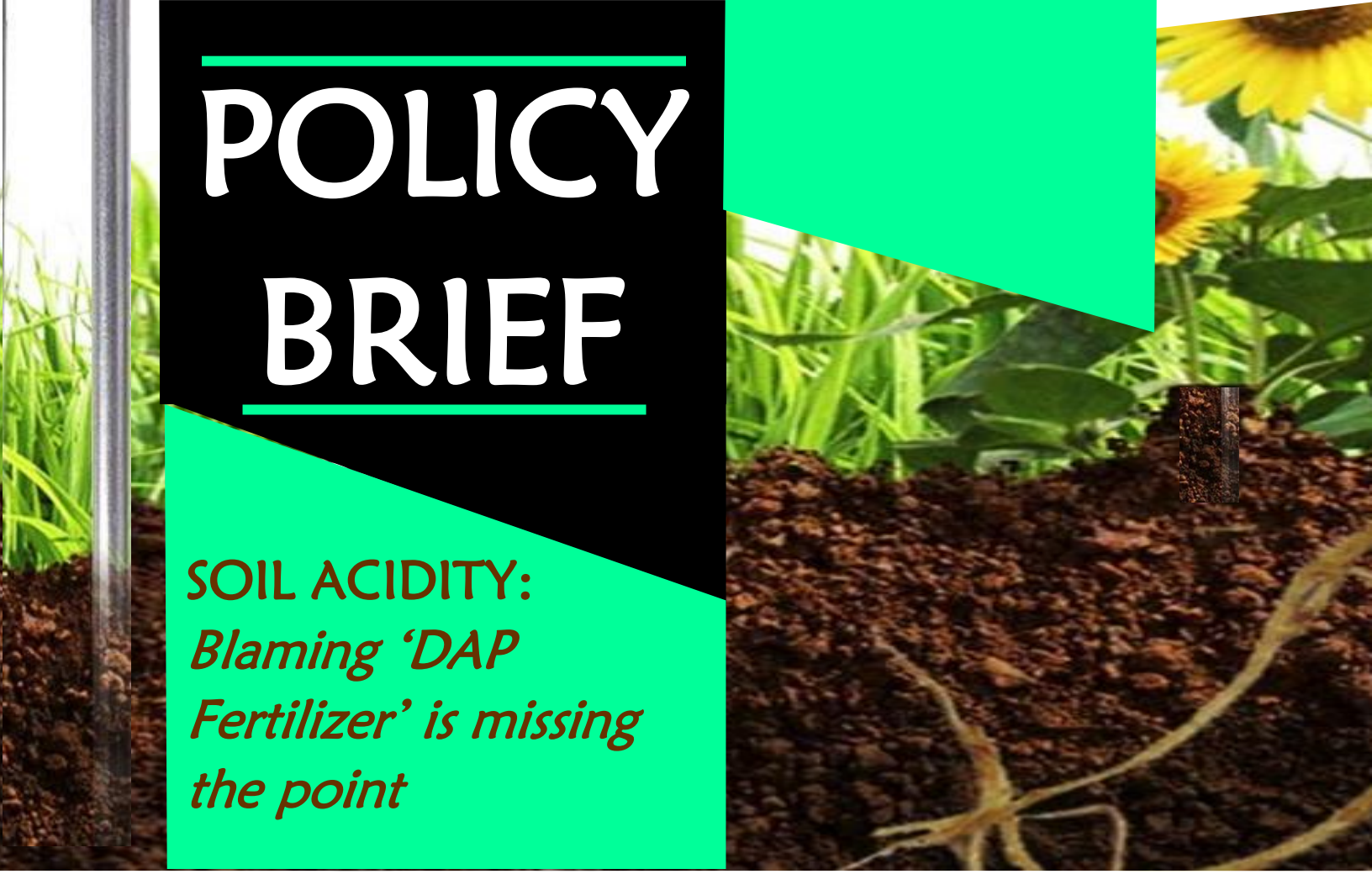


POLICY BRIEF

SOIL ACIDITY: *Blaming 'DAP Fertilizer' is missing the point*

Key Messages

- The over emphasized soil acidification effect of Diammonuim phosphate (DAP) fertilizer is misleading if viewed in isolation of other factors
- The narrative that non-DAP 'fertilizer blends' are less acidifying distorts the truth and farmers who boycott DAP for the lesser available "other brands" only suffer delayed planting
- Information on nutrient composition and quantities in various fertilizer bags is often falsified
- General enforcement of county policies that restrict inclusion of fertilizers perceived to be acidifying in subsidy programs is counter-productive since it is not informed on full disclosure

Soil acidity, a complex that limits crop yield.

Acid soils cover approximately 13% (7.5 million hectares) of agricultural land in Kenya and are associated with the low crop yield particularly in Nyanza, Rift Valley and western Kenya. The government attributes increasing soil acidity to incorrect use of fertilizers but many other factors like soil parent material, rainfall, vegetation, use of ammonium based fertilizer, land and crop management practices all contribute to soil acidity. Unfortunately, Kenyan farmers have been largely persuaded that use of Di-ammonium phosphate (DAP) fertilizer is the sole source of soil acidity. Notwithstanding, given its superiority as source of soil nutrition, farmers have resisted any effort to omit DAP in their crop fertilization regime. In order for the country to achieve the food and nutrition security envisioned through the governments "Big Four agenda', farmers must be empowered with accurate information about causes of soil acidity, effects, and mitigation options. Distorting facts is counterproductive and doesn't help the country's vision on food and nutrition security.

Soil acidity may arise from 'acidic rain', deposition from atmosphere, basic cation uptake by crops, biological processes, mineralization of organic matter and application of acidifying fertilizers such as elemental sulphur, urea, ammonium salts. Different fertilizers have different acidification degree depending partly on the nitrogen source and amount, mode of fertilizer placement, initial soil pH, soil texture, soil carbon, soil buffering capacity, soil moisture, climate or even crop species. Like is the case globally, DAP is Kenya's most widely used phosphorus (P) fertilizer (Figure 1). This fertilizer is made from two common constituents in the fertilizer industry and it is popular because of its relatively high nutrient content and its excellent physical properties.

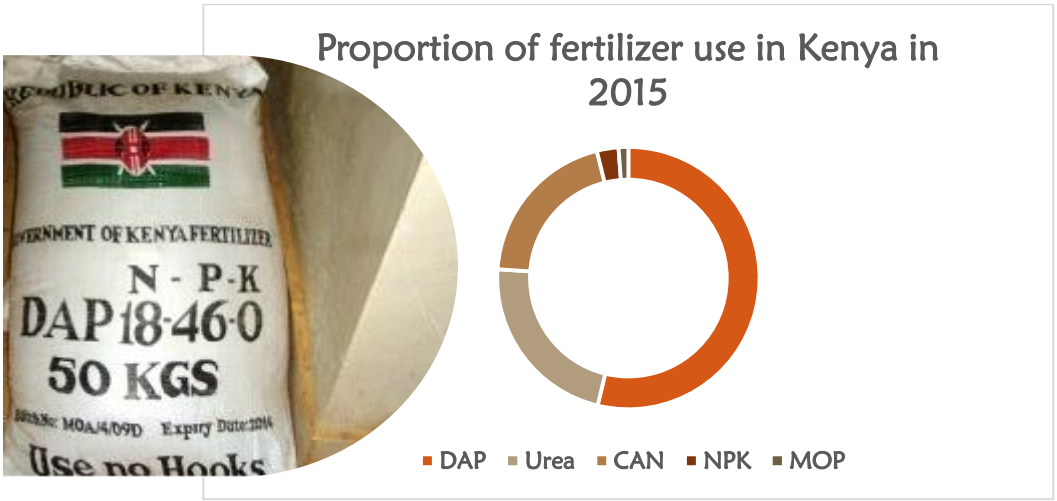


Figure 1. DAP most extensively used fertilizer

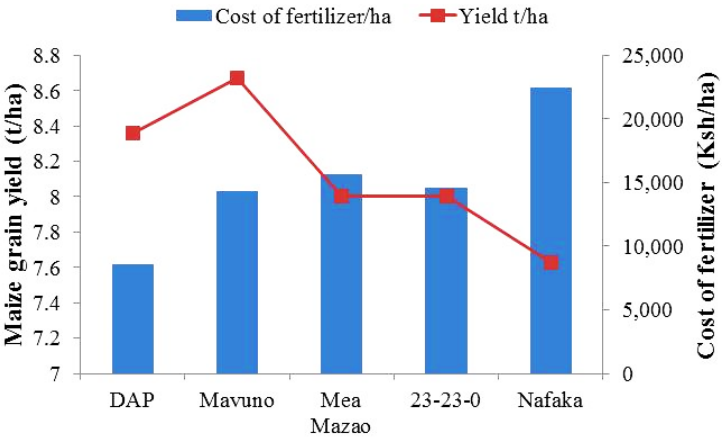
While DAP has potential to acidify, evidence shows that its effects is situation dependent

Research supports that once potentially acidifying fertilizer is applied to the soil, various complex reactions may result to no change, increase or even decline in soil acidity as follows.

- Hydrogen ions (H^+) are neutralized by hydroxide ions (OH) ions in the soil and hence water (H_2O) is formed which returns soil pH into its normal ranges after a short time
- Hydrogen ions (H^+) reacts with Aluminum oxides/hydroxides and increases soluble aluminium ions which results to soil acidification
- If a soil has adequate stable organic matter, less insoluble Aluminium-organo complexes are formed and hence negligible effect on soil pH occurs
- If soil has high clay content, the resistance to change is high which results into no or negligible changes in soil pH

Perhaps owing to the misinformation that application of DAP *per se* leads to soil acidification, there has been an upsurge of "less acidifying fertilizer blends" which are perceived as a possible solution to soil acidity. The downside is that the cost of fertilizer blends is often 50 -75% that of DAP on hectare basis of maize while the latter in most cases contribute to superior yields (Figure 2). Moreover, the increasingly popular fertilizer blends are composed of a mix of acidifying fertilizers which may results to soil acidification and non-uniformity in acidity correction. Further, the extra nutrients in the blends may be available in in the soil leading to unnecessary cost.

Figure 2. Cost of DAP per hectare is the lowest relative to the fertilizer blends while it supports significantly higher yields



Rather than condemn DAP and assume that fertilizer blends are the cure to soil acidity, the choice of fertilizer should be anchored on return to investment. An integrated approach that considers that DAP is the cheaper source of P is more sustainable if supported by the following:

Building up soil organic matter – Embracing conservation agriculture that ensures soil surface protection against erosion and accumulation of organic matter in form of crop residues or living ground cover

Use of fertilizer blends with "less acidification potential"

Combined use of lime and fertilizer – there are reports of 3 fold net benefit when lime is added to DAP compared with where fertilizer blends are applied alone.

Figure 3. Liming in combination with DAP has significantly higher benefits than fertilizer blends

Key Recommendations

- Promote and facilitate land management practices that build up soil organic matter such as conservation agriculture (CA)/integrated soil fertility management (ISFM).
- Invest in a basket of options/recommendations for correcting nutrients limitations and soil acidity while cognizant of natural factors and economic considerations.
- Invest on soil mapping targeting small geographical areas *e.g.* wards and identify limiting nutrients and soil acidity levels.
- Review and develop county level supporting policy regulation and institutional framework for fertilizer blends production and use.

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