

# FARMING-SYSTEM SPECIFIC EXTENSION CONTENT FOR ENHANCING CLIMATE CHANGE ADAPTATION AND RESILIENT FOOD SYSTEMS IN SORGHUM-BASED DRYLAND FARMING SYSTEMS OF TANZANIA AND BURKINA FASO

## FERTILIZER MICRO-DOSING

### CLIMATE CHANGE ADAPTATION AND RESILIENT FOOD SYSTEMS ISSUE

Poor soil fertility is the single biggest cause of hunger in Africa. However, smallholder farmers use very little manure, and less so, the recommended inorganic fertilizers. For the latter there are no location specific fertilizer recommendations which results in either over utilization, under-utilization or application of an inappropriate fertilizer. Because most of these are resource poor, wasteful or inappropriate fertilizer utilization makes these farmers worse off. In drier regions, farmers are also concerned about application risks.

### ESSENTIAL TECHNICAL INFORMATION

Poor soil fertility is the single biggest cause of hunger in Africa, however, smallholder farmers use very little manure, and less so, the recommended inorganic fertilizers. This is largely due to the inappropriateness of the fertilizer recommendations which are very high and unaffordable to the majority of smallholders. In drier regions, farmers are also concerned about application risks. The fertilizer micro-dosing technology deals with the application of small quantities of fertilizers in the planting hole, about 10 kg N per hectare which results in increasing fertilizer use efficiency and yields while minimizing input costs. Combining micro-dose fertilizer with animal manure in the same hole improves further crop productivity. In drought years, micro-dosing also performs well, because larger root systems are more efficient at finding water, and it hastens crop maturity, avoiding terminal drought. Recent research found that solving the soil fertility problem unleashes the yield potential of dryland cereals.

As a result of previous projects carried out by ICRISAT and partners such as the Alliance for a Green Revolution in Africa (AGRA) Microdose Project, some 25,000 smallholder farmers in Mali, Burkina Faso and Niger obtained 44-120% more yield in sorghum and millet, along with a 30% increase in family incomes. As a result, many farmers and producers agree that fertilizer micro dosing is relevant and profitable. However, a major constraint in using the technology is that it is labor-intensive and time-consuming making its use unsustainable for some smallholders.

The high cost of inorganic fertilizer relative to the income of small-scale farmers and the risk associated with its application in drought-prone areas are the major constraining factors for fertilizer use in sorghum-based farming systems, justifies the need for small amounts of fertilizer as opposed to high dosage which would have been the case for more conducive environments.

Figure 4 illustrates very well the advice on micro-dosing from the International Crops Research Institute for Semi-Arid Tropics (ICRISAT).

Figure 4. Steps in the application of fertiliser micro-dosing. (Adopted from ICRISAT)

## How to Use Small Quantities of Nitrogen Fertilizer

You received 25kg of Nitrogen fertilizer for use during this cropping season. This pamphlet describes the best way to use this fertilizer.

### Why apply nitrogen fertilizer?

- It makes crops grow and mature faster
- It reduces the effects of late planting
- It increases grain yields

### Which crops should be fertilized?

- You can apply fertilizer to any crop. The best is to put it on your main cereal crop, ie maize, sorghum, or pearl millet.
- Fertilizer can be applied on any field, whether or not you have applied basal fertilizer, manure or anthill soil.

### When to apply fertilizer?

- Apply nitrogen fertilizer when the crop is at 5 or 6 leaf stage. At this stage plants will be about knee height to an adult.
- You can apply even slightly later, but it **must** be applied before flowering.

### How to apply fertilizer?

- Take a beer bottle cap and fill it with fertilizer. This is a very small quantity, but it is still enough for 2 to 3 plants.
- Do not broadcast the fertilizer –apply it carefully near the base of each plant, as shown in the picture. In this way, all the fertilizer goes directly to the plant and nothing is wasted.

### Should you apply fertilizer on dry soil?

- No –if you apply fertilizer to very dry soil, it will not work properly. Wait until there is some rain and the soil is wet.

### Should you use manure?

- Manure and fertilizer, both are important.
- If you have already applied manure or anthill soil, and later you apply fertilizer as well, yield will be even higher.



### What type of fertilizer to use?

- There are different types of nitrogen fertilizer, eg Ammonium nitrate (AN), Calcium ammonium nitrate (CAN), and Lime ammonium nitrate (LAN).
- All three are very similar, and should be applied in the same way. Only the quantities will be slightly different, as shown in the table below.
- Urea is another type of nitrogen fertilizer. After applying urea, you **must** add soil on top, to cover it. Covering is not required for AN, LAN, or CAN.

### Application rate for different fertilizers

	AN	LAN / CAN	Urea *
Nitrogen content	34%	28%	46%
Application rate	1/3 beer cap per plant	1/2 beer cap per plant	1/4 beer cap per plant

\* Cover with soil after applying urea

This pamphlet was developed by ICRISAT after testing the microdosing method extensively with farmers in several districts.

For more information, consult your local ARES officer

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