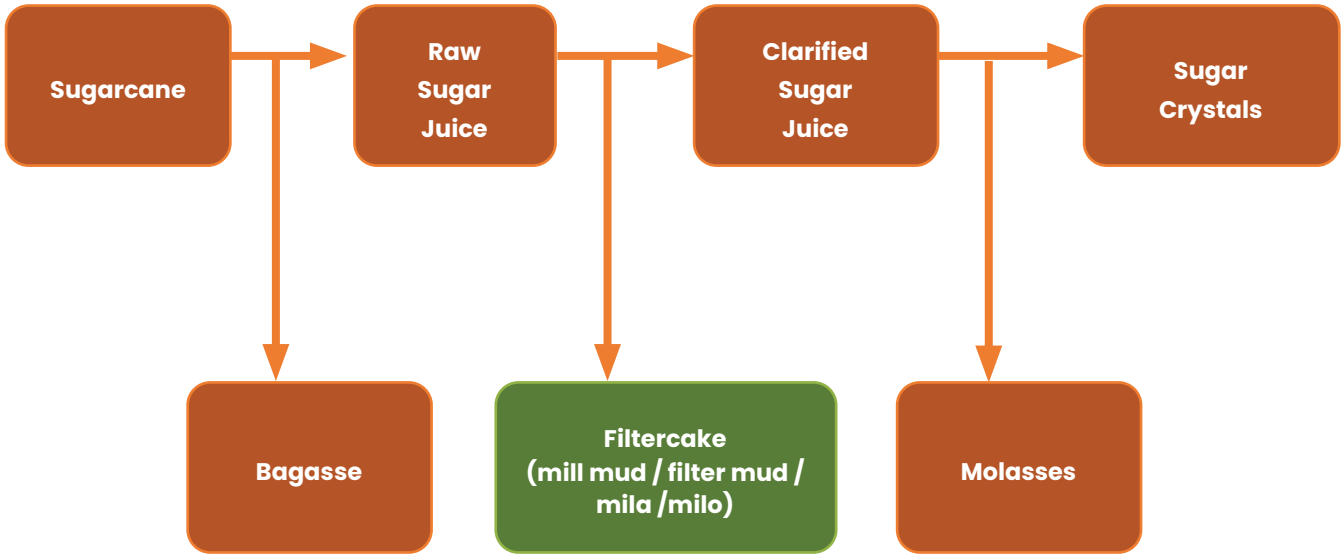
# Information Sheet

## 7.17 Nutritional amendments: Filtercake

*During the milling process, three types of organic material are produced as byproducts, namely bagasse, filtercake and molasses. Filtercake (also known as mill/filter mud, mila and milo) is a cake-like product rich in nutrients. As a result, filtercake can be applied to soil to improve soil health and offset nutrient additions.*




Depending on the milling process, filtercake can contain a range of the following components:

- 65 – 75% moisture content when fresh
- 15 – 30% fibre
- 5-15% crude protein
- 5 – 14% crude wax and fat
- 2 – 5% sugars
- 9 – 20% ash content (mineral components).

However, filtercake's widespread use is constrained by its bulk (high moisture content when fresh) and the high cost of transportation. It is therefore mainly used on farms within cost-effective lead distances from the mill (typically less than 10 km).

## Filtercake as a fertiliser

The nutritional composition of filtercake is affected by a number of variables, namely:

- the amount of soil or other contaminants in the sugarcane delivered to the mill;
- whether the sugarcane was burnt or harvested green;
- the sugarcane variety;
- the nature of the milling and clarification process; and
- whether it is mixed with fly-ash or composted.

Due to the moderately high P content, filtercake is used mainly as a source of P-fertiliser, typically applied in the furrow at planting. However, since filtercake is usually applied in large quantities (often more than 100 ton/ha), the crop will also benefit from the other recycled nutrients (such as N, Ca and some micronutrients), which can be used to offset inorganic fertiliser costs in the nutrient programme.

Some caution must be applied as sucrose % may be lowered following the application of filtercake, as the N is released gradually which can delay ripening. For this reason, growers should consider applying filtercake long before planting cane (e.g. before a green manure crop is established). It is therefore recommended that, where filtercake is used, the nutrient amounts of the applied filtercake must be known so that inorganic fertiliser can be reduced accordingly. Analysis of filtercake can be done by submitting samples to the FAS Agricultural Laboratory at SASRI.

The N:P:K ratio of filtercake is seldom ideal for use in sugarcane on its own. Filtercake with an average dry mass composition of 1.6% N, 1.0% P and 0.3% K is the equivalent of a 5:3:1 fertiliser mixture. Therefore, one ton of filtercake with a moisture content of 65% contains about 5 kg N, 3 kg P and 1 kg K. The typical nutrient rates for a 30 t/ha (at 65% moisture) application are given in the Table 1.

Table 1: Typical nutrient composition of dry filtercake (%) and 30 ton/ha application of filtercake with 65% moisture (kg/ha).

| Constituent | Dry filtercake composition | 30 ton/ha application with 65% moisture |
|---|---|---|
| Filtercake as a % of cane | 3.8% | |
| Total C % (mainly fibre, sugar & waxes) | 38.0% | |
| C:N ratio | 28.3 | |
| Total N % (as protein) | 0.71% | 75 kg/ha |
| P (%) | 0.86% | 90 kg/ha |
| K (%) | 0.29% | 30 kg/ha |
| Ca (%) | 2.67% | 280 kg/ha |
| Mg (%) | 0.50% | 53 kg/ha |
| S (%) | 0.15% | 16 kg/ha |
| Si (%) | 2.33% | 245 kg/ha |
| Zn (mg/kg) | 125.0 mg/kg | 4 kg/ha |
| Cu (mg/kg) | 70.8 mg/kg | 2 kg/ha |

In most situations, a 30 t/ha application will supply sufficient P for several seasons. Because the P is associated with organic material, the extent of P binding (P-fixation) to soil minerals is also reduced, thus improving availability for crop uptake. In the case of N, a single application is likely only to supply enough for that season. However, not all N is immediately available due to the initial slow decomposition of organic fertilisers. As such, filtercake acts as a type of slow release N fertiliser, reducing losses often associated with high rates of inorganic N-sources. Therefore, if filtercake is to be used as a fertiliser in the plant furrow, then the quantity to be applied should be guided by the amount of N to be applied. Potassium is generally the only supplemental inorganic fertiliser required to balance the supply from the filtercake.

## Balancing the nutrient supply

It is essential that soil sampling for fertility analysis as well as analysis of the filtercake be undertaken to allow for the balancing of inorganic and organic fertilisers. Table 2 demonstrates how to balance the nutrient requirement.

Table 2: An example of inorganic fertiliser requirements to offset the nutrient supplied from composted filtercake.

| | N (kg/ha) | P (kg/ha) | K (kg/ha) |
|---|---|---|---|
| FAS soil test fertiliser recommendation (required) | 120 | 30 | 125 |
| 30 t/ha composted filtercake analysis (65% moisture) | 75 | 90 | 30 |
| Amount of nutrient required to balance using fertiliser | 45 | None required | 95 |
| Consider topdressing with: | Urea at 100 kg/ha | None | KCl at 200 kg/ha |
| | 2:0:3 (49) at 250 kg/ha | | |

In this example, P supplied from the filtercake is sufficient to meet the requirements of the plant, and several ratoon crops. Where filtercake is broadcast and incorporated before planting, about twice the in-furrow P-rate will be required to compensate for increased P fixation. Composting and ageing of filtercake tends to increase the nutrient content on a dry basis and greatly improves the C:N ratio (which ideally should be <20). Therefore, analysis is required to ensure proper nutrient balances are maintained.

## Filtercake as a soil conditioner

Decomposed and composted filtercake can also act as a very effective conditioner of hard-setting duplex soils and shallow grey soils. Vertical mulching with filtercake to a depth of 45 cm in the planting row following minimum tillage can result in significantly higher yields and an increased number of ratoon crops). The main benefit appears to be the aggregating of soil particles resulting in a fourfold improvement in the water infiltration rate of the soil. Additional benefits include:

- improved water storage and cation exchange capacities;
- an increased potential for nitrogen release;
- lower soil bulk density; and
- increased rooting depth.

Soil acidification is also a common problem in rainfed regions of the sugar industry. Filtercake is often alkaline and is a useful source of Ca and humic acids which help to ameliorate acidity and Al toxicity. In saline/sodic soil conditions, the incorporation of filtercake at a rate of 350 tons/ha (2 to 5 ton Ca/ha) to a depth of 300 mm has been used successfully to leach out excessive levels of harmful sodium salt from the topsoil.

## Other impacts

- Nematodes: This effect is temporary and of limited value. Filtercake is not an alternative for nematicides. However, when used in the plant furrow to conceal the cane set it will protect the initial set roots from excessive nematode damage.
- Moisture: under rainfed conditions, fresh filtercake from the mill can be used for winter and early spring planting as its high moisture content (±70%) protects the seedcane from desiccation. Filtercake from on-farm storage piles might contain less water.
- Ratoon chlorosis: To reduce the risk of ratoon chlorosis in cane growing on neutral to alkaline soils or very sandy soils with low buffer capacity, do not apply high pH filtercake produced by factories where refinery filtercake (high in calcium carbonate content) is mixed with mill filtercake, or filtercake containing fly ash.

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