

## Filter Mud/Ash—

### *Getting value for your investment*

The mixture of filter mud and ash is a valuable soil conditioner and an important source of plant nutrients. The benefits to growers are greatest when the product is spread evenly and when normal fertiliser programs are adjusted to reflect the nutrient content of mud/ash.

Filter mud is the material remaining after cane juice is clarified and filtered. It contains soil that enters the factory with the cane supply plus organic material in the form of sugars and bagasse particles

plus lime used during the clarification process.

Ash is the material remaining after combustion of fuel in mill boilers. Bagasse is the major fuel used.

#### **Application**

Application rates to cane land are usually between 100-200 wet tonnes per hectare. The average for NSW is around 150 wet tonnes per hectare (11 to 12 loads per hectare).

Rates of 100 to 150 wet tonnes per hectare are recommended where the material is required for its fertiliser value. Higher rates are often used where the primary aim is to improve soil structure and water penetration.

Most mud/ash is applied to fields before crops are planted. It is preferable to



A tractor drawn spreader being used for wet weather application of mud/ash.

incorporate the material into the soil as soon as possible after spreading to minimise the potential for loss of nitrogen to the atmosphere.

Applications to ratoons are also effective. Contractors can fit a deflector to spreader trucks to direct mud/ash away from emerged cane shoots.

The material can be stock piled if weather conditions prohibit spreading. These piles should be sited away from watercourses and drains to prevent offsite movement of nutrients. Preliminary investigations of all-weather spreading equipment are being undertaken in NSW.

### **Water content**

One hundred wet tonnes of mud/ash is approximately equivalent to 25 tonnes of dry material. The high proportion of organic matter in mill mud gives the product a high water holding capacity, but the water content is variable, often causing spreading and stockpiling problems.

### **Nutrient content**

Rates of applied nutrient for a typical application of 150 wet tonnes mud/ash per hectare are shown in Table 1. These rates have been calculated from the average nutrient content of a limited number of mud/ash samples collected from Broadwater, Harwood and Condong mills in 1997. However, the composition of mud/ash may vary considerably throughout the season.

Some of the nitrogen and sulfur in the mud component are in an organic form and are therefore not immediately available to the crop.

**Table 1. Approximate rates of nutrient (kg/ha) when mill mud/ash is applied at 150 wet tonnes per hectare.**

Nutrient	Application rate (kg/ha)
Nitrogen	245
Phosphorus	165
Potassium	320
Sulfur	50
Calcium	605
Magnesium	260
Copper	1.2
Zinc	4.4

*Calculated from data of Barry et al. 1998*

### **Nitrogen**

Reduce Nitrogen fertiliser by the equivalent of 150 kg of urea per hectare for the first crop after mud/ash application. The value given in Table 1 is based on the total nitrogen content. Much of this is in the form of organic nitrogen, and this is not all immediately available to the crop. About 25-30% of the nitrogen is available to cane in the first year. An application of mud/ash at 150 wet tonnes per hectare will supply about 60-75 kg nitrogen per hectare in the first year. This is equivalent to 130-160 kg urea per hectare. The remaining nitrogen becomes slowly available as the organic material is broken down in subsequent years.

Because of the capacity of the mud/ash to release nitrogen over time there is a possibility of continued nitrogen supply during the ripening period when it is not required.

### **Phosphorus**

Phosphorus is not required for seven years after mud/ash application in most circumstances. Typical rates of phosphorus applied in planting mixtures are in the 20-80 kg/ha range depending on the phosphorus status of the soil.



When this is compared with the phosphorus applied in mud/ash (Table 1) it is apparent that more than enough phosphorus for one crop cycle is supplied. Analyses of soil samples from blocks receiving repeated applications of mud/ash have shown very high levels of available phosphorus. Use soil analysis to determine when to recommence P applications.

### **Potassium**

Sufficient potassium is supplied for the first crop after the year of application.

### **Sulfur**

The total amount of sulfur applied is more than enough to meet the crop requirement. The annual crop removal is about 30 kg S/ha.

### **Calcium**

The amount of calcium applied is equivalent to the calcium in 1.6 tonnes of agricultural lime (Table 1). However, the effect of mud/ash on pH is not as marked as that from lime (see below) and not all of the calcium is immediately available.



Top: Conventional mud/ash spreading (works well in dry weather).  
Below: wet weather conditions necessitate reloading from stockpiles.

### **Magnesium**

Mud/ash contains significant levels of available magnesium.

### **Effect on soil pH**

Mud/ash has a small 'liming effect'. This arises mainly from the ash component and from lime used in the juice clarification process that produces the filter mud. The effect of mud/ash on the pH of a very sandy soil is shown in Table 2. Mud/ash application to loam and clay soils will result in smaller pH increases than shown in Table 2 (over page).

**Table 2. A comparison of mud/ash (120 wet tonnes/hectare) and lime (4.5 tonnes/hectare) applied to a sandy soil with initial pH 4.7.**

Years after application	Increase in pH	
	Mud/ash	Lime
1	0.4	1.6
2	0.3	1.2
3	0.2	0.9
4	0.2	0.8
5	0	0.7

*Data from Kingston and Aitken 1996*

### Effect on soil physical properties

The material will improve soils with poor physical conditions as it contains substantial quantities of calcium and organic matter. Both of these components have a beneficial effect on soil structure. An application of 150 wet tonnes/hectare supplies calcium equivalent to 3 tonne of gypsum/hectare.

Both the organic matter and ash in mud/ash will improve the soil's water holding capacity. This will be of benefit on very sandy soils in dry periods. Water penetration will also be improved by mud/ash application.

### Is the use of mud/ash sustainable?

The repeated use of mud/ash on many blocks close to the mill has led to very high levels of available phosphorus in the soil. High phosphorus in soil may reduce the availability of other nutrients and may adversely impact on aquatic environments if it is carried into them during storm run-off.

In most cases, heavy metal concentrations in mud/ash are similar to or lower than exist in farm soils and are therefore of no concern. Although zinc and cadmium levels in mud/ash are somewhat higher than soil concentrations, the inputs are relatively small and, in the case of cadmium, are similar to those from phosphatic fertilisers at normal application rates.

To ensure mud/ash recycling is done in a sustainable manner mud/ash should be distributed as widely as possible within a mill area. In addition, application rates need to take into account the nutrient and heavy metal loadings on the soil. Treatment of blocks with mud/ash once every five to 10 years would be an appropriate frequency and this should be confirmed by routine soil analysis.

### The bottom line

Filter mud/ash improves cane yield in most situations. It acts as a soil conditioner and supplies part or all of the nutrients for the next and subsequent crops. Evaluate your own situation using the above information. Use soil analysis and recover part of your investment in mud/ash by reducing your normal fertiliser program.

*Further Information:*

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