Information Sheet

4. HUSBANDRY

4.7 The pros and cons of trashing or burning at harvest

The practice of burning sugarcane before harvesting is widespread. The main reason for this is to eliminate excess trash to improve harvesting, handling and milling efficiencies of the cane. However, there are a number of disadvantages to burning, such as poorer soil and moisture conservation, the public nuisance of smoke and soot, and possible pollution and health hazards from cane fires.

The decision whether to burn or trash at harvest therefore demands a careful assessment of the pros and cons in any particular situation. In South Africa, the negative environmental effects of burning have been recognised, and industrial guidelines incorporating a code of practice have been formulated (see SASRI Information Sheet No. 4.8). In essence, this suggests that fields in sensitive areas should be trashed, and that all other fields should be mapped for burning or trashing according to agronomic/economic factors. A number of factors influence the occurrence and magnitude of any benefit from trashing discussed below.

Crop yield

Effects of a trash blanket on the crop include slower initial growth and tillering, and a lower peak population of taller and thicker stalks. The final population (at harvest) is not affected. Conversely, burning allows for faster ratooning and the development of a higher peak population of shorter and thinner stalks. Less lodging can therefore by expected from trashed cane but this has not been proved as yet.

Responses to a trash blanket

These are influenced by factors such as rainfall, season of harvest, variety, aspect, altitude and soil type. On the coastal lowlands, an average increase in yield of 11% or 9 tons cane/ha/a was measured over a wide range of conditions. These include the comparison between burning and non-burning of residues and the removal of burnt residues. These conditions simulate the field practices of burning at harvest, windrowing and re-burning any left over residue. The latter practice is now seldom followed in the sugar belt as results from the oldest cane trial in the world (BT1 at SASRI) indicated that a full trash blanket will have a 2,4% or 2 tons cane/ha/ an benefit over burnt cane with singed tops left scattered.

Responses to burnt tops left scattered

Where the crop residue (singed tops) are left as a mulch after harvest, cane yields are on average improved by 7 tons cane/ha/a compared to instances where all the residues were removed. In addition, soil capping (crust formation) and erosion were significantly reduced under mulched conditions. All residues retained after burn at harvest normally cover

between 60% to 90% of the surface depending on the yield obtained. Surface cover might be as low as 10% during a drought. A cool burn will also yield more residue to cover the surface. Table 1 summarises the response of burnt cane and either all residues removed or retained relative to green cane harvesting.

It is clear from the Table that the largest responses to a full trash blanket will occur under dry conditions in summer and the worst under wet conditions in winter. The smaller difference in yield response between trashed and burnt cane with the tops retained compared to where all residues were removed is also shown.

Factors affecting burning and trashing

Crop quality

Unburnt cane that was well de-trashed will result in a better cane quality as compared to burnt cane. However, if not de-trashed cleanly (as is often the case) the extraneous matter is likely to result in a higher fibre value for trashed cane.

Crop deterioration

Deterioration (loss of pol %) of burnt cane after cutting is faster as compared to trashed cane. Quantitative data is available only for hot, summer conditions when the rate of pol loss per day for burnt cane (2,3%) was about 40% higher than for trashed cane (1,6%). The rate of pol loss under cooler conditions is slower.

Payloads

Payloads from well-trashed cane are no different than those from burnt cane. However, poorly trashed cane can reduce payloads by up to 33%, and this may be a decisive economic factor. This applies to both field-to-zone and zone-to-mill transport.

Harvesting costs

These may be increased by as much as 45% by trashing as opposed to burning. This has to be offset against the expected increase of 2 to 9% in stalk yield. Management plays a crucial role in both harvesting rates and payloads that are achieved.

Conservation

Trash conservation reduces soil and water losses from cane fields, particularly on steep slopes. Crusting, reduced water infiltration, erosion and loss of soil organic matter and biological activity are associated more with burning than trashing. Quantifying these effects is difficult. However, on a Waldene soil (11% slope) trash prevented 90% of the rainfall loss and more than 60% of the soil loss that occurred from bare soil over six months.

Weed control

A good trash blanket can suppress weed growth completely although more commonly, some weeds escape and need to be treated with herbicide. Costs may vary from 0 to 100% of those on burnt fields, but would usually be about 45% of the costs of weed control under burnt conditions.

Ratoon chlorosis

Ratoon chlorosis, which occurs on alkaline sandy soils, can be severely aggravated by a trash blanket. Treatment with a 10% ferrous sulphate solution alleviates the problem without affecting yields. However, in untreated areas, yield reductions of as much as 20% can occur.

Trashworm

This pest is more likely to occur with a trash blanket, but may also occur in burnt fields. Yield effects have been simulated and reductions of up to 10% recorded. Normally yield loss due to this pest is not significant.

Eldana

Burning is recommended where new outbreaks of eldana have occurred or where heavy infestations occur in severely droughted cane. Ensure good field hygiene by not leaving stalks in the field and ensuring that cane is cut at the soil surface.

Table 1. Relative yield response of cane burnt (B) with all residues removed (to) or retained (t) relative to cane trashed (T) at harvest.

Climatic condition	Spring and Summer		Winter	
	T/Bto	T/Bt	T/Bto	T/Bt
Dry	13%	6%	-	-
Average	10%	5%	4%	-1%
Wet	1%	-1%	-15%	-13%
Bto = Burnt and tops removed			Bt = Burnt and tops retained	T = Trashed

Wind

Wind is a problem due to the difficulty of controlling fires, and also due to trash being blown into unwanted areas (i.e. houses) leaving bare patches in the field.

Power lines

Cane fires cause flashovers, and cane should be flattened before burning under power lines. Good communication with electricity suppliers and early notification of intended fires will avoid many of the problems.

Factory criteria

Work at two specific mills has shown that 1% trash in cane delivered to the mill will:

- reduce extraction by 0,44%.
- reduce purity by 0,33%.
- increase clear juice colour by 3,6%.
- increase clear juice turbidity by 4,2%.
- reduce crushing rate by 2,2 to 3,0%.

Summary

Rainfall and the season in which the crop is harvested, are two factors in a potentially long list that determines the response of sugarcane to trashing. Crops harvested in winter and followed by an above normal rainfall are likely to produce less cane than cane burnt at harvest and all residues removed. On the other hand, cane harvested in summer followed by below normal rainfall (especially during the first six months after harvest) is likely to show the highest yield response where trashing is practised. This coincides with the period before canopy closure where the difference (in terms of soil water content and temperature) between uncovered and covered (trashed) soil surfaces is likely to be the largest. Trashed fields will outperform others when a dry spell is encountered in this period.

Burning

- Cutter output may be increased by an amount varying from 0 to 80%, depending on the state of the crop, the method of handling and the standard of management.
- Payloads may be increased by an amount varying from 0 to 33%, depending on the state of the crop, the method of handling and the standard of management.
- Damage due to trashworm can be minimised.
- May be necessary where eldana infestation is heavy.
- Sugar quality, particularly in terms of colour, will be better.

Trashing

- Yields can be improved, especially in dry years.
- Deterioration losses due to delays between burning and harvesting, and long delays between harvesting and crushing, can be reduced.
- Chemical, manual and mechanical weed control costs can be avoided or kept low.
- Damage to power lines is avoided.
- Soil and water conservation are improved.
- Pollution due to smoke, smuts and herbicides can be reduced and, in some cases, totally eliminated.

References for further reading

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Van Antwerpen R, Meyer JH and Thompson GD (2006). The impact of trashing on yield response in the South African sugar industry: A summary of results from several BT trials. *Proc S Afr Sug Technol Ass* 80: 130-133.

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