Information Sheet

14. SOIL SUSTAINABILITY

14.4 Infield traffic management

Introduction

Too often yield loss is attributed to soil compaction when the problem is stool damage. It is important to differentiate between these two causes of yield loss. Soil compaction refers to the closer arrangement of soil particles due to external forces. This results in less space between soil particles for water storage and root development. Stool damage results from vehicles travelling directly over the cane stool causing irreversible damage. Yield loss from stool damage can be as high as ten times that resulting from soil compaction and becomes worse with every crop, even if no further stool damage occurs.

Compaction and stool damage are long-standing problems in the South African sugar industry. It has been acknowledged that preventing vehicles from entering cane fields is not practical and/or economical with current technology. Other ways have to be developed to overcome this problem. The principle to be applied requires row alignment to cater for an area dedicated to wheel traffic. To achieve this, the spacing and width of wheels of all equipment to be used infield needs to be taken into account. Because equipment on each farm is different, it is difficult to prescribe a controlled traffic system in terms of row spacing that will be acceptable to all growers. The row spacing arrangement below should therefore be seen only as a guide for designing field layouts.

Most farms in the South African sugar industry could make use a row spacing arrangement of two cane rows spaced 0.6 m apart alternating with a 1.2 m wide traffic area. Note that these measurements are taken from the centre of one cane row to centre of the next cane row.

When the cane row width (typically 0.4 m) is taken into account, the above arrangement gives us a cane production area of 1 m and a traffic interrow area of 0.8 m. This is sometimes referred to as the 1.8 m tramline system (see Figures 1 and 2).

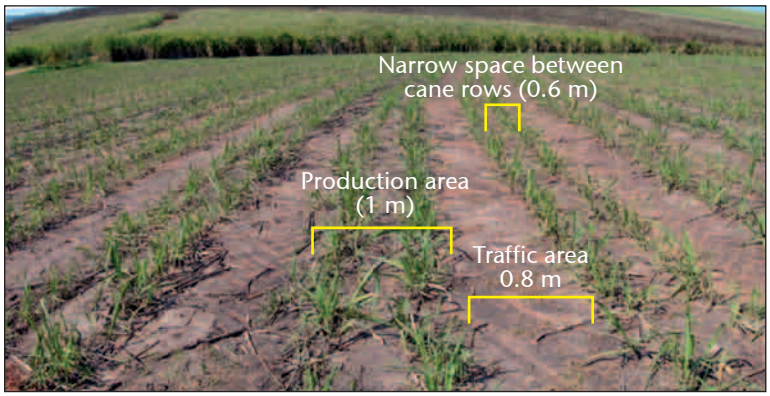

Figure 1. Zones in fields laid out for controlled traffic.

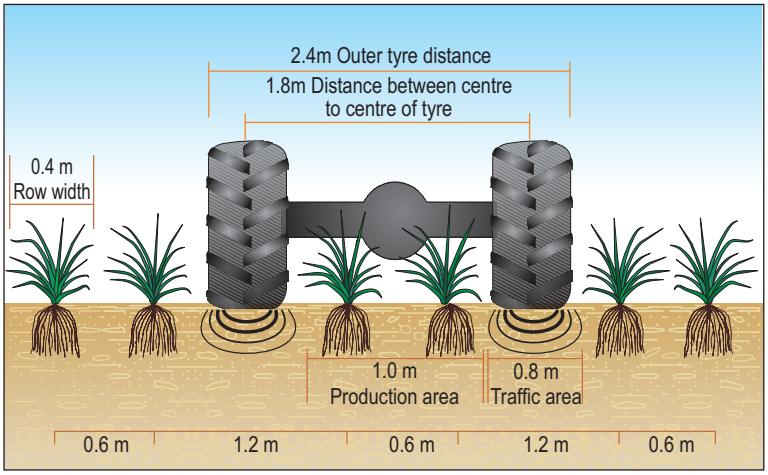

Figure 2. The production area and traffic row spacing arrangement that should be suitable for most farms.

Better Management Practices (BMPs)

1. Ensure row alignment to cater for an area dedicated to wheel traffic taking spacing and width of wheels into account.
2. Only the cane row area (production area) is disturbed.
3. Separate dedicated and permanent areas for growing cane and for wheel traffic.
4. Ensure that plant rows run at a gradient of about 1:150.

Planting for controlled traffic

General objective: To create separate, dedicated and permanent areas for growing cane and for wheel traffic. This implies that cane will never be planted in the traffic area again, and that growing sugarcane remains in the production area indefinitely. The field is thus permanently divided into a traffic area (for wheel traffic only) and a production area (for plant production only).

How to lay out a field for controlled traffic:

- If possible, join smaller fields.
- Remove the old crop.
- Apply gypsum or lime and incorporate well.
- Rip if compacted layers are present.
- Ridge for new layout (see Figure 3).
- Fertilise in furrow and plant. Use FAS for the application rate of all chemicals.

Replant of fields already in controlled traffic system: When the current cycle comes to its end, only the production area is disturbed. The crop is killed with a herbicide and left (not removed). The area on either side of the dead cane in the production area is planted to a break crop using minimum tillage. At the end of this break crop's life cycle, or when the crop needs to be removed, the residue is not removed but ridges are drawn and cane is planted in the areas where the stools of the previous cane cycle used to be.

Equipment: Conventional planters or ridgers can be converted to prepare and plant fields to the required row arrangement with very little cost (see Figure 3). Vehicle guidance systems could be used to ensure accurate trail patterns (controlled traffic).

Figure 3. A modified ridger preparing four rows for planting cane in a 1.8 m controlled traffic system.

Keeping the wheels in the interrow: To ensure that drivers are aware when they approach cane rows and to further reduce the chances of damaging stools, the row area is raised approximately 100 mm with soil from the traffic area.

Slopes: Care should be taken to ensure that water running in the compacted traffic area does not accelerate uncontrollably which could lead to soil erosion. Therefore ensure that rows are planted at a gradient of about 1:150.

Maintenance: It is not necessary to alleviate compaction created in the interrow area as the impact of interrow compaction on the growth of cane is minimal. Should water infiltration pose a problem, a shallow rip (150 mm max) could be used to loosen the soil to improve interrow water infiltration. This should be done only if it is absolutely necessary. The ideal is not to disturb the interrow area so that it becomes firmer for improved traction by infield equipment. Where possible, use cane residue (dead leaves) in the traffic area to reduce the speed of runoff water and therefore the danger of erosion.

Advantages

- The total row length with the 1.8 m tramline system is 11 111 m/ha compared with 8 333 m/ha for fields with a cane row spacing of 1.2 m or 6 667 m/ha where the row spacing is 1.5 m.
- Stool damage is avoided.
- Follow-up weeding is limited mainly to the traffic area.
- Traction is improved due to the firm surface of the compacted traffic area.
- Fields can be entered in wetter situations when compared to conventional field layouts.
- Compaction is restricted to the traffic area.

Disadvantages

- Plant costs are higher due to the longer row length/ha and extra seedcane required.
- Water infiltration is low on the compacted traffic area, which could be improved by covering the surface with crop residue (dead leaves).

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