

CONSERVATION FARMING PAYS

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Abstract

Practical experience gained over twenty years which were spent rehabilitating and improving a cane farm comprising mainly Cartref series soil, has shown that strip cropping panels between contour roads 40 - 70 metres apart can be very successful.

Introduction

This paper is not a technical one detailing measured run-off of water or loss of soil, but is based on my views and findings after a study of the effect of heavy storms, causes of erosion, and protective results achieved through strip or panel ploughout and harvesting, spanning a period of twenty years on my own farm, Stone Lodge, and also on many other farms since being elected to the Lower Tugela Soil Conservation Committee nine years ago.

Stone Lodge was purchased in April 1957. There were thirteen dongas on the farm, the largest being 1,75 hectares and the next 0,4 hectares, and the others varied in size and length, and up to 5 metres in depth. Most of the dongas were as a result of the January 1953 floods, when a whole hillside was being re-established, and was bare to the elements.

Nothing had been done to contain the dongas between 1953 and the time of purchase in 1957, and it was obvious that stringent measures had to be taken to repair the damage, and halt further erosion, on a TMS soil (Cartref series) which one might classify as being highly erodible.

Having read Louis Bromfield's books, "Pleasant Valley" and "Malabar Farm", stories of the re-habilitation of a run down farm, I decided to follow his example and put the whole of Stone Lodge on a strip (panel) basis. Thus started my conservation farming.

As this was some six years prior to the farm planning division being set up at the Experiment Station, and with no data available as to what width panels should be, use was made, where possible, of existing roads and the new contour roads between panels were put in, either on the level or, again where possible, on a constant gradient, so as best to serve the three gantry points on the farm. A number of the panels, unfortunately, were considerably wider than present teachings advocate.

When the subject of conservation farming is raised, most people think of soil conservation only, whereas, in my view, water conservation warrants an almost equally high priority. I will deal with the two subjects separately.

Soil Conservation

We all know that sugarcane is an excellent conservator, once it is established, but, during the period of re-establishment for some 3-5 months, we cane farmers are just as vulnerable to soil erosion as, for instance, any maize farmer, and in fact very often more so, by virtue of the very steep slopes on which we plant.

We know, further, that volume, and particularly velocity of run off water, are the main causes of erosion. The longer and steeper the slope, the greater build up of velocity, and the greater potential danger of serious erosion. How then can we break this velocity and so protect our bare fields during this period of re-establishment?

The most commonly used methods are:-

1. By the use of broad based bench terraces, usually used also as extract roads
2. By the use of contour structures
3. By the use of strip or panel ploughout, and

4. By the use of a combination of two or more of the above mentioned methods.

Professor Scott, a doyen of Soil Conservation, stated in an address to the Natal Regional Advisory Committee, that Soil Conservation was a compromise between the book and economics. This does not mean the neglect of soil conservation because of the cost thereof, but getting the best coverage for monies spent, whilst at the same time, adequately protecting one's soil.

In the light of the above let us examine the various methods.

1. *Waterbearing broad based bench terraces used as extraction roads.*

These are fairly expensive to construct, have to be very accurately put in, face the danger of soil from above being washed into them, thus requiring constant and careful maintenance and, when being used as extraction roads during rain and wet periods, it is impossible on sandy and unstable soils, to prevent puddling and damming, with the consequent hazard of a break and possible serious erosion by the accumulated water.

2. *Contour structures*

These too, as in (1) above, have to be accurately put in, have to be of adequate capacity, require regular and careful maintenance, as, being considerably smaller than the broad based terraces, they face a greater danger of being silted up, with consequent overtopping and serious erosion downslope.

From intensive research work done in America, Dr. Grobler of Potchefstroom, using various formulae developed for the calculation of soil loss, was able to determine values applicable to South Africa.

Using Dr. Grobler's formula, it is calculated that, in a normal year from bare loam soils, on a 40% slope at a spacing of 20 metres, soil loss will be some 49 m³ per hectare per annum, or at 40 metres spacing, some 76 m³ per hectare per annum, with the contour structure theoretically being completely filled with silt, twice per annum.

It is therefore obvious how essential it is to carry out regular and correct maintenance.

3. *Strip or panel ploughout*

Panels should be some 40-70 metres wide, depending on slope, roads above and below the panels should be on contour, water-spilling and grassed, and should serve as field boundaries and extraction roads. A line, somewhere in the centre of the panel, should be put in on contour at a fall of say 1 in 100, and the ridges then drawn above and below, and parallel to this contour line. These ridges will act as minor contour structures, and assist in taking off water in the initial stages of the plant crop.

Should these planting lines go off contour because of a change in terrain, they should still be taken through for the full length of the field to facilitate the use of mechanical operations, if so required, or to obtain maximum productivity from labourers. Short lines should only occur at the top or bottom of panels.

This method, coupled with strip harvesting, is the one which I believe to be the most economical, whilst still giving safe and adequate protection on sandy and highly erodible soils on steep slopes. My reasons for stating this are:-

- (i) Only one panel of a hillside is bare to the elements at

any one time (one might have alternate panels bare in the initial change over to strip cropping).

- (ii) The bare strip is protected by panels of established cane above and below.

Any build up of velocity of run-off water is broken and checked, by the panels of established cane above, and any wash of soil which might occur is held, initially, by the grassed contour road below, and if excessive, is held by the panel of established cane below. One thus might have movement of soil but not loss of soil.

- (iii) Maintenance required is minimal, being limited to the rotor-slashing of the grassed roads. Furthermore, if for some reason, maintenance has to be deferred, it poses no hazard as in the case of broad based terraces or contour structures, but is, in fact, more effective in the trapping of silt, by virtue of the grass being longer.

- (iv) *A combination of two or more of the methods mentioned above.*

If, for some reason, the panel is so wide that it is felt that contour structures should also be put in, this should only be done if the water which they will carry, will be *safely* discharged.

I firmly believe that, where waterways are constructed, these should extend only as far up the hollow to where, what I term, natural waterways exist, i.e. to as far as the hollow is naturally damp, so that deep rooted water grasses can be established to stabilise the waterway. I am against extending waterways up the hollow into a dry hillside, as I have yet to find a grass which will thrive, and has sufficient depth of root system to stabilise the waterway, especially when having unnatural volumes of water discharged into it.

I believe this practice is inviting erosion, and I have had serious results by so doing myself.

Water Conservation

The pundits and books on conservation say water must be taken off the fields. Should this in fact be done? I believe that with a few exceptional areas such as Gingindhlovu and Mtunzini, the biggest limiting factor to increased yields in our sugar growing areas is moisture, or lack thereof, and I believe, therefore, that every drop possible should be retained on the fields.

If the water taken off was in all cases surplus water, I would agree with the books, but this is not the case. As we all know, with the type of precipitations we get here, we very often, on bare lands or newly cut fields which might also have been burned, have water running long before the rain has soaked in, or the soil reached water holding capacity, and often, before the rain has even reached the ground in heavy stands of cane.

How, then, can we best conserve this water?

I believe, that by having contour spill-over roads, by trashing, by harvesting in panels so that run off from bare or newly cut fields can be held, and percolate through panels of different aged cane below, and the water allowed to find its own natural way down the hillside, a large measure of success will have been achieved. Furthermore, on the economic side, if this practice is adopted, with no waterways constructed up into the dry areas, and with no water-bearing structures carrying water across the hillsides and discharging into waterways, then those waterways can safely be reduced from the size advocated, with the attendant beneficial effects of less land being taken out of productivity, and substantial savings on maintenance of structures and waterways.

This paper deals, in the main, with conservation on sands and erodible soils on steep land, but, if the methods advocated work on the abovementioned soils, and I have proved them so to do, I see no reason why they should not be equally effective on the more stable soils.

The fact that Stone Lodge, on far from the best of soils, produces just on ten tons of sucrose per hectare bears out the statement that conservation farming pays.