SOIL CONSERVATION IN SUGARCANE FIELDS

By T. D. ARCHIBALD

With the coming of the white man to South Africa with his ability to cultivate large tracts of land, which were formerly covered with thick vegetation, bush or grass, has come a tremendous acceleration in nature's pace of erosion.

Today the amount of soil which is being washed from our lands annually has reached astronomical figures. It has been computed that the Union of South Africa is losing something like 300,000 tons of soil each year and that if this figure were expressed in terms of acreage of average soil depth, say two feet, over 90,000 acres would be eroded down to rock or their non-productive sub-soils. Each year, in other words, South Africa is losing this huge acreage and to that extent its productive potential is shrinking.

To bring this tragic state of affairs into even more striking reality, let us come nearer home and consider what goes down the Tugela River each year in the form of silt. I understand that from tests carried out and observations made on the Tugela a few years ago, the authorities have come to the conclusion that, so great is the amount of silt passing out to sea in these waters each year that to load it into 3-ton trucks to carry it would take a string of trucks standing bumper to bumper running one and three quarter times round the world. So bad is our erosion that it is not surprising that Jacks and Whyte, authors of The Rape of the Earth should have stated that a national catastrophe due to soil erosion is perhaps more imminent in the Union of South Africa than in any other country visited by them; that the tragedy of South Africa has been the appalling rapidity with which its fertility reserves have been depleted and its thin soil covering washed away; and that in no other country have the disastrous consequences of erosion followed so quickly after its commencement.

These you must all agree are most staggering findings and an appalling waste of our soils and their fertility. Erosion is one of the major causes of our small tonnage per acre and consequently a high cost per ton of cane.

What are we who are making a living, or should I say trying to make a living from growing cane on our hillsides and at the same time reduce this hazard of erosion over the planting period? One of the most effective methods to counter erosion is to break up one's fields into contour bands or strips. We have used this method over the past six years and have found the results to be highly encouraging. While I cannot state the increase in tonnages from this method, I can say that on our own farm, which is on the South Coast, 1,800 feet above sea level, with a granite type of soil over its greater portion and a small area of Table Mountain Sandstone soil, we have increased our crop average over the past three years. Where it was formerly 38.8 in 1959-60. The drop here I attribute to the damage done by terrific wind during the May floods when nearly all, or over 90 per cent of our plant cane was blown down. I would go so far as to say that this increase is very largely due to our changed methods as our fertilizer costs have definitely dropped over the same period. I believe, too, that 75 per cent of our former rate of erosion has been stopped by the strip replanting method.

On our farm which is very hilly a graded system of roads has been built up over the course of years. These admittedly cost a little more to build in the initial stages than a haphazard road with its ups and downs, but over a period of time have proved to be
far cheaper from a point of view of maintenance and more particularly from the ease of operating vehicles over them.

These graded roads give natural divisions for the strips or bands of cane. When ploughing out fields, only cane between one road and the next is taken out, leaving a belt of cane with its trash blanket between that road and the next above, so dividing up the field into alternate bands or strips of prepared soil for planting and trash blanket cane. In this way each planted strip is protected from above by the roots of the ratoon cane and its trash blanket which reduces the run-off to an absolute minimum, while the ratoon cane below, with its trash blanket, acts as a filter for any soil which might in exceptionally heavy rain be washed from the planted strips. Furthermore, as roads are usually not more than 100 yards apart the amount of water caught up from one furrow to the next, even in fairly heavy rain, does not have sufficient distance to run to accumulate enough to do serious damage.

This method does not in any way inconvenience the working of a field as a whole. Even though one might have to use small trucks and tramlines there will still be mature or millable cane but not, of course, of the same age, on each side of the line provided one does not fallow. Where fallowing is practised, the division can easily be made on the natural division of the "carry" to the trucks, with the tramline more or less one third from the bottom of the strip and two thirds down from the top. With those who use lorry or tractor-trailer transport there is absolutely no inconvenience whatsoever, whether one falls or cuts, ploughs, and plants in the same season. The little inconvenience that might, here and there, be caused to users of tramlines is far more than offset by the saving in soils and fertility.

Mentioning fallowing as I have just done brings to mind another aspect of erosion which should claim our serious thoughts. In this hilly country of ours should we practise fallowing at all? The more I come to think of it the more inclined I am to believe that we are actually doing more harm than good by fallowing. There can surely be no argument about the fact that by fallowing we are keeping our soils in their most vulnerable stage for twice as long as we need do. I believe we should try as far as possible to cut, plough, and plant in the same season or, at most, to leave only the last field cut in the season to be planted first in the next planting season or for a fallow period of roughly not more than six to seven months. There is no doubt about it that fallowed land, in which there are no traces of trash, will erode far more easily than lands which still show signs of decomposing trash, as each little particle of trash, however soft it might be, will help to hold back and to bind the soil together.

Tramlines and roads running through fields are a great source of danger from an erosion point of view, for, with their hard surfaces it is the first place on which water will start to accumulate and run off. These roads where they run through or immediately above freshly planted cane should be covered with a fairly thick mat of trash. Even the peelings from the cane setts at planting are, in themselves, enough and it is surprising how much run-off can be stopped by this simple method. When it comes to weeding the hoed out vegetation should be left spread over these roads which will still further reduce the rate of any run-off.

Another effective step against erosion is to keep as much trash as possible on the fields by not burning, even though a field is to be ploughed out it should not be burnt, but trashed and as much of this trash as possible ploughed in. A heavy Rome disc will make a good job of this. For those who cannot afford this heavy equipment, an ordinary single-furrow reversible plough followed by three labourers, pushing into the furrow just ploughed as much trash as they can, will do an equally good, if not better, job. The trash pushed into the furrow will be almost completely covered by the next furrow ploughed and in this way almost 80 per cent of the trash can be incorporated into the soil. That which remains above the ground after a discing should be burnt off in favourable weather, leaving the buried trash to decompose, which it will do sufficiently in wet weather in three to four months, to allow normal further working of the soil in preparation for planting.

There are some who will say that the trash in decomposing will rob the soil of the nitrogen the young cane will need. This may be true, but it is very easily overcome by broadcasting a light dressing of nitrogenous fertilizer at the time of ploughing-in.

I would like to summarise by saying that the most effective steps one can take against erosion in cane fields are:

1. Break up the fields into strips or bands to suit the form of transport.
2. Don't go in for long fallows, i.e. two years. On steep hills I would say don't fallow at all.
3. Keep as much trash on the fields as possible by not burning.
4. When ploughing out a field incorporate as much trash as possible into the soil.
5. Keep the roads and tramlines where they run through or above freshly planted cane covered with trash and dead weeds.

I trust that you have found something of interest in this paper and that, at least, it will set some of you on the path of "Strip" replanting, which I regard as the most easily achieved and yet most effective measure against soil erosion in our cane fields.
Mr. N. C. King wanted to know if any implement had been devised to turn the soil uphill rather than plough it downhill. With the present method of ploughing it seemed that the top soil was gradually brought downhill to the valley below.

Mr. Archibald replied that he did not know of any instrument at the moment but a disc plough could turn the soil uphill by keeping the tractor wheels in the furrow which reduces the angle of tilt. A wheel tractor, however, could not work under extreme conditions of slope.

Mr. A. C. H. Souchon said that in his experience the Ferguson reversible single furrow mouldboard plough did the job of turning the soil up the hill very well indeed. By using the simple extension on the mouldboard and by starting to plough on the top of the hill it was possible to level the tractor and plough sufficiently for the long mouldboard and its extension to throw a sod right over. Disc ploughs had a tendency, through their design, to kick the sod straight up instead of rolling it over and, thereby, stopping it from falling back into the furrow. In this sort of work it is also advisable to have a plough of the three-point linkage type and easily manoeuvrable.

Mr. Tedder said he could not agree with Mr. Archibald about ploughing in the trash. He found in dry years in May or June, after ploughing in trash, the trash came out of the ground as it went in. He asked if nature ever provided for trash in its raw state to go into the ground. He preferred rather than burning the trash to cart it off the field, onto dry hilltops where humus was lacking.

Mr. Archibald replying to Mr. Tedder said that nature never intended us to plough it at all. The sugar cane grower had an advantage over other forms of agriculture in that he did not require a very fine seed bed for establishing his crop so that a much more crude job could be tolerated. He said that nitrogen assimilation by pieces of trash and stubble could always be dealt with by the application of nitrogen. Where Mr. Archibald referred to a drop in fertilizer used, he asked if this was per ton of cane?

Mr. Archibald said that they were now using a smaller total amount of money on fertilizer because they are not now losing their fertilizer by it being washed away down the river.

Mr. Pearson referring to Mr. Archibald’s idea of piling trash and weeds on the tramline, said he thought that perhaps a better idea was to allow grass to grow in the roadway.

Mr. Archibald agreed, and said that that would apply only to ratoon crops but he was referring particularly to the planting time when roads were usually widened or some road repair done. In those cases trash should be imported and spread over the road surface to stop the accumulation and subsequent run-off of water. He agreed that one should encourage grass and weeds as much as possible in the roadways.

Dr. Cleasby said that a new practice at Tongaat was to burn the last crop and replant cane immediately so that the ground was left unprotected for a minimum period. He wondered if this was a possible approach on the steep hillside of the South Coast which, in conjunction with strip planting, would justify burning the last crop and allow easier preparation of the land.

Mr. Archibald said anything that would reduce the period of land being bare was to be desired. He did not know how much trash would be left after burning but he tried to get as much organic matter back into his soil as he possibly could by not burning at all.

Mr. Tedder said it was not easy to plough on the steep hillside as it was on the flat. His idea was to cut the cane and burn the residual trash after rain, which got rid of the bulky portion of the trash, leaving the partly rotten trash to be ploughed in. This old trash rotted quickly.

Mr. Pearson said that with the introduction of the self-loading trailer should not roads be spaced in accordance with the length of carry of the loader rather than the contour fall of the land? In this way the tractor and trailer might be kept off the stools of cane and compaction restricted to the road area where it was required.

Dr. McMartin said that one good reason why a crop should be kept in as pure a stand as possible was to aid the plant pathologists in disease surveys.

Mr. Pearson said he appreciated the fact that N.Co.310 had got a bad reputation at Pongola when actually the cane which had smut was Co.301. The Chairman (Dr. McMartin) referred to the opening paragraph of the paper where soil erosion was blamed on the coming of the white man, whereas in the Native reserves the erosion was even worse.