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CONTOURING YOUR COFFEE!

Vetiver grass! The long range low cost solution.

P.N.G.C.R.I.
May 1998.
kcc & tkk.

There are many problems to be faced in meeting the challenge of mechanisation of our coffee industry. However, given time, by starting the changes well ahead of necessity, the actual capital outlay, or the trauma incurred can be made as painless as possible.

The need to bring about such changes are not only because of economic factors such as falling prices or rising wages costs. Coffee growers are also facing problems with deteriorating soil structures and erosion. This years drainage channel one spade wide, is double the width in three years time. However, control of surface runoff and soil erosion by conventional means is not only expensive but also very hard work. Even when terraces are constructed by hand or machine, the annual ongoing costs of maintaining them is high. Above all, any such reconstruction by traditional methods means several years of loss of revenues until newly planted coffee comes into bearing in a freshly exposed situation which is largely subsoil..

ENTER A NEW SOLUTION:

In the last 30 years, the use of Vetiver grass to create stable long lasting land terracing has solved many problems around the world. These may be read about in the BOSTID manual Vetiver Grass The thin green line. For the last five years a program has been running in Papua New Guinea under the Australian Aid program CARE, to assist the Simbu people to

protect their steeply sloping land. Supplies of Vetiver grass planting materials are readily available in the Highlands.

Vetiver, "Vetiver zizanioides", is a bunchy type of grass with a very strong root system and a non seeding and non invasive habit, which is capable of growing in either wet or dry conditions. It is from the same family as lemon grass which can also be used in this way. Where ever one plants it, that is where it stays. Lines of vetiver slips close planted across a hillside will in a few months provide a firm barrier to both slow down surface run off and filter out and hold back soil and organic matter. As the soil gradually builds up behind the line of stiff bunchy stems, it automatically spreads itself upwards and backwards, by means of its unusual outwards and upwards growing stolons, to form a firmly held bank slopping back at about 80 degrees and ultimately up to two meters high. The soil that gradually backs up behind the grass line, covers its own build up of surface organic matter and is thus very friable and well drained. Because the surface runoff from heavy rain runs toward the low spots and deposits its load there behind the filtering action of the vetiver's bunchy habit, the terraces automatically become self leveling.

The slow buildup of terraces in this way over a period of years, using only ones off season or slack period labour force to create, allows a slow conversion of the landscape and the chance to restructure an existing agriculture program by slowly phasing out up and down hill planting and replanting on a contour, without a total loss of income at any time. The trees on the outside bank of the terrace tend to get buried, as the soil builds up around them. And the trees on the inside of the terrace gradually have their roots increasingly exposed as the soil moves away from them. However it is these rows which ultimately become sacrificed as the embankment builds up and leans back into the slope.
Over a period of several seasons new coffee can be planted accross the spacing of the rows to make what looks like a boxed formation before selected stems can be removed from the old rows to make the spaces required to realign the rows at ninety degrees to the previous pattern. If the new planting is done during a recycle operation, then both new and old stems tend to grow fairly evenly. By the beginning of the second recycle, growth should be indistinguishable. Some authorities advocate wrenching the roots of those coffee trees to be sacrificed with a sharp nosed 'drainage spade', at the same time as the top is recycled, and then after 3-4 weeks it can be lifted and replanted in a new position to fit into the changeover.

The actual horizontal land area occupied by the steeply sloping grassy banks is very small, and the grass can be easily controlled by slashing at semi-regular intervals, to provide mulch and organic matter for the terrace below it. Where the cut grass falls naturally is where the top soil tends to gradually thin out at the toe of the terrace. In this way, combined with mole ploughing, as described elsewhere, XXXX, the complete width of each formed terrace will slowly become converted to a deep rich and well mulched friable top soil.
As also mentioned elsewhere, before such terracing is commenced, the land should be mole ploughed along the existing lines of coffee at the change of cycle. Do note however that this requires a firm clay subsoil, which is not available in all places. If it is possible, this will provide a long lasting down hill drainage system underneath the terracing which will not erode into open scars. However, as the toe of the terrace erodes, the top soil thins and some

cultivation is required to bury the mulched grass and speed up the conversion of subsoil to top soil. In time the underground mole holes will become exposed at this point and the cultivation will cut them off. It is then that new mole drains need to be pulled, along the inside edges of each terrace, at the toe point, and parallel to the newly formed lines of coffee. Being pulled deep into the exposed subsoil, they will hold their shape and structure for many years. Those mole drains along the bottom of each grassy slope, with a new cut every recycle operation will then drain the terrace above it and gradually open up the thin soil layer at that point and convert it to a friable top soil of even depth right accross the newly formed terrace.
This newly formed parallel drainage pattern needs to start from the old hollows and finish up on each ridge of the original landscape meeting with the new access road to the terraces as a series of water tables. This should put the roading system on the firmest and highest ground with the least runoff and erosion problems. The sides of the road and the drainage channels should of course be stabilised with vetiver or lemon grass. In this situation the grass will not grow down into the drainage channel and block it. Vetiver will only propagate backwards and upwards to stabilise the bank up behind it.

If it is required to grow shade, then it is along the bottom slope of each terrace, ie. on the high side of the first line of grass, and in what will ultimately become the wettest and poorest soil that the shade trees should be planted. There the tree roots will help to stabilise the vetiver grass slope, and their roots will be cut on the down side by each mole plough operation so that they will not steal any nutrients from the rows of coffee. Each actual terrace width is a function of the angle of slope on the existing terrain, but can be adjusted sufficiently to give enough lines of coffee trees, say four, six or eight, to facilitate mechanical husbandry operations in later years.

The ultimate time period required to fully achieve the changes described depends very much on the type of soil involved, and whether it is kept bare in the early stages, to facilitate soil movement.

Here is one time when the use of total control herbicides has some positive benefits. In some situations, we are describing practises that will only benefit the next generation. Nevertheless in a period not exceeding three cycles of growth, it should be possible to convert an old hillside plantation with eroded soils and difficult mechanical access into the beginnings of a terraced operation with reduced operational costs, a deeper richer and non cracking soil, with a high organic matter content good moisture retention and excellent drainage characteristics. Furthermore, this can be achieved with only rented machinery, ones existing labour force continuing to be occupied in slack periods, and an absolute minimum of capital expenditure.

However, someone has got to buy that first mole/drain plough!

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