

By NGURE KN

EFFICIENT use of water for crop production has been a major concern for decades especially the arid and semi-arid lands (ASAL) of Kenya. Today this concern is greater than ever because of the rising needs of food.

Water conservation should be a major priority to those involved in agricultural production. Because of the high population, there is need to increase land output on a sustainable basis. While irrigation would provide the best solution to water problems in the Asals, most farmers consider it far fetched and few have attempted. Sooner or later irrigation will have to be implemented to balance the two forces of demand and supply. In the meantime the little rainwater received can be properly utilised for higher yields.

Water loss through inappropriate land use is an immediate threat to mankind. Measures need to be undertaken to conserve rainwater for better yields during every crop growing season. There is a need to promote knowledge and understanding of what is being done and what can be done to conserve more water and improve the food situation.

As the long rains pound the soil, those who care and know about rainwater harvesting know that the soil, which acts as a big reservoir absorbs less water as the rains become heavier. The rest of the water is lost as runoff. Soil absorbs rainwater which is used by plants through their roots to sustain growth. To refresh our thinking, consider



In dry lands, it is advisable that deep ploughing is done to help loosen the soil for better water absorption (Fi

a 20mm rainfall falling on one hectare of land. If no runoff occurs, the one hectare will be storing 200mm of water which is equivalent to 200,000 litres. Unfortunately, this is hardly the situation. Little of the rainwater gets into the soil.

The soil's rainwater harvesting capacity needs and can be improved. The intake rate of water by the soil is reduced through inappropriate land use such as overstocking, indiscriminate slashing, cutting and burning of natural vegetation. The maximum amount of water that the soil can hold "equivalent to a full reservoir" has suffered a similar fate; it is low in most soils.

In Asal, tillage methods should be aimed at increasing the water intake and the water holding capacity of the soil. Conventional tillage where the farmer uses a hoe to prepare the land before planting and later weed after crop growth should be used with caution. The farmer could be dealing with the topsoil and leaving a hardened layer beneath that will resist water and root penetration. Actually it is not always desirable to carry out tillage especially on steep slopes and soils that erode easily because it will enhance soil and water loss.

Advocators of minimum tillage advise farmers to reduce

the number of physical soil manipulation to the minimum. Sometimes it is important to do deep ploughing to break the hardened layer beneath. One of the greatest attributes to minimum tillage is soil moisture conservation. This is due to the plant residues left on the surface that reduce solar radiation and consequently reduce water loss through evaporation. It has the combined effect of reduced runoff, reduced surface evaporation and an increase in water holding capacity. This makes more water available for crop use and consequently during short dry spells, crops suffer less from drought. The

detachment of soil particles by the rain. The mulch also lowers runoff rates where rainfall is heavy. This creates more capacity for the soil to take in the rainwater before it gets lost as runoff.

Agroforestry is a farming system whose known advantages are countless. Agroforestry provides firewood, building materials and fruits. As far as soil and water conservation is concerned, agroforestry stabilises soil particles, making them less prone to detachment by rain drops or moving water. The trees provide mulch material which enhance infiltration rates and increase the moisture holding capacity of the soil.

Agroforestry has gained acceptance in parts of Central and Eastern provinces. Structures that conserve soil and water are numerous and in common use but have not been very effective. This includes the *fanyafuu* terrace which is an open trench with an embankment on the upper side.

The bench terrace involves a lot of excavation that leaves the land in completely level stairs.

Grass strips are very easy to make. Strips of grass are grown along the contour and left undisturbed. Some of the structures are easy to make while others are more demanding. What is important is for the farmer to select what is affordable and suits his land in terms of effectiveness in controlling soil and water loss. The existing structures are not very effective because farmers don't construct enough of them to cater for all the land. All the same, any number is better than none at all.

system also creates the possibility of farming at greatly reduced costs, especially labour.

Use of organic material on the land helps fertility of the soil more than most farmers realise. The organic materials used include organic manures, organic mulches, crop residues and dry leaves. These later decompose and give the soil a sponge-like structure that makes it take in and hold a lot of water. It also binds soil particles together thus reducing soil loss through erosion. The mulch cover on the soil surface greatly reduces evaporation. It also dissipates rain energy thus reducing