



# DRAINAGE

Climate Smart Agriculture (CSA) Brief No. 3 for Agricultural Field Officers



Building a drain at the Mirabeau Propagation Station, St Andrew

## Did you know?

*Drainage systems increase crop yields by providing a better environment for plants to grow, especially during the wet season.*

## Challenges

**Heavy, wet and poorly drained soils suffocate the roots of plants thus creating many problems.** When water accumulates in a particular area on the farm it can cause swampy conditions and potentially kill plants. Sticky clay soils can make muddy, slippery and dangerous conditions on the farm. Excess water running off the surface of the land especially on plowed areas or off overhanging branches can also cause major problems and bring silt and clay to the surface.

**Waterlogging is an indication that a soil is poorly drained.** The impact of climate change with the projected increase in heavy rain events will worsen the conditions on farms. The events could lead to loss of top soil through erosion, and damage or loss of crops.

## What is an agricultural drainage system?

This is a system by which water is drained on or in the soil to enhance agricultural production of crops. It is the natural or artificial removal of water from the soil. It may involve any combination of storm-water control, erosion control and water table control. A good drainage system is therefore required in persistently wet soil. **Plant's roots can withstand heavy rainfall if a good drainage system removes the excess water quickly.**



Contour Drain, HM Prison's Farm, St George



Drain on the slope with steps to slow down the flow of water, HM Prison's Farm, St George



## Benefits of drainage systems

- ✓ They usually increase crop yields on poorly drained soils by providing a better environment for plants to grow, especially during the wet season.
- ✓ The system generally helps to improve field conditions for timely cultivation, planting and harvesting.
- ✓ Subsurface drainage systems have a positive impact because they generally decrease the amount of surface runoff, thereby reducing erosion, the loss of soil nutrients and other substances which may be transported by overland flow or runoff.

## Implementation

If it is not known whether or where the soil requires drainage, one should observe the field during the rainy season to see if the water pools, where it pools and for how long it pools. **The longer water stands, the more drains will be required.**

The best time to dig drains is immediately after preparing the fields, before making beds or planting trees. Otherwise, plants may have to be uprooted or left in the drain. Drains should not be dug to run downhill, since it could create gullies that expand with each rain event, and cause serious soil erosion. Instead, drains should be done along contours on sloping land. Drains should be dug with the sides at an angle so as to reduce crumbling of the side walls into and blocking the drain. The depth of the drain depends on the soil and water conditions. In heavier, wet and slower draining soils (e.g. clay soils), more and deeper drains will be required to assure a well-drained plant root zone. However, generally a depth of 12 inches is recommended.

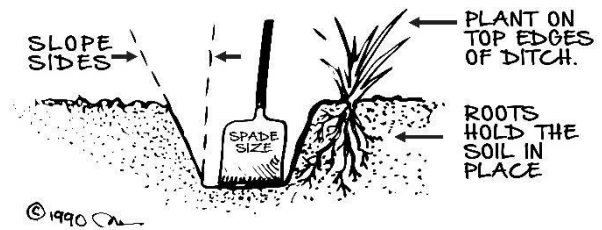
### Step-by-step process:

1. Dig the drains along the contour. An "A-frame"\* can be used to mark the line where the drain is to be dug.
2. Dig segments about 100 to 150 feet long and leave a small (4- inch high, 18 – inches long) block of undisturbed, undug soil in the bottom of the drain. The block will keep the water from running off fast and allow leached nutrients to be re-absorbed into the soil. It also allows silt to settle at the bottom of the drain. Otherwise it would be carried away, speeding up soil erosion and decreasing soil fertility.
3. At the end of the rainy season, block the ends of the drains. This will allow the drain to hold water, like a check-dam, and provide extra moisture to plants during the dry season.
4. Plant vetiver (sweet root or khus-khus) grass, or other suitable type of vegetation on the uphill side of the drain. This will stabilize and hold the sides from washing and falling into the drain.
5. All drains should be cleaned at the end of the dry season in preparation for the upcoming rainy season.

\*See "How to build an A Frame" practice sheet (Brief #7)

## Disadvantages of drainage systems

- ✓ Significant financial investment;
- ✓ If they are poorly designed, drains can reduce the amount of water entering watersheds and water bodies such as lakes, wetlands and the sea or even the quality of water received due to silts.



Credit: Drain illustration from *Farmer's Guide to Cocoa Production*, by Oleen Hess, Published by The Pan-American Development Foundation, 1990

### Key points to remember

- ✓ Eroding soil is equivalent to losing money;
- ✓ Drains should not be dug to run down-hill. Dig drains on the contour instead;
- ✓ Remove excess water not soil;
- ✓ Drains should flow slowly, not run off rapidly.
- ✓ Always remember to construct drains using the V-shaped method rather than the boxed drains

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