

FALLOW MANAGEMENT

Why fallow?

After a few years of banana production, plot yields decrease for several reasons:

- Loss of density due to toppling of some plants (gale, parasitism);
- deterioration of planting structure (distance between banana plants, shorter plants unproductive);
- Reduction in soil fertility (compaction and erosion).

This requires the renewal of the plantation and a fallow management.

Fallow eliminates banana specific pests by suppressing the crop. It regenerates soil fertility by restoring soil structure through tillage and /or the use of cover crops, and corrects soil deficiencies through amendments.

1. DESTRUCTION OF AGED PLANTATION

■ Inject all the main banana plants and their suckers with glyphosate herbicide (see below "how to treat with glyphosate?"). This injection must be perfectly controlled (correct dose, no forgotten plants) and done in a single application to allow quick mechanical destruction of the plantation. Remove all water suckers (small independent plants with large leaves).

■ Why destroy with glyphosate?

The roots and bulbs of the former banana plantation are the main sources of nematodes of the plot to be set aside. Devitalizing bananas with a systemic herbicide which acts on the underground parts (bulbs and roots), will eliminate the nematodes.

■ How to do glyphosate treatment?

When injecting, remove all banana bunches and flowers present on the plot without cutting the plant. The banana plant should conserve its leaves so as to keep the sap flowing and enable the glyphosate to work efficiently:



Spot Gun - IT² photo

- use a syringe or a spot gun with a needle equipped with one or two side holes;
- inject in the pseudo stem 4ml of product diluted at 50% with water, or 2ml of pure product. The injection should be done at man's height (1m – 1,5m);
- inject product while pulling

out the syringe to prevent spills of the product on the pseudo stem;

- first wither symptoms appear a few days after injection and increase in the following weeks.

2. SOIL PREPARATION AND PLOT ARRANGEMENT

(see "Plantation" sheet)

■ Bury residues 2 to 3 weeks after injection using a digging machine or tool disc.

■ Destroy all new growth by repeating the operation.

■ Select tilling tool depending on soil type, degree of compaction and humidity.

■ Soil preparation has two objectives: restore sustainable soil structure and break bulbs and roots of the banana plant. Old

stumps that stock nematodes and weevils decompose faster, and the old crop enriches the soil with potassium [K₂O] (60t of organic matter per hectare).

■ If the fallow is left "naked", all free growing banana should be systematically destroyed and natural vegetation controlled in order to reduce the spread of banana soil pests. However it is best to install a cover crop in fallow so as to maintain nematode levels at zero, create biological porosity, limit erosion and the use of herbicides.

3. IMPLEMENTATION OF A GRASSY FALLOW

■ The implementation of a fallow with one or more cover crops also called « service crops » helps to restore soil structure and fertility, reduces erosion and the use of herbicide during that period. IT², in partnership with CIRAD is evaluating numerous cover crops in order to make the best of their properties and potential.

■ Thus, the use of fallow grass *Brachiaria decumbens* (see data sheet) is now common among many farmers in the French Caribbean.



Fallow *Brachiaria decumbens* - IT² Photo

■ This forage plant can clean up the soil, restore its structure and fertility while preventing the growth of other weeds. Other species of *Brachiaria* are being evaluated:

- *B. ruziziensis*, fast growing, should be used for short fallows and its destruction produces mulch easier than that of *B. decumbens*.
- *B. brizantha*, which produces more biomass, is preferable for long fallow. Its forage is more palatable than for *B. decumbens*.

■ Legume species like *Sesbania*, *Crotalaria* or *Cajanus cajan* (pigeon pea) may be interesting for they can fix nitrogen from the atmosphere and restore it to the soil. The use of mixed cover crops (grass + legume) creates a synergy and multiplies the benefits that each plant brings. Example of mixes: *B. ruziziensis* or *B. decumbens* + *Crotalaria* or *Sesbania*.

4. DIAGNOSIS OF FALLOW

■ In order to obtain sanitation and nematode free plot the length of fallow must be more than one year. For fallows less than twelve months or to know the sanitary state before replanting, nematode tests must be conducted.

■ Nematode test: 45 to 60 days before replanting, 40 samples each having 2 litres of soil with a total weight of 12 to 15kg, are to be collected from the plot and put into pots. Ten tissue cultured banana plants are then planted in them. 30 days later, nematode analysis is done on the roots. If nematodes are found present then the fallow should be lengthened until a negative result is obtained.

5. AMENDMENTS (see "Fertilisation" sheet)

■ Soil analysis should be done 45 to 60 days before the expected planting date. Depending on the results, a fertilisation and amendment plan is then elaborated.



Mix of *Sesbania*, *Crotalaria* and *Eleusine* for fallow - CIRAD photo

■ Mineral amendments prevent soil acidification and ameliorate its structure. Application is done before planting.

■ Organic amendments improve on the physical, chemical and biological characteristics of the soil. Application can be done before or after planting.

Crop rotation, as well as fallow, cleans the soil by eliminating soil pests (nematodes) specific to bananas and also helps to enhance plot by maintaining agricultural production. Crops used must not be hosts to banana nematodes (sugar cane, pineapple, vegetables except for carrots and cucurbits).

Links to BANANAGAP frame of reference V5: AF 6.1.1 - CB 3.2 – CB 4.2 & 4.3.

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