INSTITUTE OF RURAL ECONOMY

Japan International Research Center
for Agricultural Sciences

Landscaping contour for soil conservation in farmers' fields

December 2012

Appendix: Technical Manual 9

"Guide for the Management and Natural Resource Conservation"

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THE MINISTER OF AGRICULTURE

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REPUBLIC OF MALI

One People - One Goal - One Faith

Technical sheet

Landscaping contour for soil conservation

Type of Production: Vegetable production

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1. Introduction

The availability of water is one of the factors limiting crop yields in the Sudano-Sahelian zones in general and Mali in particular. To this is added water erosion accentuated by strong runoff. Runoff is detrimental to agricultural production because, firstly it reduces water availability for crops and the trees of the park and, secondly, it can lead to soil depletion by stripping horizons superficial. In low-input agriculture in semi-arid areas such as Mali, the development or improvement of rainwater conservation techniques is essential to ensure the sustainability of production systems.

It is in this perspective that developed simple, inexpensive techniques to maintain or increase the fertility of cultivated fields, or fields to cultivate "marginal", a little too acidic or sensitive to runoff. Indeed, since 1995, we are testing a new technical developments contour on individual fields. Contour lines are permanently marked by an earthen ridges covered with natural vegetation. These teens can guide the cultural practices such as ridging, plowing, ridging etc. This technique respects the traditional land rights and is popular with farmers who also agree to pay for the construction.

The objective of this specification is to provide support for the training of researchers, technical advisors of farmers 'organizations, farmers' organizations, NGOs, consulting firms etc. The purpose is to contribute to improving the productivity, sustainability and competitiveness of production systems, as well as securing and diversifying income of family farms. In collaboration with IER, JIRCAS supported in 2011 demonstration and training of technical-farm in the circle of Baraouéli Mali.

2. What is the amenities contour technique?

2.1. Provenance / origin:

Mali

2.2.Description Technology

The technology applies across the farmer's field and respects the land rights. A topographic instrument, a water level, a framework "A" etc. can be used to stake out the contour. Thus, simply mark permanently the level curve (level teenagers) that the farmer can settle its ridges and other cultural practices following the contour. So, each inter-ridge is a water tank which forces maximum infiltration of rainwater that has consequences for the increase in crop production. The level of teenagers that have to be permanent are made larger for better readability in the agricultural landscape. level teens have about 1 m wide and 30 to 50 cm in height,

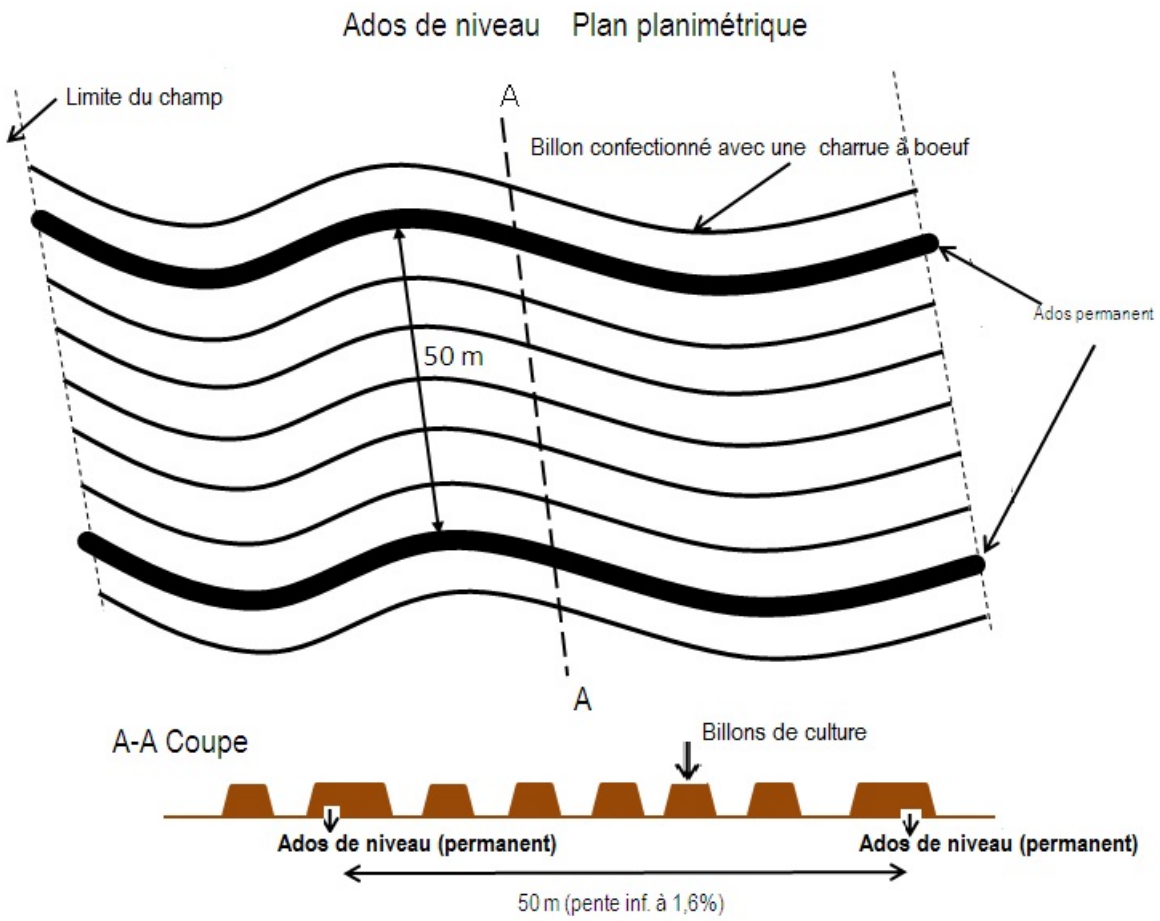

Figure 1 Schematic representation of the level of teenagers and ridges arranged in a field.

3. Matérielsutilisés

Photo 1-a and 1-b shows the water level used to measure the contours, and the picture 2-a and 2-b part "A".

Picture 1: Using the spirit level to determine the contour

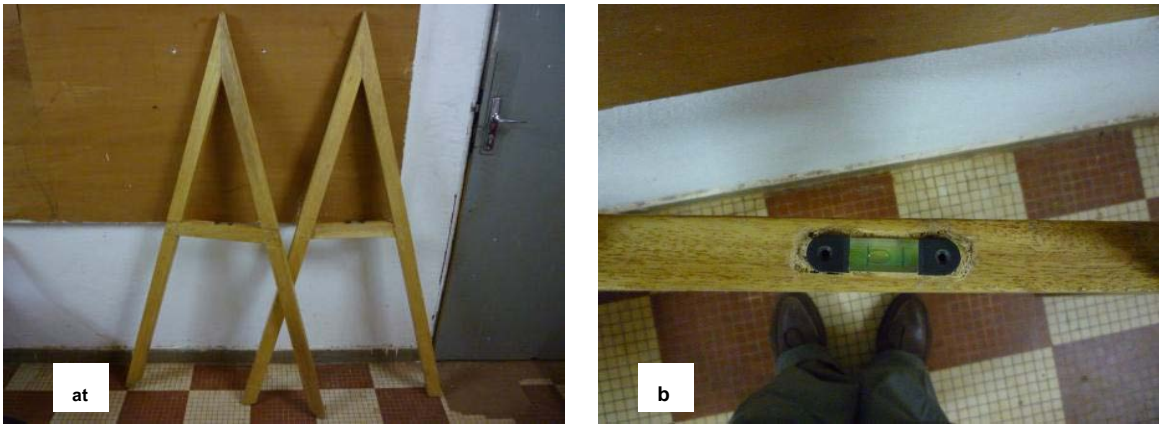

Photo 2: The Framework "A" (note the spirit level attached to the horizontal bar of the "A")

- For the water level, water is poured into a plastic tube to the level of

two rulers on which are fixed the two ends of the tube. The rule is positioned vertically relative to the ground, and if the indication of the two graduations (water level in the tube) is the same, we have the same height from the ground so the level; Then, one is fixed and the other moved to find a point of the same height, which becomes a new fixed point, and search for items of the same height and is repeated. The water level compares fairly accurately the level difference between 2 points. Its use is suitable for relatively gentle slopes.

- As regards the frame "A", a tripod is fixed, the other is moved, and the same height of the soil is tested according to the position of the air bubble to be at the center of the bubble tube. The first leg is moved when the latter is set and the search for new continuous point until stabilization of the air bubble in the bubble tube. Contour lines are thus determined by repeating the same operations until the end of the field. Due to the sensitivity and handling of this tool can be used in more remote areas, also in part "A" is it suitable for steep slopes.

4. soil conservation measures applied to agricultural fields

The problems and technical solutions for soil conservation cultivated fields generally fall as shown in Table 1.

Table 1 Problems and measures you ns (example)

Problems	proposed technical measures
• Influx of neighboring land runoff	• Construction of a diversion ditch outside the field • Ridging on the field boundary line (to divert flowing water if the strength and speed of the water are not great) • pebbles barriers to plug the leaks and other water entry points
• water drain excess field	• Construction of a water drainage channel
• Soil erosion on the field	• Spatial contoured field • Cord stones (greater slope. 5%), level of teens (lower slope. 5%), grass strips (lower slope 5%) etc.

As indicated in Table 1, to fight against soil erosion, it is necessary to prevent water inflow on the field. Thus, it is necessary to evacuate the excess water on the field by a diversion ditch, establish level of teens and finally, if necessary, carry cords of stone that have a spreading role of water on parts summital the agricultural landscape

Achieving contoured layout comprises four steps (Figure 2). First, a technician, for example. extension agent and the farmer shall carry out diagnostic status of the field and its surroundings, to observe the water paths and soil erosion state, the action (contours for example), proceed to picket contour line ; materialize and finally ensure the maintenance of control works (teens and level ridge).

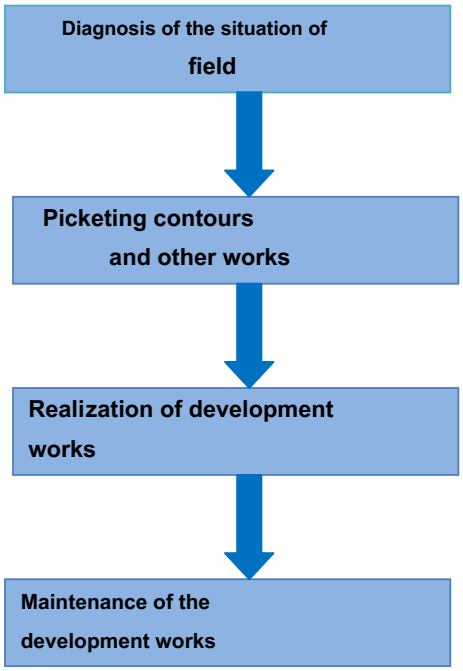

Figure 2 Stages of implementation of the technical development contour

4.1 Step 1 field diagnostics by the farmer and agent agricultural technical services

• A visit to the field, the farmer can identify the water roads and erosion problems or excess water that arise, the slope of the field, the soil of the field (sandy, clayey, gravelly etc.). Then the technician maintains the farmer on his level of equipment (ox-plow, hoe, shovel), the available workforce, the period of works, the availability of the works of construction materials (eg . stones for making stone barriers) does exist in the village? if not, what is the alternative measure to take? etc. Added to this is the need for permission and involvement of the owner of the field to the work required. then proposes a comprehensive development plan for the field including, if necessary, a guard gap for collecting the water coming from the upstream and an outlet for discharging the water in excess; then the contour starting from the upstream of the field. The farmer can choose among possible solutions.

4.2. Step 2 Picketing contour lines and other structures

Picketing of work must be done in the late dry season, when the vegetation of the previous year was harvested or folded, and early enough that the first rainfall can be used to carry out the work without delaying agricultural work (photo 3-a and b)

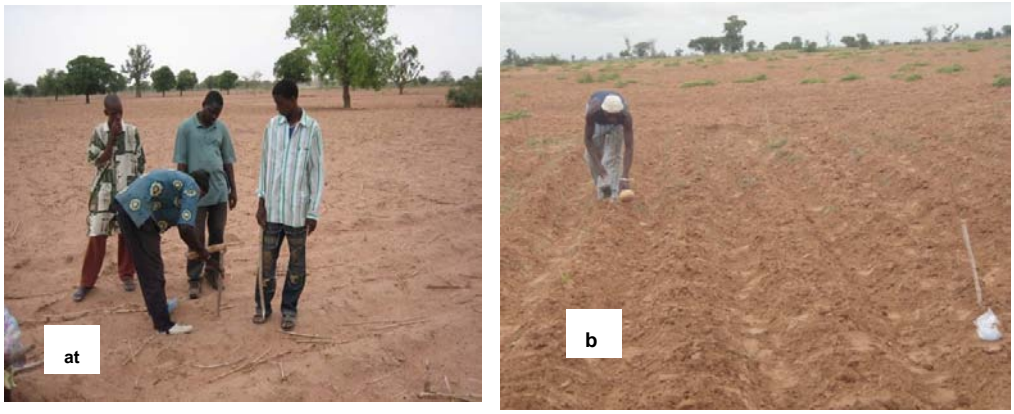

Photo 3: Staking contour using picket 40-50 cm long The survey of the contour line will start from the highest point of the field to be treated. The distance between the stakes will be up to 10 m, and it will be reduced if the shape of the contour is complicated (Figure 3).

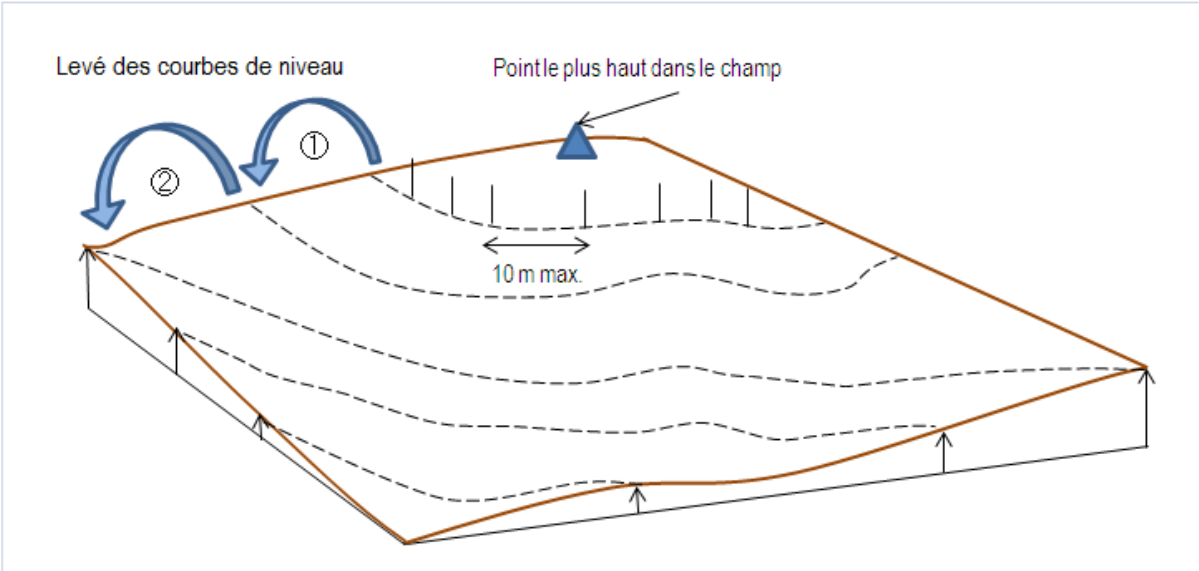

Figure 3: Schematic representation of the picket contour

4.3 Step 3 Realization of works:

Teens are made with ox plow the first rains, in order not to delay planting.). They can be made in 3-4 return a bullock plow along the pegs. .DES that this book can guide unambiguous sowing lines, management can function properly. generally allowed to wild herbs on the level of teenagers to stabilize Some farmers prefer perennials, such *Andropogon gayanus (* that can easily be planted from wild strains) or pigeon peas. These species will not only ensure the stability of teens, but will also be used as a building material (shed roof, attic, box, etc.) and human and animal food. (Picture 4-abcd).

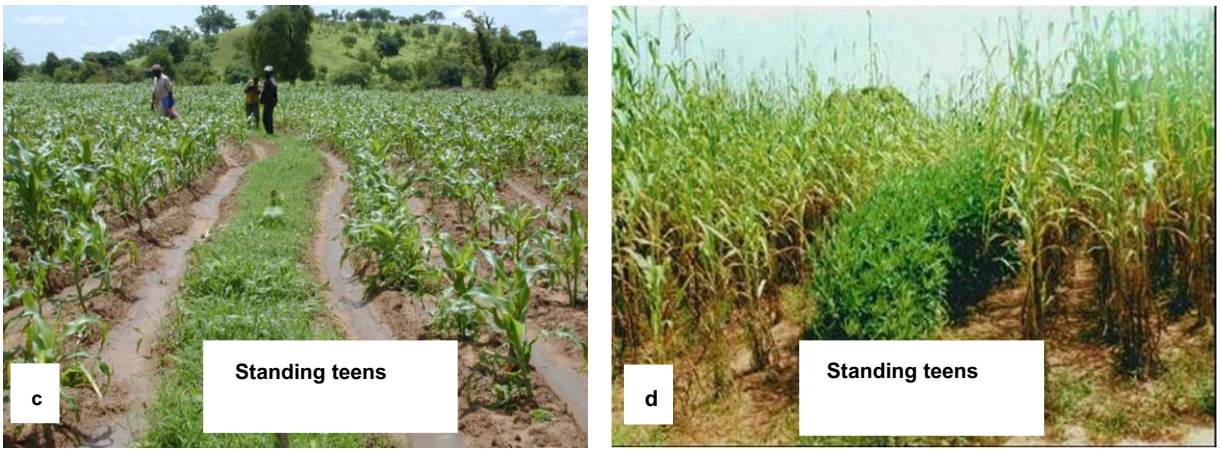

Photo 4: Establishment of permanent teens (a, b) and wild herbs (c) and pigeon peas (d) growing on teens

4.4. Step 4 Maintenance works

In almost all cases, there is breaks in the works, at least the first year when the newly turned soil is soft. Repairs that are important are the more easily they are made quickly. Repair teenagers is collecting the land around and realizing again teens where only a few fragile locations. But if the collapse of several meters, the level of the curve again to be rebuilt using oxen to plow. In some cases the barriers of earth covered stones are used to seal large gaps.

In all cases, we must make the facilities very gradually, starting on a small scale by one or two hectares in the first year and continuing in small increments thereafter. If we try to do more planning, the farmer will be too much work to do at the same time, at the beginning of the rainy season and it's embarrassing. Conversely, operating gradually, one quickly observes a significant impact on managed parties but also on the parties to the downstream receiving less of runoff.

5. Requirements for the successful application of technology

- Voluntary adoption of technology by farmers
  To promote the voluntary adoption of the technique, visiting farmers having already established technology, and exchange of ideas on the implementation and the effects are necessary.

- Availability of equipment (hoes, plows, etc.) necessary to Teen establishment Establishment teenagers requires effort, and it is therefore desirable that the farmers have an ox plow. Furthermore, in addition to the ox-plow, you need a hoe necessary for maintenance.

- Selection of participants in the training and technical support to implement the work of setting up teens with an ox-plow will actually be made by the son of heads of families, not by the heads of families themselves. Therefore, the

technical training of farmers, it is desirable that not only the heads of families involved, but also their son. Furthermore, if the farmer tried the technique for the first time, a single training will not allow him to master the technique completely. Therefore, in the implementation in the field, supported by a technical support agent will be desirable.

- Monitoring advice mentoring promoted

  It is not clear that the peasants set up as regularly as teenagers rights field configurations are not the same. So in the first year of implementation of the technique, sometimes teenagers break less rights at points of high curvature. It will be critical repair parts collapsed, and supervision of the extension agent will be needed to ensure the correct repair.

The level of adaptability of the technique is very high, so that apart from very sandy soils, it can be applied to most soils regardless of the type of work (manual, harnessed, motorized) used. But we must take sufficient account of the overlap with other agricultural activities, and the level of equipment of the peasants (plow multiculteur, oxen, daba etc.).

6. Effects of technology

The following effects can be expected of the layout contour:

- reduced runoff by 20-50% so erosion;
- improvement of soil wetting front;
- increase the efficiency of manure and fertilizer;
- increase in the yield of 30% on average cultures (picture 4);
- improvement of the water table;
- improvement of natural regeneration in the fields;
- improved sequestration (soil and vegetation);
- improving farmer income.

Photo 5: Sorghum Field sown the same day with the same variety

(Arranged on the left and right undeveloped)

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