THE ROLE OF SOIL PROTECTION IN ANGOLA'S PLANT PRODUCTION

SZABÓ LAJOS
University Gödöllö, Dept. Tropical Agriculture, H2103 Gödöllö, POB. 303 Hongrie

Poster

In tropical and subtropical regions erosion and deflation damages have increased in the last 20-30 years, especially as the result of effects of human origin. The aim is to show the damage caused by water-erosion and the possible protection against it in the Middle-Western region of Africa as shown through the example of Angola.

The soil as a mean of production in agriculture, is the most significant, conditionally renewable (it can be protected) natural resource of Angola. Its most important feature, the soil fertility is determined also by the degree of its erosion.

According to our research results soil erosion can be found on 57% of the total area of Angola (46% water-erosion, 11% deflation).
On the cultivated area of Angola (mountainous and hilly region) the initial introduction of agrotechnical and biological methods is essential, which can be followed by technological soil protection.
The first important task was the elaboration of the principles and methods of the protection against erosion damages.

Problems to be solved:

- study of the principles of water-erosion
- determination of the position of eroded areas,
- valuation the effects of soil erosion on soil attributes and yields of cultivated crops,
- elaboration/application of the best method to determine the soil loss,
- test of agrotechnical methods.

Literary review.

The first researchers working with soil erosion in Africa (Fournier, 1967, Hudson, 1971, Boyd, 1971) underlined the importance of soil-protective blanket made of cultivated crops during the whole year.

About the determination and classification of the development of erosion processes Hudson 1971, Morgan 1979, Kirgly and Morgan 1980, Zachar 1982 write.

The Wischmeier-Smith (1959) method for measuring the soil loss, originally developed for USA soils, was modified to be used in Africa by Roose 1976, Lal 1976, Arnoldus 1977, Obi 1982, Ulsaker-Klilewe 1982.

On the farms in the tropical-subtropical regions the agro-sylvi-pasturing cultivation system based on the ecological conditions is the most economical system.

research material and method

The researches were carried out in the mountainous and hilly regions cultivated intensively. The indication of the places of the researches were based upon the materials and geomorphological and soil maps of the Agronomical Research Institute (Huambó). The field survey followed this.

Number of research places: 14, where the following soil types can be found:

Scientific results

1. Effect of soil loosening. The results of the method are shown in Figure 1., 2.

2. Effect of contour line cultivation. Up to the slope of 15-16 degrees this was the most important agrotechnical method.. (Figure 3.)

3. Effect of ditching. Among the conditions of Angola up to the slope of 16 degrees it is a guaranteed method in the case of maize. (Figure 4.)

4. Application of research results to determine the factors "C" and "P" (USLE). To the Wischmeier-Smith formula the yearly soil loss numbers (t/ha) are taken from the research results (Table 1.,2.).

5. The "R" factor of the Wischmeier-Smith formula was determined by the method of Roose 1981

   R=0.5 H+-0.05 (H=yearly precipitation in mm)

6. I got the factors of the lenght (L) and steepness (S) of the slope in Angola after my measures on field with the help of the Wischmeier-Smith formula (L) and Hurni (1982) extrapolation (S) (Figures 6., 7.).

7. a/ After classification the yearly average of soil loss (actual erosion) 57.3% of the country's area (0-10 t/ha/year) falls into the admissible category, 35.5% (10.1-30 t/ha/year) falls int the critical and 7.2% (more than 30 t/ha/year) falls into the dangerous category (Figure 8.).
   b/ After the classification of potential erosion danger:
   39.9% falls into the 1. category
   32.2% falls into the 2. category
   17.9% falls into the 3. category
   9.1% falls into the 4. category
   0.9% falls into the 5. category. (Figure 9.)

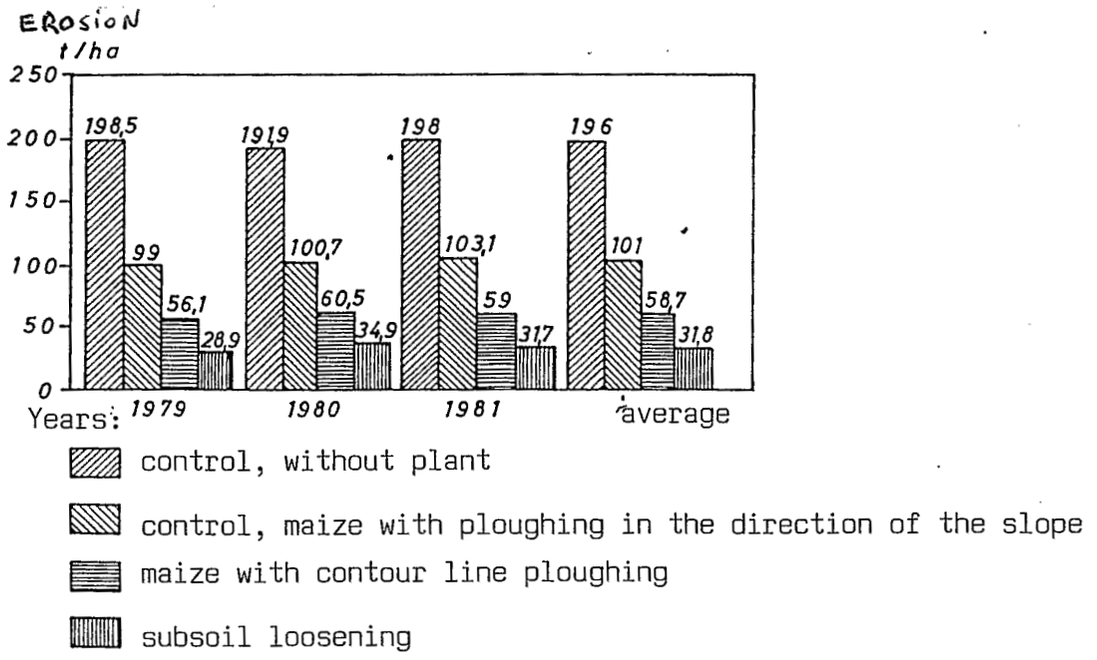


Figure 1. Comparing the results of subsoil loosening test and other cultivation methods with maize, on the Chianga Research Station on rhodic ferrasol soil, slope of 15 %.

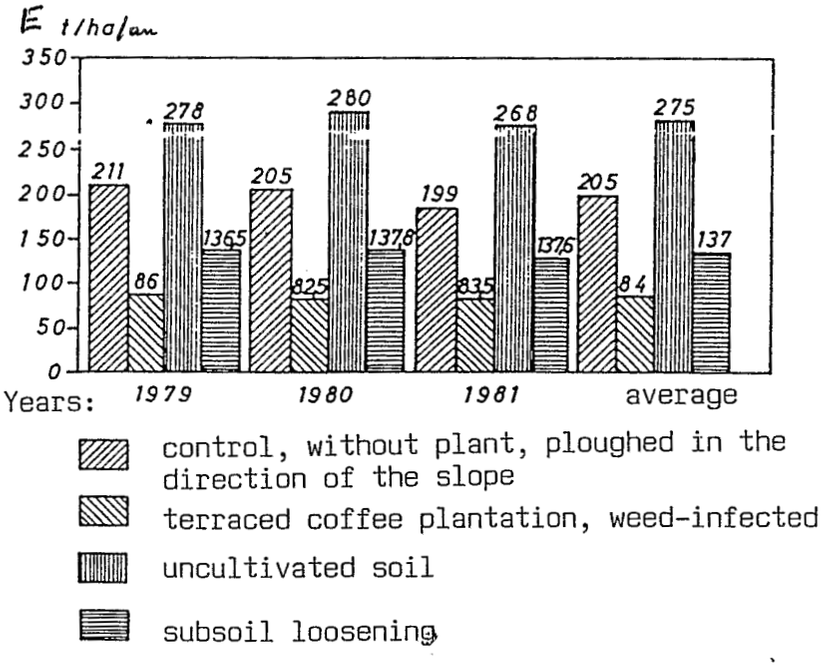


Figure 2. Results of subsoil loosening tests in coffee plantation, slope of 7 %, on Cangola Research Station.
Soil: Xanthic ferrasol.

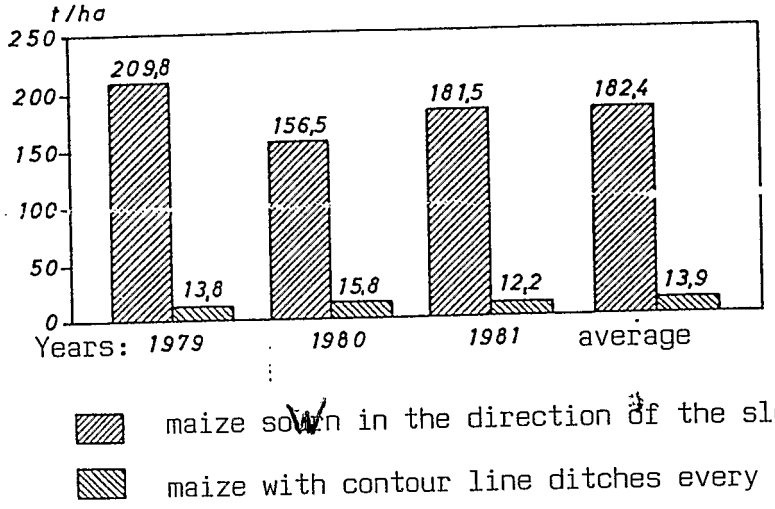


Figure 4. Result of soil protection experiment in maize made by horizontal ditching, on slope of 16 %.
Soil: red ferralitic, /Chipipa/

Table 1.

„C" factor of the plant cover in Angola

Plant and cultivation	C technology
1. Maize sown in the direction of the slope	0,51
2. Maize contour line sowing	0,30
3. Maize contour line sowing and subsoil loosening	0,16
4. Coffee plantation, weed infected terraces	0,42
5. Coffee plantation subsoil loosening on slope	0,67
6. Cotton, in crop rotation with maize	0,4
7. Soil protective crop rotations: maize, potato, cotton, peanut (contour line ploughing)	0,13
8. Soil protective crop rotations: maize, potato Schizolobium deepingianum (grass) contour line ploughing	0,16

Table 2.

"P" factor of soil protective technologies in Angola

Soil protection technology	P
1. Contour line cultivation (average of 8 tests)	0,45
2. Soil protective: Sudan grass (above) and maize	0,28
3. Soil protective: maize (above) and Sudan grass	0,07
4. Small Contour line ditches evens 20 meters (slope of 16 %)	0,08

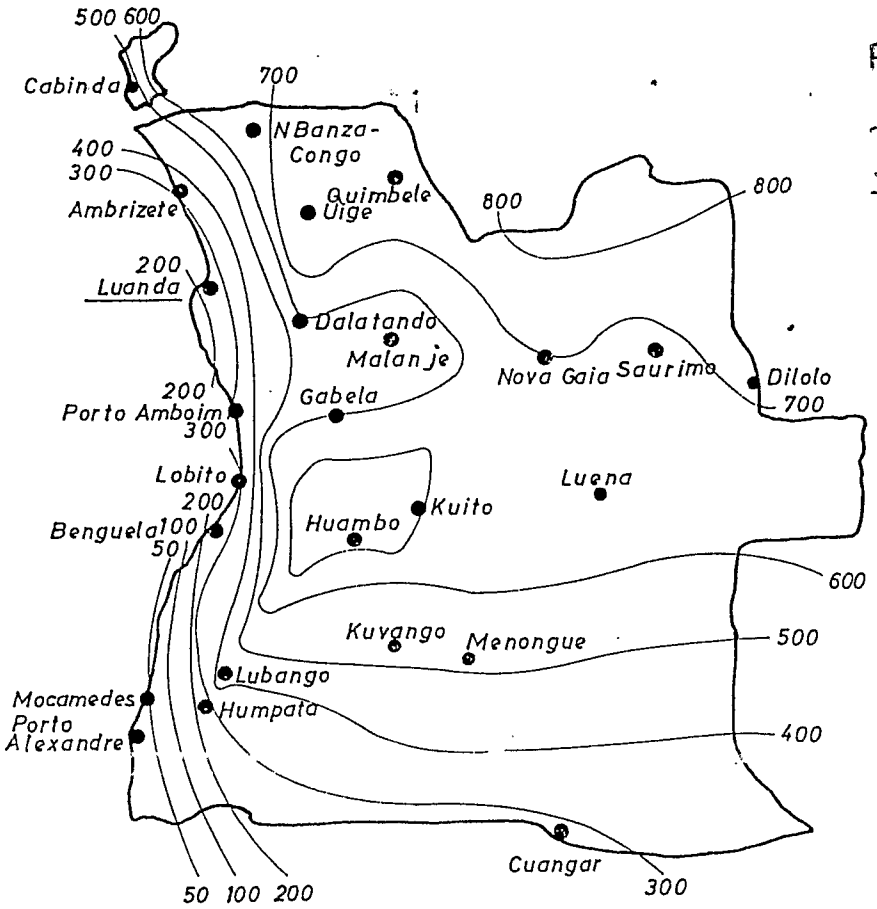
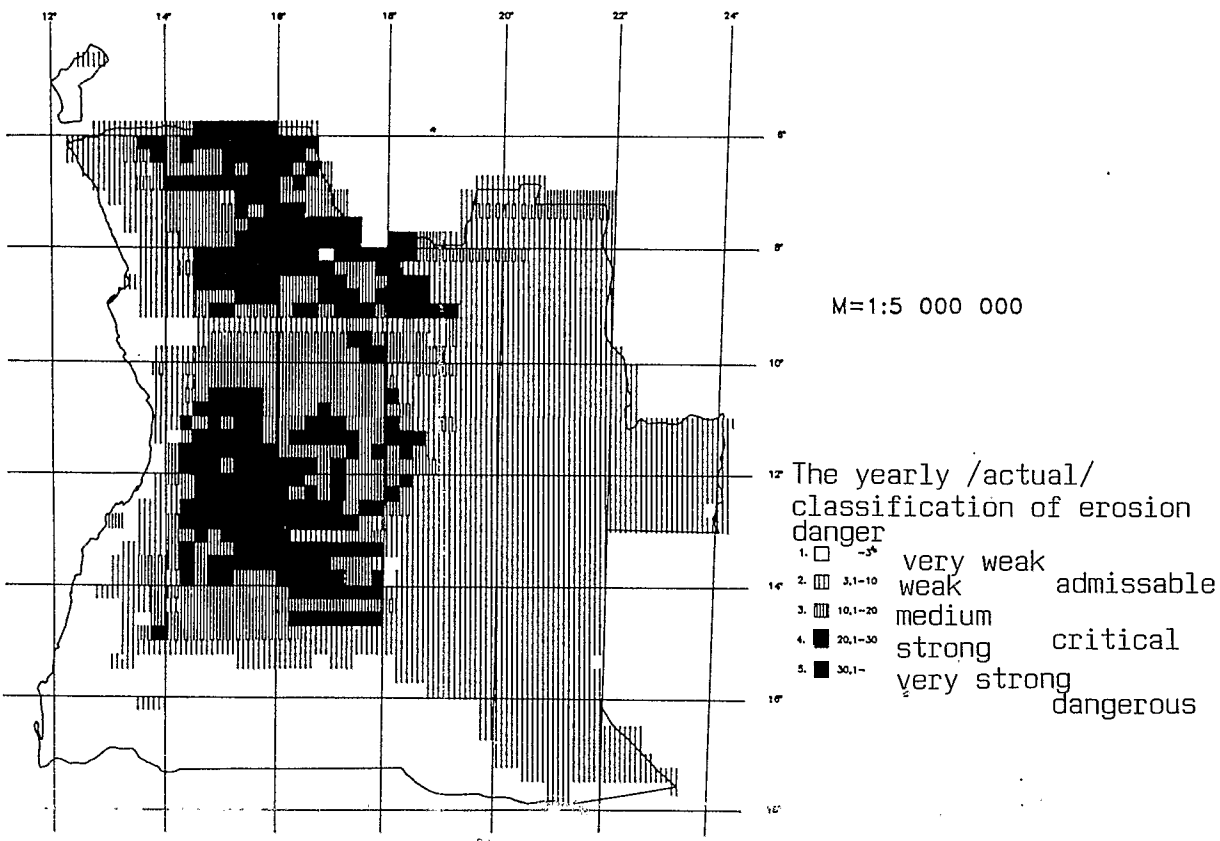


Figure 5. Map of R index for the precipitation in ANGOLA. If Ram = 0,5 Ham.

Figure 8. Map of yearly average soil loss /t/ha/year/ in Angola after Wischmeier-Smith /1958,1960/



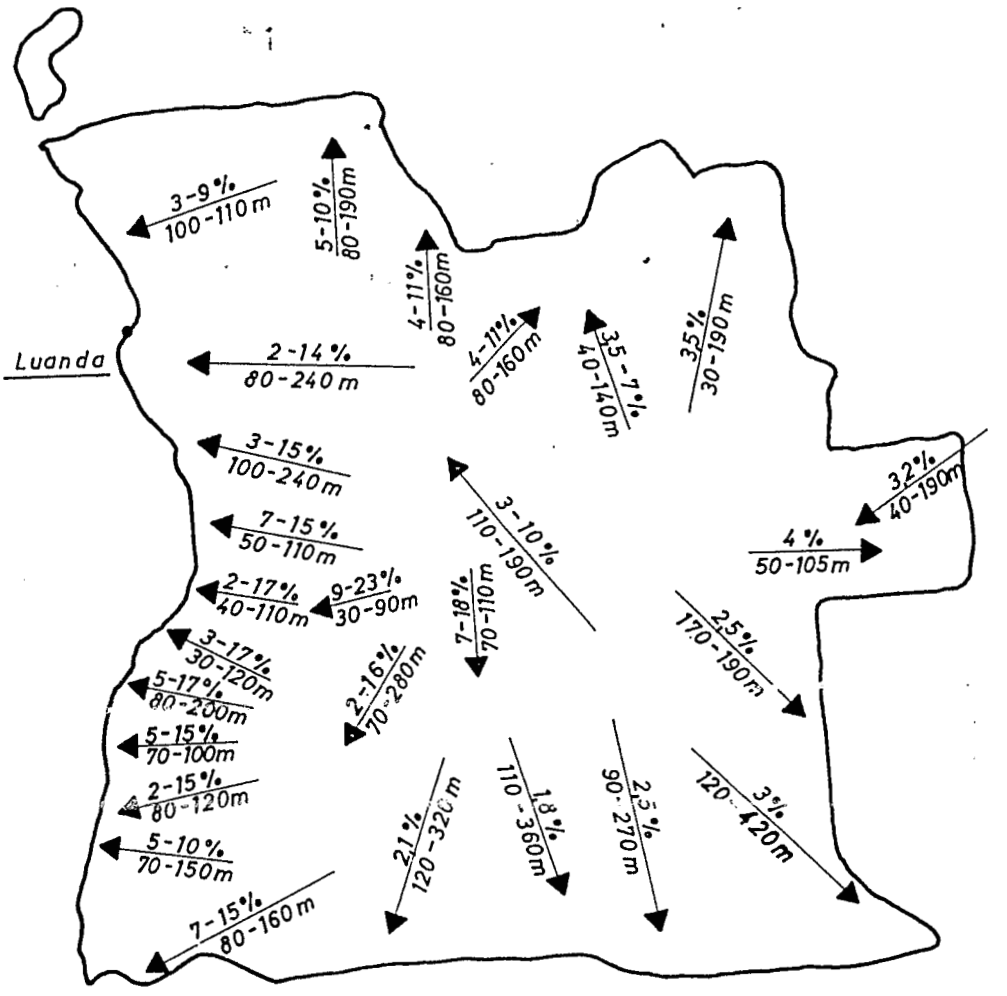


Figure 6. Steepness and length of the slopes in Angola