

THE MINISTRY OF AGRICULTURE AND ENVIRONMENTAL PROTECTION



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The regional centre for agricultural research in the area of Sudan  
Agricultural station in Bébédjia BP: 31 Moundou



## EFFICIENCY TEST OF NANOAGRICOLE ON COTTON

Growing season 2014/2015

### THE REPORT

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### Introduction

In frames of collaboration between ITRAD and our partners on development there was performed the efficiency test of liquid fertilizer Nanoagricole on cotton plant in the Bebegjia station. Delay of delivery of the product to the station did not allow to meet the deadline of the cotton sowing, which is set to be no later than July 5. However, data collection and monitoring were carried out in ordinal mode until the end of the cycle of cultivation of cotton.

The main purpose of this work is to study the effectiveness of fertilizers for further promotion, if the test is successful.

The given report draw up the results according to the terms and conditions received in the course of the first year of the product research.

#### I. Conditions of work performance

Climatic conditions of the agricultural season of 2014/2015 were worse than in 2013/2014 agricultural season. During this agro-season of at the station Bébédjia was reported total rainfall 975.6 mm in 74 j against 1459.7 mm in 76 j for the year 2013, respectively deficit-484.1 mm. May and the first half of June were particularly dry, as the station has registered only one rainfall of 20 mm (Figure 1). Precipitations were not regular in September and October.

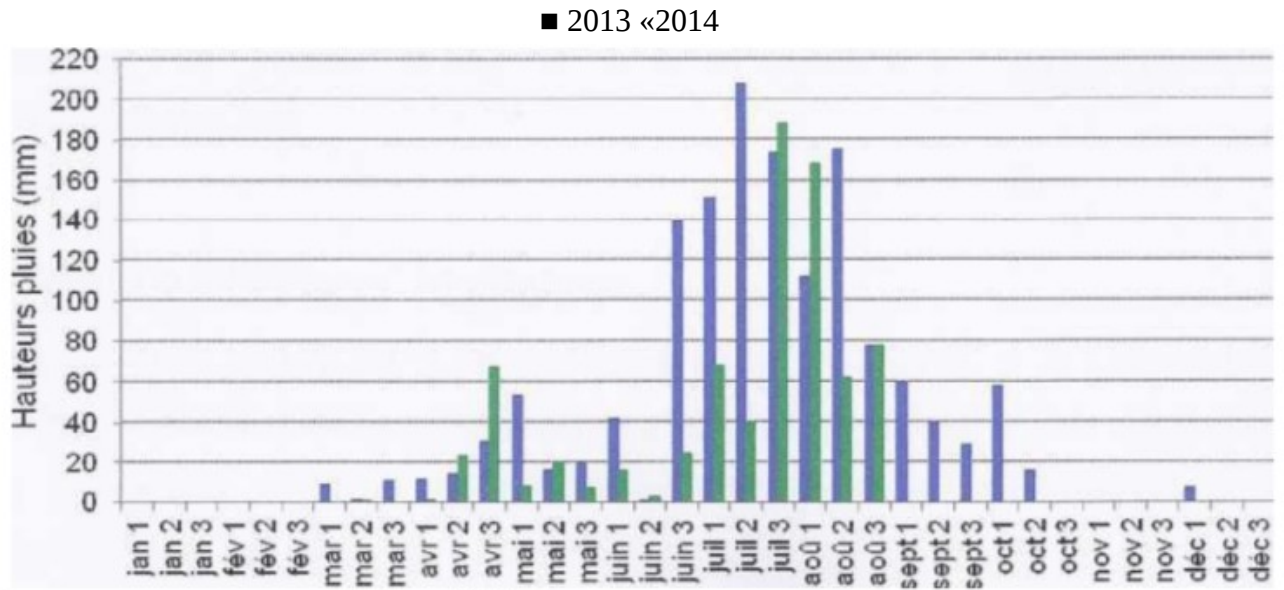


Fig. 1: Precipitation in 2013 and 2014.

## II. Materials and methods

### 2.1. Materials

- Place of test performance: Scientific and research station Bébédjia
- Plant material: a cotton variety A51.
- Mineral fertilizers:
  - NPKSB (19.12.19.5.1,2) used in Chad for cotton growing
  - Uria solution (46%N)
  - Nanoagricole fertilizer

### 2.2. Methods

The device is the Fisher block with six turning lights.

Experimental plot: 4 lines of 5 m each (0,8 m x 4 x 5 m)= 16 m<sup>2</sup>

Experimental plot: 2 central lines (0,8 m x 2 x 5 m)= 8 m<sup>2</sup>

Procedure of the research:

1. T: control processing (without putting fertilizers)
2. E1: a dose and formula of the fertilizer for cotton [100 kg/ha NPKSB (19.12.19.5.1,2) + 50 kg/ha of uria 46%N]
3. Na: E1+Nanoagricole (the studied fertilizer) in the dilution with carbamide (ratio is 1/10). Adding foliar nutrition (Nanoagricole) was carried out in a month after putting NPKSB. Plant protection: phytosanitary treatment was carried out since the first buds appeared (16.09.14) and continued until the end of the cycle of cotton cultivation.

All together there were performed 6 procedures, including 2 Cypercal 720 EC, 2 in EMACOT 019 EC, and in the las 2 in C CONQUEST 176 EC.

### 2.3. Statistical data processing

XLSTAT 2007 software was used for descriptive analysis and deviation (ANOVA) of the data. Newman Keuls test was used to separate the data, since the analysis showed a significant difference in the level of probability of 5%.

## III. Results

The results reflect the work that has been done on the stations Bébédjia. Delay in sowing works allow only observe the general trends in the first year of the product study. Therefore, we adhere to a certain caution in the results. In fact, if the crop was produced on time, the results would differ from those presented in this report.

### 3.1. The work with the plants

The dates of plant treatment, performed on the experimentals plots are presented in the Table 1.

Table 1.

Operation done	Date
Sowing	26/07/14
1 я прополка	22/08/14
Разрежение	22/08/14
Внесение NPKSB и мочевины	22/08/14
2 я прополка	11/09/14
Окучивание	12/09/14
Внесение Наноагриколя	18/09/14
1 я фитосанитарная обработка	16/09/14
Сбор урожая	15/12/14

Sowing was carried out 21 days after the optimal sowing dates July 5, recommended for cotton in Chad. After that date, the yield of cotton seeds is reduced drastically. This delay significantly affects the results of the research.

### 3.2. Effect of fertilizer on density and size of agricultural plants.

Taking into account an average density of 44,444 plants/ha, received density ranged from 25 000 to 57 500 plants/ha, although the optimal density is 83,333 plants/ha. This can be explained by the fact that sowing was carried out during the period when the soil is oversaturated with moisture. Probably such soil conditions has led some seeds to decay, resulting in low density of the cotton. The density and yield of cotton are low (Table 2).

The dispersion analysis on the level of 5% showed no significant differences in the studied data.

Table 2. The density and size of the crop

Variety	Density of cotton (plant/ha)	Size of a plant (cm)
T	47083,3 a	86,7 a
El	44791,7 a	85,1 a
Na	41458,3 a	97,3 a
Coefficient of variation(%)	21	13
Signification	ns	ns

As for the size of cotton, analysis of variance also showed no significant difference between treatments. Dry periods were observed in September and October and, therefore, affected on the size of cotton (Figure 2).



Figure 2. On the right there are 4 lines of cotton treated with Nanoagricole and on the left the one without treatment, which was very affected by drought.

### 3.3. Effect of fertilizers on the state of the separate parts of cotton.

We supposed that the fertilizer applied to cotton can make it vulnerable to pests. To define this, sanitary analysis was performed on buds and mature bolls.

The average proportion of healthy buds and bolls is 49 and 66%, respectively. When processing of Na (foliar application), and T (control), less than half of the study were healthy buds, while processing El (fertilizers), more than half were healthy (Table 2). However, a variance analysis showed no significant difference between treatments.

Table. 3. State of health parts (flower buds and boxes) of cotton

Variety	The proportion of healthy flower buds (%)	The proportion of healthy bolls
El	56 a	68 a
T	49 a	65 a
Na	42 a	65 a
Coefficient of variation(%)	28	13
Signification	ns	ns

As for bolls, it was found that more than half of them are healthy. The dispersion analysis revealed no significant difference between treatments.

### 3.4. Effect of fertilizers on the yield of of cotton

Due to delayed sowing of raw cotton crop has amounted only 430 kg/ha. The dispersion analysis revealed no significant differences between treatments at 5%. Extremely high coefficients of variation show that there is a large scattering between treatments and between the experimental plots with the same treatment.

Yields obtained after Nanoagricole treatment, conventional fertilizers and control are statistically the same (Table 3). However, between treatments Na (Nanoagricole) and El (conventional fertilizers) an additional increase of 100 kg/ha of sown field is observed.

Taking into account the actual purchase price of raw cotton, which is 240 F CFA/kg, an additional benefit from the use of the product will be 24,000 f CFA.

Table. 4. Productivity of cotton plant

Variety	The cotton seed yield (kg/ha)	Biomass output (kg / ha)
Na	537,3 a	1729,2 a
El	437,9 a	1375,0 a
T	312,3	1229,2 a
Coefficient of variation(%)	43	46
Signification	ns	ns

As for the production of biomass (stems and leaves), the average yield is from 500 to 2750 kg/ha. In the treatment of Na, El and T, were obtained outputs 1729, 1375 and 1229 kg/ha, respectively. However, analysis of variance revealed no statistically significant differences between the values obtained.



Figure 3. Cotton on the experimental plot at the opening bolls stage

