

Effects of Introducing Animal-Drawn Implements and Equipment within Sahelian Farming Systems in Niger

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Abstract

The project 'Machinisme Agricole' DGIS/SNV/INRAN studies the effects of introducing animal-drawn implements within Sahelian farming systems in Niger.

Two types of implements are found to be useful: a donkey or oxen cultivator to break up crusty soils (anti-erosion and better yields), and an ox-drawn subsoiler (developed by the project) to break up hard pan soil, so it can be replanted to prevent soil-degradation. A solid, low-cost donkey cultivator still has to be found and promoted. Well-trained farmers can make animal traction profitable, but care should be taken on the negative side-effects like worse social/economic relations and land-extension (soil-degradation).

Introduction

During the last workshop on animal traction (AT) in Senegal 1988, two papers were presented concerning the history (Tchougoune 1988) and the research executed (Ashburner and Yabilan 1988) on AT in Niger. Tchougoune sums up the restrictions which prevented the widespread use of animal-drawn implements in Niger:

- Different adequate techniques unknown;
- Inadequate training and escort of farmers;
- Ignorance of traditional farming systems;
- High price and poor returns of implements;
- Ignorance of implement-maintenance;
- Risk of soil degradation and fertility decrease;
- Animal-related problems (lack of veterinary care and fodder).

Ashburner and Yabilan (1988) describe the results of the FAO project 'Recherche, Production et Formation pour l'Utilisation du Matériel Agricole en Zone Sahélienne'. This project was concluded at the end of 1988 (Lecca et al. 1988).

The results came out of basic research on-station and testing of implements on-farm. The Atelier de Construction et de Reparations de Matériel Agricole (ACREMA) workshop in Tahoua was closely connected to the project.

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The financier, the Dutch Government (DGIS), decided to finance two more years to study 'the effects of introducing animal-drawn implements within Sahelian farming systems in Niger'. This Project 'Machinisme Agricole' started at the beginning of 1989 and is executed by the Netherlands Development Organisation (SNV) and the Institut National de Recherches Agronomiques du Niger (INRAN). Research is executed in cooperation with DECOR, the economic department of INRAN.

Description of Animal Traction in Niger

In early 1989 a study was executed by the project (de Beus, 1989), which evaluated the introduction of AT in Niger and the results of the former FAO project.

A survey in 6 villages already applying animal-drawn implements was executed. Generally, farmers say they apply tillage for better water conservation in the soil (higher production per field), and weeding for time-saving (resting and other activities possible), or land-extension (higher total production).

Farmers note the lack of training and credit-facilities and don't know the possibilities of donkey and camel traction.

The specific village situation especially influences the application of AT: social/economical structure, presence of extension-service, nearby markets, local blacksmiths, soil-types, rainfall-pattern, population pressure, etc.

Special attention in the report is given to:

- Returns of AT : can farmers really make profit out of it by higher yields. or is transport and cattle-breeding the main thing?
- Social-economic effects: will the gap between rich (first access) and small farmers increase, can women profit?
- Durability of farming-systems: are long-term soil and water conservation, soil-fertility and population pressure on soil influenced by use of AT?

Research Activities

During the rainy seasons of 1989 and 1990, 3 villages representative of middle-Niger were chosen:

- A valley and plateau-area (erosion problems and hardpan soils);
- A crusty soil area (sandy soils);
- An area with sandy soils and small deep-situated parts (clay soil).

Four implement types were distributed:

- Lightweight donkey-cultivators existing in Niger: Chinoise, Arara, Occidentale, Manga and Ucoma;
- Oxen-cultivator: Arara 'Canadien' 3 or 5 tines;
- Ridger: Arara;
- Strip tiller; subsoiler prototype developed by the project, mounted on the Arara frame. It is a low draught, ridging tine with chisel point at low angle and small wings to open a furrow.

Sixty five farmers were able to choose one implement to be used intensively with assistance of locally-based agents. The project provided the implements, and farmers could buy it on credit after 2 years. Farmers already possessed the animals, used for breeding and transport.

Effects to be measured;

- Agricultural: change in farming systems;
- Technical: performance of the implements used;
- Social: difference in use between rich and small farmers, did women profit?;
- Economic: returns and profit.

Results so Far

Two types of implements are found to be very useful for the regions surveyed:

- Cultivators to be pulled by one donkey or ox, to open up crusty soils, and thus prevent water-erosion and enhance water-infiltration. Weeding can be done faster and at the right time, which increases yield considerably;
- The subsoiler prototype can be applied on hard pan soils after sufficient rainfall. Direct sowing into the furrow doesn't influence the sowing time much. It can be very useful on degraded soils which risk turning into stony deserts. It is also a good intermediate between hard manual and expensive bulldozer work.
- Ridging on sandy soils is only profitable when manure or fertiliser is applied at the same time. Since use of the latter is limited and risky in Niger due to crop failure when the rainfall is low it will only be useful on heavier soils in the near future.

Close cooperation with farmers showed results: about 50 trial-farmers will buy the given implement. Outside the trial, over 100 farmers ordered implements (one third donkey equipment) and already gave advances.

Once farmers see the effect of intensive use of an implement, a part of their cash-flow is spent on advances, which is more a matter of priority than a lack of money as is often thought.

Farm income is gained through off-season work (irrigated crops, work in coastal states, small-trade, transport and sale of part of the rainfed agricultural yield: millet, sorghum, cowpea and groundnut).

Aspects like a reduction in erosion and time-saving when weeding is done by animals are hard to measure, but certainly play an important role to the farmers.

Restrictions

For further development of AT, special attention should be given to:

- Production of implements: in Niger local workshop will be able to produce special types of implements. Especially for donkey traction, one solid and low-cost cultivator is needed. The existing types all have their own specific faults. For the majority of small farmers, donkey traction is the only attainable possibility.
- Spare parts should be obtainable locally at cooperatives. Local blacksmiths will be able to do small repairs.
- In the Maradi area, small enterprises already produce a donkey and oxen cultivator, with

groundnut-lifters for weeding. It is widely sold (at low price) but of poor quality. On the other hand it shows the interest of farmers, though it is typically Sahelian short term thinking: better a bad cheap one for two years, than a good quality double-priced one which will last.

- Land extension results in fewer fallow fields and pastures, which could mean respectively soil-degradation and social conflicts with nomadic people.
- Already benefiting farmers could use time saved in weeding, to perform payed weeding on fields of others. This means fewer possibilities for seasonal labourers, often other small farmers, who see such labour as an important way to obtain cash.
- If the inevitable intensification of agriculture means a displacement of small farmers, their labour could become cheaper than AT.
- Influence of drought years; farmers will be selling animals and equipment to gain money for food.

Future

Research reports will be presented at the beginning of 1991. Afterwards a manual will be written on 'application of animal traction for agriculture in Niger'. This manual could be applied by governmental services and projects, to show how AT should be introduced properly, depending on rainfall areas, population density and soil types. It would also draw attention to possible negative effects. With this manual, basic research on AT will not be really necessary; application together with other inputs is the next step.

Most probably, a new Dutch-financed project will start up in the project-area. This would be a general agricultural extension programme at village level, specifically teaching small groups of farmers how to organise themselves to be able to obtain the different kinds of agricultural inputs. Small revolving funds will be created and managed by villagers.

Animal traction will probably play an important role in it!

Résumé

Le projet Machinisme agricole du DGIS/SNV/INRAN consiste à étudier l'incidence de l'introduction de machines à traction animale dans les systèmes de production du Niger. Deux types de machines apparaissent intéressants: le cultivateur à traction asine ou bovine qui sert à briser la croûte du sol (lutte anti-érosive et amélioration des rendements) et une sous-soleuse à traction bovine (mise au point dans le cadre du projet) destinée à fracturer les sols compacts afin de pouvoir les replanter et éviter leur dégradation. Il reste à concevoir et à lancer un cultivateur à traction asine robuste et peu coûteux. Des paysans bien formés peuvent rentabiliser la traction animale mais des précautions devront être prises pour éviter les effets secondaires adverses tels que la détérioration des relations économiques ou sociales et la dégradation des sols.

References

- Ashburner, J.E. and Yabilan, M. 1988. Le développement du matériel de traction animale adapté pour la production agricole dans les zones pluviales du Niger. Troisième atelier régional sur la traction animale pour le développement agricole en Afrique de l'Ouest. Niger, Juillet 1988, 16 p.
- Beus, J. de and Kruit, F. 1989. Partie 1: Enquête villageoise, 32 p. Partie 2: Etudes des possibilités d'application, 61 p. SNV/INRAN - Niger, juin, 1989.
- Lecca, M.L., Nielsen, K. and Kruit, F. 1988. Rapports de recherches de l'hivernage 1988, Rapport interne no. 5, Projet UNDP/NER/088/009. FAO, Niamey, Niger, 132 p.
- Tchougoune, M. 1988. Les contraintes dans l'utilisation de la traction animale. Troisième atelier régional sur la traction animal en Afrique de l'Ouest. Niger, Juillet 1988, 12 p.