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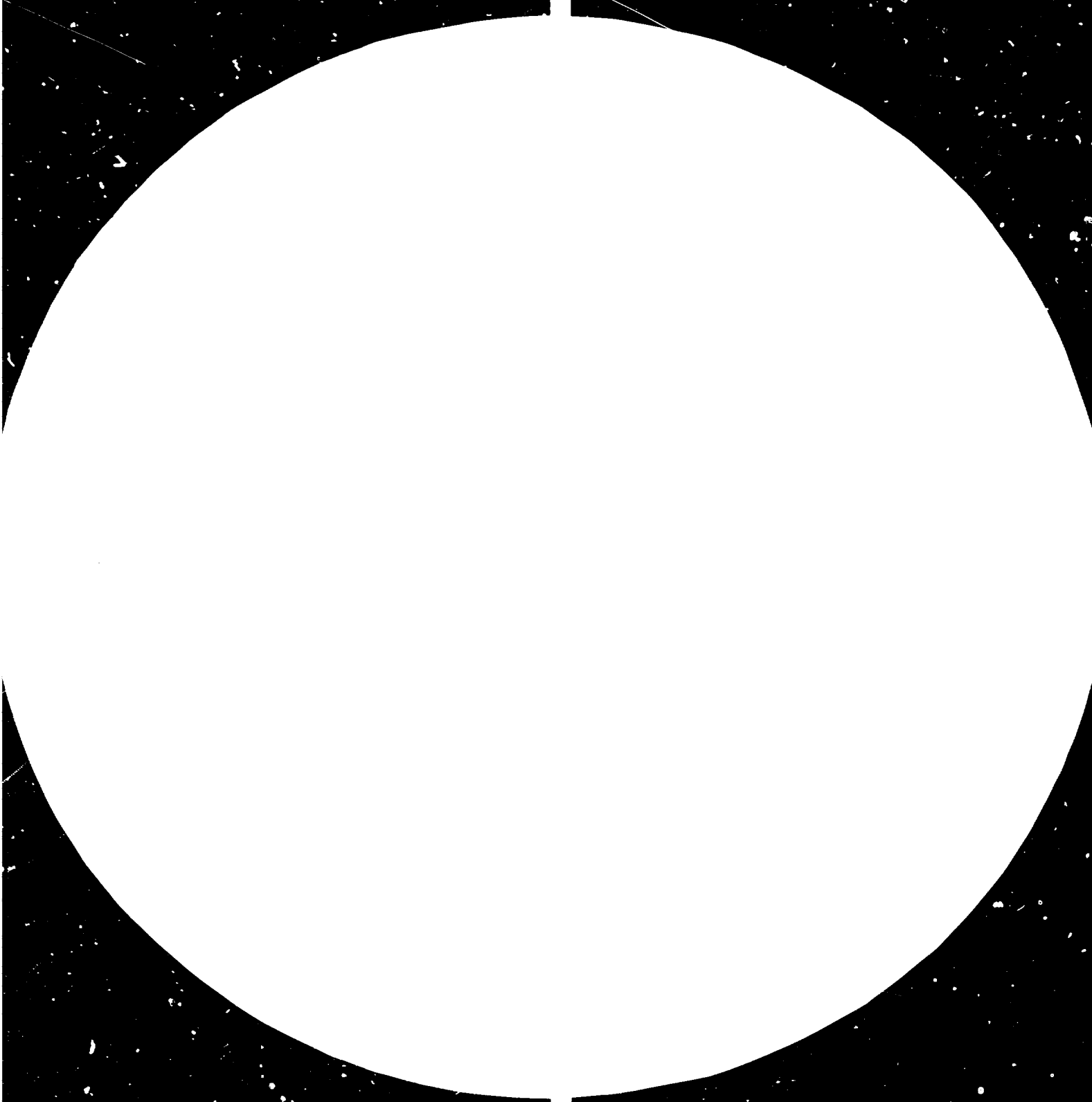
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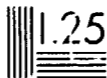
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AGRICULTURAL MECHANIZATION IN MALI*

presented by

SMECMA**

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* The views and opinions expressed in this paper are those of the author and do not necessarily reflect the views of the UNIDO Secretariat. This document has been translated from an unedited original.

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I. Introduction

There is no doubt that at the present time the Malian farming community enjoys the highest level of agricultural mechanization in West Africa.

Agricultural mechanization was first introduced to the French Sudan in 1928-1930 in the form of animal-drawn equipment imported for use in the rice-growing areas.

The stated objective in introducing this equipment was to increase production and productivity. The first implement to arrive was the plough, followed by the animal-drawn hoe and later by all the soil-preparation devices. During the period from 1933 to 1938, the Agricultural Service set about to popularize this equipment, first in farm-schools and later directly among the peasants. However, this policy was largely a failure, not so much because of the unsuitability of the equipment as because of the incompetence of many extension workers.

In 1945, the first tractors were introduced to the central Niger delta (Office of the Niger, Macina, etc.). In 1950, the introduction of motor-driven machinery gained impetus in the majority of the agricultural regions. By 1955, a promising future seemed in store for the tractor, and there was reason to believe that it would rapidly replace animal-drawn equipment. But in 1958, the outline law provided for a reorientation of agricultural mechanization through a partial abandonment of efforts to introduce motor-powered equipment and the assignment of priority to the popularization of animal-drawn implements. The disadvantages of the tractor were beginning to make themselves felt: difficulties in the supply of spare parts, shortage of trained personnel for the maintenance and operation of the equipment, etc.

With the advent of independence, in 1960, the tractor pool was estimated at nearly 300 units, while animal-drawn cultivation equipment was estimated at some 5,000 ploughs and 3,000 hoes. The new policy envisaged:

The assignment of priority to farming with draught animals using:

Multi-purpose equipment in dry growing zones;

Special-purpose equipment in rice-growing zones; and

Confinement of the use of motorized equipment to the initial deep-penetration operations for opening up virgin lands in the rice-growing regions, and to certain harvesting operations (threshers).

The Five-Year Plan for 1974-1978 continued this policy by providing for the use of tractors (including very small tractors adapted to local conditions) only after the most careful consideration. Mastery of cultivation methods using draught animals is regarded as a prerequisite for the introduction of other factors of production and, above all, for possible subsequent agricultural motorization, since motorization requires substantial investments and a complete readaptation of cultivation techniques by the farmers.

II. Thoughts on appropriate technology

All human activity, and especially agriculture, is based on technology, i.e., in the broad sense of the word, on the use of tools designed according to particular scientific concepts or the results of experience. Today, in many countries of the Third World, attention has been focused on "appropriate", "adapted", "intermediate", or "soft" technology. It should be noted that a consensus on this terminology exists only to the degree that it makes it possible to preserve the ambiguity and fluidity already inherent in the notions of "development" and "under-development". In other words, the terminology makes it possible to disguise the extremely profound differences of opinion regarding the social models made possible through the use of different technologies.

The notion of "appropriate technology" is ambiguous. The fact that it has been generally accepted does not imply the existence of a consensus. It cannot be used without additional explanations.

Brief survey of the agricultural equipment used in Mali

1. Cultivation using draught animals

(a) Multicultivator (Ciwara type)

This is a simple multi-purpose animal-drawn implement with which most soil-preparation activities can be performed on a small holding (tilling, scraping, ridging, weeding, harrowing, and peanut lifting). The following equipment may be clamp-mounted on a toolbar: straight plough bodies, rigid frame harrows, adjustable-wing ridging bodies, tines for weeding and lifter blades. The Ciwara multicultivator unit has performed to the satisfaction of most Malian peasants.

(b) Plough (BAJAC-TM)

This animal-drawn cultivation implement is the one most widely used in Mali. Originally intended to be horse-drawn, this French-designed plough was modified for use with oxen. It remains very popular in most regions of the country and is now being produced in Malian plants. There are two models of the Bajac plough, the B2 and the B4, which are used exclusively in paddy-growing.

(c) Seeder (SMECMA)

This is an animal-drawn single-row linear seeder, which is very similar in design to the Super-Eco seeder. This multi-purpose seeder has performed to the satisfaction of the users.

(d) Fertilizer-spreader

For the same purpose of increasing productivity, the Agricultural Mechanization Division (DMA) recently prepared a study on a fertilizer-spreader which can be fitted on the SMECMA seeder or the Ciwara multicultivator. Through the use of this implement, fertilizer can be applied locally at the time of seeding or following sprouting.

(e) Cart (SMECMA)

This multi-purpose implement is the equipment item with the highest sales after the Bajac plough. The most popular version is the model with the 1,000-kilogram useful load. This cart represents a good example of "mixed" appropriate technology in that State-run and private industrial enterprises are involved in its production.

(f) Hoe (ass-drawn type)

This is a multicultivator which is derived from the western hoe and is capable of performing the following operations: tillage, weeding, harrowing, and scraping. The prototype, produced by DMA and SMECMA, performed to complete satisfaction during testing. SMECMA now has this item under series-production.

(g) Animals

In the main, the animals in use are:

N'Dama and Zebu oxen;
Asses and horses;
Camels.

Each of these species is particularly well suited to individual geographical regions of the country.

2. Crop-treatment implements

Manual dah breakers

An initial prototype of this implement was designed by the DMA Design Office at the request of the Institute for Cotton and Textile Research (IRCT) in Mali. This implement, which, although sturdily built, is light enough to be transported to the field, is crank-operated by two men.

3. Water-lifting equipment

(a) Wind-powered. The "Savonius" unit, designed by the DMA Design Office and built by the Centre for the Study and Teaching of Agricultural Mechanization (CEEMA), is of interest because of its simplicity and low-cost maintenance.

(b) Pumps. Vergnet, Pneuride and Briau (Nepta) pumps have all performed satisfactorily in rural conditions.

4. Motorized cultivation equipment

Several micro-tractors or simplified tractors of the so-called intermediate-motorization type are currently being followed at various locations in Mali (combcultivators Bouyer MT80, Bouyer TE, Fiat 300, etc.).

Summary of the most widespread agricultural implements
in Mali over the last five years

Equipment types	Motorized farming				
	1974	1975	1976	1977	1978
Wheeled tractors	385	413	431	445	465
Floughs	240	270	284	289	303
Caterpillar tractors	300	369	400	426	450
Threshers	200	237	250	253	290
Sprayers	250	231	240	243	251
Seeders	126	130	140	144	150
Trailers	150	300	317	321	361
Motor-driven pumps	900	1 038	1 180	1 280	1 430

Equipment types	Farming using draught animals				
	1974	1975	1976	1977	1978
Floughs	94 000	100 010	106 704	120 104	129 306
Carts	36 000	47 708	52 204	66 254	78 373
Multicultivators	23 000	33 365	40 555	53 619	58 229
Sprayers	25 000	30 200	33 050	36 600	43 600
Harrows	7 000	10 400	10 739	10 739	12 239
Seeders	5 000	7 800	9 707	17 209	24 264
Hoes	600	13 987	14 053	14 058	16 160

III. Projects and prospects

There are a large number of projects. The activities which DMA intends to undertake in the near future may be divided into three categories:

Energy sources. Two projects, one dealing with anaerobic fermentation (biogas) and the other with the burning of rapidly renewable organic matter (brush grass), are soon to be proposed to financing institutions.

Information sources. A project has been prepared for the establishment of a documentation centre to collect information on traditional technologies, with the support of a design office to develop improvements in these technologies. The financing for this project has yet to be secured.

Crop-treatment implements. With the assistance of a number of financing agencies, several programmes have been undertaken. They concern:

Improvement of the karité processing system, particularly the presses;

Development of a manual millet thresher of a size suitable for use on small holdings (in progress).

IV. Organizations working in the area of agricultural mechanization in Mali

1. The Agricultural Mechanization Division (DMA)

DMA was established in 1968 to promote agricultural mechanization in Mali. It is governed by a National Consultative Committee on Agricultural Mechanization. This Committee, which meets once every second year, is responsible for formulating general guidelines in respect of agricultural mechanization in the country.

DMA includes:

An Economic and Technical Studies Section (prototype development);

A Training Section for the training of rural-development officials and the students of the country's agricultural and industrial schools;

An Experimentation Section for the testing and development of equipment;

An Information and Documentation Section, which has for two years been publishing an information bulletin entitled Machinisme Agricole au Mali (Agricultural Mechanization in Mali) (MAM).

DMA works through a Centre for the Study and Teaching of Agricultural Mechanization (CEEMA) and, at the ODR level, through testing and demonstration stations (PEDMA). These stations have yet to be established and the necessary financing has not yet been secured.

2. Malian Company for the Design and Construction of Agricultural Equipment (SMECMA)

SMECMA works with DMA in developing the prototypes of equipment appropriate to the needs of the rural regions. Once a suitable design has been developed, the equipment is manufactured at the Company's plant. At present, SMECMA is producing all the animal-drawn cultivation implements used in Mali.

3. The Agricultural Credit and Rural Equipment Company (SCAER)

This is a credit institution which makes available agricultural equipment to the Rural Development Operation Offices, which in turn provide this equipment on credit to the farmers.

4. The Rural Development Operation Offices (ODR)

These offices are responsible for the promotion of particular agricultural commodities. Thus, they contribute to the integrated development of the regions in which they operate. They function as intermediaries between SCAER and the farmers for the placement of equipment.

5. Private companies

The country has a certain number of private companies which are engaged in the sale of agricultural equipment.

V. The problems facing agricultural mechanization in Mali

(a) The selection of imported equipment

A few years ago, SCAER was importing various types of equipment (Soviet, Chinese, Japanese, etc.). Frequently this equipment proved to be unsuited to Malian conditions and, having found no local use, is now rusting quietly away. This experience confirms the fact that, in order to produce satisfactory results, a mechanization policy must embody a well developed approach technique in respect of a wide range of problems. DMA has been given the task of carrying out the checks preliminary to any decision to introduce an agricultural machine.

(b) The problems of extending farming methods using draught animals

A sizable segment (70 per cent) of the rural population does not yet enjoy full access to animal-drawn farming equipment. In any event, continued motorization would constitute a severe financial risk for the agricultural sector.

Without a doubt, the major obstacle at this time to the general spread of farming methods based on the use of draught animals is the meagre self-financing capacity of the rural masses, the rather stringent terms for agricultural credit, and the lack of credit for the purchase of draught animals.

(c) The problems of motorization

There are two types of motorized equipment in Mali:

1. Standard motorized equipment

This refers to large tractors similar to those found in the developed countries. Their operation under State-controlled co-operative arrangements (e.g. Office of the Niger) has fallen into disuse for lack of interest on the part of the farm workers. They are now employed on only 600 hectares of sown land.

Today, large tractors are found for the most part:

In the possession of a few private individuals who seek to turn a profit with them by performing work on a contractual basis;

Above all in the possession of the rural development offices that provide services to farmers prosperous enough to afford them.

2. Intermediate motorized equipment

This refers to small tractors intended for individual farmers. It should be possible to begin the gradual introduction of this kind of equipment in the near future, since DMA has repeatedly been made aware of the existence in the country of a farming élite who, because of the size of their holdings (at least 20 hectares), their technical level and their self-financing capacity, are in a position to assume the risk of intermediate motorization and are very eager to do so.

However, as the introduction of the small tractor will precipitate the disappearance of the principal motivation for integration between agriculture and stock-raising and will involve a risk of a decline in the fertility of the land, it must be prepared for with foresight.

In general, the problems facing motorization in Mali flow from:

- The very serious shortage of spare parts;
- The inefficiency of the after-sales service;
- The lack of skilled maintenance personnel.

VI. The role of UNIDO

UNIDO should not limit its consideration to the problems of manufacture, but should also take into account the problems in the areas of training, information and research (development), which are prerequisites for the manufacture of agricultural equipment that have been entirely neglected by other organizations.

Unless steps are taken to tackle both these aspects of the problem, the manufacturing effort will fall short of its objective, which is to achieve the large-scale use of domestically manufactured equipment.

For these reasons, it would be desirable if UNIDO were to assist the Malian Government in financing the national centres and their network of correspondents. Further, through the dissemination of an information bulletin, UNIDO could co-ordinate the various agricultural mechanization activities taking place in the developing countries.

VII. Interregional co-operation

SMECMA has begun to co-operate with a number of countries in the promotion of agricultural mechanization. As part of this co-operation, we have received trainees from Guinea-Bissau and the Sudan.

Very recently, we also received visitors from the Upper Volta and Brazil.

None the less, DMA requires the assistance of other developing countries in the areas of research and training.

VIII. Conclusions

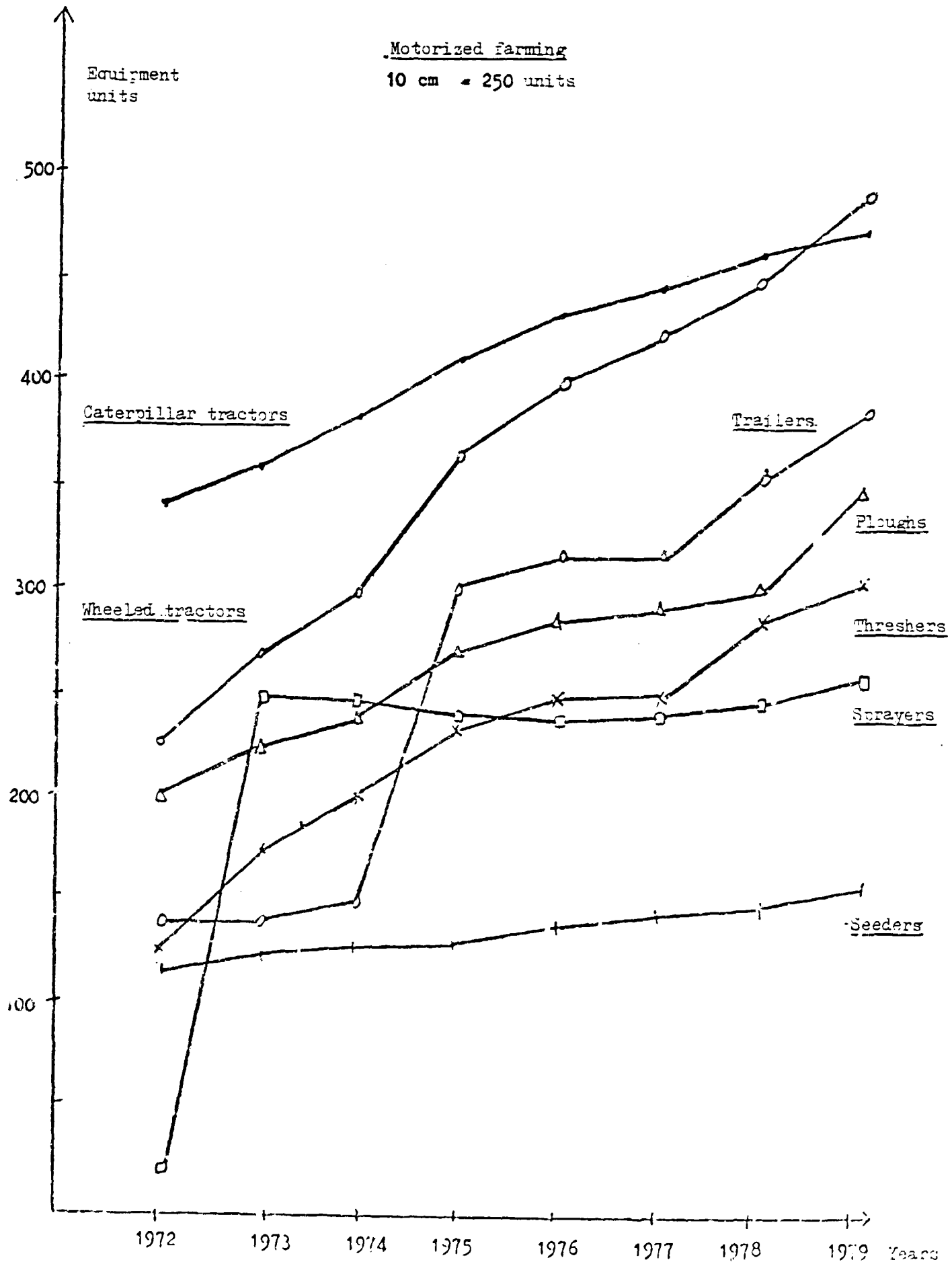
The extensive introduction of agricultural mechanization in Mali requires an "appropriate approach technique", of which the political aspect is certainly not the least important component.

On close consideration, it can be seen that the spread of technology in Europe had, and in many instances is continuing to have, a profound effect on the peoples of that continent. It must be borne in mind that the choices that will be made in the Third World countries will determine the possibilities for developing much more participatory alternative technologies.

What values will be given priority in these choices: the cold law of cash or the festive celebration of African women pounding karité?

Annex

Graph estimating equipment in rural areas in Mali



Farming using draught animals

10 cm = 50,000 units

o Equipment units

