

**AGRICULTURE OF THE ARIBINDA REGION
BURKINA FASO
FROM 1875 TO 1983
The size of change**

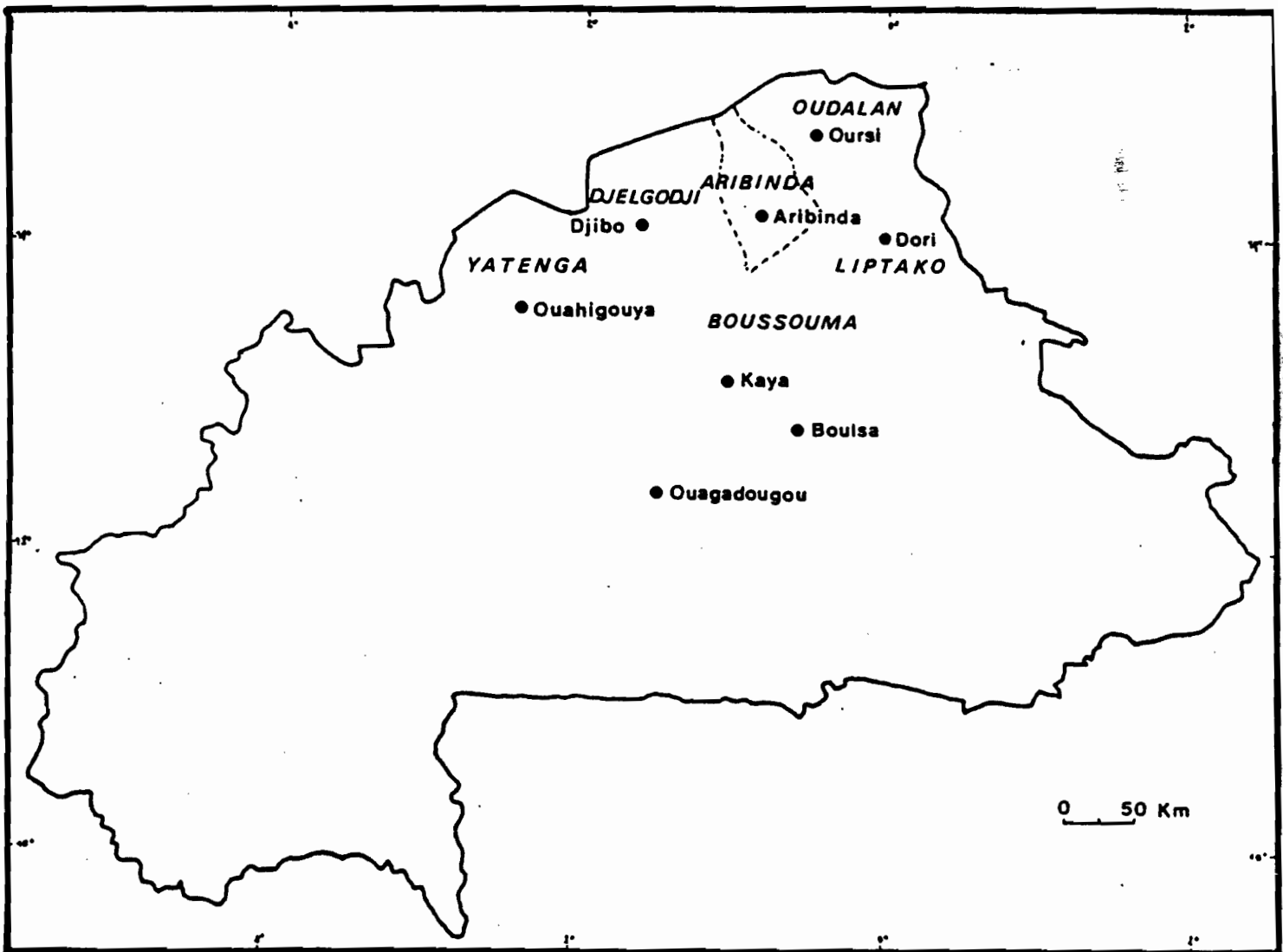
Georges DUPRE

Dominique GUILLAUD

ORSTOM - 213 Rue Lafayette
75418 PARIS Cedex 10
Department M.A.A: Milieu et Activité Agricole

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- Figure 1 : L'Aribinda dans le nord du Burkina-Faso -

1. SUBJECT; LIMITS AND PROCEDURES

We shall deal solely with agriculture and not with the agropastoral system of Aribinda as a whole (2). This choice was made for practical reasons--simply because it is in agriculture that we have made the greatest progress thus far with the work on data gathered in the field between 1982 and 1984. Livestock breeding will only be touched upon, in connection with agriculture either concerning competition for space or in a complementary sense, as in the case of manuring.

We shall endeavor to assess the present situation from the point of view of change. This is why we do not undertake an analysis of all agricultural practices, but limit ourselves instead to those which are changing or enable one to foresee future transformations.

Our surveys were carried out in Aribinda, a small sahelien region of about 5000 km² in the north of Burkina Faso (13.5-15 lat. N; 0.5-1.5 long.0) which stretches as far as the districts of Aribinda and Koudougou. Aribinda is thus the geographical framework for the facts reported. This spatial demarcation of the subject was not decided upon simply for the convenience of this article. If we relate it to a possible theory of production systems, it not only poses the problem of the extension of a production system but also that of its nature. We shall try to solve this theoretical problem clearly, based upon facts about Aribinda. We shall then briefly put forward the theoretical positions which led us to this solution.

The choice of Aribinda was firstly a practical one, made when the research program was decided upon. At that time, there was no available information and our choice could not be based on an analysis of the realities of this region. However, Aribinda seemed to us quite particular compared with its surrounding regions. Moreover, its small size was to enable us to control the different facts in the time chosen, both those concerning the natural environment and those concerning the population.

It became apparent to us very early in the course of our field work that Aribinda had a coherence which transcended and organized its diversity.

The name "Kurumba" conferred on the inhabitants of Aribinda by ethnographical literature gives the illusion of unity within the population and masks both the complexity of its place in history and

its present diversity. The population of Aribinda can be outlined as follows: the Songhay who came from the Tendirma region on the Niger were joined by the Kurumba who came from Yatenga, then by the Mossi who came from Boulsa. These last arrivals succeeded the Songhay as head of the chiefdom. These three elements constituted what became known as the Kurumba.

For a long time Aribinda remained confined to a territory immediately surrounding the small town and it was only around 1870 that the villages were created first to the north, then to the south, in order to exploit the available agricultural land. From then on, groups of livestock breeders began coming to Aribinda. First came the Sillube, followed by the Djelgobes from Djelgodji, then the Bella, former captives of Alkasebaten and of Kel el Souk of Oudalan. More recently, Peol Gaobe also came from Oudalan. Finally, since the beginning of this century, Mossi farmers have been settling in the region, creating their own villages or integrating with existing ones.

We can suppose that this social diversity goes hand in hand with a diversity in agricultural techniques. In this area, the most striking feature is the use of two weeding tools. H. Raulin (1967, 103) remarks upon Aribinda's remarkable position as a "meeting point between the two techniques" of the hoe and the iler and connected this duality with the diversity of ethnic groups present in Aribinda: "We notice," he writes, "that those who use the 'Kaibena' weeding tool call themselves Songhay descendants, whereas those who use the hoe are either true Korumba or else related to the Mossi." (id.) Moreover, for Raulin (id. 75) the use of the hoe and the iler imply not only two different weeding techniques, but also "two complete systems of cultivation, considered not only from the preparation of the soil right up to harvest, but from one annual cycle to the next."

The study goes on to look closely at the way in which the very real diversity in agricultural techniques in Aribinda highlighted by Raulin can be understood:

1. The use of a weeding tool, if introduced to the region by a given group, is not at present coextensive to that group. This is true even for the groups most attached to their own techniques, as the Mossi are to the hoe and the Bella to the iler.

2. It is difficult to imagine, as Raulin would wish, only two systems of cultivation, with tools pertaining to each. We find ourselves in a situation where, between these "pure" systems identifiable among the Bella and the Mossi, there exists all manner of middle ground situations involving compromise of coexistence of

the hoe and the iler.(3)

In fact, for the last 40 years or so, we have found ourselves in an extremely changing situation made up more of various and unsettled compromises than of pure situations in terms of techniques, both as far as agricultural instruments and varieties of crops cultivated or the nature of the soils chosen.

It is therefore not in the purity of agricultural or technical facts, if we ever thought these could be criteria, that the suitability of Aribinda lies with regard to defining a system of production.

The significance of our reference to Aribinda lies elsewhere. Aribinda--and this is the result of our surveys--has a history of its own which is linked to no other. (4) The small chiefdom of Aribinda managed to resist the pressures of the great political bodies of the Peul of Macina and Sokoto with which it was in contact through the emirates of Djelgodji and Liptako. In the same way, it managed to maintain its autonomy in the face of the powerful Mossi chiefdoms from the south and to check the aggressive advances of the Touaregs at the end of the 19th century. This independence demonstrated in its history would in itself have warranted establishing Aribinda as a reference had it not found internal expression in an autonomous process involving taking possession of land.

Agricultural colonisation which began around 1870 brought about a spreading of the elements of the population, groups and lineages initially contained and organized within the village. The study brought to light the existence of a network whose bases are the villages, hamlets and fields. This framework of the Aribinda region is not only the mark of history in the area but it is also the ever-influential political and land-based point of reference. For example, it is within this framework that the present-day scattering of dwellings into hamlets takes place. A new arrival is ascribed his place in this web by the chiefdom. There he makes his place in Aribinda and becomes an integral part of its history by reactivating power and rights over the land. In short, a political and land-based regulation is at work in Aribinda under the aegis of the chiefdom, controlled by the geographical network built up over history.

In the final analysis the significance of our choosing Aribinda as an extension and limit to the agricultural system lies in this regulation of "space" lines. Underlying this conclusion and what led to it are a certain number of theoretical and epistemological positions which require explanation.

A system of production is a model which enables one to

organize the information gathered on a concrete situation and to give it a meaning. Whether this meaning is produced for its own sake, that in order to understand it, or to be acted upon is not a significant distinction. Indeed, it may seem obvious that one can only act well upon reality if one understands it.

For a given branch of production, the information that goes into making this model is obtained by observing and recording of the facts concerning the subjects, the means of production and the work force used. But can one identify as many systems as branches of production? The answer depends on each particular case; in the present case that answer is negative. In so far as the different branches of production use the same land and the same work forces, they are not independent of each other, and cannot be considered as different. This is why we thought it wise to speak about about the production system as a system concerning production in its entirety.

What we analyse in this article is limited to agriculture, one element of the production system, and concerns only the changes and transformations that affect this sub-system.

When we use the concept of production system, we are following two basically different procedures (5):

1. The first consists of producing information from the study in the field.

2. The second consists of producing a meaning using the information gathered in the study to give a particular content to the production system concept.

These two procedures are quite separate. They are created in two different orders of reality. They have their own objects and objectives. We must keep in mind this distinction in order to avoid confusion which arises when one limits oneself to a formal approach centered around problems of definition.

One of the consequences of this epistemological distinction is that something which is significant in one of these procedures is not necessarily so in the other. For example, in the survey, agricultural exploitation is a strategic unit for observation and recording facts. But one cannot say, a priori, that agricultural exploitation holds the same position when one builds the production system. One can even say a priori that there are reasons why it does not: the concept of production systems must take into account the existence of an original combination of different factors of production at a given time--at the time of the survey, for example. But it must also be able to take into account the existence of this combination over time and permit thinking about its reproduction, whether this reproduction be identical or implying transformations.

Whether one examines things according to one or the other of these requirements, the production system can only exist within the social system.

To keep to what is most immediately concrete--that is, the study--agricultural exploitation does not in itself have the means for its reproduction. Thus, what makes possible the meeting of producers, men and women, in a field for a technical operation is to be sought outside the production system. The foundation of this transient conjunction must be sought in the systems of marriage and land, that is, the systems of social relations whose objects are women and land. This concept of the production system obviously requires some effort to overcome the positivism which surrounds it. The production system cannot be confused with the results of measures taken concerning agricultural exploitation which are accompanied by the obligatory lip service to "social context". Let us be clear on this point: either the social question is intrinsically linked to the production system or the production system is a useless concept because it has no true possible content.

This concept implies that the production system cannot be defined as an extension of criteria which are an integral part of it, such as the homogeneity of techniques. This definition can only be made in reference to that part of the social system in which the existence of the production system has its basis. This social reference of the production system varies from one society to another; in the case of Aribinda, the point of reference is its political system.

The 1983-84 agricultural season was the worst that Aribinda has experienced in at least thirty years. The climatic crisis, due to both insufficient and badly distributed rains, brought about a fight for survival which became extremely acute beginning in early 1984, at which time the granaries were for the most part emptied of the feeble harvests stored there.

It is this situation that we lived through on a daily basis and which we described (G. Dupré and D. Guillaud, 1984) and which is the origin of our research on changes in agriculture.

Our first step was to ask ourselves about the immediate changes which the crisis could provoke in terms of agricultural practices. It turned out that the lack of objectivity on the part of farmers and the helplessness of their reactions made an immediate assessment difficult.

But a crisis is never alone; it stands in relation to former ones which together define a state of crisis beyond annual ups and downs. It is in relation to this state of crisis that we have examined family

farms (7) and tried to highlight technical changes indicative of innovation. But the different combinations of production factors used by the farms appear essentially as the result of adaptation strategies and not at all innovative. This does not result in opposition to change because of "tradition" but in the fact that the farmers, when faced with very heavy environmental constraints, cannot permit themselves to innovate. And yet the history of Aribinda as it can be reconstructed since the end of the 19th century shows that considerable changes have taken place in agriculture.

2. THE IMPACT OF A CRISIS

2.1 The year 1983 in Aribinda

The report drawn up of the 1983-84 agricultural season brings to light an acute situation. This year saw the lowest rainfall on record--280mm compared with an average of 480mm for the preceding 30 years. This deficit was the result of a low number of rainy days and the absence of heavy daily rain, as was the case to a lesser extent for the other two deficit years of 1972 and 1980. What was unique about the 1983 season was its shortness and the fact that the dry periods between monsoon rains were such that the first successful plantings were not possible until the beginning of August, more than a month later than in the preceding thirty years. Moreover, the already shortened agricultural season was cut short on the whole, and the crops did not get sufficient water to complete their growth cycle.

As a result, the harvest was in deficit by more than 80% overall compared with previous years when food needs were generally satisfied. This is not the place to go into a detailed climatological analysis of the season. Nevertheless, and this is an important fact, the great regional variations in meteorological conditions resulted in enormous regional differences in the food-production deficit.

The study carried out in January and February 1984 underlines the overall seriousness of the food situation. By February, three quarters of the farmers saw their harvests used up.

Although millet and sorghum are the main foods of the area, they do not represent the farmers' only foods. In 1983-84, however, secondary crops (corn, groundnuts, sesame...commercialized or consumed directly) as well as wild plants yielded practically

nothing. The livestock was also much affected: animals died from lack of grazing, poisoning and disease. The losses in cattle were about five times greater than in 1982.

number of months of food harvested	responses
0 and less than 1	18
1	27
2	21
3	9
4	9
5	1
6	1
more than 8	0

Table 1. millet and sorghum harvests in 1983-84 measured in months of consumption (N=86)

2.2 Reactions and projects arising from the food crisis

Faced with the seriousness of the situation, all resources were mobilised. In February, the usual rhythm of two meals per day was reduced to one meal in most families, and it was meager. Three quarters of those surveyed had already begun to buy grain. To do so, the farmers used their saving and did various paid jobs. The farmers also got together to buy sacks of cereals and made the most of solidarity and family ties.

But most of the cash for the purchase of foodstuffs came from the sale of livestock: in February the majority of the farmers had already sold animals, or envisioned selling, despite constantly falling prices. They got only very low prices for animals which were often very young, but often the weakest animals were also eliminated from the herds in this way.

Departure was often seen as a solution, especially among the encampment people, the quest for grazing being of vital importance for the herds. Seven out of ten encampments in February had seen departures or foresaw moving on. In the villages, only three out of ten families fell into this category, mostly young people who were leaving temporarily in search of work which was assumed to exist outside the region.

The immediate reactions to the crisis were emergency reactions. They could be seen in every aspect of life--the urgent

sale of livestock, economising on food, resorting to foraging in the wild, aimless departure and the hunt for monetary income in addition to farming, sometimes in the most unexpected ways, such as gold-digging.

But we have also tried to assess long-term reactions. To this end, the survey contained questions on what changes the farmers intended to make in their practices as a result of the bad 1982-83 season. Their replies can be set out in the following manner:

1. a general enlargement of cultivated areas, without specifying the type of soils: 26 replies
2. the cultivation of marshland and the addition of sorghum crops: 4
3. the adoption of fast-growing varieties of millet: 4
4. a change of tools:
 - abandoning the iler in favor of the hoe: 2
 - trying the plough: 1
5. increasing manuring: 3
6. earlier sowings, beginning with the first rains: 3

Two comments can be made about these replies which are at best only anticipations. The changes mentioned are firstly quantitative: thirty replies are along these lines as opposed to twenty responses concerning different qualitative changes. These 50 replies were expressed by 44 out of 92 heads of farms questioned. The majority of them, therefore, had no idea at that time about the means to use in order to improve their situation. And it must be noted that these opinions correspond to a great extent with reality. The crisis left many farmers without means of survival. Seriously affected in their work force, often obliged to eat next year's seed, they seemed at that time to have neither the energy nor the material means to change anything about their agricultural practices.

2.3 Beyond the emergency: agricultural strategies

In comparison with the scale of the crisis, the changes appear very limited; but remember that the changes, by the very nature and timing of our study, are projects rather than observable facts.

This suggestion of possible change must be situated within actual agricultural practices; among these practices we must try to detect any possible indications of evolution.

Let's put it very simply: our survey of 16 farming operations showed that manuring, the use of the hoe and the intensity of the

work done per person in hectares are three factors which favor better yields (8). The concentration of these factors on the same plots of land could lead to a new model of land exploitation which could bring to light an optimum cultivation system.

In reality it happens differently. The collective fields are those in which both the work is least intensive and which are worked by hoe more often than elsewhere. (9) Everything happens as if the factors likely to improve productivity were not concentrated, but dispersed to confront climatic hazards and to compensate for the considerable wearing down of the soil, so as to spread out the chances of a harvest over the different cultivated plots.(10)

Here we find again an attitude which is similar to the one observed during the crisis. These practices obviously aim to ensure maximum security by spreading out the technical factors and also by the geographical scattering of the plots of the same farm.

The strategy springs from specific situations which can be explained to a great extent by local variations in rainfall. Thus, in 1983, Aribinda had 258mm of rain in 31 days of rain, whereas the village of Gasselnaye, 25 km to the north-east, had only 112mm in 13 days (11). Through adaptation, agricultural practices simply express the heavy constraints imposed on them by their environment. Everything seems to indicate, as much through the latency of the situation as through its exacerbation, that the farmers, placed in a limited space in a critical period, cannot risk innovating.

2.4 The turning point of the crisis: agriculture is set aside

The time scale and the subject of our analysis (limited to agriculture) result in the exclusion of any indication of real change or solution. In 1983 it seemed that the agricultural situation, at least according to the initial reactions of the farmers, could only evolve towards the maintenance of the status quo or the accentuation of the present situation.

In the field, this conclusion was all the more striking because day to day life contributed to our feeling of the extreme hopelessness of the situation. The turning point came quite unexpectedly, with the discovery of gold and its exploitation from veins near the surface. A veritable gold rush revitalized Aribinda. The presence of gold had been detected by geological soundings such that the whole population knew that there was gold in the quartz veins which wind through the granite in great numbers. As the food shortage worsened, the whole country was looking for gold. All over

the hills pieces of smashed quartz bore witness to this search. Gold was finally discovered near Aribinda and was immediately exploited. By April this movement was so great that no one in the region abstained. All able-bodied men began working at the laterite with makeshift tools. The quartz blocks were brought back to the yards to be smashed by the women, children and old men. Day and night the gold digging continued, which immediately created numerous activities, businesses and trafficking of all kinds.

But the gold quickly became much more than a means of procuring food. The gold hunt became not just a stake in subsistence, but also a social focus. More than a simple release, the work created by the gold mobilized everyone's energies and once again brought cohesion to the social relationships which had been eroded by the crisis. In the end, thanks to the gold, very few farmers left the region, and many of those who left returned. Finally, others came from elsewhere to try their luck in Aribinda. It is difficult to assess the contribution made by the gold income to the people's subsistence. It would probably be incorrect to claim that the sale of gold gave farmers the means for obtaining all the food they lacked. Gold certainly played an important role in their survival, but it was above all a catalyst for the social system. A very wide distribution of the gold resources grew out of improvised networks of exchange and services. Transcending the helplessness and distress of individuals, the gold made possible a social answer to the crisis.

2.5 The frozen time of a crisis

The example of the gold, the suddenness of the event and all it entailed, leads one to question the adequacy of a procedure which considers its subject only within the limits of a single space and time. On the scale of one year, in the space of one farm, things seem destined to perpetuate themselves. The short time frame barely enables one to measure the true extent of the reactions, or even necessarily to make out what they will be like. We would scarcely have thought, in January 1984, that the situation would hold solutions in itself; the logical conclusion we were forced to make was one of a standstill (12). Yet this agricultural crisis found a solution beyond agriculture which would have been impossible to foresee on this scale. Change is often difficult to grasp within a limited space and time. Although certain mechanisms can be brought to light within it, the trends around which the events arrange themselves can only be properly detected over a long period of time.

3. THE TIME OF HISTORY

3.1 Spatial and temporal limits

We have just described the limitations of an analysis of change carried out from a specific event (the food crisis) or from limited observations (a number of farms observed at a given point in their evolution). We now intend to expand our field of vision over the long period of history and over the whole region under consideration. In this other space/time, our procedure will entail going from the quantitative to the qualitative, from the spatial aspects of change to the most technical aspects. Once again, the results of this study will lead us to trace the limitations on our appreciation of reality set by this space and time.

But first, we must specify the spatial and temporal limits within which our analysis is situated.

1875: At that time the small town of Aribinda was still tucked around its hills. It was then that expansion outwards and agricultural colonisation of the region began. We chose this date because it corresponds to a moment in time when it is possible to cross two basic facts: an estimate of the cultivated surface area (obtained from a history of the Aribinda territory) and an estimate of the population (extrapolated backwards from the first census of the township of Aribinda in 1904).

1955 and 1981: In these years, two aerial scans of Aribinda were carried out. Without a contemporary census at our disposal, we relate the population of 1954 to the cultivated surface area of 1955, and the population of 1983 to the 1981 surface area. Moreover, only the number of people present in the interpreted photographed zone of Aribinda was considered.

The following table sums up the basic facts concerning the agricultural areas and the 1875 and 1983 populations (13):

Year	Agricultural Areas	Population	Ag area/inhab.
1875	1000-1500 ha	2000-2500	0.4 - 0.6 ha
1954/5	13,000 ha	13,500	1.0 ha
1981/83	34,000 ha	29,500	1.2 ha

Table 2--agricultural areas and population,
1875 - 1983

3.2 Some landmarks in the demographical evolution

3.2.1 A region of immigration

Since the beginning of the century, the population of Aribinda has grown at an annual rate of 2.8%. From 2500 people in 1904, its population grew to 4200 in 1983. This considerable growth rate (14) is as valid for the period 1904-1954 as for the period 1954-1983.

This increase occurred despite a certain number of major crises, whether famines or epidemics:

- 1914: the great famine
- 1929-1930: the plague of locusts
- 1931: the sorrel famine
- ? : the "afolfiula" epidemic
- 1949: the meningitis epidemic
- 1950-1951: the "akonkore" famine (15)
- 1972-1973: the year of the "red sorghum"
- 1982-1983: famine

This growth may seem incompatible with such a series of disasters given, for example, that the 1914 famine decimated nearly 20% of the population of the Yatenga (Marchal, 1980, 70 and 83). If the population has been increasing so considerably since the beginning of the century despite the losses (which we cannot assess) caused by these crises, it is primarily due to Aribinda's attractiveness to immigrants: the land available for cultivation and grazing, soils reputed far and wide for their exceptional fertility, and a region far from administrative outposts (thus making it possible to avoid recruitment and taxation) were the main factors that brought migrants to Aribinda.

3.2.2 Breeders and the development of cattle livestock

The Peul, Sillube, Rimaibe and Bella livestock breeders represented about 25% of the population of Aribinda in 1983 as opposed to 20% for the Mossi.

Around 1870, the breeding of cattle seemed unknown in Aribinda and the only animals bred there were goats and sheep. All through the 19th century the modest chiefdom managed as well as could be expected to preserve its independence against its powerful

neighbours to the east and west, namely the Peul emirates of Liptako and Djelgodji. Passive resistance and diplomacy were the means towards this fragile independence, so much so that around 1870 the livestock breeders, particularly the Peul, were absent from Aribinda. It was not until the 1870's that the Sillube of Djelgodji arrived. Their arrival followed the Bulol Boye war and these first breeders appear to have been captives that the victorious princes of Aribinda brought back with them. Between 1890 and 1910, numerous Peul groups came from Djelgodji to flee the Touareg incursions and also to escape the cattle plague of 1891. The end of the century saw the arrival of the Bella of Oudalan. Since the 1973 famine, Aribinda has experienced massive arrivals of Gaobe from Oudalan who, coming at the end of the dry season, often settle there permanently.

The numerical data we have on livestock since the beginning of the century should be considered only as landmarks of a growth about which we do not know the details:

1904: 500 heads

1956: 5,000 heads

1983: 50,000 heads

This growth is due to livestock kept by breeders, essentially Peul, but also to the livestock in the hands of the Kurumba who quickly took up cattle breeding. Inversely, all or almost all the breeders farm; many of them took up agriculture at the time of the food crisis or of the successive cattle plague epidemics which began in 1891.

Breeding played an accelerating role in the colonisation of land in as much as many farmers, especially beginning in the 1950's, left to settle "out of the way" of the huge cultivated zones in order to devote themselves to breeding over their farming activities.

3.2.3 The Mossi migration

Around 1910 the first massive arrivals of the Mossi took place on the southern fringes, where they set up their own villages; this movement continued into the 1950's and then eased off. In recent times, the creation of permanent Mossi hemlets has been sporadic, and the major Mossi movement towards Aribinda was still in the south, to agricultural establishments during the winters.

3.2.4 A low but increasing migration

According to the national census of 1975, the migration rate of the population of Aribinda as a whole rose to 1.45% that year. This rate seems low when compared with that of the Mossi region: for example, in 1964 more than 6% of the total population of the Yako Circle had been absent for less than six years (Kohler, 1971, 215). In 1973, in west Mossi, the migration rate rose to 15.2% (Ancy, 1983, 110).

Since 1975, the migratory movement appears to have sped up. A survey carried out on 913 people enabled us to calculate a migration rate for 1983 of 2.8% of the total population, which would indicate that migration had doubled in eight years. Half of the migrants who leave Aribinda remain in Burkina Faso; most of the others go to the Ivory Coast. Departures which took place in early 1984 in reaction to the crisis reveal migratory movement lacking the bearings and organization of the Mossi migrations. The extremely different destinations of the migrants and the indecision of many who want to leave but don't know where to go bear witness to this fact.

3.3 The future of a trend: towards the saturation of land?

In a situation of heavy immigration, which tends to increase with crises, and of weak emigration in numbers as well as in its organization, we can estimate that the population growth rate will remain roughly equivalent to what it is today. This demographic growth, which up to now has put few constraints on the still-available land, will, if it continues at the same rate, end up producing an imbalance between the population and the farm land. We must therefore question the limits of this process of land occupation.

Based on the assessment by aerial photo interpretation, the land fit for cultivation is divided up as follows (16):

total usable land	area utilised in 1955	area utilised in 1981
61,900 ha	10,500 ha	29,700 ha

Table 3--cultivated land 1955-1981

Assuming that the population growth will remain at 2.8% in coming years and that the area used per inhabitant will, for lack of

another hypothesis, be similar to what it was in 1981, we can deduce that by the first decade of the 2000's all the available land will be cultivated. However, this prediction is based on the very optimistic hypothesis that all the land will, at that time, be in the same condition as today. In fact, there is a good chance that this saturation will happen sooner if one considers that a fair amount of the oldest farmland will no longer be arable, because it will be infertile. Moreover, local variations have not been taken into account: the process leading to land saturation will be greatly shortened in certain areas where the cultivation of sandy soil is well under way. In the whole area north of Aribinda, 70% of the sandy soil has already been cultivated. The local percentages are higher: 74% around Arra, 82% around Bose, and 83% around Diamon. The increased scarcity of this light soil risks accelerating the cultivation of marshland, whose saturation seems further away. Livestock will then be deprived of their best grazing land and will be withdrawn to areas unsuitable for cultivation, where grazing is very mediocre.

All signs seem to indicate that the time is not far off when the growth of agricultural areas will no longer be possible, whether due to the arrival of migrants or simply to the natural population growth. Given this observation, it would appear that another system of land exploitation, agricultural as well as pastoral, or even extra-agricultural, is indispensable.

3.4 A "stupidity": fallow land

Referring back to Table 2, the figures given for 1955 and 1981 on the cultivated areas resulted from aerial photo interpretations which do not enable us to distinguish those fields which are cultivated from those which are not. In fact, these figures include a sizeable amount of unworked land. Our study of the farms allowed us to calculate the area cultivated per resident in 1984 at 0.52 ha. Thus, the ratio between the surface area lying fallow and that which is cultivated stands at about 1 (17). If for 1981 we must roughly divide by 2 the figures concerning agricultural land to obtain the land actually cultivated, it is difficult, without direct observation, to indicate precisely what ratio to apply to the agricultural surface recorded in 1955 to obtain the area farmed.

On the other hand, for 1875, we can suppose that the cultivation under "Faidherbia", in as much as it corresponds with what is seen elsewhere (18), gave the land no rest. Based on this supposition, each inhabitant of Aribinda would be cultivating little

more surface area today than in the past. Of course, land distribution has changed in the meantime: everything happens as if the weight of demographic changes had brought itself to bear upon an area unfinished until now.

What is new, on the other hand, is the extent of this hiatus between cultivated surface area and the basic agricultural surface. In other words, the enormous extension in the last century of what we, in the field, noted as fallow land. In Kurumfe, this land is called "akiogo zabre" which literally means the stupid field. The translation of this expression by fallow land seems inappropriate when we know that the land is cultivated continuously for 20, 30 years or more, leading to its total exhaustion and abandonment. It is this that the farmers call the stupid field, one which can no longer be farmed, which has been eaten away by "asoro", the baldness that uncovers the compact clay underneath the sand. Unlike in 1875, half of the land cultivated at present is made up of over-used land, a considerable amount of which is sterile.

Fallow land is an ambiguous notion in the context of Aribinda. It quickly became apparent in the field that this notion, in its everyday technical sense, could barely apply to the agricultural system, given the near permanence of crops. Under these conditions, halting cultivation of a plot of land goes against all land-management strategies; it comes about when the soil is completely drained. Discussing land with the Aribinda farmers constitutes setting aside the area of agricultural techniques in favor of land rights: the "akiogo zabre" is never excluded, even when drawing up the accounts of the farmland. Whatever its condition, the farmers hope to cultivate it again in the often indeterminate future. One may wonder if this declared intention is in fact nothing more than the affirmation of a right over this land.

Thus, it takes only a few decades of farming to render some fragile soils incapable of sustaining the slightest vegetation. In Brigtoega, 30 years of continuously growing millet were enough to transform a sandy foothill into a hard, cracked bed of clay and stones. The only soils which can stand up to this predatory agriculture are the deep sandy soils of ancient erg. The evolution in agricultural surfaces on these soils provides clear evidence of the interest the farmers show in them: the farming zone where they are dominant, the whole area north of Aribinda, increased from 30% of available surface area in 1955 to 70% in 1981.

It is consequently difficult for us to make a judgement about the capacity of these neglected land reserves to be once again cultivated one day. The question of this return to cultivation,

unlikely on soil that is fragile and stripped by decades of continuous cultivation, should be asked about the deeper dune soils and parts of the marshland.

4. CHANGE IN THE LONG TERM: TECHNICAL AND SOCIAL ASPECTS

We only mention the situation in 1875 in order to put later evolution into perspective. Most of the quantitative facts available to us are in fact the result of comparisons made on the period 1955-1981, or from our personal observations. But this does not exclude resorting to information of a qualitative nature in the long term.

In 1875, a large part of the territory concentrated around the village of Aribinda was cultivated on the dune sands of the ancient erg and under "Faidherbia albida". The thousand hectares used in 1875 represent all the land that was actually cultivated, since the presence of the park leads one to believe that the cultivation continued from one year to the next, and that fallow land was either nonexistent or very limited. The whole of the territory at that time was concentrated within a radius of about 2.5 km around Aribinda.

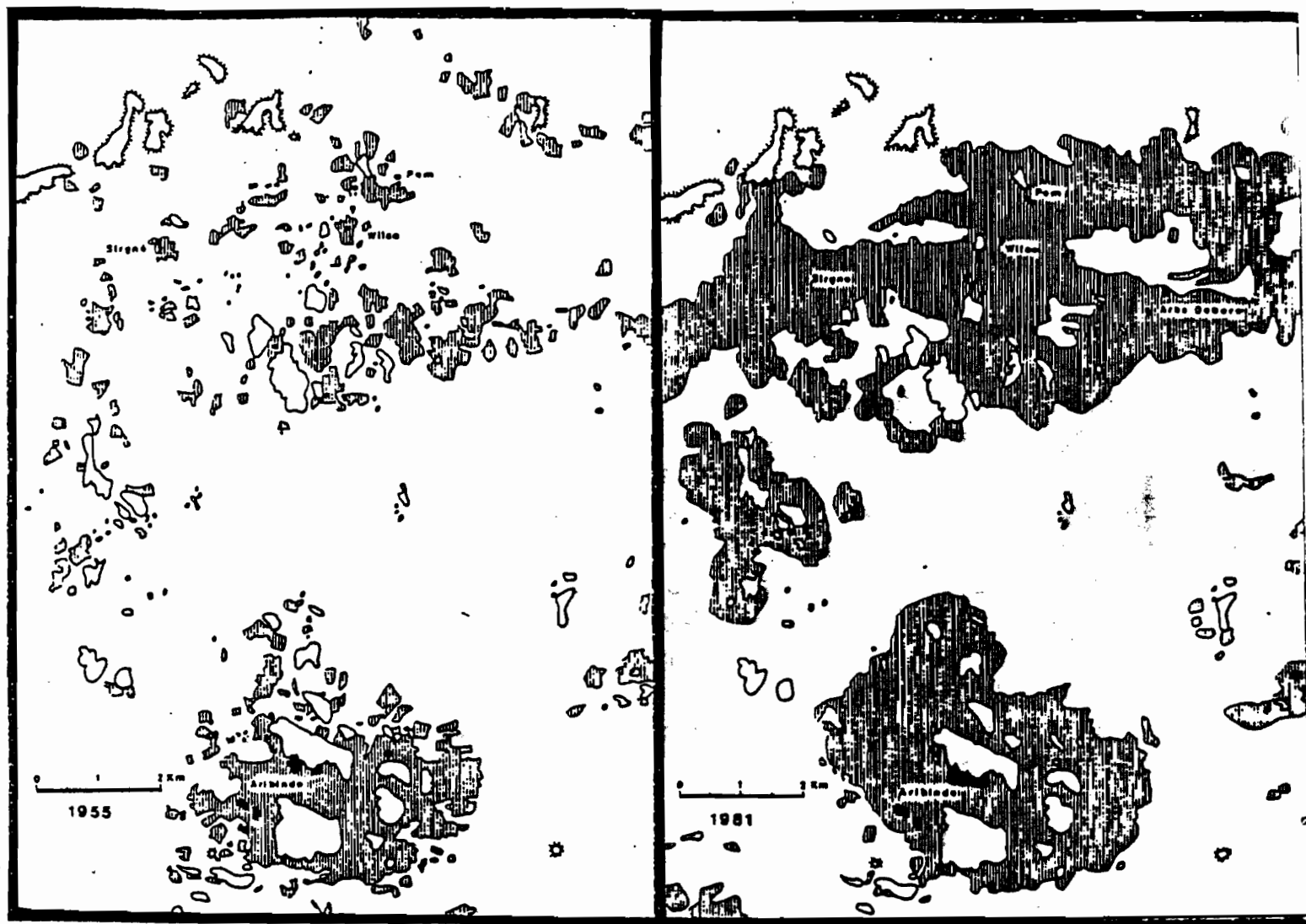
Then, with a growing feeling of security, the territory expanded. The availability of new and different types of land rendered null and void the system based on being tucked around the hillsides. This expansion and dispersion had various aspects and many consequences.

4.1 On the sand, hoe, and iler

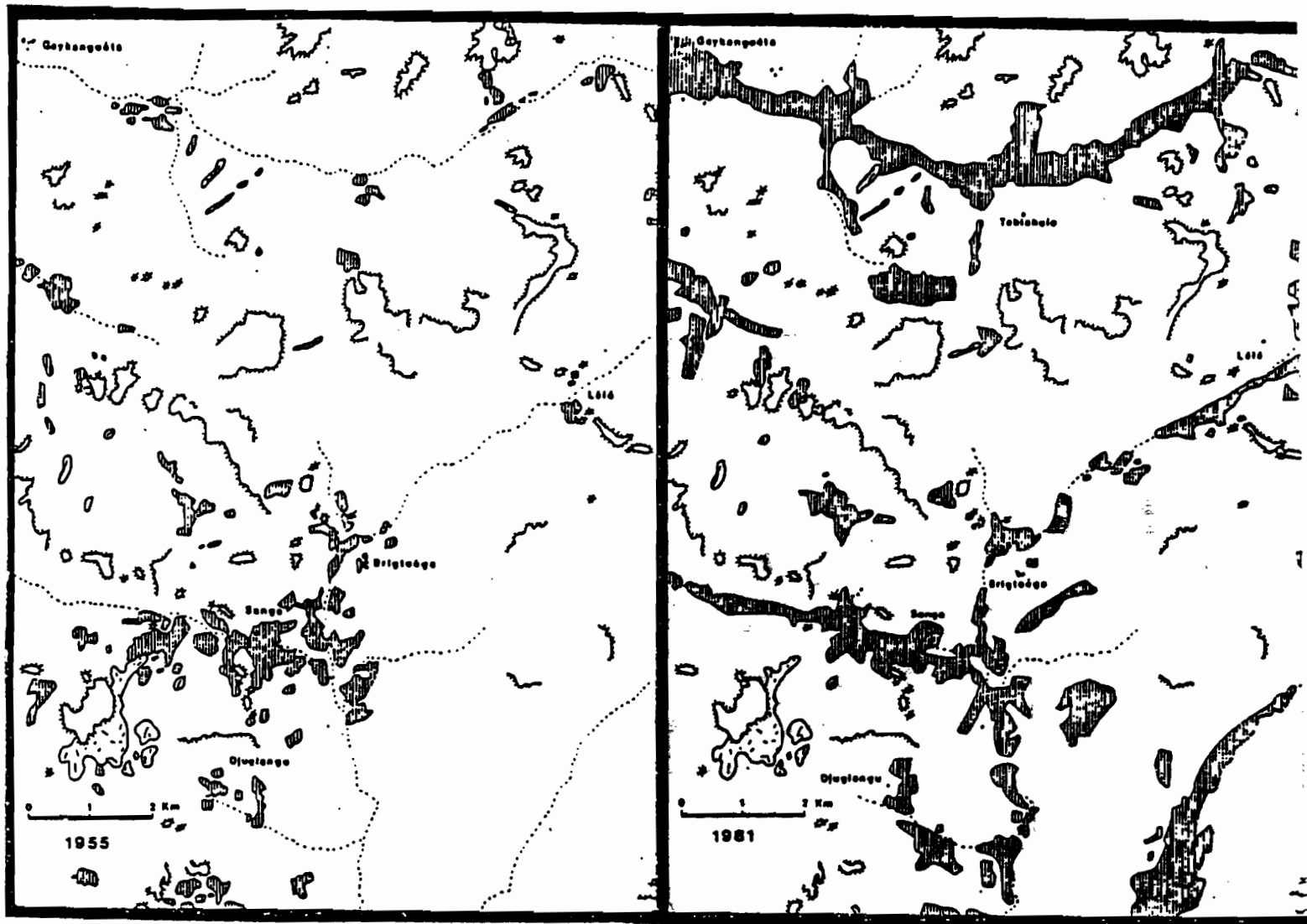
All the dunes were already permanently occupied in 1955. At the beginning of the century, people settled on the ancient erg sands situated 30 km north of Aribinda, which is the present northern limit of sedentary establishments of any importance.

What is new about this colonisation of the sandy areas is the growing use of the iler for weeding (19). The date this tool appeared has not been firmly established. Although Raulin (1967, 103) calls it the tool of the Songhay of Aribinda, it appears that it was upon contact with the Bella who came from Oudalan that its use became widespread, starting in the east.

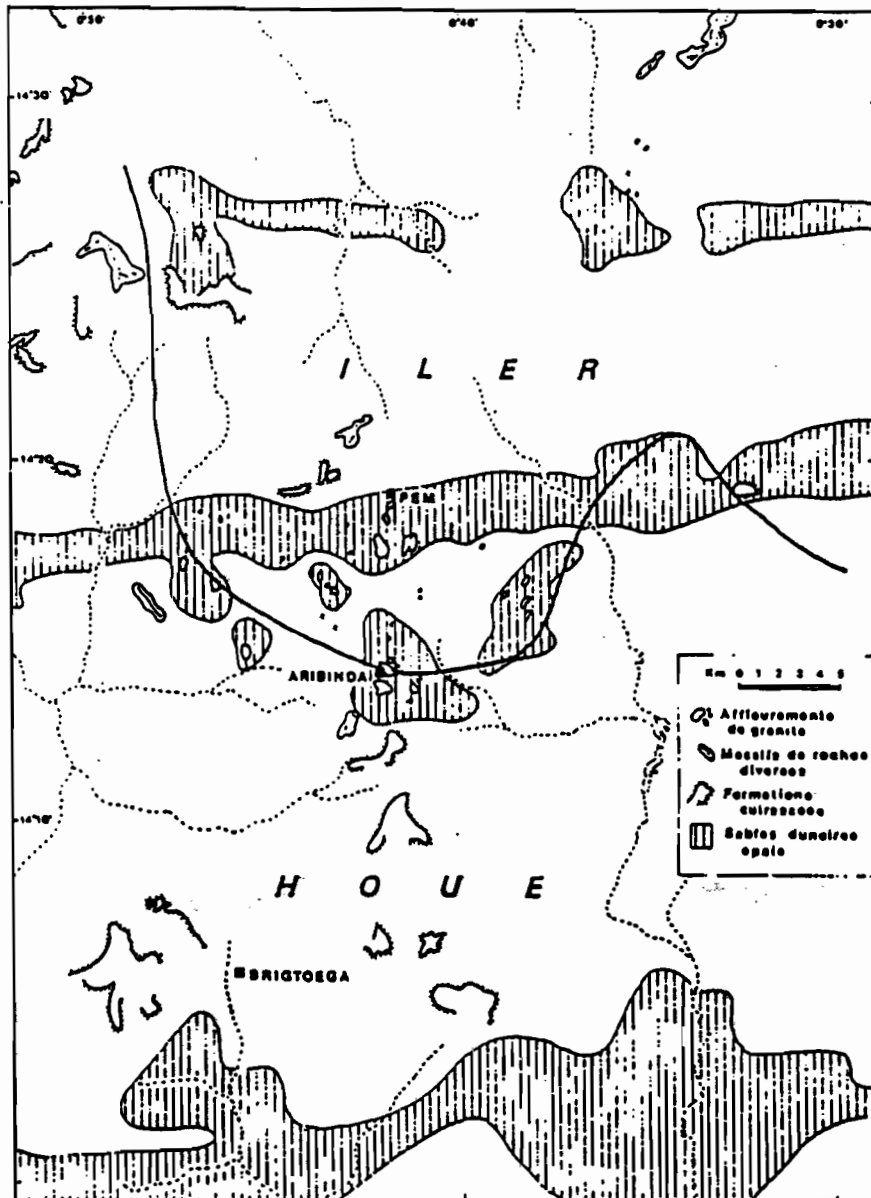
The first reason given to justify the choice of this tool is the fact that it requires little effort, since the user can handle the iler in an upright position. Moreover, the tool makes possible cultivation of a greater area with little trouble. According to both Raulin (id. 76) and our observations, it would take half the time to weed the



- Figure 2.a : Evolution des surfaces utilisées entre 1955 et 1981, sur les cordons dunaires : zone d'Aribinda et de Pem -



- Figure 2.b : Evolution des surfaces utilisées entre 1955 et 1981, dans les bas-fonds du sud : zone de Brigtoéga -



- Figure 3 : limite des aires d'utilisation de la houe et de l'iler dans l'Aribinda -

same area with the iler as with the hoe. The work required is less, but the results are less good, as the iler, unlike the hoe, only acts on the surface and certain deep-rooting self-propagating weeds soon reappear. Add to this the impossible task of digging mounds with this tool, whereas the practice is general among those who use the hoe. The addition of greenery to the land through digging self-propagating weeds into the ridges is done away with as is the anti-runoff effect of the ridges, though on deep sand soil the run-off is limited.

The overall effect of these factors is visible in production. In our studies of 80 plots on sand, the lowest yields (less than 300 kg to the hectare) corresponded in 7 out of 10 cases to weeding with the iler. The ratio is the inverse, in favor of the hoe, for plots which yielded more than 500 kg.

The time gained by using the iler is linked partly to an occultation of the female work time which this tool implies. The man uses the hoe and the woman thins out after him. With the hoe, the farmer, bent over, carries out all these operations alone and also does even more, namely making mounds and digging. Furthermore, the number of weedings required when using the iler is increased due to the fast re-growth of self-propagating weeds. To obtain results comparable with those of the hoe, weeding with the iler must be carried out much more frequently. But in fact the number and duration of weedings remain extremely variable and in general the choice comes down to less care taken with farming methods in favor of an increased consumption of land. It is more the affectation of work time than its duration which differs when using the iler instead of the hoe. Yields certainly show the effect of this, although this is not to say that productivity suffers from it.

4.2 The coexistence of two technical options

Aribinda appears to be a frontier where the choice of one tool or the other, or even both, is possible. Its position between the sudanese and sahelien worlds leads us to put forward a hypothesis which could explain the coexistence of the hoe and the iler: we find ourselves in an area where the potential weeding time, which we can define as the strategic lapse of time taken during the farming season to carry out this operation, allows for the choice of one, the other, or both techniques. This potential weeding time is affected by various factors, notably by rainfall. Consequently, agricultural intervention no longer fits in exactly with an extended strategic weeding time, nor exactly with a shortened time in which the

weeding must be carried out quickly. Since there is an element of choice possible, we are not dealing with antagonistic options but, in theory at least, with a possible coexistence. (20)

4.3 Lowlands and sorghum

Around 1930, agricultural colonization turned towards the previously neglected areas, the lowlands in the South. The Kurumba farmers had already settled in the South before that time, where they farmed mainly the sand at the foot of the hills. The development of the lowlands is linked to a two-fold phenomenon: on the one hand, the very strong competition from the Mossi arrivals, familiar with the farming of marshland, forced the farmers already there to affirm their territorial control by beginning to cultivate the same soils (21). On the other hand, the rapid degeneration of the aeolian surfaces which had been exploited until then, as well as the necessary decongestion of the old dune lands contributed to the growing interest in these available soils with favorable water conditions. It was thus that the lowlands came to be the farmers' favored soil in the whole of south Aribinda.

This agricultural conversion towards new soils brought with it the adoption of sorghum. This cereal, which was only cultivated in gardens by the Kurumba, spread over the vast area of the lowlands and their edges. This growth was spectacular in certain areas: at Gaykangeota, the surface of marshland cultivated was multiplied by 9 in 25 years. This expansion was carried out in strong competition with the Mossi farmers, as we have seen, but also with the livestock breeders; many encampments whose herds found their best grazing the marshland are today obliged to leave the southern zones in the winter for the North, beyond the cultivated areas.

4.4 The renewing of seed stocks

The change can be noted from an initial realisation which establishes the present weakness of the original stock of varieties grown. For us the "originality" of this characteristic, in this specific case, lies in the respective contributions of each of the founding groups to the range of crops grown. This contribution turns out to be small: a strain of fairly fast-growing millet, most likely ("poteyana", or "first millet", 70-90 days) and perhaps two other strains of long-cycled millet, ("torodo" and "anyara kumele", "short millet", both 120 days). In terms of sorghum, this weakness is even more staggering: of fourteen common present-day varieties, only

two (which are far from being specific to the region) can be attributed to contributions by the founding groups: "beloko", white sorghum with a very long cycle (120 days or more), and "red sorghum", "atisiga somenga", used in beer making.

In the later introductions, it is above all the considerable importance of the Mossi contribution of sorghum which deserves mention: of 14 varieties, 6 or more are of Mossi origin. This introduction would date back to the Mossi arrivals during the first half of the century, which led to the conversion of the Kurumba to the farming of the lowlands. Thus it was that there appeared fast-growing sorghum such as the Mossi "pisyope", which became the "domde tisiga" ("70 sorghum") of the Kurumba. Also worth noting are the "atisiga" and "awonega prenga" (two varieties of long-cycled white sorghum) as well as "akolega" with a shorter cycle (50-70 days).

For millet, the contribution would have come from across or from the north of Aribinda. From the Dogon came "hayre", the name given to the cliff of Bandiagra and which applies to a short-cycled variety (70 days). This introduction would date back to the end of the last century (22). In the 1920's the Bella introduced "belamayarou gatoru", a long-cycled millet of 90-120 days.

So far we can scarcely come to the conclusion that, with the passage of history, the stock of available seed has been enriched, an enrichment which would culminate in the present time. In fact nothing is said about varieties which may have been adopted and subsequently abandoned. On the other hand, this enrichment seems probable when we examine the changes as a whole which have affected agriculture: ancient farming, right up to the beginning of the century, was based almost solely on the millet crop. Sorghum was a secondary crop which shared, with cotton and aromatic plants, the small enclosed gardens or "akal". The only food-producing variety claimed by the Kurumba is "beloko" and it is unlikely that other important present-day strains co-existed with it. For millet, it is almost certainly harder to judge. The opening up of Aribinda to outside influences, as well as the development of trade, may be reasons in favor of enrichment of the plants cultivated.

Today certain strains dominate these two cereals, millet and sorghum. They are the long millet of the Bella, followed equally by "anyare kume" and "hayre". For sorghum, "pisyopwe" is most important, followed by "beloko", all the other varieties of sorghum being of lesser importance. What we noticed in these pairs of parallel oppositions is the competition between one or several

relatively old strains and a much more recently acquired strain. For millet, the last changes would apparently have been during the first third of the century. In the case of sorghum, the oldest strain is still competing hard with one of the newest ones.

This change also includes a choice, staggering in the case of sorghum, of more and more fast-growing varieties. In all the villages "beloko" is on the way out in favor of "pisyopwe". The long-cycled "belamayra" tops the varieties that were the least productive in 1983-84, and that may seem like the sign of present inadaptation of long-cycled varieties, at least in times of crisis.

This leads us to one final observation. It would be logical to believe that the choice seen today, which favors ever shorter-cycled varieties, itself risks leading to a shortening in the authorised strategic duration of weeding operations. We may therefore wonder if the changes seen here, as in the other areas examined, are indicative of the transition towards an agricultural situation wherein the jobs would have to be carried out in an ever shorter space of time.

4.5 The work force and the division of labor between the sexes

Up to now we have only discussed the technical aspects of change by establishing what may have changed since the beginnings of Aribinda among the most tangible factors of production. We shall now examine the big trends in the changes which have affected the work force and the organization of agricultural labor.

4.5.1 Increase and division of the productive forces

"In the past, only the prisoners worked the land, and their princes who did not work ensured their protection. With the emancipation of the captives, the princes began to farm, but their women were not involved in agriculture. Then the women too began to work the land, but in their own fields."

This description, given to us in the field, refers to the Maega, offspring of the Songhay-Mossi alliances. But it can be applied to a good number of social groups in the region. In fact, it concerns several distinct movements which it confused:

1. The relative increase in active individuals. The abolition of servility by the colonial administration and the ensuing emancipation of the captives led the nobles, both men and women, to work the land themselves. This increase of the labor force within the population accelerated both the colonisation movement which

had begun around 1870 and the redistribution of the population over the region.

2. The division of the productive forces. Until around 1950 the collective field in which all active family members worked was, without exception, the generalized situation in Aribinda. At that time, individual fields began to appear, which were the making of men as well as women. Several facts can be mentioned to explain this movement, although no single one explains it exclusively. The appearance of individual plots is obviously not foreign to the development of trade which sprang up at that time. But in Aribinda it is explicitly linked to the widening use of the *iler*. The adoption of this tool for weeding enabled the members of family work-groups to gain time, thus giving them the time to cultivate for themselves. According to some sources, this movement began with the women in the zone where the *iler* was originally used, then spread to the women on farms where the hoe was used, and then finally reached the men of the region. This was the division of labor between the sexes in relation to the use of the *iler* (23), originally in the minority in Aribinda but which, once becoming generally used, enabled the women to gain time for work of their own.

4.5.2 The technical implications

From a sample of 80 plots of sandy soil cultivated in 1983, we were able to assess the division of labor between the collective fields and the individual ones. 8 out of 10 individual fields benefited from a relatively large work force (each individual having less than 0.5 ha to cultivate) as opposed to 4 out of 10 collective fields. The division of the work force appears then to favor the individual plots. The collective fields are by far those with greater surface areas. They are also more often worked by *iler*. This can be interpreted as a balance between a low investment in work force and a technique which requires less work.

To simplify, we can say that the *iler* is used not because it enables twice as much work to be done, but because it economises the work force. Raulin (1967, 127) noted that "the division of the farming unit brings about considerable change on the level of production. The reduction in the number of workers in the field means a lower yield, not necessarily in proportion with the number of workers." Our observations, however, are these: the fields which benefit from a great contribution of labor per unit of surface--each individual having less than 0.1 ha to weed--have, 6 times out of 10, yields greater than 500 kg per ha. In the cases where each

individual has to work 1 to 2 ha, 8 out of 10 yeilds stand at below 500 kg. The atomisation of the work force certainly seems to move towards a decrease in productivity.

	COLLECTIVE	INDIVIDUAL
Total surface area of the samples	118.7 ha	28.3 ha
Number of plots	42	70
Average surface area of the plot	2.8 ha	0.4 ha
Number of workers	105	70
Average surface area per worker	1.1 ha	0.4 ha

Table 4--work in collective and individual fields

7 out of 10 people work an individual plot as well as in a collective field. One may wonder to what extent the work in the individual fields competes with that carried out in the community fields, as well as about the priority given by the individuals to one or the other type of farming.

5. BETWEEN THE CRISIS AND HISTORY

By shifting our observations, as we have just done, from the scale of a year of crisis to that of history, the nature of our observations appears to change. The same is true when the observation changes location and shifts from a family operation to the region as a whole.

In the reduced, precise space/time, which we have called a crisis, we are not really in a position to notice change. In the long term, on the contrary, the perception of change is structured differently. We no longer reason from a central point from which a series of measurable reactions and options diverge. The change, in the long run, is perceptible through a network of events linked to each other by multiple connections. An analysis over a long period of time produces a picture of movement which, global and integrated, shows the direction of change but not the process by

which it is created or the way in which it operates. For example, discussing the consequences of the introduction of the plough based only on the information gleaned from history would lead to discussing the advantage of being able to cultivate the collective fields more quickly in order then to devote oneself to the individual fields; but would give no information about the real technical advantages of the tool nor about the economic effects resulting from its use. In the same way, when dealing with the choice of strains cultivated, one may think that the short-cycled varieties would become a permanent choice. Yet we see that there is no linear evolution in this direction. At a given time, there is the adoption of short-cycled varieties, then a return to long-cycled varieties. Change in this area is not based on climatic evolution, but takes much more complex phenomena into consideration--in this case, what could be called a taste for a variety like "gagoru". This shows the necessity for these two observation scales. But it also emphasises the gap between an evolution grasped in the long term and observations limited to a short period during this evolution.

Between these two procedures, between the closed perspective of the crisis and all the projections or hypotheses rooted in the long term, arises the necessity of observation on an intermediate time scale, which would permit access to the mechanisms of change.

This conclusion is reinforced by a certain number of facts observed in the field. The plough, introduced beginning in the 1950's in north-eastern Aribinda, only spread to Aribinda itself in the 1970's, and had barely reached the village of Dalla, 10 km to the west, by the time of the survey. At the time of the 1973 drought, a new variety of rapid sorghum was introduced in the villages near the Bukuma marsh. The Mossi village only began to cultivate this strain 9 years after it had been introduced. All indications seem to be that a change which occurs in one domain--be it strains or species cultivated, soils exploited, or tools--has its own rhythm. Along the same lines, if we did not notice any tangible effects of the introduction of the plough to Aribinda, it is perhaps simply because the rhythm of its diffusion escaped the scale of observation which we chose.

To reconcile the different scales of space/time in which the observations are made and to organize them into a hierarchy seems to us, based on this work, to be a basic methodological problem which at present we can only indicate as a necessary line of research.

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NOTES

(1) Most of the information used here was taken from a paper we presented at the symposium Nordeste-Sahel in Paris on January 16, 17 and 18 1986 (G. Dupré and D. Guillaud, 1986). Here, however, the problems exposed and the conclusions drawn are completely

different.

(2) The study of the production system as a whole should not only take into account agriculture and livestock breeding, but also other production activities which are generally left out, such as the gathering of wild plants, which plays a particularly important role in Aribinda.

(3) The coexistence of the hoe and the iler is observed on several different levels: both tools can be used within the same family operation, either by the same or by different individuals. Both tools can also be used on the same plot, either successively or simultaneously (in the case of collective work).

(4) This is unlike the Kurumba of Pobe Mengao, who were defeated by the Peul at the beginning of the 19th century, then came under the influence of the Mossi.

(5) This can be said of any process of knowledge which is based on that which is concrete.

(6) It is obvious that even if the procedures are distinct, they are not independent of each other. They are linked in many ways. For example, an idea of the production system will serve to inform and guide surveys in the field.

(7) 16 exploitations were studied, whose plots were treated.

(8) See 4.5.2

(9) 25% of the plots cultivated by hoe are manured, as opposed to 60% of the plots cultivated by iler (sample of 80 plots).

(10) All in all, manuring plays a compensatory role more than one of improvement.

(11) Source, O.R.D. These facts differ slightly from those of the ASECNA. Their interest is to cover several villages in Aribinda.

(12) Moreover, this is the opinion we expressed in two previous publications (G. Dupré and D. Guillaud, 1984 and 1986).

(13) Of the total population, only the individuals present the in the

zones with interpreted aerial photographs were considered.

(14) Considerable, but not exceptional. Marchal (1983, 240) quotes, for the regions of Dori, Djibo and Gorom-Gorom, a growth rate along these same lines (2.5% per year), comparing it with the annual growth of Yatenga, nearly 1.8% per year. The demographic growth in Aribinda takes on its importance when compared with that of the Mossi areas, whose weakness is due to emigration.

(15) From the name of the tomato concentrate can which from that point on became the new unit of measure for grain.

(16) Some indication should be given of the problems posed by the assessment of these surfaces. Locating soils in the sand dunes is relatively easy and the assessment of their area fairly precise. The same is not true for the lowlands. This purely topographical description in fact covers different pedological categories. The surfaces registered as marshland correspond to river beds, characterised by denser growth of vegetation. In this context we find extremely different soils from the point of view of their agricultural use.

(17) Refer to any geographical literature on this subject, particularly Pelissier (1980, 135-6).

(18) The iler is a large weeding tool which enables one to work upright. It is essentially, but not only, used on light soils. Some farmers in Dampella use it soils containing more clay.

(19) Our results establish that an individual who works with an iler cultivates and average of twice as much land as one using a hoe.

(20) This hypothesis should of course take into account the other factors that influence the choice of tool--soil types, and the availability of farm land and work force.

(21) For example, this is what happened at Djulangu, 30 km south of Aribinda, around 1920.

(22) One source, Nobila Wono, is of the opinion that all of the fast-growing strains of millet came from the Dogons.

(23) Certain sources attribute this division of labor to the Islam

Dupré Georges, Guillaud Dominique

Agriculture of the Aribinda region Burkina Faso from 1875 to
1983 : the size of change

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