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Agriculture in The Dinka And The Nuer Land Jonglei Province

By

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LIST OF TABLES AND FIGURES

TABLE OF CONTENTS

I SUMMARY:

I.I. This report is about the agriculture of the Dinka and the Nuer of Jonglei Area. The Dinka and the Nuer land have a good resource potential for the development of livestock, agriculture, and fisheries. However with the present state of culture, the utilization of this potential for the economic and social prosperity of the communities inhabiting the two areas, could hardly be foreseen in the near future. This is very true of the case of agriculture.

I.2. The type of agriculture practised in the two areas, which is well integrated with the livestock economy : the mainstay of the Dinka and Nuer, has so far succeeded in maintaining a form of livelihood for the people; yet as survey findings have revealed the dependency of the two communities on the produce of agriculture is not steady, since crops are open to occassional failures, particularly dura, the main staple food crop. So far people have managed to overcome periods and years of food shortages through the extended family system, which rationalizes whatever available to one part of the family, to be consumed by the wider kins group. With the changes that are taking place at present, in the economic relationships of the members of the extended family, this form of dependency is deemed to vanish in future.

I.3. Agriculture in the two areas suffers from a number of adverse factors namely: the smallness of the areas cultivated, floods, excessiveness and fluctuation of rainfall, bad soil conditions, water logging, drought, weeds,

pest and diseases, and the primitiveness of the implements used. The local farmer is aware of these handicaps and from his side has sought many alternatives. One of these is the adoption of the practice of selling cattle or bartering it for dura. Another is the use of the remittances received, or the cash earnings from wage labour, for the same purpose.

I.4. People's realization of their need for the improvement of their agriculture has been raised in the many meetings, the survey team held in the two areas, to investigate the various problems they face, and their attitudes towards the different areas of change anticipated to take place, as a result of the coming of the Canal Project. In these meetings, the overwhelming majority of attendents, have expressed their desire for more progressive farming, to be planned and implemented by the Jonglei Project. "Tractors" have been mentioned in more than one gathering as an aid for expanding areas cultivated, generating employment, increasing production of dura, and putting an end to the threat of famine in the two areas.

I.5. In reaction to the above felt needs of the population, substantiated by survey findings as revelaed by this report, the present study recommends the establishment of two experimental farms with a viable agriculture extension service in each: one at Kongor, and the other at Ayod, as an initial programme for the improvement of agriculture in the two areas.

2. INTRODUCTION

2.1. This is a preliminary report on the present situation of agriculture, in the Dinka and Nuer land, of the Jonglei Area. The findings of the report have been based on the study of the two communities namely: the Dinka of Kongor area, and Nuer of Ayod area. The methodology used in obtaining information on the agriculture of the two areas was the case study method, embracing cases selected at random in each of the two communities. The data furnished by these cases is by no means exhaustive, and will be complemented from the elaborate questionnaire findings, pending for analysis. However, it is thought convenient to compute the data furnished through the case study method, and present it at this stage of the research in the form of preliminary report, on agriculture in the two areas.

2.2. Though the information presented in this report is inadequate in answering many of the detailed questions, especially with regard to the quantitative aspects, yet it is valuable from the point of view of summing up, the main characteristics and problems of agriculture in the two mentioned areas. In this connection the report has validated the proposal that has been recently put under implementation, namely: the experimental farm in Kongor area. On similar lines the report is recommending another farm in Ayod area to serve the same purpose.

3. THE PHYSICAL FEATURES OF THE REGION:

3.I. CLIMATE:

3.I.I. According to the generally accepted classification of world climates, the Jonglei Area lies within two climatic zones: (i) the zone of Steppe climate, and (ii) the zone of Grassland Savannah. Since climate is a result of a number of interacting factors, there are no sharp boundaries between the two above major climatic zones, but a wide transitional belt.

3.I.2. Generally speaking, temperature and rainfall have more effect on climate than any other factor. In Jonglei Area temperature ranges are very small, and on the whole biologically favourable. On the other hand rainfall is characterized by irregular and seasonal distribution; and also varies according to latitude; being heavier as one goes south.

3.I.3. Rainfall is therefore the principal environmental factor, not only because it is the chief source of supply of moisture, but because of it's influence on on the other factors of importance to plant life such as: humidity, temperature, insolation and the local movement of air. (see the Equatorial Nile project, Jonglei Investigation Team, volume I, Page 5).

3.I.4. The south west winds are the main source of rain for southern Sudan. The rain starts as showers in the beginning of May, to reach its maximum in July and August, and stops by the beginning of November. Rainfall

in this sequence has it's positive and negative effects on human activities in the Jonglei Area, specially in relation to agriculture, livestock raising, fishing, and transportation. Generally the pattern of rainfall shows similarities yet vary in quantity from north to south; as the annual average ranges from 750mm at Malakal, to 900mm at Bor. Accordingly we find that among the Nilotes cultivation activity decreases southwards; while cattle acquision reversely decreases northwards.

3.2. Soil and Topography

3.2.1. As Jonglei Area is an extension of the central clay plains, the black, cracking, heavy, clay soils are the most dominant in this area. Usually the cracking character is a resultant of the dryness of the soil after the rainy season. Excessive rains result in the sealing of the vertical cracks, hence the soil becomes impermeable. With water accumulating on the surface, topography acts as an important factor in magnifying the problem of water accumulation, as the flatness of the landscape is a common feature of this region. However the periods of flooding of these soils are generally interrupted by periods of dryness; but never approach in length the duration of flood conditions, which give rise to the development of the creeping flow.

3.2.2. The other types of soil found in the Jonglei Area are the non-cracking loamy soils, being encountered on the intermediate land, especially in the southern part. The

loamy soils, compared to the cracking clays, comparatively show better possibilities of drainage. These soils are highly heterogenous, ranging from heavy to highly loams, to be found on the high lands, that are not periodically flooded i.e. in Ayod area.

3.2.3. A third type of soil found in the area, is the non-cracking sandy clay soil which exists in patches, specially around Duk Padiet and Duk Faweil. This type of soil possesses a good structure, and root penetration is not a problem.

3.3. VEGETATION

3.3.I. The type of vegetation and it's frequency of distribution are governed by climatic conditions namely: rainfall and temperature; and by the physical conditions mainly: topography and soils. Though the region falls within the zone of Grassland Savannah, the variation in soil and topography, give favourable conditions for the growth of a mixed type of Acacia including: Acacia Senegal, Acacia Seyal, Acacia Fistula, Balanites Aegyptiaca. The above types of trees are found on the high land, as well as on the intermediate land. But due to the flood of 1961-64 most of these trees have disappeared, specially in Kongor district.

3.3.2. The distribution of the grassland areas mainly of perennial grasses, differs according to topographical conditions and drainage characteristics. The main types of grasses to be found on the high land are: Setaria incrassata, Hyperrhenia sp., Sporobolus sp. The common

types found on the intermediate land consist of tall perennial grasses namely: Hyperrhenia rufa, Setaria incrassata, Echincochola pyramidalis, Cyperus rotundus. The toich area on the other hand is characterized by the swamp types of grasses namely : Cyperus papagnas, oryza spp. vossia cuspidata (see Equatorial Nile project, Jonglei Investigation Team, Volume I, chapter II, page 137).

3.3.3. In conclusion and as indicated by it's natural conditions, this region has a rich potential for large scale agricultural development, in terms of crop and livestock production. The interacting nature of rainfall, soil, topography, and temperature provide this area with agricultural capabilities for the production of a wide range of crops such as: dura, maize, groundnuts, sugar cane, rice, and vegetables; with the exception of tea and coffee both of which require well drained soils. Similarily and with proper range management techniques, the same region could be developed as a centre for livestock production.

3.3.4. However, as there are potentials, offered by the environmental conditions, there are as well drawbacks. The amount of rain, it's intensity, and distribution, inversely affect agricultural production; as intensity and excessiveness hamper crop growth. While the long dry season is a dead period for agricultural production. Also soil and topography plays their role in developing bad drainage systems, as water from the rains always

accumulate on the soil surface, leading to flooding and creeping flow. Besides, the heavy clay soils give a hard structure for crop production, limiting the range of crops to be produced. With regard to livestock raising, among the adverse factors counted are the unhealthy conditions specially during the rainy season; with flies and mosquitoes prevailing in the area. Coupled with all this are the human diseases including: bulharzia, and malaria, undermining the labour input of the population with regard to agricultural and livestock raising.

3.4. LAND USE

3.4.1. The state of use of resources in any region are dependant on the natural conditions. The greater the determinacy of the latter on the former, the more man is dependent on nature. This is well reflected in the type of land uses present in Jonglei Area namely: agriculture, and traditional livestock raising. Agriculture is based on the cultivation of the individual plots around the homesteads for production of food crops; as the communities inhabiting the area wholly depend on the return of the land for their existence. Being cattle rearers, most of their usable land is devoted to grazing, with cultivation confined to the high land zone.

3.4.2. To carry out these two activities, the Nilotes have tied their search for subsistence with the environmental potential available to them, which is not fully utilized at present due to the level of technology so far attained, in these areas. Based on the type of use, and the acti-

vities pursued according to season, the Dinka and the Nuer land could be classified as follows:

i. The High Land.

By the highland we are referring to those elevated areas, being slightly subjected to wet season flooding, and as such are utilized as the main centres of settlement, where almost all of the population concentrates. Apart from providing the population with suitable sites for setting their homes, they stand as the main cultivable lands, as their elevated nature renders them fairly drained, compared to their surroundings. Furthermore during the rainy season when the other areas become inundated and inhospitable from grazing point of view, the high land provides refuge for the herds, and an adequate supply of pastures in their vicinities.

ii. The Toich

By the toich we mean the low land fringing the river system, and almost under swamp conditions, during the rainy season. The toich lies to the west of high land, and is separated from it, by what is termed as the intermediate land. The toich extends parallel to the high land, in a north south orientation. It starts narrow in the south near Bor town, and gradually widens up till it reaches it's maximum (80km) east-west extension in the Nuer land. The toich is an important grazing land in Jonglei Area, where cattle are deriven to it during the dry season. This type of grazing land is indespensible to the Nilotes in relation to their present cycle of migration; as it

provides them with adequate pasture and water supply at the peak of the season of scarsity. Apart from grazing, the toich being part of the swamps is pontentially rich in fish. The herders, camping for the whole of dry season in the toich, obtain regularly an adequate supply of fish, and occassionally send home small amounts in dry form to their families residing in the villages on the highland.

iii. The Intermediate Land.

The term intermediate land is used for those areas lying parallel to the east and west of the highland zone. The term is derived from the natural features, and geographical location of this type of land. Again from the way it is utilized, it also acts as a grazing land intermediate between wet and dry season conditions. Apart from grazing, the intermediate lands to the east of the highland zone known as "Ayeng" used to be utilized for cultivation. Those eastern areas are held locally as very productive in terms of agriculture and grazing. Presently the same areas are uninhabited due to the Murle raids that occured during the last decade, still having their psychological effects on the population. The eastern lands have a promising potential for the development of dura mechanized schemes as weeds can be easily controlled; while they have good pasture cover for livestock production, since most of the available grass species are platable (for location of the three types of land see Fig.1).

4. AGRICULTURE IN THE DINKA AND NUER LAND.

4.I. The Place of Agriculture in The Economy of the Two Tribes

4.I.I. As mentioned in the introduction to this report, the present study deals with the agriculture of the Dinka and Nuer; since the shiluk, the third tribe among the Nilotes of the Jonglei Area, will be surveyed next season.

4.I.2. Generally speaking, the economic activities pursued in the two areas embrace: livestock raising, cultivation, fishing, and hunting. These activities are undertaken mainly to provide the family with it's food requirements. However, this pursuit is rarely met, and in most years the family faces food shortages; which is accounted for by the fact that, the natural resources available to the local communities are not efficiently utilized due to many factors. These centre around the primitive means of production, the lack of technology and scientific know how, and the constraints set by values, beleifs and customs.

4.I.3. In practicing the two economies namely: livestock raising , and agriculture to maintain a living, almost all of the family members in the Dinka and Nuer land are engaged in production. To show the place of agriculture in relation to livestock raising, the size of the labour input and its distribution in the two activities is a good indicator. In their harsh

environment, both of the Dinka and the Nuer, look at their cattle as the most suited means of livelihood, to exploit the resources of land, compared to agriculture. However they exert a sizable effort in raising their crops. Mixed with social implications, cattle has emerged as a divine animal in the two communities. Because of the continuous attention it needs throughout the various seasons, more of the family time and labour are devoted to cattle rearing; involving the repeated migration to the different grazing lands, and the close attention given to the herds while they are in the luak(s)[1] and cattle camps.

4.I.4. Compared to cattle raising, traditionally agriculture was looked at as the occupation of the poor, especially among the Dinka, as reflected in one of their songs (cultivation is the job of those who are not Dinka). However with the recent changes that have taken place in the two areas, including the engagement of some of the tribesmen as migrant labour in the production schemes outside the area, agriculture started to assume more importance. This inclination is strengthened by the recent conditions of stability, witnessed in the two areas, following the Adis Ababa agreement; and the realization of the need for more dura to avert the repeated effects of famine

1.Luak(s): A luak is the local name used for the cattle byre, where the herds are kept during the rainy season

4.1.5. Among the Dinka and the Nuer, social and economic factors interact to result into certain forms of division of labour to carry the two types of economies. The labour requirement for livestock raising is provided by the younger age groups of the population compared to agriculture, which is normally undertaken by the older productive forces in the two communities. To carry the agricultural operations, the family relies wholly on the labout input of its members. This limited source of labour supply, coupled with the lack of efficient equipment, have narrowed the margin of expansion of agricultural production. In fact present day agriculture in the two areas is that of centuries back, inherited with the slightest change.

4.2. THE MAIN FEATURES OF AGRICULTURE IN THE DINKA AND THE NUER LAND.

4.2.I. Agriculture came to be known to the nilotic tribes, at a time immorial, as a means of livelihood. The form of agriculture that has evolved in the two areas, same as in the case of livestock raising, is an adaptation to the natural conditions, prevailing in these areas. Because the potentially cultivable land is limited to the high land zone, agriculture took the form of small plots annexed to the homesteads. The latter, being dispersed as dictated by the suitable sites for settlement; it follows that the small plots of cultivations take the form of scattered patches. This is especially true in the Dinka land compared to the Nuer case where, apart from the plot around the homestead, the family cultivates a second farm in the forest. This

variation in the agriculture of the two tribes, marks the strong influence of the natural elements on land use. In the Nuer case, the more favourable topographical and soil conditions, allowed the farmer some room for manoeuvering compared to the Dinka where, the potentially cultivable land is limited to the elevated patches close to the homesteads.

4.2.2. As the land inhabited by the two tribes lies in a climatic region of the high rainfall, with impermeable, ill drained clay soil, floods are frequent; affecting cultivations as well. Under such conditions the inhabitants came to know from experience, that agricultural production is not a secure undertaking. This developed in them a state of approach cultivation every year with hesitation. However, they undertake it because no other alternative is available to them. Under such circumstances agriculture is venturesome, and this might be one of the reasons, behind the lack of initiative to expand areas under crops, and increase production.

4.2.3. The uncontrollable factors being unpredictable, have instilled lack of confidence in the tribesman towards his agricultural interprise. The reaction to this is reflected in the request put by the local communities, for the introduction of improved practices in their areas; namely machinery in the form of tractors, as raised in the many meetings held with their leadership. The repeated occurence of famines, due to inadequate crop production, particularly dura, coupled with the lack of transportation to make for the shortage through imported amounts from other areas, in addition to the high prices charged, have altered the local

communities to feel the real drawbacks of their present agricultural system.

4.2.4. Communities leading subsistence economies of this nature, such as the Dinka and Nuer, with an extended family system and marginal production can manage to exist at subsistence level; because the total output is shared among the members of the extended family. In other words the saturation point of the population in a subsistence economy is larger than that of wage labour economy. However, this mechanism will not continue to operate in future, due to the many changes taking place at present, besides, there are the expectations of the local communities, for the improvement of their lot, as a result of the execution of the Jonglei Canal Project.

4.3. DURA PRODUCTION IN THE DINKA LAND

4.3.1. The Dinka cultivate a number of crops namely: dura (sorghum); maize, pumpkins, tobacco, okra and beans. Among these crops dura is the most important, as it is the source of their staple food. In what follows the production of dura in the Dinka land will be considered in more detail, and the same will be done for the Nuer case. As for the rest of the crops these will be tackled for the two tribes together.

4.3.2. The Dinka, as mentioned earlier, cultivate around their luak (s) on the high patches of soil, to avoid the effects of floods, and to facilitate the close supervision of the farm; as wild animals and herds might damage the crops. Every head of household has a plot near his homestead; while

some cultivate more than one plot, in case they have more than one wife, living at different sites.

4.3.3. The average size of the holding is I.6I feddans, however there are variations, and the range is in the order of 0.6 to 12 feddans. Apart from the physical factors which control production, the size of the farm depends on the available labour force, mainly constituted of the adult men and women in the family. Production fluctuates from one year to the other, depending on the conditions of flooding, weed, drought, pest and diseases.

4.3.4. The largest part of the farm is devoted to dura production, since it is the most essential food crop in the area, other than milk. The Dinka cultivate two crops of dura a year. In the first season of cultivation, starting in May, the farmer grows dura, maize, tobacco, pumpkins and beans. The second season, which starts in early October, is wholly devoted to dura production, being a crop that resists drought conditions to some degree.

4.3.5. As mentioned above, the sowing of the crops starts at the beginning of May, however this is not all the time the case. Late rains, or very intensive showers, might induce the farmer to start sowing at the end of May. Resowing is practised, as the seeds often fail to germinate, during the early stages of growth. Manual weeding is done twice, during each of the two seasons of cultivation.

4.3.6. The harvesting of the first crop, sown in May, starts in mid August, and continues up to the end of September. Harvesting is done in courses, depending on the stage of maturity of the crop. The amount harvested per cutting is instantly consumed, especially towards the end of the rainy season, when the family stock of dura gets depleated. In this connection, it is difficult to estimate the amount of dura produced during this earlier period, really making the attempt to give a rough estimate of yields, and total farm production, very cumbersome.

4.3.7. Towards the end of the rainy season, usually in October, the Dinka start sowing their second crop of dura, as during that period the clay soil retains a high moisture content. However, the second crop, usually harvested in February or March is frequently open to failure, because as time proceeds, the soil loses its water content, as the wilting point is easily reached.

4.3.8 An attempt at furnishing some idea about the size of farms in the Dinka land is given in Table I. The information given in this table is based on actual survey work on a number of farms, selected at random, in different Dinka villages. The table displays the names of the villages, and estimates of areas cultivated in feddans. As seen from the Table, and for most of the cases surveyed, the areas cultivated are very small in the range of .06 to 3.4 feddans; except for the last two cases, where the size of the farm reaches 12 and 5 feddans respectively. The only explanation found for the large size of farms, in the two

last cases is that, the two concerned farmers claimed that they are active, and they spend all of their time in their farms, being assisted by their wives. It seems that the main factors influencing the size of the farm are : the availability of well drained soils close to the homesteads; the labour force available to farmer depending on the size of his family; the intensity of weed infestation; and the degree of motivation of the farmer towards cultivation.

4.3.9. Among the above factors influencing areas and production, the last one should not pass unnoticed, and has to be accorded it's due importance. As mentioned earlier, the primitive technology and practices, applied by the Dinka farmer have not enabled him, to reap a produce equal to the effort he exerts annually in his farm. The repeated crop failures have brought the farmer to the point that, there is no need of wasting time and effort in farming, where the risk is too high to recover. This has the effect of undermining the motivational forces of the farmer, for increasing the area under cultivation. Instead there are signs that he started looking for alternatives, to make for the deficit in his dura production. One of the solutions he adopted is the selling of his cattle, and the use of cash earnings in purchasing the additional amounts of dura he needs. Another alternatives presently conceptualized is the voiced demand of the local communities through their leaderships for government approval and implementation of mechanized schemes; or only the provision of tractors for

TABLE (I) :

Actual measurements of farms selected at random in Kongor district, 1977.

NAME OF VILLAGE	NAME OF FARMER	AREA OF FARM MEASURED IN FEDDANS
1. Pawi	Deng Biar	1.70
2. Pawi	Aten kn	1.70
3. Pawi	Ajang Jok	0.60
4. Pawi	Ajang Bior	.80
5. Panagor	Nyncur wal	1.25
6. Panagor	Deng Jok	1.25
7. Panagor	Dau Lual	3.00
8. Kongor	Deng Ajang	1.300
9. Wanglei	Mauh. nebion	3.40
10. Maar	Grarg Akor	1.40
11. Maar	Deng Bol	1.50
12. Paliaw	Grong dua	1.60
13. Paliaw	Tor Jok	1.40
14. Panagor	Ajak than	12 *
15. Panagor	Wal Kulang	5

their areas, as part of the development anticipated of the Jonglei Canal Project.

4.3.10. Of the other factors influencing production is the quality of seeds, and the way it is obtained. The amount needed for sowing is collected from last year harvest. To obtain his seeds, the farmer applies a measure of selection, picking those heads (ears) that show signs of good performance i.e. mature, vigorous, and free from diseases. These criteria can be actually considered as meeting the requirement of natural selection. The selected ears are then tied in form of bundles, and carried from the farm to the luak for storage. No treatment is administered for the seeds, however being kept hanging from the roof of luak, they receive the fumes rising from the burning dung; which is a kind of treatment, good for controlling and protecting the seeds, against disease and termites damage.

4.3.11. Considering the seed rate, it is actually higher than the average, when compared to other areas of rainfed agriculture; as the figure is 7.5lb/F^2 in the clay plains to the north, compared to the estimated figure of 8.5lb/F for the Dinka area; due to the effect of weeds, flood, and drought. As for the seeds per hole, it is in the range of 3 to 6 seeds. Table 2 gives the seed rate for 4 out of the 15 farms surveyed in table I.

2. Source: current Agricultural statistics, Vol I 1975.

TABLE 2.

Seed rate for 4 out of the 15 farms surveyed in Table 1

NO.	AREA IN F	SEED RATE IN LB.
1	1.4	15
2	3.4	20
3	1.4	10
4	1.5	13

4.3.12. As for the types of dura grown in the Dinka area, they are of the late maturing varieties, that resist high rainfall. Two major cultivars: the white and the red one, are grown in this region in a mixed form. The white cultivar is the most productive one, showing resistance to water logging. The red one comes next in terms of durability and productivity.

4.3.13. Dura production in the Dinka area fluctuates from one year to the other, due to many adverse factors including: flood hazards, weed, pest, diseases, and drought. The average yield per feddan in case of the first season crop is estimated to be 2.8 sacks, with a maximum yield reaching 5 sacks.[3] This is usually attained in areas with fertile soils, and free from severe weed attack. Productivity is lower in the case of the second, compared to the first season crop. For the second

crop the average yield is estimated at 1.9 sacks with a maximum yield reaching 2.5 sacks. The low yield of the second season is accounted for by the following factors :

i . towards the end of the rainy season, and with the progress of the dry months, the soil loses it's moisture content, forming an inactive media for micro-organisms; with the result that the work of the latter slacks, and the process of organic matter decomposition consequently loses vigour, leading to nutrients deficiency.

ii. Towards the end of the rainy season, infestation by weeds reaches it's maximum, and tends to be a problem.

iii. The late sowing towards the end of rainy season makes the dura crop susceptible to the attack of stem borer; sesamia critica.

iv. The excessive cultivation, two times a year by a monocrop without rotation, leads to soil exhaustion.

4.3.4. A more detailed picture of the productivity, and yields of dura in the Dinka area could be depicted from Tables 3 and 4, for the two cultivation seasons of 1977. The data in the tables give the area cultivated, and production in sacks; plus the average yield for 6 cases, out of the 15 surveyed in Table 1. It is clear from the table, that production is variable from one farm to the other; which is

an indication of the variability of farm conditions, and that of the labour input in each case. As for yields, it is apparent that the yields attained from the crop of the first season are far better than those of the second season.

4.4. DURA PRODUCTION IN THE NUER LAND.

4.4.1. As mentioned at the beginning of this report, Ayod area has been selected to represent agriculture in the Nuer land, same way as Konger area has been selected to represent the Dinka land.

4.4.2. Generally speaking, the natural set-up of Nuer land reflects the same characters of the Dinka area, in terms of: distribution of land terrains, land use patterns, and location of human settlements. However, it varies in that, areas of high elevation, suitable for cultivation and development of settlements are more abundant and expansive in the Nuer land; also that loamy soils are more extensive. These favourable conditions have decreased the liability of flooding; a factor which attracted the present Nuer population occupying the area, to migrate from the region of Fangak to this locality.

4.4.3. The Nuer cultivate one season a year, but on two plots. They follow the same practices applied in the Dinka land as decerned above, with regard to ; time of sowing usually starting in May; the varieties cultivated; the seed rate; and the dependency on the family labour supply. Their only exception from the Dinka is that, their

TABLE 3 & 4 :

DURA PRODUCTIVITY AND PRODUCTION IN KONGOR DISTRICT DURING 1977 SEASON, BASED ON THE AVERAGE YIELDS OF THE FARMS SURVEYED IN EACH OF THE 6 VILLAGES

Table 3: FIRST SEASON CROP

VILLAGE	SIZE OF FARM IN F.	PRODUCT-ION IN SACKS	AVERAGE YIELD/F IN SACKS
1.Panyagor	3.0	7.0	
2.Kongor	1.3	4.0	
3.Panyagor	3.4	5.5	
4.Maar	1.4	10	
5.Maar	1.5	5.0	
6.Wanglei	4.0	20	
	14.0	14.5	2.8 sacks

Table 4: SECOND SEASON CROP

VILLAGE	SIZE OF FARM IN F	PRODUCT-ION IN SACKS	AVERAGE YIELD/F SACKS
1.Panyagor	3.0	3.0	
2.Kongor	1.3	2.0	
3.Panyagor	3.4	4.5	
4.Maar	1.4	4.0	
5.Maar	1.5	3.0	
6.Wanglei	4.0	10.0	
	14.6	32.5	1.9 sacks

cultivation year ends by late September, or early October; while in the case of the Dinka; the harvest season of the second crop continues up to February.

4.4.4. The two plots cultivated by the Nuer consist of a small family farm, located close to the homestead, surrounding the luak (s); same as in the Dinka case; and a comparatively larger farm, located in the forested area, at a distance from the settlement. The first farm is devoted to the production of: dura, maize, tobacco, pumpkins, and beans. The Dura and maize grown near the homestead are for early consumption, since with the progress of rainy season the dura shortage becomes acute; and the imported dura purchased to agument the family supply no longer reaches the area, as roads are closed, apart from the fact that the stored amounts in the areas of production twindle.

4.4.5. In the second farm, located in the forest, the main crop grown is dura. The forest farms usually provide favourable sites for this sort of production as the soil is more fertile being newly opened, and due to the absence of noxcious weeds.

4.4.6. Compared to the small plots close to the homesteads which have an average size of 0.47 feddans, ranging between 0.38 to 0.8 feddans, the forest farms are larger in size, with an average acreage of 1.30 feddans, ranging between 0.8 to 2.2 feddans. The areas of the two farms when computed give an average size of holding of 1.77 feddans. Table 5 and 6 furnish more information

on acreage for the two types of farms; based on the survey of a number of cases.

4.4.7. With regard to land tenure, the small plot which is part of the homestead is normally inherited, while that in the forest is opened by the direct labour of the family; and is part of the wider tribal domain, acquired through belonging to the tribe.

4.4.8. In terms of yields, the farms in the forested area, follow the trends of shifting cultivation, which normally give high yields when plots are newly opened; decreasing with the over use, as the years proceed. On the average the feddan gives 3.6 sacks of dura, with fewer cases registering yields as high as 7 sacks. Normally the farmer cultivates his plot for 8 succesive years, after which he shifts to another site, when yields begin to decline. Table 7 exhibits the situation, and gives some information on production and yields in sacks for the 7 selected farms.

4.5. MAIZE AND TOBACCO PRODUCTION IN THE DINKA AND THE NUER LAND.

4.5.1. Since the nature of production of the two above crops, and the practices applied are the same in the Dinka and Nuer land, it is thought convenient to takle the two crops in the two areas under the same section.

4.5.2. Maize Production.

4.5.2.1. Maize produced in the Dinka and Nuer areas is mainly for home consumption, being an early maturing crop.

TABLE (5) :

ACTUAL MEASUREMENTS OF THE HOMESTEAD FARMS AROUND THE LUAKS IN AYOD AND WAAT DISTRICTS, BASED ON CASES SURVEYED DURING 1977 SEASON

VILLAGE	SIZE OF FARM IN FEDDANS
1. Magcuk	0.38
2. Fultnck	0.70
3. Fultnck	0.50
4. Kuak Deng	0.30
5. Kuak Deng	0.80
6. Ayod	0.30
7. Ayod	0.64
8. Ayod	0.64
9. Ayod	0.47
TOTAL AREA OF FARMS SURVEYED	4.34

The average acreage for farms around the luaks is in the order of 0.47 feddans.

TABLE (6) :

ACTUAL MEASUREMENTS OF FARMS IN THE FOREST AREA, AYOD AND WAAT DISTRICTS, BASED ON CASES SURVEYED DURING 1977 SEASON

VILLAGE	SIZE OF FARM IN FEDDANS
1. Magouk	1.50
2. Magouk	0.80
3. Fultruk	1.20
4. Fultrud	1.20
5. Ayod	1.50
6. Ayod	0.88
7. Ayod	1.00
8. Falit	1.70
9. Ayod	1.20
10. Waw	2.20
11. Ayod	2.00
12. Waw	2.20
13. Kuakdeng	0.82
14. Kuakdeng	1.00
15. Ayod	1.35
16. Ayod	0.83
17. Ayod	1.50
18. Ayod	0.80
19. Ayod	0.83
20. Ayod	1.29
21. Ayod	0.86
22. Ayod	0.86
23. Kuakdeng	1.70
Total area of farms surveyed	31.96

The average acreage of farms in the forest area is in the order of 1.30 feddans.

TABLE (7) :

PRODUCTION AND YIELDS IN AYOD DISTRICT BASED ON THE SURVEY OF 7 FARMS DURING 1977 SEASON

VILLAGE	SIZE OF FARM IN F	PRODUCTION IN SACKS	AVERAGE YIELD PER FEDDAN IN SACKS
1. Wau	2.00	7	
2. Ayod	2.20	7	
3. Magouk	0.98	1	
4. Magouk	0.36	2	
5. Magouk	1.70	5	
6. Ayod	1.50	10	
7. Ayod	0.64	2	
	9.38	35	3.6

As such, maize helps much in providing the family with a a source of grain, at the time the dura shortage is at its peak.

4.5.2.2. Maize is grown immediately around the luak(s), where the land is more elevated. This enables the crop to resist water logging, since it has a sensitive rootry system. Special cultural practices are applied in it's production. Being a soil nutrients depleating crop, animal manure (in the form of dung, or ashes from the burned dung in the hearths) is applied to the plot where it is grown, to retain soil fertility.

4.5.2.3. Maize is usually grown at the end of May, or in early June; depending on the periodicity and intensity of rainfall. By the beginning of August the family starts harvesting its maize, coming out at a time the dura shortage is really felt.

4.5.2.4. Two varieties of maize are cultivated in this area. Both varieties were introduced recently, following the settlement of the dispute in Southern Sudan. The two prove to be adapted to environmental conditions in the two areas, as they manage to resist water logging. The area under maize can not be easily increased in acreage unless the implements used, and the cultural practices applied, are improved to solve the drainage problem. Presently the area cultivated per household is very small,not exceeding 200m^2. Production is meager, and is directly consumed as any head that matures is cut, grinded into flour, and instantly eaten.

4.5.2.5. As for the seed rate they sow very shallow, with an average of 3 to 4 seeds per hole; to give vigorous growth, and decrease the problem of water logging. With regard to seed selection, the same practices applied in dura are followed in the case of maize.

4.5.3. TOBACCO PRODUCTION

4.5.3.1. Tobacco is produced in the Dinka and the Nuer land as a cash crop. The varieties grown are local types, mainly for consumption within the area. There are signs that under good cultural practices, the varieties grown are highly yielding.

4.5.3.2. At the beginning of the rainy season tobacco is sown in nurseries around the luak(s) on high sites; since tobacco seedlings do not resist excessive rains. To accelerate vigorous growth, animal manure (in the form of dung and ashes) is added to increase soil fertility. While the crop is in the nursery, weeding is done to ensure good germination. Transplanting normally follows after a period of one month, usually carried in August. Harvesting starts in the beginning of October and continues till the end of November; and the mode of harvesting takes the form of collecting the ripenning leaves.

4.5.3.3. The quality of the tobacco produced depends wholly on: the proper date of harvesting, the way of processing, and the variety produced. Diseases also tend to lower the quality of the produce, as the crop is subjected to frog eye and leaf curl; which often lead to crop failure, since both infest the leaves.

4.5.3.4. Considering the processing of the crop, the amount used for home consumption is processed in the form of clots, through turning the leaves into a powder, which is then wetted and dried into clots. As for the amount intended for sale, the treatment is different. The leaves, after being collected are exposed to sun shine to dry, to avoid rotting. Then the dried stuff is packed in small animal skins known locally as "gook".

4.5.3.5. Normally half of the amount produced by the family is used for it's own consumption, while the other half nearly the size of two gook(s) is taken for sale. In this connection tobacco is an important cash crop in the two communities; having ready market at Bor, Juba, Malakal and sometimes Khartoum. The prices fetched differ according to the quality, variety, and the way of processing. Generally two "gook(s)" of tobacco earn (2-10) Sudanese pounds.

5. FACTORS AFFECTING CROP PRODUCTION AND YIELDS IN THE DINKA AND THE NUER LAND.

5.1. RAINFALL:

5.1.1. Rainfall is a determinant factor in agricultural production. The sequence and intensity of rains in the Dinka and Nuer land expose crops to floods and droughts. The floods being more frequent affect production drastically. Floods, as mentioned previously, are a result of many interacting factors mainly topography, soil, and rainfall.

5.1.2. Hence in connection with the above, rainfall affects sowing dates, growth, and crop maturity. In addition, it limits the suitability of land to certain crops, at least under the present practices; and as such, narrows the range of crops produced in the two areas.

5.2. S O I L

5.2.1. The soils of this region have the inheret the characteristics of the clays, being an extension of the central clay plain. These types of soil have poor water perculation, and in absence of run off the problem of water logging becomes acute, and an obstacle to cultivation.

5.2.2. Under the present practices, the soil structure limits the range of the crops produced, and the varieties cultivated. A more optimum utilization of these types of soils, being highly fertile, will entail the introduction of new farming practices that will resolve the problem of water logging.

5.3. FLOODS:

5.3.1. The effects of floods on agricultural production can be easily grasped from the distribution of population and farm land; being characterstically dispersed, limiting the cultivable areas to the small parcels close to the homesteads.

5.3.2. Apart from the yearly floods, there are the periodical drastic changes to which people are sometime subjected, such as those ensuing from the long floods of 1961-64. During that period, agriculture was badly affected, exposing the area to famine, for the whole of the flood duration.

5.3.3. Normally the inundation of the fields leads to decrease in soil fertility, as the inorganic constituents are leached; while the activity of the micro-organisms is stopped, retarding the formation of organic matter. Furthermore floods result in vegetational changes, c causing the infestation of the fields with harmful weeds; and the pastures with unptalable species.

5.4. PEST AND DISEASES:

5.4.1. The most prevailing pests and diseases, in the Dinka and the Nuer land with regard to dura are: birds, grasshoppers, worms, stem borer, aphids (Aphis sorghi), and dura head smut. As for tobacco it is mostly affected by frog eye, leaf curl, and nematodes. Apart from the above, termites and rats are hazardous to the crop, during the growth stage and during storage.

5.5. **WEEDS:**

5.5.1. The most prevailent weeds are:
Hyperrhenia rufa, Setaria incrassata, Cyperus rotundus, Cynadon dactylon and Um shoka.
Weeds are a major problem that faces crop production in the two areas; since farms are infested with perennial grasses which can not be easily controlled; and the farmer frequently loses his crop, due to the presence of these noxcious types of weeds. This factor has contributed to the low productivity, and to the limited size of production; since the areas cultivated are very small. In the absence of efficient means of weed control, coupled with the prevailing practice of monocropping system, without rotation, on a fixed piece of land, agriculture will continue to be a risky undertaking in the Dinka and the Nuer land.

5.6. AGRICULTURAL IMPLEMENTS

5.6.1. The agricultural implements used in the Dinka and Nuer land do not equip the farmer, to utilize the resources available to him with maximum efficiency. Being rudimentary they are a limiting factor to the development of agriculture, whether horizantally or vertically.

5.6.2. To sow his seeds, the farmer scratches the soil with a wooden implement, which does not facilitate the formation of a good soil structure, since the clay soils need a more heavy implement. As such expanding

the area under cultivation is a very tedious undertaking; and the small plots cultivated at present require a tremedous labour input from the family.

5.6.3. Nearly all of the implements used in agriculture are locally made; with only few of them purchased from the rural markets in the area. The implements used differ from one operation to the other, including:

i. The Hoe: known locally to the Dinka and the Nuer as "Agot" used for clearing.

ii. The "Anunut" or "Shob" : known by the first name among the Dinka, and by the second among the Nuer. A wooden tool similar to the "saluka", but without a nodge; used for sowing.

iii. The 'Maloda' known by this name to both Dinka and Nuer. An iron implement used for weeding, normally purchased from the local market.

iv. For harvesting two types of implements are used: a sharpened shell of a snail (at the same time used as a spoon), and the spear. The latter is known as 'tong' among the Dinka and 'nut' among the Nuer.

v. 'Thial' or 'gak' known by the former name among the Dinka, and by the latter among the Nuer, which is a long stick, made from wood, and used for threshing.

5.6.4. Figure 2 Annex 2. exhibits in sketch form the above types of implements. It could be concluded that the agricultural implements used, by both the Dinka and Nuer, are primitive; in fact inherited by one generation from the other; and as such do not help the development of agriculture in the two areas.

6. CONCLUSION AND RECOMMENDATIONS:

6.1. CONCLUSION:

6.1.1. Agriculture has a decisive role in providing communities living at subsistence level, with an adequate food supply. In this capacity, the farm should hypothetically produce all of the basic diet, required by the family. Self sufficiency based on the farm produce is obviously important in areas without a developed cash economy system; particularly those far from markets; which normally provide the local communities with a reliable and remunerative outlet, for the sale of their farm produce, and the exchange of the returns into the food items they require[1].

6.1.2. Agriculture in the Dinka and Nuer land is an illustrative example of the characteristics of subsistence economy, where the people directly depend on the returns of the land and the herds; under conditions where the produce from both falls short of meeting the family requirements.

6.1.3. Dura and milk are the main items of food in the two communities. Milk is important all the year round, especially in years of crop failure, and during the rainy season, when the family runs short.

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1. Wilde, J.C., Agricultural Development in Tropical Africa., The John's press, 1967, p.p.23.

of dura. In recent years, and with the decline in milk productivity, people shifted towards the consumption of more dura. This has increased the dependency of the population on imported dura; normally obtained from the mechanized schemes to the north, such as Renk area.

6.1.4. Inspite of the realization of the authorities of the shortage of dura produced locally, and the measures taken to increase the imported supplies; the Dinka and the Nuer areas still suffer from a wide gap between demand and supply. The people from their side, have attempted to overcome this shortage through bartering cattle for dura, especially in years of famie. Similarly those who succeed in raising a surplus from their farms, customarily invite relatives who suffer from lack of dura, to share the excess amounts with them; a practice adhered to, to increase the solidarity of the kinship group. Only a meagre part of the population has reacted in a more practical way, by exerting more efforts in farming to increase production, horizontally and vertically. In Panyagor area near Kongor, one of the natives cultivated last year about 9 feddans. Besides, many families have reported that they put more effort in compating weeds. Though the range of such positive reactions is very limited, it is indicative of a change taking place in the area of agriculture.

degree of involvement and participation, of the local farmer in any proposed programme of development. Drastic changes aiming at the introduction of a new form of agriculture are risky in absence of the necessary technical know how, and lack of the skills and aptitudes required in farm management. Furthermore, the pace of change, and the adoption of innovations in such communities are directly tied with the felt needs of the population. The scope of the latter is presently limited in the area of agriculture; only geared towards meeting the food requirements of the family, in a subsistence economy. Agriculture in this capacity is neither the main occupation of the population, nor the main food supplier, but is an aid to livestock production, to maintain a living for the family. It is therefore necessary, that programmes for improvement of crop production, should bear in mind this strong interrelationship and complementarity of the two sectors of the economy. More than that such programmes should be devised in such a way, that new inputs in any of the two sectors of the economy, at least in the first years of development, in the Jonglei Area, should not jeopordise the progress of the other sector. The goal should be for balanced development.

6.2.2. The felt needs of the local communities in the area of agriculture are easy to identify. As voiced

by their local leadership, as well as, by the laymen in the many meetings held; and as reflected by the results of the cases investigated by the research team, the priority of the people with regard to future agricultural development, centres around meeting the dura shortage, suffered at present at the level of the individual, the family, and the area as a whole. Hence, the start of any programme for agricultural development in the Dinka and Nuer land, should aim at resolving this shortage. In short, increasing the capabilities of the farmer, to secure his yearly dura supply from his own farm production is just an adequate objective, in the initial stages of any agricultural development programme in the Dinka and the Nuer land.

6.2.3. To achieve this objective, it is recommended that better farming practices that suit the conditions of the area be introduced. Since agricultural research is lacking in connection to the above, besides that the area under consideration does not show similarities to those in other parts of the country where such research has been undertaken, it is recommended that two experimental farms, one in Kongor and the other in Ayod be established, to furnish the information presently lacking. The two recommended farms should be of demonstrative nature, closely linked to the needs of the local farmer. It is not expected of the two farms, to indulge in very

elaborate research, that will last for a number of years, particularly inrelation to dura production; but to serve as agriculture extension centres to improved farming.

6.2.4. The areas of emphasis, in the programmes of the two proposed farms, should be solving the problem facing agriculture at present as mirored under chapter 5. Shortly these are: the effects of excessive rainfall, the bad soil conditions, the effects of drainage and water logging, weed infestation, pest and diseases, and the primitiveness of the agricultural implements.

6.2.5. Since the two proposed farms will play a demonstrative role, it is highly recommended that a strong agriculture extension service should be embraced as an intergral part in their establishment. The whole set-up should be part of the programmes of integrated rural development recommended for the two areas as revealed in our reports number: 5, 6, 7, 8, & 9.

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