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SOME ASPECTS OF LABOUR USE IN THE AGRICULTURE OF LANGO DISTRICT
RURAL DEVELOPMENT RESEARCH PROJECT
of Uganda
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1. Introduction

Lango District is one of high agricultural potential as soils and rainfall are generally favourable for the growth of annual crops yet only 18 - 20% of the land area is cropped at any one time. The majority of farm operations are carried out by hand methods and family labour is the most important agricultural input. At certain times of the year, many crops are competing for scarce family labour¹ and subsistence food crops tend to be given priority. This leads to temporary neglect of the main cash crop, cotton, and a failure to achieve the high yields which have been shown possible on experimental stations. Most extension advice is concentrated on the cotton crop and the complex problems of allocating labour between a range of crops tend to be ignored. Not surprisingly, farmers have responded by ignoring much of the extension advice, as they find many of the recommendations are impractical.

This paper is an outline of a study of agricultural labour use which was carried out in Lango District. It investigates some of the implications of seasonal labour inputs and special attention is given to those operations which appear to limit timely planting and expansion of crop acreage. Previous work in the district has indicated those periods where pressure of work is highest² and a labour profile has been calculated showing the distribution of work by crop.³ The current techniques used in the limiting operations have been described; rates of work have been measured and work is proceeding on the development of new techniques which will minimize labour bottlenecks.

2. Methodology

Three separate areas of study were chosen to enable an adequate coverage of existing ecological zones and their related agricultural systems. Local enumerators were selected in order to minimize problems of suspicion as it was important that farmers should work normally while being observed. In each of the study areas one enumerator was responsible for a year round investigation of three farmers. A total of nine farms were studied in detail but the range of information was enlarged by studying each man in the context of his communal cultivation group (wangtic). The farmers were chosen

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1. See Appendix I. An Agricultural Calendar of Lango District.
 2. Survey of Thirty Farms in Lango District - Uganda Government (unpublished)
 3. See Appendix 2

subjectively and were of middle age with fairly young families.

Table 1 gives the family composition of the farms and Table 2 shows the acreage of crops grown by each farmer.

Table 1. The Household Composition of the Nine Farms Studied
in the Survey

Holding	Number of wives	Children of working age		Children below working age	
		Boys	Girls	Boys	Girls
A ₁	2	1	0	4	2
A ₂	1	0	0	3	1
A ₃	1	0	0	1	2
B ₁	1	2	2	2	1
B ₂	1	0	2	0	2
B ₃	1	0	0	0	3
C ₁	2	0	0	1	3
C ₃	3	5	0	3	5
C ₄	1	0	1	1	4
Mean	1.4	1	0.6	1.7	2.5
Mode	1	0	0	1	2

Table 2. The Acreage of each Crop on the Nine Farms Studied

Crops	A ₁	A ₂	A ₃	B ₁	B ₂	B ₃	C ₁	C ₂	C ₂
Cotton	2.95	1.20	1.80	1.92	1.30	1.06	4.40	6.21	2.25
Finger millet	3.30	1.50	0.90	2.21	1.36	1.36	4.20	4.02	4.03
Cassava	0	0	0	0	0.31	0	0	0	0
Groundnuts	1.15	0.41	0.40	0.20	0	0.42	0.90	2.91	1.51
Sim sim	1.66	1.21	1.21	0	0.85	0	1.80	0.83	0.75
Sorghum	0	0	0	1.18	0.95	1.00	1.55	3.09	3.09
Beans	0	0	0	0	0	0	0	0	0
S. potatoes	0.44	0.23	0.08	0.14	0.05	0.14	0	0	0
Maize	0	0	0	0.14	0	0	0	0	0
Rice	0	0	0	0	0	0	0.51	0	0
Pigeon peas	0	0	0	0	0	0	0	0	0
Total Acreage of Farm	9.46	4.48	4.39	5.79	4.82	3.98	13.36	17.06	11.63

The level and seasonal distribution of labour inputs were recorded for each farmer and this information was supplemented by direct measurements of work rate and by detailed observations of certain agricultural operations. The latter were recorded onto outline process charts¹ which were completed by the enumerators when they accompanied farmers during the performance of selected agricultural operations. Each chart contains a description of the amount of work completed and both work and rest periods were recorded in sequence. As the enumerators were known to the farmers and as the work continued over a long time period it is tentatively assumed that farmers were working at their normal pace and the 'Hawthorne Effect' due to being observed was minimum. The whole operation was recorded, as the enumerator remained until the work was completed. Estimation of areas cultivated or weeded was by pacing and then correcting for error by using a 'pacing factor', harvesting outputs were weighed using a spring balance.

Measurements of work rates were also obtained by sampling certain operations for thirty minute periods, using marking pegs to indicate the area covered during the observation period. These direct measurements will be used to indicate the accuracy of the general labour data which relied on year round recording of farmers estimates of the time worked on individual measured plots.

3. Labour Organisation in Lango District.

The husband is head of the family and is responsible for making most farm decisions. Each farmer relies mainly on his own labour and that of his wife (wives) and unmarried sons or daughters. This is supplemented by help from various communal labour groups, the largest of which is known as the wang tic. It is headed by a leader or rwot wang tic and consists of 30-40 men of the same clan who work together on members' farms. Assistance must be applied for to the rwot wang tic who is responsible for arranging the work schedule of the group and supervises the quality of work as it is carried out. This work group usually starts rather late in the morning but works extremely hard until the task is finished and the group goes to drink local beer which is provided by the host farmer. This form of work group is very common in the west of Lango but is not so strong in the east of the district where ox-cultivation has largely replaced the hoe.

Within the wang tic are minor groupings which may weed or plant a range of crops. Pur alea is a form of organisation where two to five people arrange to help members on a reciprocal basis, no payment being made. Pur gweno is

1. See Appendix 3.

a small group working for chicken meals and pur adili groups are larger and work for beer. These last two groups are used more frequently by farmers with millet to brew or chickens to prepare and it is therefore misleading to think of all communal labour as being reciprocal.

Division of labour by sex is still apparent, but seems to be slowly breaking down. Men are willing to carry out operations previously regarded as womens' work once the crop can be sold for cash and today this is true of most crops. Table 3 illustrates that no operations is the exclusive preserve of one sex. Although weeding of food crops is performed almost entirely by women most of the cotton is weeded by men. Harvesting is carried out by both sexes but most of the initial cultivating is men's work as it involves heavy digging and often tree felling. Labour clashes can often be interpreted differently when sex differentiation on jobs is considered. For example the apparent conflict for labour between millet weeding and opening land for cotton is modified by the fact that one of the jobs is almost exclusively womens work and the heavy digging is men's work.

Table 3 Male and Female Labour Inputs (Man Days)
for Four of the Main Crops

Operation	Land Preparation		Sowing		Weeding		Harvesting		Total Man Days	
	M	F	M	F	M	F	M	F	M	F
Cotton	61	20	13	8	71	11	27	11	168	48
Millet	13	7	29	9	0	28	14	22	56	66
Cassava/ groundnuts	17	8	8	4	2	13	8	12	35	37
Sim sim	11	6	15	6	0	14	4	15	30	41
Total Man Days per Operation	102	41	64	26	73	60	49	60	288	193
	143		90		133		109		481	

Source : Average Results from Nine Survey Farms

Men work a greater total of hours than women although the difference is exaggerated by the exclusion of minor food crops which are tended almost entirely by women. More than half of men's work is concerned with the cotton crop which accounts for 49% of combined male and female labour inputs compared with 24% ^{for} millet which is the next most labour absorbing crop.

4. Observations on Cotton Growing Operations.

Ideally crops should be studied simultaneously when seeking to reduce labour constraints as labour expended on one crop implies an opportunity cost in terms of the neglect of a competing crop. Limited time and resources however forced a concentration on cotton which is the main source of cash and which

offers many opportunities for improving work methods. A range of operations was observed as the elimination of one bottleneck simply means that another operation becomes limiting. Improvements in such operations as land preparation and weeding are applicable to all crops and of all the operations described only cotton picking is specific to that crop.

Cotton is grown mainly on land which is opened from a bush fallow. Preliminary cultivations are carried out after the arrival of the rains which enables the ground to be cultivated with a hoe. The plot is left to weather for some weeks; meanwhile trees are felled by men and when dry are dragged by the women to the grass strips which border the plot. The ground is considered ready for planting after the second digging and the planting operation is jointly undertaken by men and women. A stick cut to a yard in length is used to indicate row spacing and other sticks are placed in the ground to indicate the beginning of each row. A row is marked out by stretching a line along it. Shallow holes are prepared, approximately 18 inches apart, by men who precede the women up the row. The women follow dropping seed into the holes and covering the seed by raking soil with the foot. The line is then shifted to the next row and the procedure is repeated until the work is finished. Cotton planting is deliberately staggered to even out labour demand for weeding, some cotton may go in as early as April or May on second or third year land whereas cotton on new land could be planted as late as August.

Cotton weeding is generally considered to be a man's job, the hoe is used to loosen the weeds between the rows and those near the cotton plants are pulled by hand. Both weeding and land preparation are operations where it is important to increase labour productivity. In June the weeding of early planted cotton competes for labour with the final seedbed preparations for later planted cotton & the women are not able to help as they are then busy with food crops. Millet harvesting competes for labour in July and August with subsequent cotton weeding and it is only in September when adequate labour is available. By this time, however, weed competition will have affected future cotton yield.

Both land preparation and weeding depend on the hoe; in this area the Lango hoe is used. This is a straight hoe used with a pushing action which is very effective on the light soils of the district. Although no inversion is attempted, the surface vegetation is loosened and soil is shaken from the roots by hand. The Lango hoe is not effective when used as a weeding implement as it is too awkward to work quickly among the growing crop. An improvement in the rate of work must depend initially on the spread of ox-cultivation. As indicated in Table 4, the superiority of this technique is very great in terms of working speed.

Table 4 A Comparison of Rate of Work for various Cultivations
between the Lango Hoe and Ox-cultivation

Hours per acre

Operation Technique	Initial Ploughing/cultivation	Second Ploughing or cultivation	Initial Weeding	Second Weeding	Total Cultivation
Lango Hoe	50	46	46	46	188
Ox-cultivation	11	10	3	3	27

Source : Data from six farms using the Lango Hoe and three farms using Oxen
(~ 15 observations per farm for each operation)

Ox-weeding Rate from: S. Foy. A Report on Ox-cultivation in Uganda
Draft Copy August 1966.

Basic tillage with oxen is 4 - 5 times the speed of hand methods and weeding if fifteen times faster. Even if three men are needed to work with the ox-team a considerable saving in labour would result. In theory one man and a boy could be used and the adoption of this technique would obviate a whole series of labour constraints. Under peasant conditions, however, standard of work is usually poor, necessitating a great deal of hand labour. This is particularly so with seedbed preparations and the Bentall Seeder recommended by government has not generally been successful when used after ox-ploughing. The newest version of the A.H. seeder is however greatly improved and future work must be directed toward the development of a hand pushed and ox-seeder which can work successfully in rough seedbed conditions. Despite some discouraging experiences it is not extravagant to claim that Lango agriculture would rapidly improve if the agronomic, capital, social and educational constraints holding back widespread acceptance of ox-cultivation were given as much attention as that/to the technical development of the practice.¹

Cotton harvesting is undertaken by men and women, it commences in late November or early December as soon as enough bolls have opened for farmers to judge picking to be worthwhile. Daily picking sessions begin around nine in the morning after the dew has dried. It was observed that each picker used a container and the women also used the front of their dresses as an intermediate container. The dress was tied tightly at the waist and above the breasts and was open at the front so that the picker could use both hands to pick and transfer the cotton inside the dress front. The men picked with only one hand while the other held the harvested cotton to the chest. As more cotton was picked the bottom of the shirt was inverted at the front to form a shallow pocket which when full was emptied into the container which was often an empty 5 gallon paraffin time. Other men preferred to drag the container with them as they picked. In general, women picked two rows of

1. S. Foy, Report of Ox-cultivation in Uganda (Unpublished).

cotton at a time whereas men picked only one. The rate of work varied quite widely round the mean of 7.5 pounds per hour. Below six pounds of cotton per hour was recorded and rates of over ten pounds per hour were reached by women picking with both hands. Cotton harvesting could be made more efficient by using picking aprons or sheets tied at the neck and waist and hanging down the pickers back. Picking rates of up to fifteen pounds of seed cotton per hour can be achieved and it should be possible to harvest up to one hundred pounds in a working day. Unless harvesting techniques are improved the full benefit of faster cultivation and weeding can not be gained, it is imperative to have a multi-operational approach to the problems of improving work rates.

5. Suggestions for Further Study

As labour is a vital input in peasant farming, with its characteristic low levels of capital investment, it is not surprising that a growing number of investigations are being carried out in this area of study. The majority have centred on the ex post recording of labour inputs obtained by questioning during surveys or case studies concerned with measuring farm inputs and outputs both in physical and cash terms. This approach has much to commend it as it is extremely flexible and can give labour inputs over time. The level of sampling error can be varied according to the sampling fraction taken from the universe and the recording error can be minimised by increasing the visiting frequency and raising the level of enumerator supervision. These two main sources of error are of function of the resources available for the data collection so that a desired level of accuracy can be aimed at by adjusting the size of the universe studied in order to achieve a suitable sampling fraction and visiting frequency.

The survey method is, however, subject to some limitations with regard to both the accuracy of the labour data collected and the uses which can be made of the data. As most peasant farmers are illiterate, the accuracy of information concerning labour inputs must depend on the memory of the person supplying it. With frequent visiting the memory of recent work should still be fresh, but members of the same family may work in different parts of the farm and usually it is only the head of the household who is questioned. This leads to inaccurate estimates of the time spent by others. For instance the farmer's wife will most likely finish work before her husband in order to prepare the mid-day meal or to fetch water, but the farmer will usually assume that the same number of hours have been worked by all members of the family. Communal work groups are very difficult to record as members arrive and start working at different times and may finish work and leave at different times so that a crude mean figure must be taken. Some labour operations may be forgotten, especially if they are short and repetitive such as the gradual harvesting of food crops. Other operations may be wrongly assigned to different plots growing the same crop. Perhaps the strongest objection to recording labour inputs

in this way is that very few farmers possess watches and their estimates of hours spent working are therefore mere guesses helped by the changing position of the sun throughout the day. Another shortcoming of the survey method of recording labour inputs is that the quality of the recorded work is not visually assessed and although it may be indicated by the yields obtained these are a result of the interaction of many variables including, incidence of pest attack, climatic variations and soil fertility. Attempts have been made to correlate age and sex with work rate using surveys results but as much of the data is aggregated by recording groups of workers it is difficult to obtain satisfactory results.

A work study approach to the recording of peasant farm labour could overcome some of these drawbacks and could provide a valuable complementary source of labour information. Work study is a technique which systematically examines the factors which govern the efficiency of a given labour operation in order to effect improvement. It consists of two parts, namely method study and work measurement. The former approach examines and analyses work methods in order to design more efficient work routines whereas work measurement is simply the direct measurement of rate of work for any specific task performed to a given standard. Work measurement provides an objective criterion for evaluating improved work methods under actual working conditions. The technique enables the investigator to calculate work ratings for various age groups and male and female workers over a whole series of operations. Working times are recorded by means of a stopwatch and should provide a very accurate series of data providing enough observations are taken. Subjective assessments of the quality of the work performed can also be made.

Method study has an even more important part to play than work measurement in the development of peasant agriculture. Most farm management studies have looked at peasant farming as it exists and have attempted improvements by using techniques which attempt to allocate existing resources in an optimum fashion using existing input/output relationships. Linear programming models of increasing complexity have enabled recognition of previously ignored constraints which affect optimal farm plans e.g. capital constraints, subsistence considerations, risk problems and complexities of labour availability at different times of the year combined with different intensities of labour use. Nevertheless plans must always be limited by current work methods and increasingly sophisticated models might achieve solutions which are identical to those existing on peasant farms. Method study offers a means of minimising labour constraints by suggesting improved operational techniques thereby enabling the realization of even greater farm incomes when these techniques are incorporated into a planning model.

The current Lango study has employed recording techniques to obtain seasonal labour distributions and work measurement methods have been

used to record existing work rates. There remains a need to use method study techniques on existing operations in order to improve labour productivity. Work measurement would then be used to estimate the improvement in performance resulting from the new methods.

Another possibility for future research is the measurement of energy expenditures for agricultural tasks using a respirometer. This instrument measures calorie expenditure by recording rates of breathing while performing various types of work. If this research is combined with studies of caloric intake at different times of the year it could possibly pinpoint operations which are subject to physiological limitations. Table 5 indicates that various operations are performed for fairly constant periods and that the heavy operations are performed for shorter times.

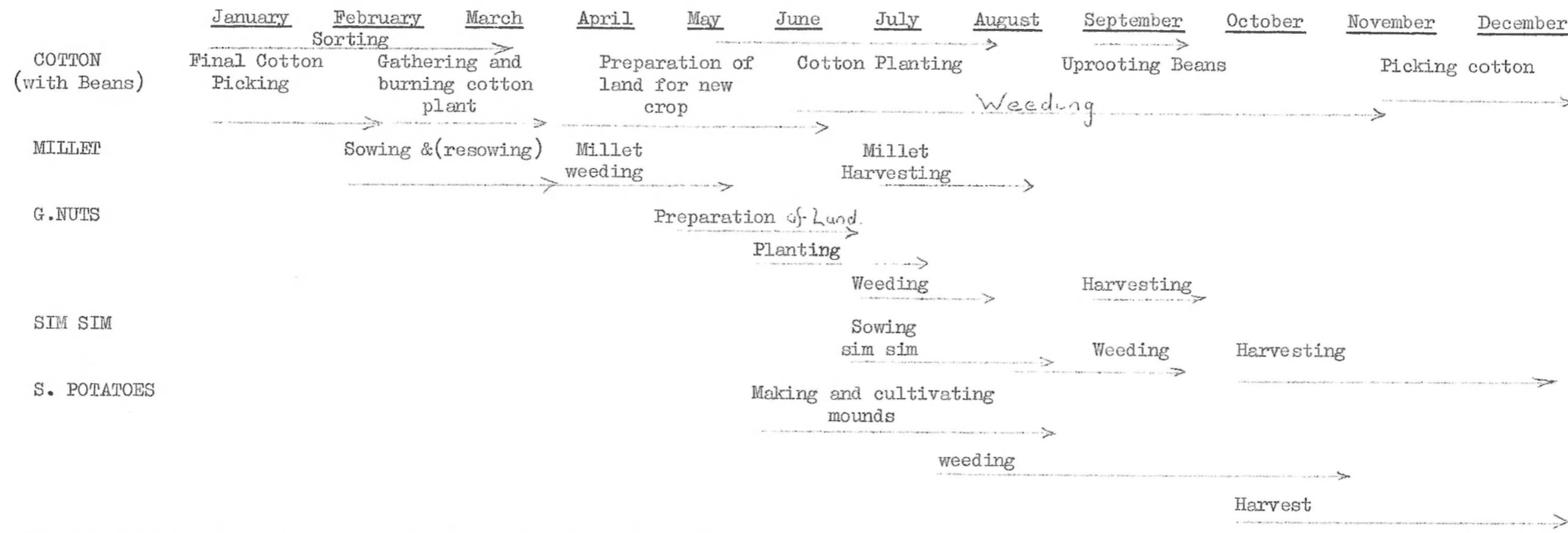
Table 5 Average Working Hours per day for Different Operations on Nine Farms

Farm Number	A ₁	A ₂	A ₃	B ₁	B ₂	B ₃	C ₁	C ₂	C ₃
<u>Operations</u>									
Opening land	2 $\frac{1}{4}$	2 $\frac{1}{2}$	2 $\frac{1}{4}$	2 $\frac{1}{2}$	2 $\frac{1}{4}$	2 $\frac{1}{2}$	-	-	-
2nd cultivation	3	3 $\frac{1}{4}$	3 $\frac{1}{4}$	3	3	3	-	-	-
1st ploughing	-	-	-	-	-	-	4	4	4
2nd ploughing	-	-	-	-	-	-	4	4	4
1st weeding	3 $\frac{1}{2}$	3 $\frac{1}{2}$	3 $\frac{1}{2}$	3 $\frac{1}{4}$	3 $\frac{1}{4}$	3 $\frac{1}{4}$	3	3	3
2nd weeding	3 $\frac{1}{2}$	3 $\frac{1}{2}$	3 $\frac{1}{2}$	3 $\frac{1}{4}$	3 $\frac{1}{4}$	3 $\frac{1}{4}$	3	3	3
Picking	5	5	5	5	5	5	5	5	5

It is possible that farmers will work until a certain total level of energy has been expended so that light work such as picking involves longer hours than heavier cultivation work. This energy expenditure level may vary with current standards of nutrition, so that a knowledge of calorie expenditure for each task and knowledge of the nutritional profile would indicate the likely total hours which will be worked at different times of the year. This knowledge would be valuable in estimating labour resource levels for planning work and could lead to closer co-operation of farm management with nutritional and medical research.

Appendix I

Agricultural Calendar for Lango



SOURCE : From Analysed Accounts of the Nine Farms Investigated.

Appendix III

METHOD OF FIELD RECORDING

Outline Process Chart

Farmers to be observed ...

Date

Owner of plot

Job

Chart begins

Chart ends

Distance travelled

Farmers	A ₁	A ₂	A ₃	
	X ₁			1
	X ₂			2
	X ₃			3
	X ₄			4
	X ₅			5
	X ₆			6

Summary

Areas cultivated (or amount of work) by each

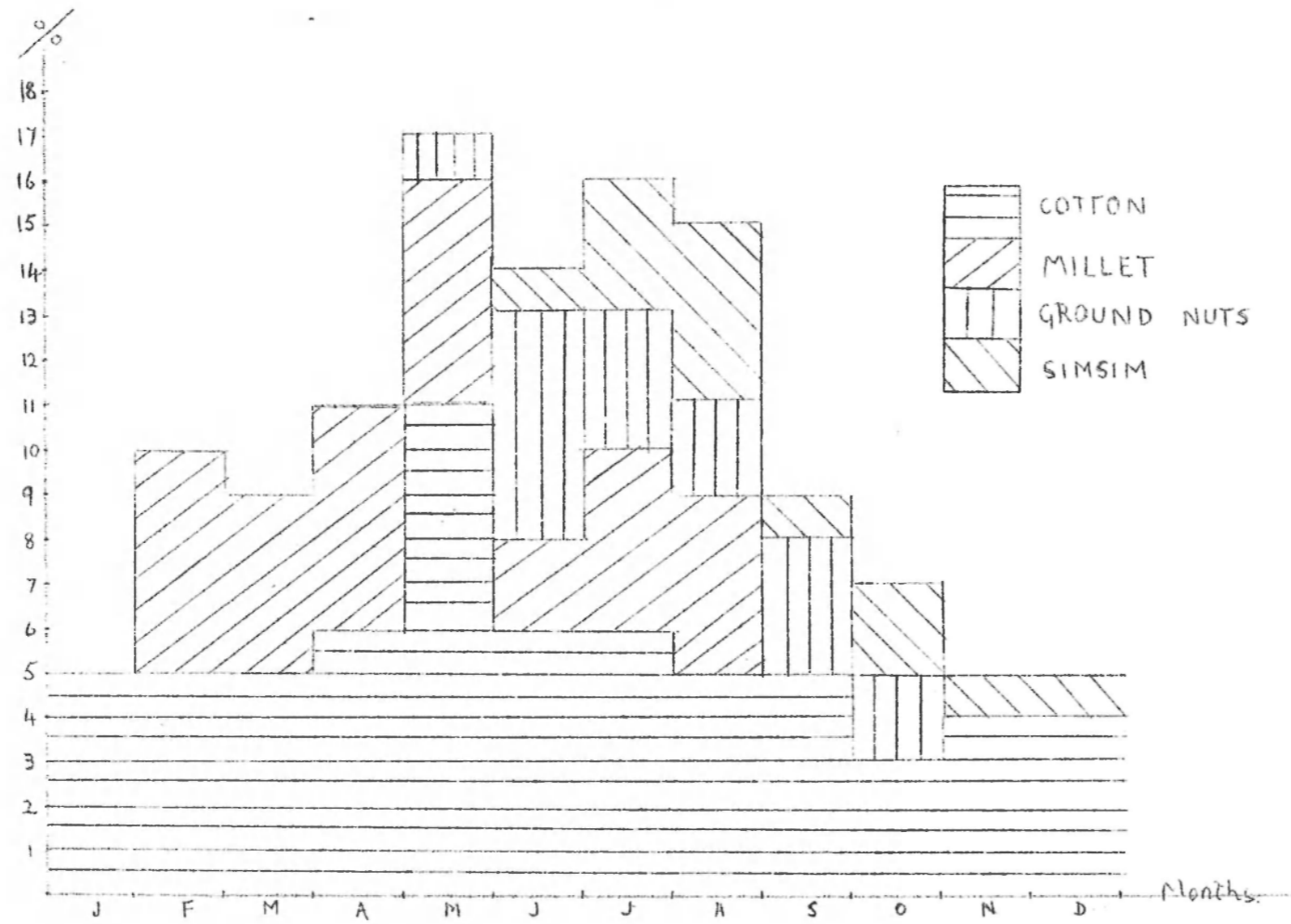
Time taken $((X_5 - X_2) - (X_4 - X_3))$ hours

Total participants (men women children,.....)

Total area cultivated (or total amount of work)

Appendix III

Monthly Labour Distribution as Percentage of Total Labour
Input for the Four Main Crops



Source : Survey of Nine Lango Farms.

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