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THE ADEQUACY OF THE TECHNICAL BASE FOR THE AGRICULTURAL EXTENSION
SERVICE IN UGANDA : A CASE STUDY IN LANGO DISTRICT.

1. Introduction.

Research results have outlined simple husbandry practices which, if adopted by the peasant farmers, would significantly raise the standard of their farming. The rate of adopting these practices has, however, been disappointing and the overall husbandry standard is still unsatisfactory.

While research and extension workers attempt to better the farming standard, the peasants, for socio - economic and other reasons, remain generally antagonistic to practices patiently proved to raise the level of production. The research specialists and development planners must also bear some responsibility for their lack of critical appraisal of the farmers' background. The lack of analysis of the underlying problems leads to policies which are conflicting and which defeat their own aims of raising the present low standard of farming.

Under the compelling need to raise agricultural productivity a start must be made somewhere and the extension service, which requires the co-operation of people from all walks of life, seems to be central enough for worthwhile studies. The concern of this paper is to examine rather superficially the range of problems involved in the extension service. The first part summarises the existing farming systems in the district and the development schemes designed to revolutionise peasant farming.

2. Some features of Lango Agriculture.

a. The Organisation of Communal Labour.

The Langi are Nilotic with a long tradition of both agriculture and livestock keeping. Cattle play an important part in the social customs of the people although their owners are not dependent on them for their diet and the cattle are not integrated with the arable crops.

The employment of labour on the farm is not common, but there is a system which very ingeniously helps to overcome the labour shortage which are bound to happen with such an agricultural community using very simple hand tools. The system is known as "wang tie" and is headed by a "rwot wang tie" who is responsible for enforcing the community discipline laid down by members of the association. When a member requires assistance, he applies to the head of the association to assign him a day when he will receive assistance. A block of land is apportioned to each participant. After work beer is served as a reward at the home of the assisted farmer.

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Recently a new system with a different obligation has emerged and is popularly called "awak". This system of reciprocal assistance receives no reward whatsoever and the method of securing assistance is slightly different. Serial numbers corresponding to the number of members are written on pieces of paper. Each member draws a number which indicates when collective assistance for specified farming operations will be given.

The two systems are now deeply rooted in the social customs of the people on the western part of the District where there are fewer ox-ploughs in use than in the east. Because of the increasing number of ox-ploughs in the eastern and southern areas of the District the size of the work groups are considerably reduced to two or three plough owners as compared to the twenty to thirty members forming a "wang tie" in other areas.

b. Land Tenure.

Land in Lango District is vested in the Land Board of Lango District Administration. Ownership of land is non-existent in the District although land on which crops are grown is held in owner-like possession until the end of the rotation when the land reverts to communal ownership. Temporary occupation licences over land can be granted, for instance for group farms, or public use.

The main characteristic of land tenure is that it is held under customary form of tenure. There is no security of tenure, no title and apparently no marked value. There is no incentive to invest in land, to increase its productivity to its capitalised value.

c. Agricultural Services.

(1) The Extension Service.

The District is run by a District Agricultural Officer with a pyramid of assistants under him. There are two Assistant Agricultural Officers each of whom is in charge of three counties. Only 25 agricultural and field assistants are in the field running 43 Gombololas.

Various methods of diffusing technical innovations are employed and they consist largely of the following:

- (i) talks, lectures etc;
- (ii) audio-visual aid by means of a cinema van;
- (iii) personal contact either at the District Farm Institute or emergent farmers' home;
- (iv) shows and demonstrations;
- (v) agricultural competitions at various levels.

(ii) Education

There is a secondary Farm School at Aler, training primary six school leavers in elementary agriculture. After the course they are supposed to settle in rural areas.

At the District Farm Institute farmers are taught some general agriculture and specific subjects like ox-cultivation and clean milk production.

(iii) Research

There is an experimental farm carrying out trials on different crops especially cotton and groundnuts. Improved beef cattle are being reared for sale to the progressive and emergent farmers.

d. Development Schemes

(1.) Group Farms.

The main objectives of Group Farms are based on the economic use of agricultural tractors and implements. In addition the group farm exponents hope the farms will become nuclei of improved farming and will serve as informal demonstration centres. How far this objective will achieve its goal remains to be seen.

(ii.) Tractor Hire Service.

This scheme started operating in the District as early as 1949 but its economic impact on the peasant agriculture is not clearly known apart from relieving the farmers from the dawn - to - dusk drudgery of hand cultivation.

(iii.) The Subsidy Scheme.

Ox implements, tractor operations and cotton insecticide sprays are being subsidised heavily by the Government. The scheme was started in 1961 and its impact on the standard of farming has ^{not} yet been apparent.

(iv.) Cassava Production.

A cassava factory has been erected a mile north of Lira. Wet cassava roots are purchased from farmers from all parts of the District at -/03 per lb; if delivered to the factory by the farmer and -/02½ if transport is provided by the Company. The factory is run by the Lango Development Company in partnership with the Uganda Development Corporation. Initially the farmers withheld their cassava since they considered the price offered was not attractive. This was an illusion as the farmers were not used to single-unit bargaining. Indication from the cassava buying returns is encouraging. The factory in addition to producing starch and cassava flour, will also be producing oil, cattle feeds, industrial alcohol and soft paper from groundnuts. It is hoped this will boost groundnut and cassava production in the District.

3. The Main Problems.

The research recommendations, demonstrative schemes, credit facilities, mechanisation, etc. all sound by any standard have not produced the expected result of improved farming. The main reasons seem to be farmers' conservative attitudes and the lack of critical appraisal of farmers' background and the physical circumstances of peasant agriculture.

a.) Farmers Attitudes.

In 1953 Aler Secondary Farm School, eight miles north of Lira, was opened to primary school leavers who could not be absorbed into paid employment. The object was commendable as it was hoped it could arrest an exodus of teenagers to urban areas with its consequent social threat. After training, the boys would settle in groups of five in rural areas to farm and wherever possible the neighbouring peasant farmers could be assimilated into the groups in order to accelerate the spread of good farming. The local farmers viewed the move with scorn and in

1956 the school was looted as it was thought to promote the land ownership idea contained in the 1956 Land Tenure Proposal. Since then trained boys have been scared and only a few die-hards have attempted to establish holdings. Even in areas where they settle the boys are regarded as unwelcome immigrants from distant clans. They continue living under constant threats and some groups have been forced to disintegrate because of this hostile attitude, and the expected assimilation of the neighbouring farmers has been a failure. The whole problem is based on the fact that the scheme is viewed as a cunning move to introduce individual land ownership, a system still greatly resented by the local people.

Because of land problems some boys have been forced to settle in remote areas where the problem of clearing bush and water scarcity has been considerable. Even in established holdings the boys work as a team with considerable strain and other members retire to their clan areas where they are sure of continued and uncoveted assistance from their relatives.

Here was a scheme which, if accepted, could by now be demonstrating good farming and assisting the extension workers in their effort to revolutionise peasant agriculture.

Land problems examples can be cited in other Districts as well. In Bugisu the Department of Agriculture has patiently been trying to convince the peasant farmers to consolidate their holdings. The farmers never agree apparently because they do not visualise any worthwhile return from the move.

Attempts to settle the Bakiga in Kigumba (in Bunyoro) and Ntoma (in Toro) have been unsuccessful because the would-be settlers considered that they would lose contact with relatives in Kigezi (4)

Some of the husbandry recommendations will, if adopted ultimately lead to a change in social life. Because of uncertainties and risks speculated, the peasant farmers never accept them wholesale before experimenting under their conditions. Some examples, quoted at length, may reinforce the statement. Cotton spraying has been proved, beyond doubt, to increase cotton yield to an extent which covers the cost of the insecticide and labour and still leaves sufficient net profit. Recommendations as to the correct method of spraying have been issued and there is nothing on record that the farmers have not heard them as yet. Most farmers, have not observed the recommended spraying regime either because of an antagonistic spirit or because sharing the spray among extended family members. In most cases insufficient insecticide is purchased to spray the total acreage under cotton. The little which is bought is thinned out over all the cotton with the disappointing result that only two applications of the insecticide instead of the recommended four are all that the farmers achieve. (6). The strength of the insecticide is a matter of suspect. The little that is stocked in most cases, is shared among extended family members. To ensure that all the cotton is sprayed very little insecticide is added to too much water. (This is further discussed below)

Row cropping and inter-row cultivation have been proved at Serere Research Station to save labour, and increase yield of crops through improved cultivation. The farmers' attention has been drawn to the benefits known to be derived from these practices, but they rarely adopt them apparently for social and economic reasons (9).

As regards row cropping the farmers think that large areas are left empty and the practice would interfere with their usual inter-cropping practice. Inter-row cultivation requires destumping to before it is successfully adopted. Destumping is costly in terms of money and time. Trials carried at Ogur in 1960 on destumping indicated that in thick bush of 250 - 300 trees per acre (average of 8" in diameter) required about 45 man days and cost \$70/- . In a light bush of 150 - 250 trees the destumping operation required 30 man days or \$ 45/-.

Destumping tends to confer individual ownership of land, a system not yet accepted by the local community. Secondly the exploitive nature of peasant farming does not encourage the farmers to destump as they are aware that they will vacate the land after exhausting the fertility and move to fresh ground with its characteristic numerous stumps (6). With increase of agricultural population and the resultant expansion of acreage under crops, shifting cultivation practices are fast coming to a halt. Resting periods are considerably reduced and the farmers are beginning to talk about the use of their old plots after resting. It is viewed by many as a beginning of individual land ownership (6).

b. Advice and Techniques resulting from inadequate understanding of Peasant Farm Conditions.

Wholesale condemnation of the farmers' conservatism may be unwise. Through experience the peasants have realised that certain advocated practices cannot be profitably applied under their conditions. They have therefore developed a cautious attitude in tentatively testing all practices advocated before finally adopting them. In most cases they are more convinced by their results than those of the research station. The subsequent sections review some of the peasant farmers' own research results as opposed to standard recommendations.

(i) Ox cultivation.

The potential of ox cultivation in accelerating agricultural development is clear. Credit facilities have been made available to farmers considered to be likely to benefit. Farmers may purchase either a complete or partial set of ox implements. For instance in 1961 the following ox implements were purchased under the scheme(9).

| <u>ITEM</u> | <u>NO BOUGHT</u> | <u>FULL PRICE</u> | <u>SUBSIDY</u> | <u>PRICE TO FARMER</u> |
|-------------|------------------|-------------------|----------------|------------------------|
| Planters | 13 | 180/- | 90/- | 90/- |
| Harrows | 40 | 200/- | 100/- | 100/- |
| Cultivators | 56 | 205/- | 102/50 | 102/50 |
| Ridgers | 12 | 340/- | 170/- | 170/- |
| Ox carts | 5 | 250/- | 125/- | 125/- |

In subsequent years ridgers were not purchased because the farmers realised they could not use them profitably. It was heavy and strained the working oxen(9). Above all the Lurgi save for heaps of sweet potatoes, never plant on ridges but on the flat. The Department of Agriculture recommended it because it was hoped it could conserve soil and water and facilitate the harvesting of root crops.

A similar fate also faced the harrow. The farmers who used it realised that if a very fine seed bed was prepared, heavy rain, caused heavy soil wash and capping. In case the seeds were already sown, they would be washed down the slope of the field and an uneven stand would be obtained. The use of the harrow was later abolished because of the above reasons coupled with the numerous stumps which invariably interfered with its smooth use.

Row cropping and inter-row cultivation are both crusades of the Department of Agriculture. The Bentall¹ and lately A.H. seeders have been favoured. In Lango District, the junior staff were issued with the Bental seeders in the latter half of 1962 to demonstrate to the farmers the benefit of row cropping and in subsequent years to encourage the sale of the seeders. In order to ensure that the junior staff conformed to the instruction, the District Agricultural Officer issued cyclostyled forms to each of them to record weekly row planting. The completed forms were submitted to the office to enable the D.A.O. to assess the progress of row cropping. The strict instructions given to the junior staff leave no ground to suspect that row planted crops were not recorded. On the other hand one might suspect an exaggeration of the plots reported by the staff to avoid the D.A.O.'s criticism for lack of intensive campaigning to popularise row planting. Names of the farmers who had planted their crops in rows were also included in the forms for follow up purposes by the senior staff. It is therefore reasonable to believe that the number of row planted plots reported since 1962 is fairly accurate.

The junior staff report in terms of acres and in case a plot was more or less than an acre, the actual width and length were paced and the acreage calculated in the office. Probably it is here that inaccuracy may arise as paces are not the same for all and not all plots are rectangular or square. (Pacing factor is usually taken to be 0.6). The Table summarises the crops row planted since 1962-64.

ROW CROPPING 1963 AND '64 (IN ACRES)

| <u>Crop</u> | ROW PLANTED | TOTAL DISTRICT ACREAGE OF THE CROP | ROW PLANTED | TOTAL DISTRICT ACREAGE OF THE CROP |
|---------------|-------------|------------------------------------|-------------|------------------------------------|
| Millet | 121.00 | 170,255 | 217.61 | 172,025 |
| Cotton | 29.50 | 196,021 | 68.66 | 209,364 |
| Groundnut | 4.75 | 17,125 | 9.55 | 22,584 |
| Sorghum | - | 89,052 | 0.22 | 110,759 |
| Simsim | 2.50 | 53,366 | - | 78,426 |
| Rice | 1.00 | 657 | - | 975 |
| Beans | 1.30 | 9,354 | 0.25 | 133,586 |
| Maize | <u>1.50</u> | <u>4,984</u> | <u>0.50</u> | <u>6,878</u> |
| Total Acreage | 161.55 | | 296.82 | |

1. The Bentall seeder although hand pushed is considered along with ox implements because it is complementary to them and/or can be attached to a plough or cultivator.

| | | | |
|---------------------------------------|------|---|-----------|
| Number of Seeder bought on subsidy in | 1963 | = | 63 |
| " " " " " " | 1964 | = | 37 |
| " " " issued to A.A.'s | 1962 | = | 49 |
| " " " " to farmers | 1961 | = | <u>30</u> |
| TOTAL NO. OF SEEDERS IN THE DISTRICT | | = | 159 |

The average acreage planted per seeder is less than 2.

Twenty eight progressive¹ and emergent² farmers, and nine ordinary farmers were sampled from three counties for personal contact to study their problems at the farmers level (6). These classes of farmers were chosen because they were considered to provide adequate information at different levels of farming as to why the peasant farmers so not adopt practices considered to improve their farming standard.

Far too often we tend to pass moral judgement that the peasant farmers are lazy and conservative. They are heavily inclined to profess that we are the only ones active in the field of research and the peasants the subject of our experiments. This idea is in itself erroneous as the farmers study us probably more than we study them and their desire to study us is enhanced by recommendations passed to them which often fall short of their expectation. The farmers have, therefore, refused wholesale acceptance of the recommendations before proving their **viability** under their background.

As regards row cropping the peasant farmers have no doubt appreciated its benefit (6). They pointed out that the germination percentage of the row planted crop was high and the crop yield was higher than that sown broadcast. It did not interfere with inter-cropping. For instance, in case of millet and pigeon peas the latter could be sown broadcast before planting the millet, or alternatively the pigeon peas could be row planted at six rows interval. Labour was saved in weeding and harvesting since a certain number of rows could be allocated to each participant and because of the even stand the operations were done much quicker than if it were sown broadcast.

The main deterrents to row cropping were unsatisfactory seeders and the required seed bed standard. The rubber bands holding the seed rate plates in position stretched and perished very quickly and had to be replaced **fairly** often. An old bicycle tube cut up made a **good substitute**. But by the time a person planting realised that the bands had perished, too many or too few seeds had already been planted. Because of the rough conditions of the seed bed the rubber bands often slackened and the seed holes around the circumference of the seeder became unequal in sizes, or closed altogether. This was so because the outer and the inner distribution rings moved out of their adjusted position. Uneven seed rate was consequently obtained which required either thinning or gapping of plants but such operations came at a time when other work was demanding family labour.

1. Progressive farmers are those peasants who are receptive of the Department of Agriculture advice and translate it into action.
2. Beginning to accept advice and translating into action.

Considerable effort was required to push the seeder especially in muddy fields. There were no bearing which could have cushioned out the difficulty. At least two men were required in pushing the seeder in turn to **avoid** one operator developing excessive muscular fatigue in the arm. The seed guide was periodically clogged with mud and required the operator to stop and remove the soil by scraping with a piece of stick because the iron scraper merely smeared the mud round the circumference of the seeder. By the time the operator has realised that the seed guide was clogged a big gap might already have been left. Other simple faults of the seeder could reduce the rate of planting. The filler cap, e.g. was designed to fit the filling hole tightly to stop seed ^{escaping}. After the first planting session the filler cap might be soiled, after refilling the hopper with seeds, the cap would not fit because of sand grains and soil on it. The operator had to sit down to clean the cap and the filling hole thoroughly before the cap could be refitted.

A fairly smooth seed bed was required for the successful use of the seeder. With the scarce labour at their disposal during peak periods, farmers were unable to prepare the required standard of seed-bed. With the characteristic rough seed bed, the covering chain was unable to cover the seeds sufficiently well. Additional labour was required to cover by foot the seed insufficiently covered by the chain. This was necessary otherwise the birds would pick up the seeds left on the open ground.

The large seeds like groundnuts, beans etc. were dragged along by the covering chain and heaped along the line when sufficient had been gathered. Some of these large seeds were cracked by the spindle agitator. The damaged seeds failed to germinate and resulted in considerable gap filling. One farmer stated that his cotton seeds got jammed inside the seeder and he had to dig ^{them} out using a piece of stick. Other farmers stated that they had to wet the cotton seeds to cushion out the fur effect before planting.

Some farmers also stated that the seeder spanner did not fit all the nuts on the Bentall and Screre Frame. If tightening the nuts was required they had to look for a bicycle spanner which could fit all the nuts.

Others stated that the numerous thorns on their plots pierced the bicycle tyre and increased the difficulty of pushing the seeder.

The axle, apparently made of aluminium metal, wore out very quickly and extra seeds fell out on the side thus increasing unduly the seed rate.

Likewise the benefit of the cultivator in saving labour and conserving soil and water has been appreciated by the local farmers. There were, however, several snags. Destumping a very costly and labour - consuming operation, was essential before the cultivator could be successfully used. This operation confers or at least encourages ownership of land, a system still resented by the local farmers. Fresh plots were opened each year with its numerous stumps. Attempts to use the cultivator in such plots would mean damaging the shares and tines of the cultivator. It was a problem to obtain spare parts with the local traders who were not willing to stock slow selling items.

In weeding cotton the implement could only do two weedings (1st and 2nd) after which subsequent weeding have to be done by hand. If the third or fourth

weeding was attempted, the implement would break the branches of the cotton plant. The damage was particularly serious in cotton closely spaced as compared to that planted at wide spacing.

The cultivator could not be narrowed to weed the 13" millet row. Weeding this particular crop was largely done by hand.

A number of farmers stated that many nuts, and bolts were missing from the implement, but the spare parts were not easily available to replace them.

(ii) DATES OF PLANTING:

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Very often recommendations with view to maximising output are issued without critical analysis of the limiting production factors involved. In most cases this advice is given on a regional basis and the variations in soil, climate etc. are ignored. The farmers, through experience, have pinpointed the weakness of this advice. For instance the principle underlying optimum planting dates is to link crop and water requirements with the rainfall patterns, and to tap the nitrogen built up during the dry season before it is leached out. Optimum planting dates have been worked out on research stations for the different crops, and recommendations are issued in accordance to the research results. A quotation from "Crop Production Programme" 1964 page 3 may clarify (16) this statement -

"In the Northern and Eastern Regions and Northern Buganda, it is absolutely essential in order to get good yields from cotton to have the land ready for planting by mid-April. This means that food crops have to be planted as early as possible to enable the opening after the onset of the rain."

The applicability of this sort of regionalised advice, which has been derived from one research station is doubted as it ignores variation in the level of the soil fertility, rainfall amount and pattern, and other related limiting factors. Even a small District like Lango can still afford an evidence against issuing such recommendations.

Looking at the map and the tables (Appendix I) one realises that Gombolola like Namasale at the southern end of the District needs different advice with regard to date of planting cotton from Alito at the north. In Namasale the rainfall peak occurs in April, a month earlier than in Alito. In the second rains, the peak in both places occur in August. The rainfall pattern in Alito tends to a single peak while Namasale pattern is bi-modal. There is also a difference in rainfall amount in the two places with Alito averaging 45" and Namasale, less than 30" per annum.

According to the above recommendation cotton planted in May or June in Namasale runs the risk of failing to link its highest water requirement with the rainfall peak. This is not the case in Alito as, apart from the late occurrence of the rainfall peak, the amount of rain may still support May or June planted cotton. In Namasale the farmers have already realised that March and early April planted cotton yields more than that planted in May or June (6). Even in Adwari where rainfall is low the farmers have realised the same. (6). Here is an example in which the farmers have shown the unsuitability of the research recommendations.

Furthermore the farmers (5) have indicated that in high rainfall areas in the District early planted cotton requires several weeding unlike the relatively late planted one. The labour required for weeding could be released to do other operations by moderate late planting. Moreover the early planted cotton starts opening early in the year when the second rain is still falling. In heavy bearing bushes the lower bolls may rot or the cotton lint may be seriously stained, by rain. Also in very fertile areas early planting encourages vegetative growth only. These problems are not observed in low rainfall areas where weeding is not a drain on labour resource, and vegetative growth is not encouraged by early planting.

iii. Recommended Spacing.

The main argument behind correct spacing is to obtain optimum plant population in order to increase yield per acre, but not necessarily yield per plant. Experimental results have already outlined optimum spacing for the different crops for instance the 26" x 6" cotton spacing recommended for the District. The peasant farmers are exhorted to adopt the spacing despite variation in soil fertility, rainfall amount etc. Taking Namasale and Alito as examples again, one doubts the suitability of the advice to the two places bearing in mind the rainfall amount in the two places (see Appendix I). Rainfall is most likely to be a more limiting factor to cotton growing in Namasale at the recommended spacing than in Alito. In the former place highest yield may be obtained at low plant population per acre. An A.A.O. in charge of the area has been shown a cotton plant with well over 100 bolls in December, 1964. The plant was exhibited in support of wide spacing (probably 4' x 2' x 1') against the 26" x 6" spacing which the farmer considered would only encourage vegetative growth. While in charge of the area I was shown a plant with more or less an equal number of bolls in August 1964. The farmers might be right in rejecting the 26" x 6" spacing in Namasale. The spacing can be adopted in high rainfall areas as the farmers have already started showing interest in adopting it. We learn in plant physiology/stages. With increased plant population as a result of closer spacing and profuse flowering as a result of spraying, it would appear unwise to recommend the 26" x 6" spacing in Namasale unless trials have proved it suitable.

IV Cotton Spraying.

Spraying Problems.

a. Those Observed By the Department of Agriculture.

The first trouble encountered was that of the spray tank collapsing and the clips to which the harness straps were attached pulling off. The former was due to an insufficiently large air hole in the lid, and the latter to faulty soldering. All genuine cases of collapsed tanks and faulty soldering were replaced free of charge, meanwhile the District staff went round enlarging the air holes in the tank lids which stopped any further tanks collapsing. It was also reported that most farmers sprayed two acres of cotton with only sufficient insecticide for one acre. This was deliberately done to obtain a partial control over a large number of acres and thereby increasing gross return.

∟ that plants require a lot of water during the flowering

The time to apply the insecticide was fixed at: first spraying 8 weeks after planting and the next three spraying following at 10 days intervals. The Field Officer, Lango commentin, on spraying generally thought that the time of application might be incorrect for certain areas. It seemed that in many cases at 8 weeks old, the cotton was only one foot high.

Also it was very noticeable with the April and May planted cotton that about twenty to thirty days after the last spray application a fairly severe and in some cases very severe bollworm attack took place. A further application of the insecticide fifteen days after the fourth application was necessary. It was also noticed that the bollworm attack was more prevalent in crops planted at 3' x 1' than in the usual District spacing of 4' x 2'. It was difficult for the Officer to give an exact estimation but he thought that 30% of the bolls set were attacked. With June planted cotton the spraying times were possibly more suitable.

A further problem was the heavy showers of rain which falling directly after spraying often washed off the application of the insecticide. The staff found it a problem to get the farmers to appreciate that it was better to be one or two days late with an application, rather than have the dudunaki washed off by rain. This and the fact that there was sometimes a series of wet days meant that many applications were wasted.

In the second year attack was normal and tended to be later than usual. In many parts, conditions were unfavourable for optimum plant growth and many farmers who took loans stockpiled the insecticide for the following year's spraying. There were also a number of people who gave their loans over to their trustworthy friends whose cotton was planted early. Again those who sprayed their cotton applied one tin of insecticide on two acres of cotton. They considered that two applications per acre had an equal effect as the recommended four applications per acre.

A few piston leathers and various washers on the pumps purchased the previous year had to be replaced at the start of the season. The recommended neatfoot oil was easily available to all pump owners. The more common repair was the replacement of packing washers.

In subsequent years the main criticism was that the farmers were not yet convinced of the benefits of spraying.

(b) Those Observed by Farmers.

Most of the farmers interviewed pointed out that a few peasants possessed plantector pumps of the unilateral high subsidy on the D.D.T. insecticide and not an equal rate on the pumps. The price of pumps had remained relatively high and most farmers could not afford them. A number of peasant farmers had to borrow the spray pumps from neighbours and a fee of \$2/- or a chicken was leived for each time the pump was hired. For the recommended four applications a sum of \$8 12/- or four chickens had to be paid. During the spraying season there was hardly any cash in the hands of farmers. Moreover the chicken could be "gainfully" used to reward assistants for certain operation during the second rains.

Certain spray pumps owners were not keen to hire out their pumps because they feared hirers might damage the packing washers etc. for which spare parts were not easily available. In t case a pump owner was willing to hire out his sprayer, there

∠ as a result

might be too many people hiring the same pump in which case the pump might not be available at the time the application was due. As a result of the erratic availability of the plantector pump the spraying regime could not be adhered to strictly. A number of farmers said that the complexity of the plantector pump was one of the major problems in spraying. All the component parts (even nuts and springs) were essentially complementary and if only one was missing the pump was absolutely incapacitated. Because of lack of technical skill to operate the pump, a number of peasant farmers hired others who had the knowledge to spray at an equal pump hire rate.

Generally a date was fixed in consultation with the hired person and the accepted date was not alterable because the hired sprayer was also engaged in other work. Even if the owner of the plot knew well that it would rain the spraying would continue as planned. If both the pump and the person to spray were hired a cost of Rs 6/- per application was incurred.

Sometimes a person might be hired but a pump for hire might not be available or vice versa. Certain farmers were left with no alternative except to use a bundle of leaves or grass to spray the cotton when faced with such a dilemma. A number of them pointed out that the plantector sprayer pump was difficult to operate and considerable muscular fatigue was developed particularly in the right shoulder muscle. They then resorted to leaves. Others had to sway the pump from side to side in order to cover two cotton rows per trip. Because of the rough conditions of the cotton plots, the operator could not walk smoothly and enough during spraying. Considerable application was made over an area less than an acre. By the fourth application there might not be sufficient insecticide. This was why most farmers who attempted to spray four times sprayed only three times.

A further problem with walking during spraying was that the square tank would cut or at least bruise the back on which it was held by the rubber straps. Some farmers placed a sack or some other pads on the back to cushion out this effect. Some farmers instead of using the tin, employed a large saucepan which had two to three times the capacity of the spray tank. Only one standard cupful of the insecticide was added to the water in the saucepan and this was used to spray the whole plot. The wife carried the saucepan on her head holding the strainer in position inside the saucepan. She then followed her husband while he sprayed. The strength of the insecticide was definitely weak and could only have a partial control. When questioned why they did not use the spray tank to measure out the correct amount of water into the saucepan and then add the corresponding amount of insecticide, the farmer said that that was intentionally done to enable the farmers to spray as many acres as possible with one tin. This was a result of a speculation of the increase in the dudumaki price in future. The speculation had been caused by the subsidy scheme which was at one time 100% and the following year suddenly reduced to 50%. A number of tins of dudumaki had been spared for future use, should the price become high. This same answer was also given for the spraying of two to three times instead of the recommended four applications.

A number of farmers stated that the Department of Agriculture insisted in the past on strip cropping of 35 yards in width each but the length could exceed used the 140 yards length, if the farmers so wished. Farmers were already exceeding

the length and consequently each plot was more than an acre. Cultivation was communally done and was rewarded in kind (beer, chicken etc.). To ensure a corresponding return for the reward, the farmers always exceeded the 140 yards length. Secondly they exceeded the 140 yards length to obtain a worthwhile gross return.

Tins of the insecticide on the other hand were purchased in proportion to the number of plots opened and not to the number of acres calculated from the measurements. Moreover, a number of peasants opened several cotton plots for which they did not have sufficient cash to purchase the corresponding number of tins. The few tins purchased were used to spray all the plots planted to cotton. In other words the application was not sufficient.

Seven farmers interviewed said that they had attempted to spray their cotton according to the recommended spraying regime. After the second spraying, they noticed that most of the bolls set did not fall, but when drought hit the crop most of them were lost while unsprayed cotton although did not have as many bolls as the sprayed cotton did not lose the bolls as a result of the drought.

Two of these farmers attributed the loss to the early return of the lygus pest after the last spraying because some plots adjacent to theirs were not sprayed, or even if sprayed the application was not properly done to kill the lygus.

After two weeks the effect of the insecticide was lost as the result of the continued rain and the lygus could return unharmed. Because of this experience they followed a different spraying regime; the first spray application was after 35 days from germination or 42 days from the planting date followed by three 12 days spraying intervals. The result was very satisfactory except that there was a mild bollworm and red mites attack which required a fifth spray after the last spray to stamp out the damage.

(e) There are certain tiny black ants (hymenoptera specy) which are known by the farmers to control the population of lygus in some parts of the District. In these areas the farmers consider that cotton spraying may not be an economic proposition on the basis of the marginal increase in cotton yield which may not offset the cost and labour involved in spraying.

(f) Two farmers have redressed their cotton seeds before planting hoping that the early attack by lygus would be stamped.

One farmer has sprayed his cotton immediately after planting hoping by the time the cotton germinated there would be no lygus to attack the seedlings.

(g) In certain areas fetching water from as far as two miles or more from the plot hindered current spraying regime as the small amount of water is sparingly used to spray large areas.

4. The Extension Service.

a. Extension Staff.

The principal object of the extension service is to educate the peasant farmers to better method of farming. In Uganda the extension teaching has been confined to a well established pattern of practices recommended by research specialists. While these practices will no doubt improve farming standards, the extension procedure is not quite that simple. The preceding section has indicated resistance that farmers are likely to offer in attempts to impose a particular practice.

∠ with the insecticide

To overcome these human problems there is urgent need to increase the numerical strength of the staff at all levels. In addition better qualified staff should be recruited. In the next place there are basic essentials, transportation, markets and incentives which should be met before any development in agriculture can be achieved.

The District extension service is staffed by the D.A.O. with a pyramid of agricultural and field assistants under him (the latter A.A.'s and F.A.'s hereafter called the junior staff.) The junior staff trained at Serere Agricultural Research station have acquired simple practical farming principles which place them in a position to do, reasonably well, some practical demonstrations of good farming to some the peasant farmers. In the extension service, however, they are messengers and in cases advisers the job for which they were not sufficiently trained. Demonstration, originally their main profession, becomes physically difficult in view of the large area each staff supervises. In the District there are 25 junior staff in the field looking after 43 Gombololas, and a total of well over 84,000 tax payers most of whom are peasant farmers. The District total area is 4,898 square miles which means that each staff supervise approximately 200 square miles. This figure may be exceeded in view of the fact that seven senior agricultural assistants are in charge of counties in addition to supervising Gombolola each. With bicycle the junior staff can hardly cover the area, and verbal information is all that is passed to the farmers.

Because of the physical effort involved in cycling, and the pay quarrel the junior staff are too disheartened to intensify their efforts in the agricultural production drive. The staff claimed that they have had some training in agriculture and in the past there was an appreciable gap between their pay and the ordinary labourers yet with the achievement of independence the increase in the labourers' wages supported by the minimum wage legislation and no corresponding increase in their salary has narrowed the gap. This has been advance as a disincentive to work hard.

Some old junior staff are hardly better than the peasant farmers themselves on account of their low educational standard. When new practices are recommended they take an equal length of time with the local farmers in learning the practice. This is so because they live in rural areas where they speak the local vernacular almost seven days a week and therefore cannot hope to improve their knowledge since their English knowledge the medium of most instructions is ever dwindling. Meanwhile the research stations continue to feed them with numerous recommendations all of which are written in scientific language increasing the problem of digesting has the content of the papers. The D.A.O. or one of his senior staff to explain. Some senior staff do not speak the local vernacular and a clerk or one of the educated junior staff with sufficient English knowledge has to interpret. The local vernacular, unfortunately is not rich enough to explain adequately the recommendations. The information therefore gets somehow confused through interpretation. Some examples may reinforce the argument.

Spraying and row cropping are receiving considerable emphasis from the Department of Agriculture. In 1959 when cotton spraying was introduced on a District level, two courses for instructions were held at Ngeta Experimental Farm for the

District Staff. The main object of these courses was to instruct the staff how to spray, and effect simple repairs. The writer was the interpreter during the two courses and had observed fairly well the difficulty the staff faced in learning the principles underlying spraying. Some staff especially the old ones showed no indication of understanding and were very much confused with the spraying regime in particular. Even in subsequent years the senior staff continued commenting that some agricultural and field assistants were not clear in their mind in regard to spraying intervals. However this year the junior staff clearly know the spraying regime.

During the 1959 course pump repair was explained and demonstrated. Each staff had a trial run and the performance was satisfactory. The main problem was in regard to spraying operation itself. The best method of spraying required that the operator held the lance in position one foot above the cotton plants while the right hand pumped. A number of ageing staff could not hold the lance steadily even after numerous practices. During the pulling motion, the left hand swung to the right towards the direction of pull, and during the pushing stroke the left hand swung to the left in the direction of the motion. The lance was, therefore, swayed in a zigzag manner over the cotton plant. One wonders whether or not such staff could demonstrate correct spraying to the farmers.

The junior staff farm also; last year names of the peasant farmers who had sprayed their cotton correctly were recorded for future result demonstrations. The writer has gone through the list but none of the junior staff has his name included in the list. It is doubtful whether or not the junior staff can carry out a successful spraying drive after failing to spray their cotton according to approved recommendation. Nevertheless they have courageously gone out preaching the benefit of cotton spraying.

The Department of Agriculture since 1961 has launched an all-out campaign to popularise row cropping. The junior staff were issued with seeders to demonstrate this practice. Hitherto little progress has been achieved because of the seeder. The junior staff grow their cash and food crops as much as the peasant farmers do. Records of the farmers attempting row cropping are in the D.A.O.'s office and the writer has gone through the list. Unlike in spraying, names of the staff are included in the list. As already indicated above only a negligible number of acres have been row planted. Paradoxically the junior staff are one of the exponents of row cropping. After failing to row plant their crops they have gone out to the peasant farmers exhorting them to plant in rows basing their propaganda on some theoretical benefits known to be derived from row cropping. In response to the appeal the peasant farmers have asked for group farms because they have seen row cropping a success on group farms where bush has been mechanically cleared and a reasonable seed bed could be prepared for the successful use of the seeders.

b) Other Extension Media.

The District Farm Institute, the Agricultural Newsletter, Radio Talks and the recent Audio - Visual have contributed materially in arousing the farmers interest to improve their agriculture.

The Credit scheme especially the cotton spraying subsidy scheme have contributed substantially in initiating willingness to adopt recommended practices. The marketing organisation which could have put final touches to Extensionists' effort is lacking.

5. Some Observations and Conclusions.

The Department of Agriculture apparently would like to transform the native agriculture to conform to the pattern of the developed countries as indicated by development priorities which are orientated towards this goal. Extension method specialists are recruited from America and Israel. While endorsing most of their methods proved to be sound after generations of experience. I would still think that methods can still be modified without distorting the underlying principles, to suit the background of the peasant farmers. This means stepping up the recruitment of suitably qualified local people who understand the social background of the farmers, to man the extension service.

Post-graduate students of agriculture should be encouraged to work on local problems rather than doing their courses overseas coming back to be disillusioned that their training is not of practical use to the farmers.

This history of the extension service in Uganda is a sharp lesson that successful agricultural development depends on adequate knowledge of the farmers background. The progress achieved to date even though disappointing, has been valuable in that it has shown the many questions unanswered that need to be rectified, before any appreciable progress can be made. An abundance of research, numerous demonstrative schemes are no substitute for the grass root analysis of the farmers' background. If the data are not available there is nothing that can be done but to start active survey and wait until such data are accumulated. This is no excuse for dilatory behaviour. On the contrary there must be all the more emphasis on the urgency of scientific and technical research and experiment under peasant conditions. This will take time but knowledge and experience can only be accumulated and not bought. This can be achieved if the District Agricultural Officers are relieved of some of their administrative duties to carry out **trials** in various parts of the District. Present research can proceed as at present but their results must be interpreted in the light of problems at the peasant farmers level and if suggest they should be taken as a guide rather than as absolute solution to present stagnant agricultural progress.

Considerations may also be given to improving conditions of service in the Department by providing good rural houses for the junior staff, incentive to work hard through better pay etc. This argument may sound unrealistic but on the basis of agricultural central position in the country's economic development it should be realised that a backbone is as useless without the flesh as the flesh without the backbone.

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