

Appendix 1

Land tenure systems and agricultural technology uptake by smallholder rice farmers in Kyela district, Tanzania.

J.P.Hella¹; N. Kibanda²; C. Riches³; J. Kisaka²; M. Mkuya²

¹ Sokoine University of Agriculture, P. O. Box 3007 Morogoro, Tanzania

² Kilombero Agricultural Research Institute, Tanzania

³ Natural Resource Institute, University of Greenwich, United Kingdom

Abstract

This study to investigate the effect of land tenure systems was conducted in two villages; Ngonga and Kilwa in Kyela district, Mbeya region in Southern Tanzania. Informal (group discussion) and formal (questionnaire survey) methods were used to collect information during January 2006. Access to floodplain land, used to grow lowland rice, was confirmed as a constraint for many farmers in the area mainly because of a skewed traditional ownership system and the water bodies surrounding the study villages. The findings suggest that while the land tenure system in Kyela may influence adoption of improved rice production packages. Limited knowledge of how to improve land use efficiency and the low opportunity cost of labour perceived by farmers are also important factors. Based on the findings, this study suggests that necessary effort to empower farmers to appreciate the value of their labour is important. This could be achieved through hands-on training and field schools.

Introduction

Rice is the second most important cereal crop in Tanzania. With an average of 359,000 ha planted per year to the crop in the period 1993 to 2003, the country is the largest producer of rice in East and Southern Africa (FAOSTAT, 2005). With an increasing rate of urbanisation the role of rice as an important cash crop is expected to increase. Indeed some 135,000 MTs per year have been imported between 1993 to 2003 to satisfy demand. However, despite of the importance of rice to the economic and social welfare of farmers, production at smallholder level continues to be low with a national average yield of 1.6 t ha⁻¹ since 1992 that is well below production levels reported from trials. By 2001 more than 80% of farmers in Eastern and Southern Tanzania continued to grow the late maturing aromatic cultivar Super India (140-160 days), established by broadcasting of dry seed with less than 15% using fertiliser and 95% relying on hand weeding (TARP II – SUA Project, 2002).

Recent on-farm trials with farmer groups in two floodplain areas of Tanzania have demonstrated that a promising increase in rice productivity can be achieved by reducing competition from the perennial wild rice *Oryza longistaminata* by using a herbicide (Riches *et al.*, 2005). Further trials have also indicated increased yields on wild rice infested fields from the combination of herbicide and fertiliser used with the recently introduced early maturing, aromatic cultivar TXD 306 for which there is considerable market demand. Anecdotal evidence from discussions with farmers in Kyela district suggested that for the majority, access to rice-land on the floodplain of Lake Nyasa is through short term lease as a result of a tenure system in which a minority of residents have historical "land ownership" rights. In classical economic theory (as expounded by Adam Smith, Ricardo and Malthus) land has a dominant role as the ultimate constraint to agricultural output and therefore as the cause of diminishing marginal returns to capital and labour. The pattern of land use in many smallholder settings is influenced by factors such as population density, technical knowledge, capital resources, soil fertility, location in relation to markets, roads and railways, and the land tenure system (Upton, 1976). Many reviews (see Upton, 1976; Tiffen *et al.*, 2001, Ellis, 2001) argue that with the exception of land tenure all of the other factors listed above create incentive for investing into modern production technology. The role of land tenure on investment on modern production technology is scanty and where available it's highly location specific. A

study was therefore undertaken to assess the possible impact of land-tenure on the Kyela floodplain on farmer investment in improved rice production practices.

Methodology

The study was conducted in two villages, Ngonga and Kilwa in Kyela district, Mbeya region. Farmers from these communities plant rice on floodplain land and have been participating in trials since 2002 to evaluate methods for the control of wild rice. People from the Nyakyusa ethnic group (clan) live in this area. Three methods of data collection were used depending on the type of information sought.

- a) Focus group discussion: This involved discussion between researchers and community members on general issues related land holding, inheritance systems, role of men and women in land use, and land ownership changes across generations. The discussion group participants represented different social, cultural and economic characteristics of the society. Gender balance was observed (see annex 1);
- b) Time line analysis: Here farmers were divided in three groups each with five members. Farmers were given ample time to recall and discuss important events related to land use from time immemorial to the present day. Each group then presented their findings to the meeting for comments, improvement or elaboration;
- c) Questionnaire survey: Questionnaire study was involved 34 respondents randomly selected from two strata; farmers participating in on-farm experiments and otherwise.

Results and discussion

Kinship and land holding: Through group discussion it was established that traditional Nyakyusa culture determines land-holding systems both across and through generations. According to Nyakyusa who accounted for 98% the people who participated in the discussion, men are custodians of the clan's land. The father who is the head of the household will normally give piece of land to his elder son. The elder son is obliged to inherit his father's land upon death of his father. If the clan had large land then the young male members will be provided with some smaller portion. While the eldest son inherits the land, decisions that relate to sale or transfer of ownership to another non-family member has to be made by all male members of the family. Females do not usually inherit family land under Nyakyusa patrimonial society. However in the rare circumstance when there no male heir only, then females are allowed to inherit land. This *ceteris paribus* traditional kinship type of land ownership would encourage investment on medium and long lasting modern farming technology such as use of herbicides, fertilizer etc. because ownership of the farm is relatively infinite to the family and clan.

Time line of land ownership changes: Time line analysis helped to trace land ownership and tenure across generations. From group presentation land use and tenure milestone at the study area dates back as far 1600 when the whole land around day Kyela town was under Chief Chungu of a tribe from modern day Malawi. The international border lies within 10 km of Kyela town. General perception depicted that social and cultural settings set through generations and well as changes in areas flooded consequent upon fluctuations in river courses on the floodplain and the level of Lake Nyasa, influenced ownership of land. Though economic changes had some influences in earlier times. post-independence macro economic and policy changes have had little influence on land tenure system in the study area, in contrast to most of Tanzania.

Before 1880s the tribe, which later came to be called Nyakysa, migrated to the region around Kyela and waged war with the natives who were driven back to modern day Malawi. After victory, the conquered land was distributed to few people who where close to the Chief (i.e. sub-chiefs, solders, relatives to the chief) or those who had livestock for exchange for land with chief or sub-chief (*Mafumu*). Important events are listed below.

| Ngonga village | | Kilwa village | |
|----------------|--|---------------|--|
| Year | Event | Year | Event |
| 1885 | - | 1885 | War between Nyakuysa and the Malawians which made the Nyakyusa to own the modern day Kyela district. |
| 1961 | Independence | 1961 | Independence which ended colonial rule and the power of the chiefs and sub chiefs. |
| 1967 | Arusha declaration – nationalisation of mean of production. This no effect on people of the village A village land was cleared close to Songwe river | 1967 | Arusha declaration – no effect on people of in the village |
| 1971 | Villageisation: People were not moved to villages as in other places in Tanzania but some places were set as government land to build schools and other service supports | 1971 | Villageisation: People were not moved to villages as in other places in Tanzania but some places were set as government land to build schools and other service supports |
| 1988 | Major flood on Songwe river | 1988 | - |
| 1978 | Flood in Songwe river which changed the course of the river and access to the flood plain | 1978 | Flood in Kiwira river which changed the course of the river and access to the flood plain |
| 2000 | Flood caused by increasing level of Lake Nyasa | 2000 | Flood caused by increasing level of Lake Nyasa submerged several plots that are no longer used for farming Many people had two plots for cultivation |
| 2003 | On farm experimentation on wild rice control begins | 2003 | On farm experimentation |

A historical consequence of the original distribution of land and the kinship based land ownership system is that few members of the clan own land today. Estimates based on PRA at the two study villages suggest that only 25-30% of the residents own land and the rest need to either lease or borrow land in order to cultivate rice. Any agreement to use the land is restricted to two years. Generally landowners are more likely to terminate agreements or refuse renewal of plots which appear to produce better than usual harvests. When a farmer who rents land achieves a high yield at any time of the contractual period, there is a risk that the owner may terminate the contract and use the land himself. Ironically land that is perceived to be of low fertility or is dominated by weeds is more likely to be leased out.

These observations may suggest that farmers who rent land may fear losing land that they have improved and so have little incentive to adopt lasting farm improvement technology. On the other hand, the reverse is may also true. Rational farmers who suspect that land tenancy on will be short, could aim to maximize land use and so invest highly on technologies which have short lasting effects such as fertilizer, herbicides etc.

Individual perceptions on land tenure system

Respondent characteristics: The major characteristics of the respondents are listed below:

- Age – ranged between 20 to 76 years old;
- Education level – 83% attended formal education and rest had no formal education;
- Wealth status – 15% well-off, 46% medium and 39% poor (according to locally set criteria);
- Marital status 76% married, 24% widow or divorced; 14% female headed households;
- 45% of the respondents were members of the on-farm experiment for wild-rice experiments;

Land size and ownership: Ownership of land varies significantly across the households. All respondents (100%) indicated that they have permanent ownership of their homestead, which were acquired through inheritance, purchase or free offer. Homesteads can make significant contributions to household income as cocoa, citrus and oil palm are grown on these elevated patches of land. Size differed from 0.2 to 1.5 hectares the smallest being the household who obtained their homestead through purchase or free offer. In all villages, ownership of farmland is highly skewed. The majority do not own land of their own. Only 20% of the respondents indicated to own all farm plots through inheritance (83%), purchase (12%) and free offer (5%). The rest are cultivating land under short-term lease which in most cases do not exceed two years. The cost of leasing ranges from 15,000 to 20,000 Tanzania shillings per year (US \$12-17) that has to be paid before the season starts.

The results suggest that there is high correlation between incidence of wild rice intensity and type of land ownership. 86% of the farmers who own land under lease reported a severe problem of wild rice problem on their plots compared to 50% for those who own land. A similar association was reported with respect to declining soil fertility problems. This observation confirms the earlier observation that land owners lease out land the least productive plots under their control.

Use of improved technologies

Use of improved technology in rice farming is the key factor that can increase production. Average production per acres ranges between 2-5 bags per acre. Except on experimental plots farmers do not use fertilizer or the herbicide glyphosate for wild rice control. Reasons advanced included high prices and availability. Several stockiest in Kyela town sell various type of herbicides, often obtained from Malawi. When visiting demonstration sites in the area during 2005 project staff have observed a number of fields on which farmers used a herbicide that has caused considerable damage to young rice. This was thought to be a herbicide, intended for sugar cane farms in Malawi, which is not selected in rice. Farmers have insufficient knowledge to know what to buy and what not to buy from market traders.

Although the majority does not use modern farming technologies, this study investigated the farmers' willingness to use herbicide with respect to land tenancy systems. Results (Table 1) suggest that willingness to invest correlated with type of land tenancy in both study villages

Table 1: Land tenancy and willingness to invest in selected technologies

| Source of land | Technology | | | Total (%) |
|------------------|-------------------|-----------------------|-----------------------|-----------|
| | Improved seed (%) | Use of herbicides (%) | Use of fertilizer (%) | |
| Inherited | 9.7 | 5.6 | 3.4 | 18.6 |
| Government offer | 15.4 | 5.2 | 6.3 | 26.9 |
| Purchase | 20.4 | 10.2 | 5.0 | 35.6 |
| Leased | 3.4 | 0.7 | 0.5 | 4.6 |
| Free offer | 10.2 | 1.2 | 2.8 | 14.2 |
| | 59.1 | 22.9 | 18.0 | 100.0 |

From the results about 60% of the respondents would rather invest in improved rice seed than fertilizer or pesticides. These were selected by about 20% of the respondents. Analysis by type of land tenancy showed that willingness to invest in improved technology is high among farmers who own land through purchase followed by Government offer which accounts for 36% and 27% of the respondents respectively. Willingness to invest is lowest for farmers who lease land, the majority in both communities. This observation is can be linked with the practice of landowners restricting tenancy to no more than 2 years. Tenants appear to be less interested in investing in technologies which have long residual effect. However another important factor is that individual technologies may not improve production alone. Improved seed is less likely to be effective unless is accompanied by other technologies such as fertilizer, water management and pesticide. The low opportunity cost of labour in the area suggests limited willingness to invest in herbicide although farmers acknowledge that hand weeding is a very tedious job.

Conclusion and recommendations

This study intended to investigate the effect of land tenure on adoption of agricultural technology in rice farming among low-income farmers. Result confirms land is the most important commodity in the study areas mainly because the ownership is influenced by traditional systems and water bodies surrounding the study villages. Although the finding suggest that land tenancy system has influence of use of technological packages, limited knowledge on the efficiency on use of scarce land resource and the low opportunity cost of labour in the area may be also be important determinants of likely adoption and need further study. Based on the findings presented, this study suggests that necessary effort to empower farmers to appreciate that the value of their labour is important. This can be achieved through series of hands on training and field schools. Increased intensity of demonstration of wild rice management by the district council agricultural team will provide a wider range of community members to assess the potential of herbicide technology. Land owners, as a discrete target group, are likely to adopt initially. This will account for up to one third of the community. As there is an increasingly strong market for rice from Kyela tenants are also likely to improve production in the long term in response to the market, even if they only control wild rice in the first year of a tenancy. Land owners will lack sufficient labour to farm all the land they own unless they are prepared to hire labour. The possible implications of widespread adoption of herbicide on the Kyela floodplain are uncertain at this stage. Effects on the demand for labour, on land rental values and access to pots by the landless majority will need to be monitored with the effected communities across the district.