Post-harvest practices that may affect rice milling quality in Tanzania.

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Background

This project aims to examine post harvest practices that affect the quality of milled rice in Tanzania. The quality of locally produced raw rice, using single-pass steel milling systems, was observed to be very high i.e not many broken grains. The identification of specific post harvest practices employed to produce good quality rice (e.g. variety, tempering, harvesting and milling techniques) would enable these technologies to be transferred to other developing countries for the benefit of rural farmers and processors.

In March 2000 a visit was made to the Morogoro region of Tanzania to provide preliminary baseline information from the rice production chain in order to gain an insight into aspects which might affect the quality and marketing of milled rice including:

- details of current post harvest practices prior to milling
- typical prices for milled rice to identify quality/value relationships.
- sustainability of milling operations
- current sources and types of mill:
- physical quality attributes of milled rice (grain size, colour, broken grain, extraneous matter etc)
- socio-economic factors including the role of women in rice processing systems

Following this first visit the following conclusions were drawn

- Rubber roll mills are superseding steel dehullers in the major areas of rice production in the Morogoro region.
- This is largely due to increased availability and demand from traders who demand a highly polished product and fast throughput
- Millers consider that proper management of rice harvesting time and subsequent drying and storage is paramount for the production of good quality milled rice.
- *Supa India* is the preferred variety due to its good processing characteristics and the presence of ready markets.
- Rice millers are quality-conscious and maintain their mills well.
- Moisture content and % brokens are very variable from mill to mill but the two factors are not correlated.
- The majority of samples would comply with the ISO7301 quality criteria

Full details of this visit are contained in report R7531

Purpose of visit

Based on the recommendations which arose from the baseline study the objectives of these visits were:

- To determine the extent of use of rubber roll mills and steel hullers and to examine harvesting and milling practices in a second rice growing region (Lake zone).
- To examine harvesting and milling practices in the Morogoro region
- To compare the effect of rubber roll and Engleberg milling on the quality of milled rice.

Structure of visit

A second visit to the Morogoro region in order to.

- Revisit mills and speak with millers and traders about drying and milling regimes
- Visit farmers to ascertain harvest practices
- Monitor paddy drying procedures and collect samples
- Purchase samples of paddy for drying according to local practices and comparative milling trials in local steel huller and rubber roll mills
- Purchase paddy for shipment to NRI for processing trials

During the course of the field work the project was discussed with Dr Joseph Mbapila, Head of the rice research programme, based at ARI Katrin, Ifakara, who expressed interest in the results of this project. At present the breeding programme does not include screening for processing characteristics or consumer acceptability. Katrin research station has neither the facilites or expertise to do so. Dr Mbapila feels this is a failing as these traits are not considered until after a variety has been released. Reasons for non-uptake are then assessed. He showed a keen interest to pursue possibilities for redressing this problem with future releases. Dr Mbpila estimates that 25% of Tanzania's rice needs has to be met by imports.

Interviews with farmers

Ifakara district

In this district yields were reported to be very low this season. Due to the prevailing wet weather harvest was very slow, with many fields not yet cut. Interviews with farmers (Table 1) revealed the following general procedures for harvesting.

- Individual ripe stalks are selected for harvest.
- Men tend to use sickles and women use snail shells for cutting the stalks. (Fig 1)
- Cut stalks are heaped in small bundles and left on the field to dry for one to two days before threshing (Fig 2)
- Threshing is carried out by beating with sticks on "tarpaulins" (Fig 3). These are made from polypropylene sacks stitched together and are reported to cost 2800/- (£2.80) and last for 2-3 years.
- Threshed paddy is put straight into sacks and taken for storage – no further drying procedures.
- Sacks are stored in sacks in weatherproof stores for several months.
- Traders are not interested in variety but check each batch for milling quality by rubbing it in the hand to assess suitability for dehusking, and pay accordingly
- **All** paddy is warmed/dried before milling

Table 1. Interviews with farmers.

Name of farmer	Variety grown	Method of harvesting	Moisture content of rice in panicles % Mean (range)	Drying regime	Threshing	Storage	Comments
Capilima Salum	Supa India	Cutting only ripe panicles with sickle	19.8 (15.5 – 31.6)	After cutting the stalks are laid in small piles in field to be threshed later in the day	Beaten with sticks on tarpaulin. Put into sacks – no further drying	Dedicated weather-proof store. Stored until money is needed	
Antonia Kapolo	Supa India	Cutting ripe panicles with snail shell	27.2 (23.2 – 29.3)	This paddy being cut for home use – not yet ready for storage or sale. Will be parboiled	Beaten with sticks on tarpaulin	Normally stores sacks of paddy in house	Traders test for quality by rubbing with hands and pay accordingly
Fidelis Mtoliela	Kisegisi	Cutting individual stalks with sickle. Mother using snail shell. Considered to be at optimum condition for harvesting. Overdrying at this stage leads to excess breakage.	13.8 (12.5 – 16.3)	Put in small bundles in field – will leave for 2 days before threshing	Beaten on sticks on tarpaulin	No further drying before storage. Stores for 5 –6 months.	Traders not interested in varieties – just quality. Storage does not affect quality. Paddy needs to be "warmed" before milling
Asia Nyalenga	Supa India	Cutting individual stalks with snail shells. Thought might be harvesting a little early but concerned about leaving it in the field for too long because of breakage	14.8 (13.5 – 15.7)	Small bundles will be left in field for about 4 days before threshing	Beaten with sticks on tarpaulin. Supa is easy to thresh	Put into sacks and stored in a weather-proof store.	After storage paddy needs to be dried for 9 hours before milling.
Binti Liganga	Limota and Supa India	Had just finished cutting – over a two week period.	14.9 (13.3 – 15.7) Samples were taken from sacks ready to go into storage	Small bundles had been left in field for one week and then piled into a large heap.	Threshed by beating with sticks on tarpaulin	Put into sacks straight after threshing. Kept for several months	Storing does not affect quality.

Turiani district
Paddy in this district was not yet ready for harvest. Interviews with extension workers indicated that similar harvesting practices are carried out as described in Ifakara, the main difference was that threshing is achieved by holding the paddy stalks and hitting them against a piece of wood to dislodge the paddy from the panicle. Traders did not consider that either method of threshing had a detrimental effect on paddy quality.

Interviews with millers/traders

Five mills were visited in Morogoro and informal discussions were held with the staff regarding availability of paddy and milling practices. Most of the mills had been closed for the previous three months - this was considered to be normal "down time" during the period immediately prior to harvest. It had been anticipated that harvest would be well underway at the time of the visit, however, due to unseasonal weather in the previous weeks, harvest in some areas had not yet started and yields were expected to be poor.
All of the mills were milling some paddy (on average around ten bags a day) and expected to be working to capacity within three to four weeks as traders arrived with larger stocks of paddy. Drying was reported to be difficult due to cloudy skies and sporadic showers. Nevertheless each mill had several traders using the communal drying space, most reported that they had purchased their paddy two to three weeks previously from the Ifakara region.

Two questionnaires were designed and used for data collection:-
- individual mills eg type of mill, capacity etc.
- details of drying regimes and samples collected (Appendix 1)

Data from questionnaires

Mills
As harvest had only recently started, supplies of paddy coming to Morogoro for milling were limited. Consequently, milling capacity was not limited and many of the smaller mills including steel huller mills were not operational at the time of the visit. Eight operational single pass rubber roll mills were visited, the data obtained confirmed findings of the previous visit in that:
- Many new single pass rubber roll mills are being installed
- Spares (rubber rolls and screens) are available locally
- Most single pass mills have a daily capacity of 80-100 bags
- Supa India is the most common variety brought for milling
- Traders are the major users of the mills
- All mills provide a drying space and storage facilities. Some will defer milling charges until the milled rice is sold , thus providing free credit facilities.
- Peak milling time is June – December
- Some millers consider Supa India to be the best variety for milling – others expressed no preference

Drying process

The drying process was observed for fifteen batches of paddy at 8 different mills. Table 2 shows some of the data collected, which can be summarised as follows:

- All of the paddy was from this year's harvest – some had been brought directly from the field, some stored for up to three weeks
- The majority of paddy is brought to the mills by traders
- The amount of paddy brought for milling ranged from 1 – 35 bags (average 12)
- Paddy was spread thinly (approx 1cm) on tarpaulin or concrete to dry
- Large drying areas are required (on average 6 square metres per bag)
- Paddy is usually turned (by hand or foot) about three times during the drying period
- Drying time is very variable and is totally dependant on weather conditions
- Paddy brought for drying had an average moisture content of 16% (range 10 – 22%)
- Paddy was dried to an average 10% moisture (range 8.7 – 11.2%)
- Dried paddy was cooled before milling. Cooling times ranged from 1-24 hours. All traders considered that a cooling period was necessary to prevent breakage.

Table 2. Drying process data

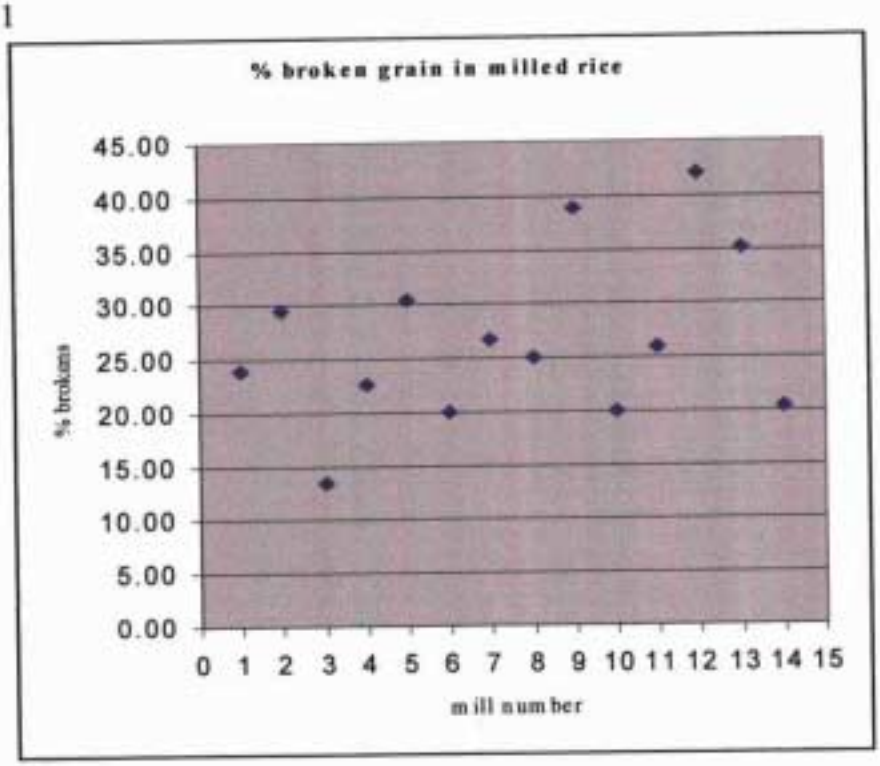
Owners initials	Moisture content before drying (%m/m)	Moisture content after drying (%m/m)	Drying time (Hours)	Ambient Temperature °C / weather conditions *	Amount of paddy brought for drying (bags)	Number of times turned	Depth of paddy (cm)	Drying area (sq m)	Drying surface	Cooling time (h)
SA	15.7	10.1	28	28-26 Cl	35	12	1.5	150	C T	15
MO	15.5	-			0			0		
V	13.5	-	24	28-26 Cl	2	9	1	16	T	12
ISA	16.7	10.3	8	30-28 S	11	3	1.5	90	C	1
GG	15.1	9.7	9	28 S	6	3	1	64	T	1
C	21.9	9.3	6.5	24-28 Cl	15	3	-	0	-	
J	16.7	8.9	24	24-30 Cl	6	3	1	16	C	0
BK	18.9	11.2	9	28-30 S	7	3	1	72	T	1
RM	16.4	9.9	15	24-30 C	26	6	1	0	T	24
DM	17.3	8.8	16	28-30 S	4	3	1	54	C	20
SS	12.2	-			0			0		
CL	17.7	9.5	24	28 Cl	23	4	-	153	C	16
HM	17.8	9.5	21	28-26 S	1	2	1	12	T	2
SR	18.1	11.2	7.5	-	8	3	-	72	-	1
FM	14.4	10.4	6	30-26 Cl	8	3	-	120	-	24
SM	10.4	8.8	4.3	32-30.5 S	17	3	1.5	81	T	16
CM	17.0	8.7	16	32-25 S	6	4	4	64	T	24
Mean	**16.2**	**10.0**			**12**			**74.15**		

Temperature recorded at start and end of drying – predominant weather conditions recorded: S= sun, Cl = Cloud

Drying surface: T = tarpaulin C= concrete floor

After drying and cooling the paddy was milled and a sample of the milled product was taken. Analysis showed that there was a large variation in the percentage of rice which was broken during milling (13 – 42%) (Fig 1)

Figure 1



Comparative milling trials

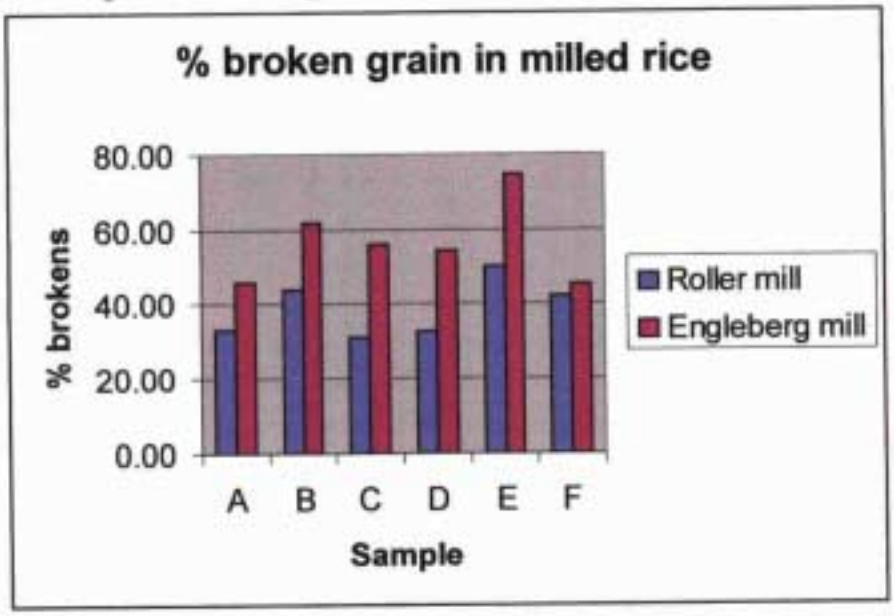
Nine samples of paddy were collected directly from mills, where possible the paddy was considered fit for milling. Milled rice from samples A-F was collected from the mill where the sample was sourced (all rubber roll mills). These sub-samples were then taken to Ifakara for comparative milling on a steel huller mill. Samples G – I were not considered fit for milling due to their high moisture content and were transported to Morogoro for further drying (Table 2).

Table 2. Details of samples collected in Morogoro region.

Sample	Where collected	Variety	Growing location	Moisture content at purchase (mean 5 samples)	Drying conditions
A	Teti mill. Morogoro	Supa India	Turiani	12.3%	
B	Nanak Mill Morogoro	Supa India	Ifakara	13.6%	
C	Mbarak Mill Morogoro	Supa India	Ifakara	13.1%	
D	Cosovo Mill Ifakara	Supa India	Lupilo	13.5%	Dried for 8 hours Kept in sacks for 2 hours to cool
E	Thomas's Mill Ifakara	Mixed Varieties	Mbingu	13.4%	Had been brought straight from field and then dried for 1 day. Not coled as sun was not too hot
F	Masepo Mill Ifakara	Mixture	Mngeta	12.6%	Dried for 3 hours - not cooled as sun not too hot
G	Cosovo mill Ifakara	Rangimbili	Ifakara		Dried for 1 hour – no cooling
H	Cosovo mill Ifakara	Rufiji	Ifakara		Dried for 1 hour no cooling
I		Kalinga Naula	Ifakara		5 hours on previous day then 2.5 hours – considered that it really needed a further 2 –3 h

Laboratory analysis of the samples showed that after milling the samples milled on the Engleberg mill had a higher percentage of broken grains (Fig 3)

Figure 3 Comparative milling trials in Ifakara



Each sample milled on a different roller mill but the same Engleberg mill.

Further samples ware purchased from Turiani: variety Super Zanzibar which had been dried for 5 hours under cloudy conditions and was not considered to be ready for milling. Line 88 was purchased directly from a shamba (farm) where it had been stored for three months. Best quality Supa India was also purchased for shipment to NRI, together with Line 88 for laboratory trials. The Supa India was purchased from a trader but was not considered to be sufficiently dry for milling.

All twelve samples (approximately 20-25kg each) were then shown to Mr Ahmed S Mng'ombe, a rice trader in Morogoro, he considered that, as they had been bagged for two days, all nine samples required further drying before they were milled. In his opinion, which was confirmed by other traders, it is important to warm/dry the samples immediately before milling, though after sun-drying, they are left in the shade to cool down before milling.

Mr Mng'ombe tested each sample by rubbing it in his hands as he would when purchasing paddy. Table 4 below shows his grading, the moisture content of the samples before drying and an estimation of the number of paddy grains showing visible mould spots.

Table 4. Paddy quality before drying

Sample	Visual grading	% paddy grains with visible mould spots on surface of husk	%moisture content before 1st drying	%moisture content before 2nd drying	% moisture content after drying
A Supa India	Good	10%	11.6	12.5	9.9%
B Supa India	Good	12%	12.9	13.4	9.5%
C Supa India	Very good	10%	12.5	13.7	10.0%
D Supa India	Best quality	10%	13.1	13.6	9.6%
E Mixture	Good	20%	13.1	13.5	9.5%
F Mixture	Very Good	10%	12.2	13.1	9.5%
G Rangimbili	Good	11%	13.7	14.1	9.8%
H Rufiji	Best quality	2%	14.8	14.8	10.2%
I Kailinga Naula	Not good –easily broken	4%	11.6	12.5	9.3%
Super India	Best quality			16.9	9.8%
Line 88	Good			15.3	9.9%
Super Zanzibar	Very Good	37%	13.8	14.1	9.8%

The samples were spread on tarpaulins to sun dry (Figure 4) and turned according to Mr Mng'ombe's recommendations. On the first day all samples were dried for 4 hours. The weather was overcast with little wind and an ambient temperature of 21°C.

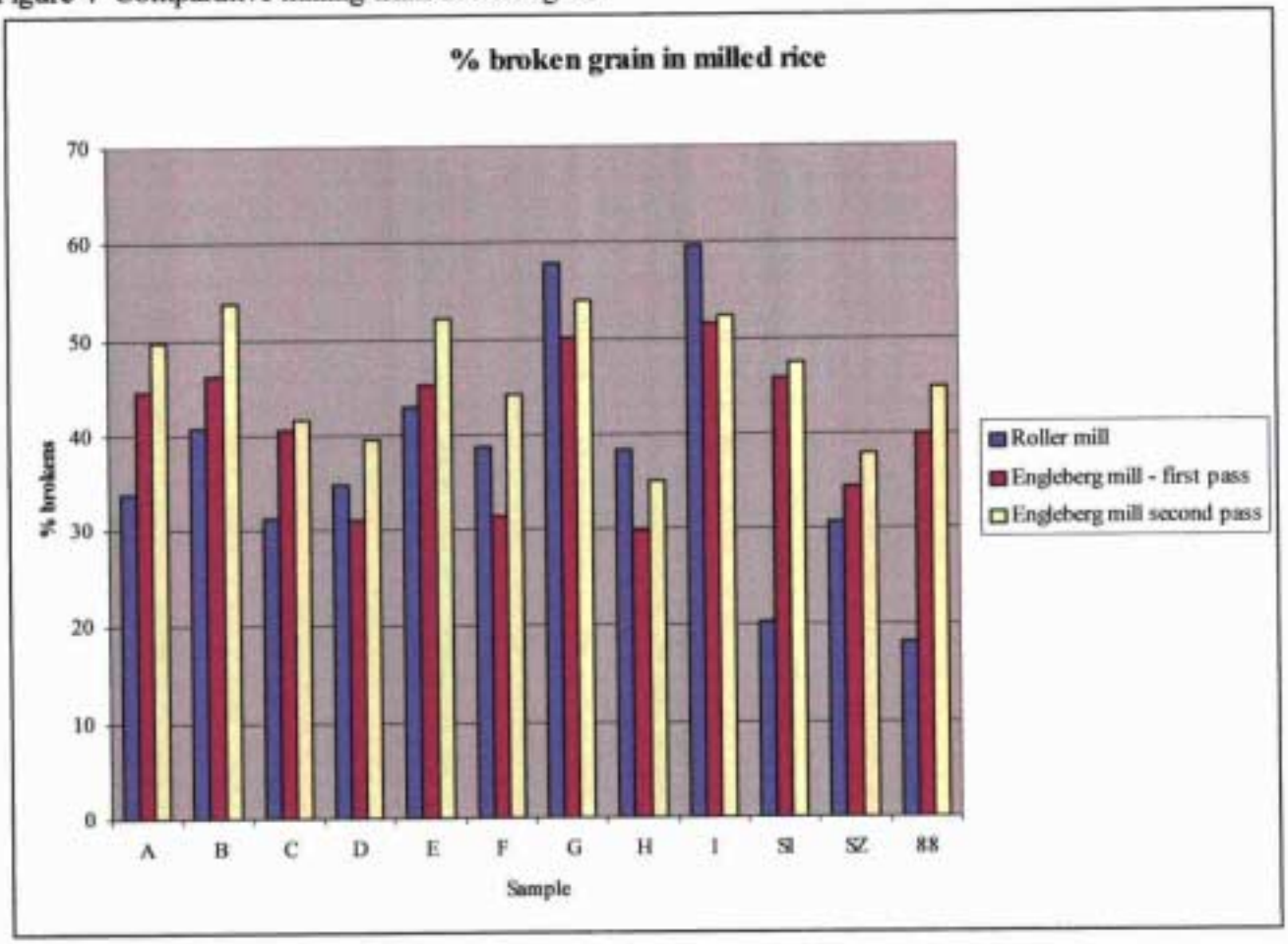
After the first day of drying the paddy was collected up into polypropylene sacks and stored overnight.
The following day the paddy samples were again spread on the tarpaulins and dried for a further 3.5 hours. Ambient temperature varied from 32-38°C, during the first two

hours the skies were clear and relative humidity was 23%. During this time the temperature on the surface of the paddy rose to 47°C. Cloud cover was variable for the remainder of the drying time. When Mr Mng'ombe considered the paddy to be dry it was collected up into the sacks and spread on the floor inside the mill to cool for approximately 30 minutes.

Half of the paddy was milled on an SP#50 single pass rubber roll mill. The remainder of the paddy was milled on a steel huller mill, the mill operator considered that the paddy needed to be put through the mill twice to achieve the correct milling quality. Milled rice samples were collected and taken to NRI for analysis.

As had been shown before there was a wide variation in the amount of brokens in the sample even though the same mills were used for all samples. Breakages in the roller milled samples ranged from 18 – 60%. In most, though not all, cases the Engleberg mill increased the amount of brokens in the sample, though there was less variation (range 38-54%). The second pass through the Engleberg mill increased breakage by between 1 and 10% (Figure 4)

Figure 4 Comparative milling trials in Morogoro



All samples milled on the same mills

Conclusions

In the Morogo region

- Paddy is harvested and stored at around 16% moisture
- Paddy is **always** dried/warmed before milling
- After sun drying the paddy has a moisture content of 10 – 11%
- There is wide variation in the amount of broken rice from both roller mills and Engleberg mills
- Throughput is a major consideration when traders decide on which mill to use

Rice in Sukumaland – Mwanza

Rainfed, lowland, bunded rice is important in the farming systems of Sukumaland. More than a third of Tanzania's rice production comes from this area. The area is semi-arid but farmers are skilled in using the bund system to conserve water from the wet season to produce the crop. This skill has turned a semi-arid environment into a rice-exporting area. Farmers in this area will quickly switch to rice production when it becomes more profitable in comparison to cotton and other crops. Farm sizes are decreasing in Tanzania due to increase in population and rice is popular since it produces high amounts of calories per unit area.

Cultivars used in Sukumaland are varied and include varieties from other parts of Tanzania as well as Malawi, Kenya and Zanzibar. Almost half the rice planted, though is the aromatic Super which originated from the "Surinam V-880" variety (IRRI, 1985). Super needs less water than other cultivars for its growth and can therefore withstand the lengthy dry spells associated with the Sukumaland area. Super also has a good taste and market price.

Important rice cultivars in Sukumaland in the 1990s

Cultivar	Tillering capacity	Water requirement	Other characteristics
Super	Low	Low	Good taste, early-maturing, good price
Rangi mbili	Low	Medium	Early maturing, withstands some drought
Pishauri	Low	Low	Early maturing, withstands some drought
Sindano	Low	Low	Less damage from birds
Faya	Medium	Medium	High production, good taste
Kahogo	Medium	Medium	Good taste, less bird damage
Tondogoso	High	High	High production, good for porridge
Lugata	High	High	Good porridge, heavy seeds

Source (Meertens, 1999)

Rice harvesting

Harvesting starts in April and continues to the end of July mainly due to the different maturity dates of the range of cultivars grown and the availability of labour. Delaying the harvest has an important effect on yield as the panicles shatter and some paddy is lost. Another important point is that late harvesting affects the rice milling properties, causing high grain breakage rates.

Milling survey

A total of 10 Engleberg mills and 5 rubber-roll mills were inspected at twelve milling sites within a 100 km radius of Mwanza city. Sites visited were Kisesa, Mwabuki, Nyambiti, Ngudu, Missungwi and Nyanguge. The most common paddy being processed was Supa, although Rangimbili, Mwiza, Lugata and mixed varieties were also found at the mills.

ID, Mill owner & location	Paddy owner	Type of mill on site	Paddy variety used in test run	Paddy drying regime	% H_2O of paddy	Milling charge	% broken rice	Comme
Mill A: Rosemary Kalapya, Kisesa,	Not applicable	• Engleberg • SB-30	No test run		Not applicable		Not applicable	Insuffici availabl
Mill B: Faraji Samwell, Kisesa	Clement Kilasa	SB-30	Rangimbili (bi-colour)	4 hours in sun + 1 hour cooled inside mill	10.7	120/- per debe	16.7	1 sampl
Mill C: Paulo Saulo, Kisesa	Not asked	• Engleberg • NZJ 10/85	**	Not asked	10.7 10.6	130/- per debe	Engleberg 57.3 Rubber roll 19.2	2 sampl (one fro
Mill D: Chilu Samwell, Mwabuki	Miss Igolo Ishilugala	Engleberg	Mwiza	4 hours in sun + 2 hours cooled inside mill	11.3	150/- per debe	50.6	1 sampl
Mill E: Mathias Michael, Nyambiti	Mrs Agnes John	Engleberg	Mixed	Not applicable - see note	13.5	150/- per debe	41.3	1 sampl Paddy o not inte drying p breakag concern wanted

								form to
Mill F: Vinod Patel, Ngudu	Ms Neema Tambi	Engleberg	Supa	Not applicable - see note	10.2	150/- per debe	22.0	1 sampl Paddy o not inte drying f breakag concern wanted form to
Mill G, Jackson Mwesa, Ngudu.	Ms Joyce Clemensi	Engleberg	Mixed	3 hours in sun + 30 minutes inside mill.	11.0	150/- per debe	22.4	1 sampl
Mill H: Marsalla Jackson, Missungwi	Deus Willy	Engleberg	Mixed	2 hours in sun + 30 minutes inside mill	H1=9.6 H2=10.2	100/- per debe	Mixed 58.0 Supa 42.4	2 sampl H1=mix H2=Sup
Mill I: Kiyenze James, Missungwi	Revocatus Bahati	Engleberg	Supa	3 hours in sun + 30 minutes inside mill.	10.3	10/- per kg	36.1	1 sampl

ID, Mill owner & location	Paddy owner	Type of mill on site	Paddy variety used in test run	Paddy drying regime	H_20 content	Milling charge	% whole rice	Comme
Mill J: Makoye Hangaya, Nyanguge	Ms Janet Nicholas	Engleberg	Lugata	6 hours in sun + 45 minutes inside mill	Supa=10.8 Lugata<9	200/- per 10kg debe	Supa 39.8 Lugata 22.8	2 sampl taken: Lugata : Supa wl was alsc milled ir Mill K a Mill L. Letters ' on Englene mill – cc have be built by
Mill K Owner unknown, Nyanguge	Budo	SB-30	Supa	6 hours in sun + 60 minutes inside mill	Supa=10.8 Lugata<9	150/- per debe	Supa 42.6 Lugata 33.4	
Mill L: Fidelis Kaloli, Nyaguge	Ms Janet Nicholas	SB-50	Lugata	6 hours in sun + 45 minutes inside mill	Supa=10.6 Lugata<9	200/- per debe	Supa 19.3 Lugata 24.8	1 sampl taken Mill ow also has Englebe but does

								use it – prefers l capacity SB-50.
Mill X: Shilumba Mageta, Missungwi	Ruben Nyerere	Engleberg	Supa	5 hours in sun + overnight inside mill	12.2	600/- per bag	38.4	1 sampl taken. Mill ow will also paddy fi villages, process sells rice traders. Also process maize.

Rice outturn (kg) from Mill J, Mill K, and Mill L – Input 9 kg paddy

Mill	rice recovered – Super	% broken grains	rice recovered - Lugata	% broken grains
Mill J - Engleberg	8	39.8	6.8	22.8
Mill K - SB-30	7	42.6	8	33.4
Mill L - SB-50	7	19.3	Larger batch processed – not weighed	24.8

Recovery rates from 9 kg batch of paddy using different mill types

Mill	Weight rice recovered from mill (kg) Super	% WHOLE rice grains recovered from 9 kg paddy	Weight rice recovered from mill (kg) Lugata	% WHOLE rice grains
Mill J - Engleberg	4.8	53%	5.2	58%
Mill K - SB-30	4.0	44%	5.3	59%
Mill L - SB-50	5.6	62%	Larger batch processed – not possible to weigh	Could not be calculated

Engleberg mills: % broken rice grains according to paddy variety

Mill ID	Supa	Mwiza	Lugata	Mixed
C				
D		50.6		
E				41.3
F	22.0			
G				22.4
H	42.4			58.0
I	36.1			
J	39.8		22.8	
X	38.4			

Conclusions –

In the Mwanza area the yield of broken rice kernels from Engleberg mill ranged from 22.0% to 42.4% for Supa variety (5 mills surveyed). The range of yield of % broken kernels from rubber-roll mills ranged from between 12.0% to 45.0%. The wide range encountered from both types of mill did not provide conclusive evidence that

Engleberg mills produced as good an outturn as rubber-roll mills. It was difficult to obtain accurate history of the pre-conditioning the paddy underwent prior to milling. Time constraints did not allow such experiments to be carried out in a scientific manner and reliance on anecdotal evidence of preconditioning had to be accepted. This led the researchers to carry out laboratory-based experiments using exact pre-milling conditions for paddy (using both Tanzanian and Ghanaian varieties obtained from rice traders in the respective countries. These experiments are reported elsewhere and confirmed the anecdotal reports on paddy conditioning obtained both in Tanzania and Ghana.

References

Meertens, H.C.C (1999). "Rice cultivation in the farming systems of Sukumaland, Tanzania". Royal Tropical Institute, The Netherlands. ISBN 90 6832 130 7 or ISBN 90 5808 092 7.

Source of samples – Morogoro region

Sample A
Teti mill
Supa India from Turiani
Milled on SP#10
Rubber rolls in reasonable condition, one fairly new, 1 50% worn
Husk removed very cleanly, no visible kernel.
4 samples taken - paddy, brown rice, milled rice and bran.
20kg purchased @8000.
Paddy m/c (kett mean 5) 12.3%

Sample B
Nanak mill
SP#50
Supa India from Ifakara
Mill only one week old rubber rolls in very good condition
Husk removed very cleanly, no visible kernel.
4 samples taken - paddy, brown rice, milled rice and bran.
20kg purchased @6500.
Paddy m/c (Kett mean 5) 13.6%

Sample C
Mbarak mill
SP#50
Supa India from Ifakara
Husk removed very cleanly, no visible kernel.
3 samples taken - paddy, brown rice, milled rice Rubber rolls looked new ~ 1cm
20kg purchased @6500.
Paddy m/c (Kett mean 5) 13.1%

28 June

Mills
Dismasi Mpureuka
Chinese roller mill
Bouught last August from DSM price 1.5 million
Rubber rolls last for about 300bags (2 weeks high season - 2months low season)
Screens last about 14 days
Spares from DSM
charge 100/- for a bag of 7 tins
Mostly farmers

Variety unimpotant. Post harvest treatment crucial to quality. Must not be allowed to get mouldy or overdry. Then needs warming for 5 hours and then cooling to avoid breakage.

Before this machine had a steel huller from Mangula - thought it underpolished and broke grain

Samples collected
Sample D
Cosovo mill
Supa India
SP#50
4 samples taken
M/c of paddy 13.5% (mean 5 readings)
Bought from Lupilo in Mlanga district (across river)
Had been dried for 8 hours and put into sacks for one hour's cooling
Rolls in good condition
4 samples taken

Sample E
Thomas's mill (new this year)(next to Dereks)
Milled specially for us, very slowly only one bucket
New rubber rolls SP#30
Mixed varieties Ranimbili, Supa India, Alpha,Rangi,Mwanza
Bought from Mbingu (across river)
Straight from field. Warmed for 1 day,not cooled because sun not too hot so quality not affected
m/c of paddy 13.4% (mean 5)

Sample F
Masepo mill
SP30 rolls in very good condition
Mixture of Supa India,Alpha and Rangi from Mngeta
Dried for 3 hours only cooled for half an hour because not sunny
Bought straight from the Shamba
m/c of paddy 12.6% mean of 5

30 th June

Took samples A-F to mill. Steel huller type. Owner believes milling quality is as good as rubber roll mills

Sample G
Rangimbili from Cosovo mill. Had only been dried for 1 hour. No cooling

Sample H
Rufiji from Cosovo.As above

Sample I
Kalinga Naula. Had been dried for 5 hours cloudy day on previous day and then 2 hours in the sun on concrete. Considered that it needs a further 2 hours drying.

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