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ARID AND RANGE LANDS RESEARCH INSTITUTE

**Report on Focused Group Discussions (FGD) on farmer knowledge
and perception on the ecotypes of *Cenchrus ciliaris***



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Preamble

Three focused group discussions (FGDs) were held with farmers to establish their knowledge and perception on ecotypes of *Cenchrus ciliaris*. The grass species has been promoted widely for reseeding Arid and Semi-Arid lands (ASALs) in Kenya. However, there are no seeds for the species in the commercial and wild collections are being exchanged in an informal market. The possibility of existence of ecotypes given the varied environments of collection poses a challenge in successful establishment in recipient areas. Thus the need to collect and evaluate the different ecotypes for possible variation was identified. Characterization studies using quantitative and qualitative data on the ecotypes is on-going. However, there is need to complement the information with farmer knowledge that could contribute to the final selection outcome. Thus three groups with each targeting eight farmers of mixed gender were used in the study. Two of the groups were made up of agro-pastoral farmers while one had pastoral farmers. A list of previously identified questions was used to guide the discussion. Samples of ecotypes were also availed to ensure the farmers were talking about the species of interest.

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GROUP DISCUSSIONS

GROUP I: PASTORAL FARMERS FGD HELD AT ILKELUNYETI

DAY 1, 28th October, 2014

The meeting started with a word of prayer by Esther Sorara, one of the farmers. This was followed by self introduction. A brief explanation on the objective of the meeting was given by KALRO staff and assisted by James Saetua (community mobilizer), who also assisted with translation in Maasai language.

Identification of Ecotypes: The identified ecotypes are listed in the table below

Table 1: List of ecotypes identified by a group of pastoral farmers from Mashuru sub-county

1. <i>Entomonyua</i> (robust green)	2. <i>Bluish type</i>	3. <i>Enkamba</i> (Small purple flowered)
<ul style="list-style-type: none"> ✓ Not dry easily especially stem. Still wet even at the pick of the dry season ✓ Takes long to disappear ✓ Found in valleys, near water collections, along rivers (specific areas- KARI, chulu, Ngulia) ✓ Provides good habitat for tse tse ✓ Can grow upto 6 ft with good rains or along riverine areas <p>Remarks: Women- thought it was <i>ole robat</i> (<i>pennisetum</i>) which is commonly found in red soils</p>	<ul style="list-style-type: none"> ✓ Only found during rainy season especially on riverbanks ✓ Rare - Not very common ✓ Easily disappears especially with reduction in rains 	<ul style="list-style-type: none"> ✓ Very small, Prostrate, Roots not so deep ✓ Inflorescence purplish and about 1/3 of the <i>entomonyua</i> and is ✓ Tastes salty ✓ Liked by animals ✓ Found in black cotton soils (<i>Engusero</i>) ✓ Regrowth with start of rains is very fast. Regrows faster than the robust green ✓ Not found in dry season because over utilized by then

Preference by animal: All ecotypes are utilized but *enkamba* preferred thus finished as soon as accessed. *Enkamba* more liked because of salty taste. Even when dry the taste is still there

Parts preference

Entomonyua: flowers and leaves selected and stem left

Enkamba: all parts utilized because it is small and roots not strongly held on the grounds, thus easily uprooted

Bluish: utilized too but since rare and not easily accessed/ found it is finished as soon as accessed

Women: they don't harvest it for the calves. Instead they look for *rikaru* because it is sugary, soft (not hard stem), fattens the calves and higher intake. When given *C. ciliaris*, some parts left (not 100%)

intake) but all utilized in *Rikaru*. But *enkamba* preferred than *rikaru* during wet season because it tastes salty.

Preference changes with change in season or growth stage

Entomonyua: not liked during the wet season but moisture content reduce (Yellowing of leaves) it is eaten. Because other grasses are available that taste better. Also it has a bitter taste to the animal and a smells too. Stem is never utilized to below about 20cm unless during extreme drought.

Enkamba: animals like it whatever the season (wet or dry) or growth stage. The y rush to it even if it is at advanced growth stage

Effect on animal performance

Entomoyua: Causes ECF/nagana diseases – during wet seasons there is water (foam-like) collection on the leaf node (ligule; mate ya nyoka) which acts as breeding grounds for tse tse fly. Thus the animals get sick when they graze on the grass. The symptoms include: just after feeding, dots appear on the skin with fur flattened, the site seem wet from afar, and sometimes it loses hair. Later, swollen lymph nodes, teary eyes, drying around the nose and a cough. The problem common during heavy rains

Positive effect – SEM much because it is rare thus amounts consumed insignificant

Enkamba: more milk, fattens

Other benefits

Entomonyua is good in erosion control. Because not easily disappear and roots strongly held in the soil therefore not easily washed off. There is no signs of erosion where found. Also used to control erosion in croplands by planting on the terraces.

Enkamba: other benefits were not so clear because of present during dry season and roots not deep

Disadvantages:

Entomonyua:

- ✓ Good tse tse habitat
- ✓ Difficult to eradicate if it grows in cropland

Disappearance with time

Enkamba composition has been reduced a lot especially around Ilkelunyeti area. Currently found only during wet seasons. The species used dominate the area from the shopping centre towards Isara. (Same to *Rikaru* which used to cover a large area – was the dominant species from Masimba area to the shopping centre). However, *Entomonyua* has not changed because it is still found in the same habitats as before

Ease of establishment: Not able answer because they have not participated in grass reseeding activities.

Selection of the ecotypes for promotion

Enkamba was selected as the ecotype of choice by all participants because it is small with all parts liked by animals irrespective of the season. It has all the qualities of a good grass as per their criteria



Plate 1: Photos of on-going discussions at Il Kelunyeti in Mashuru Sub-county

Criteria for selection of a good grass

It was difficult to agree on criteria because everybody claimed to have experience in selecting because of long term grazing. But they seemed gauge mainly by the animal preference and/or performance such as increased milk yield, fattening of animals e.g. Rikaru increases milk yield and fattens and is not season based (Any time when utilized).

There were explanations that seemed to divide the selection based on seasons. For instance:
Dry season: a good grass does not fill the animal stomach. The animal should remain light (fit) and thus not tire easily. This are found around chyulu hills, KARI. But, the ones around Emali and Poka areas are not good at such times because they fill up the animal quickly. However, they are good during the wet seasons because they fill up the stomach fast and thus quickly fattens the animal

However, eventually 3 factors were agreed upon for good grass (or preferred grass because they insisted that there was no bad grass). These criteria are:

- ✓ Thin stems
- ✓ Short grass
- ✓ Prostrate

As much as the opposite applied for bad grass, they agreed that those criteria applied for good wet season grass

Vote of thanks by Daniel Mpoika

He thanked the participants and especially KALRO staff. He said it was also a learning lesson for him since he came across things that were new to him, especially from his colleagues. He wished all well and led in the closing Prayers.

GROUP II: AGRO- PASTORAL FGD HELD AT MULILI, MAKINDU

DAY 2, 29th October, 2014

The meeting was held at Mulili location chief’s office with selected eight (8) farmers from Makindu and Kibwezi sub-counties. The group selection excluded any farmer who was perceived to be influential to other farmers in decision making. These are common interest group leaders or contact farmers in farmer managed research activities. The group consisted of 3 men and 5 ladies.

Identification of Ecotypes: The identified ecotypes are listed in the table below

Table 2: List of ecotypes identified by a group of agro-pastoral farmers from Makindu and Kibwezi sub-counties

1. <i>Black head type</i>	2. <i>Bluish type</i>	3. <i>Green, robust</i>	4. <i>Small, purple flowers</i>
<ul style="list-style-type: none"> ✓ Very leafy with deep green leaves ✓ Leaf shape like majority of big green ✓ Tufted/upright ✓ Found along Makindu river ✓ Thought to have been introduced by an NGO <p>Remarks: It was identified by only 1 farmer (Mr. Nicholas K. Jimmy) from Mulili in Makindu. He has seen it but not grazed. Therefore, discussions on this ecotype were closed at this level.</p>	<ul style="list-style-type: none"> ✓ Have milky colored leaves ✓ Very tall, many tillers and wide tussock (Robust) and upright ✓ Grows well in wetter areas and riverbanks (doing well in croplands along the terraces but not common in the grazing areas) <p>Remarks: Mentioned by 3. They said it was within <i>C. ciliaris</i> seeds given by KALRO. These were Franscisca Mueni and Christine safari (Muuni area) and Richard Mulwa from Yimwa, all in Makindu area</p>	<ul style="list-style-type: none"> ✓ Tall to about 130cm ✓ Normally looking healthy (big green leaves) ✓ Can only grow in places with water e.g riverine areas where it is common <p>Remarks: Identified by all</p>	<ul style="list-style-type: none"> ✓ Very small, about 60cm tall, Prostrate, ✓ Inflorescence is purplish ✓ Liked by animals including goats, everything eaten but not uprooted though roots not so deep ✓ forms a good ground cover (bushy), grazed to the ground and seems to be finished but resprouts/seedlings appear immediately after rains ✓ very good in spreading because it is a high seeder- ✓ Common everywhere – also because adapted to low moisture

Preference by animal: All utilized equally where they appear together

Parts preference and changes with change in season or growth stage

Robust green: flowers and leaves selected and stem left

Small purple flowered: all parts utilized because stems not tough and preference does not change with growth stage or season

Bluish: leaves and flowers selected for those that had observed (few participants). But one of the ladies insisted that the flowers are not utilized because they prick the animals. During wet seasons, it has high herbage therefore animal becomes full faster. But low intake after maturity.

Effect on animal performance: Not fed them separately therefore may not be able to tell benefits of either

Other benefits

- ✓ All are good in erosion control. But purple flowered better because it is prostrate giving full ground cover
- ✓ The purple flowered type- the roots are pound and boiled or directly chewed for cough in children
- ✓ Blue makes good brooms
- ✓ Robust Green is good for thatching
- ✓ Liked by bees

Disadvantages: the purple flowered is a problem in cropland- spreads easily and difficult to eradicate – may have to relocate the crop

Disappearance with time: The robust green is not reducing since it is still found in the same places as before. But the purple flowered is reducing because it is not obviously seen as before. It is also becoming smaller in size

Ease of establishment: Not able answer because they have not participated in grass reseeding activities.

Which one preferred for promotion: All except two participants selected the purple type. The two preferred the blue type because they target cut and carry system of utilization

Table 3: Ecotype selected for promotion and reasons for the nomination

Purple flowered (6 participants)	Bluish type (2 participants)
- liked by animals -Adapted to low soil moisture thus good for our area -Spreads easily through both seed and rhizomes -Resprouts very fast with onset rains- including very low amounts -Forms a good ground cover	-High herbage yield and therefore animal gets enough easily, and more milk expected, -Spreads easily though rhizomes -Easy to harvest seeds

Criteria for selection of a good grass

The group identified 5 criteria for a good grass. They then ranked them using pairwise ranking to identify the 3 most important as shown below:

Table 4: Pairwise ranking results for selection criteria as identified by group 2

CRITERIA	1	2	3	4	5	6	RANK
1. Not stemmy with big sized leaves	-	x	3	4	5	6	5
2. High seed germination capacity		-	x	x	x	x	X
3. Resistant to drought (small leaves and size)		X	-	3	5	6	3
4. Big stems (robust)		X		-	5	6	4
5. Leafy (Many leaves)		X			-	6	2
6. High seed yield (a lot of seed on inflorescence)		X				-	1
COUNT	0	X	2	1	3	4	

High seed yield ranked highly because the farmers insisted that their main target is the business value in dealing with grass seeds. That is the reason germination capacity had been listed in the criteria. But, was removed after agreeing that it could not be applied in the field except if lab results are included in the target selection. The others highly ranked were small sized and leafy type which is in line with their selection of the small purple flowered type among their ecotypes. They indicated that a tall, bushy grass is not well grazed and animals would keep moving in the field instead of keen grazing. However, those that targeted cut and carry system preferred a robust type grass since they believe with chopping intake would increase.

Criteria for selection of a bad grass

This listed criteria include:

1. Hairy
2. Thick stem
3. Spaced or few leaves
4. Low amount of seed – to be done through evaluation of seed amounts on the flower heads and estimated seeding heads.

GROUP III: AGRO- PASTORAL FGD HELD AT MULILI, MAKINDU

DAY 3, 30th October, 2014:

This group was composed of actively involved farmers in natural pasture activities or group leaders. It was assumed that being leaders in various groups, they would be able to influence decisions by other farmers. It consisted of 7 farmers (2 ladies and 5 men), since one of the invitees could not make it.

Identification of Ecotypes: The identified ecotypes are listed in the table below

Table 5: List of ecotypes identified by a group of agro-pastoral farmers from Makindu and Kibwezi sub-counties

1. <i>Green, purple awns</i>	2. <i>Green, green awns</i>	3. <i>Bluish type</i>	4. <i>Small, purple flowers</i>
<ul style="list-style-type: none"> ✓ Tall (150cm), less leaves and thinner than No. 2 ✓ Soft leaves, liked by animals ✓ Does not easily disappear ✓ Lower herbage than No.2 	<ul style="list-style-type: none"> ✓ Tall about 150cm, wide leaves, ✓ Stems tough when mature ✓ Does not easily disappear ✓ High herbage yield -Liked by animals <p>Remarks: both No. 1 and 2 did not differ in other discussions and will henceforth be recorded as the robust green</p>	<ul style="list-style-type: none"> ✓ Very tall – about 200cm depending on soil & moisture ✓ Stem tough when mature ✓ Does not easily disappear ✓ Rough leaves ✓ Prefers black cotton soil ✓ Head pure white when dry ✓ Easy to strip whole head as a bunch (all spikelets attached) 	<ul style="list-style-type: none"> ✓ Small about 100cm, prostrate, shallow roots ✓ Short, soft liked by animals ✓ Disappears with extreme drought or if overutilized due to shallow roots ✓ High disease incidence ✓ Early seeder and drops seeds as the dry season approach ✓ Seeds spread far and germinate easily thus higher species composition

Preference, preferred part and change with season

Small purple flowered is preferred with all parts being eaten. It is utilized even when mature because of soft leaves and stems. Its height makes it preferred since animals do not like tall forage.

Bluish type is not preferred but intake increases when chopped and mixed with molasses. The ecotype is not selected when other grasses are available including annuals.

Robust green is preferred only before seed maturity stems are left. Its stem does not loose water quickly and resprout when grazed or clipped even during the dry season. This was observed in some environments, especially black cotton soils. Mr. Ngaya clipped his on 15th October 2014 and now (30th) already resprouting yet there are no rains. Those with red soils indicated that it was not the case.

Other uses

1. All reduce soil erosion. The robust green has strong rooting system thus nicknamed “Kiemobunie” since it is stronger than someone well fed. This means that it is not easily uprooted. The purple flowered type has high ground cover and easy to establish
2. Thatching for the taller ecotypes
3. Taller also used in tying other animal feed during harvesting or when preparing for preservation. They are good for hay baling
4. Making nest for hens to lay eggs
5. Robust green is liked by bees. It produces gum like substance that attracts bees

Disadvantages

1. Robust green is liked by termites probably the roots have high moisture content. Liked by snakes too
2. Small purple flowered is a weed in croplands – but all agreed that it is not a significant problem if ploughing or weeding is not done when it is raining.

Disappearance: Small and the robust green is disappearing due to overgrazing, land fragmentation and frequent droughts

Ease of establishment

Purple flowered easy to spread and establish even with little rainfall. It also resprouts faster with little rainfall

The robust green does not spread easily from the place of establishment.

Selection of the ecotypes

Table 6: Ecotype selected for promotion and reasons for the nomination

Purple flowered (4 participants)	Robust green (3 participants)
<ul style="list-style-type: none"> - spreads and resprouts easily with little rains - drops seeds easily - liked by animals - reduce soil erosion better by forming a good ground cover 	<ul style="list-style-type: none"> -High herbage yield - Resprouts after use even during dry season - Easy to make hay - High in other benefits listed above e.g. thatching - persistent with grazing or droughts

Criteria for selection of a good grass selection

1. Many leaves
2. Soft stems
3. High seed yield (based on head size)
4. Many tillers
5. Taller

Table 7: Pairwise ranking results for selection criteria as identified by group 3

	1	2	3	4	5	RANK
1. Many leaves	-	1	1	1	1	1
2. Soft stems		-	2	2	2	2
3. High seed yield			-	4	5	5
4. Many tillers				-	4	3
5. Taller					-	4
COUNT	4	3	0	2	1	

Therefore, 3 most important criteria are many leaves, soft stems and many tillers

Criteria for bad grass

1. Rough leaves (hairy or rough to touch)
2. Hard stems (tough)
3. Low biomass (observed herbage yield)

CONCLUSION

The farmers were aware of existence of ecotypes. There was similarities in 3 of the ecotypes identified. These were the small-purple flowered, bluish type and robust green. However, group 3 were able to identify 2 types from robust green, i.e. the purple head (due to purple awns) and pure green head with no tint of purple. All the mentioned ecotypes have been observed among the collection at KALRO- Kiboko centre.

The majority of the farmers in each group selected the smaller type due to its soft stems and leaves as well as being short thus preferred by the animals. However, those that targeted harvesting for baling, preferred the robust ones. Thus the mode of utilization determines the ecotypes to select, which is recommended in planning pasture production.

The criteria for a good grass were relatively similar. Robust related traits were not preferred especially height due to poor grazing habits by animals and thick stems due to associated toughness with maturity. The pastoral group (group 1) based their criteria development with seasons. They had special reasons for dry season preferred grass. These was to allow for fitness in the animals and ease movement.

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List of participants

Table 8: List of Participants* from the three meetings held at Il Kelunyeti (Mashuru) and twice at Mulili chief's on 28th to 30th, Oct 2014

Site	Name	ID. No.	Tel. No.
Ilkelunyeti (Pastoralist, Mashuru)	William Letore	5364120	713384557
	Richard Lekeine	12950519	739833817
	Tinyikaa Makoi	1357002	738259284
	Charity Kipopoo	21822056	731717240
	Esther Sorara	12950819	734326773
	Koyie Leikari	1357464	706960196
	Tekero Ole Tumaka	1357418	736718395
	Daniel Mpoika	1356914	727274226
	James Saetua (community mobilizer)	22425181	723363525
Mulili, Makindu	Nicholus K. Jimmy		733762568
	John Bosco Mutuku		712603264
	Richard Kyenga Mulwa		710172025
	Francisca Mueni		712603264
	Rose Gathoni Musyoka		725770701
	Jane Vaati Maurice		710396619
	Francisca Mutuku		723505356
	Christine Safari Kalinyi		712318585
	Washington T. Chege (ext. off., Makindu)	354349	722539229
	Douglass Kisee (Ass. Chief, Mulili)		726904418
Mulili, Makindu Agro- Pastoral farmers (key informant Group)	Hillary M. Kimeu	2992420	714338649
	Willy G. Ngulo	1496650	731278162
	Julius M. Masia	1497442	726129878
	Florence N. Kikuvi	6033293	725889883
	Agnes N. Ndavi	5892330	723300916
	Samwel K. Maithya	1496921	710619380
	Jeremiah Ngaya		725896914
Elijah C. Memia (ext. off., Makindu)	200903876	723752876	

*the discussions were moderated by Kirwa EC and records taken by Ngétich RK both from KALRO