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Participatory Evaluation and Selection of Lowland Sorghum (*Sorghum bicolor* L. Moench) Varieties: The Case of Kamashi Zone, Western Ethiopia

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Abstract: Farmers' participation in varietal selection process is crucial to get the right feedbacks of varieties performance in the field and to promote and popularize the appropriate technology for better adoption and dissemination rate. So fourteen lowland sorghum varieties collected from Melkassa and Sirinka agricultural research centers along with local varieties collected from the study area were evaluated in randomized complete block design (RCBD) with three replications using farmers' participatory evaluation method in rain fed condition during 2013 main cropping season at Kamashi district in western part of Ethiopia. The objectives of this study were; to evaluate and select the best performing lowland sorghum variety(s); to identify farmers' preference and selection criteria of lowland sorghum in the study areas. Data were collected on phenological, growth, yield and yield components of sorghum crop. Farmers' set; grain yield, earliness, bird-damage resistance and tillering capacity as selection criteria at maturity stage of the crop. Analysis of variance (ANOVA) indicated the existence of highly significant differences ($p<0.01$) among the tested varieties for all the measured agronomic traits except number of effective tillers which was significant at 0.05 probability level. Based on observed results in the field, varieties Teshale, ESH-2 and Abshire were the earliest whereas Adukara and local check were the latest for maturity. Likewise, the highest mean grain yield was obtained from Adukara (4650 kg/ha), Melkam (4166 kg/ha) and Girana (3950 kg/ha) varieties. Farmers' evaluation using average performance of both direct matrix and pair wise ranking methods showed that Melkam, Adukara, Girana and Seredo were the most preferred varieties. Thus, the varieties Adukara, Melkam and Girana which were chosen from performance evaluation on the basis of measured traits were also acceptable and coincide with results of farmers' evaluation at maturity stage of the crop. Therefore, based on the results of this study and previous research finding from study area Adukara, Melkam and Girana are recommended for further demonstrated on farmers' fields.

Key words: Direct matrix · Lowland · Pair-wise ranking · Participatory · Selection criteria · Sorghum

INTRODUCTION

Sorghum is the fifth leading cereal grain worldwide after wheat, rice, maize and barley (FAO, 2008). It is a staple food for millions of the poorest and most food insecure people in the Semi-Arid Tropics (SAT) of Africa and Asia. Ethiopia is the third largest sorghum producer in Africa next to Nigeria and the Sudan [1]. The crop ranks third in area of cultivation and in total production among cereals next to teff and maize. The current sorghum production in Ethiopia is estimated to be 3.60 million tons on an area of 1.71 million hectares of land giving the national average grain yield of 2.11 tons per hectare [2]. It is the major crop in drought stressed lowland areas that cover 66% of the total arable land in the country. Sorghum is an important food crop in Ethiopia where it is widely grown in the highlands, lowlands and semi-arid regions of in Ethiopia [3]; especially in moisture stressed parts where other crops can least survive.

Benishangul-Gumuz Region (BGR) which is found in western part of Ethiopia is one of the dominant sorghum producing areas in Ethiopia where the crop is used as staple food for majority of the people. Among grain crops, cereals cover over 77% of the land cultivated by crops

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(cereals, pulses and oil crops) the major cereals being sorghum, millet and maize. Out of the area cultivated to grains, sorghum, maize and finger millet have a share of 27, 20 and 12% of the area and 30, 33 and 8% of the regional grain production, respectively. The area covered, the total production and the average grain yield of sorghum was estimated to be 65, 933 ha, 130, 995 tons and 1.99 tons ha^{-1}, respectively [2]. Therefore, sorghum is the most dominant crop grown in the region as staple food. Despite its economic importance, the productivity of the crop is very low which is below the national average productivity. Over the years, a number of late, medium and early-maturing sorghum varieties have been evaluated and released by federal and regional research centers for different agro-ecologies of the country. However, those varieties are not being adopted by the farmers in a satisfactory rate, probably due to poor farmers' participation during selection process (on-station), inadequate knowledge of the farmers about the varieties, lack of improved variety(s) that adapt the specific environments and inadequate supply of seed of the varieties to satisfy farmers' needs. In line with this fact [4], indicated improved sorghum varieties had not been well assimilated in Ethiopia due to the loose research extension-farmer linkage and farmers in many places do not know the improved varieties at all. On the other hand, sorghum production in Ethiopia is predominantly based on varieties developed by farmers thus; the share of improved varieties is very low [5]. Thus it is important to participate farmers during variety development or/ and cultivar (s) selection based on its (their) positive traits associated to farmers benefit in their socio-cultural and micro-climate [6].

Farmers' participation in varietal development and selection can promote adoption of released cultivars. The approach of participatory varietal selection in Ethiopia has been tested on many crops including common beans [7], sorghum [8], maize [9], teff [10], barley [11] and wheat [12]. However, participatory varietal selection has not been done on nationally released lowland sorghum varieties in the Benishangul Gumuz region in general and in Kamashi district in particular. Hence, it was mandatory to evaluate the performance of lowland sorghum varieties under participatory approach of direct matrix and pairwise ranking methods to enhance sorghum production and productivity thereby contributes to attain food security and reduce poverty. Therefore, the objectives of this experiment were to evaluate and identify the best lowland sorghum variety(s) that adapt the specific study area and to identify farmers' preference and selection criteria of lowland sorghum varieties in the study area.

MATERIALS AND METHODS

Description of Experimental Area: The experiment was conducted during the main cropping season of year 2013 at Kamashi district which is found at 560 km to the west of Addis Ababa and 246 km to the South east of Assosa town. It is one of the major sorghum growing areas of Kamashi Zone in Benishangul-Gumuz Regional State (BGRS) of Ethiopia.Kamashi district has an altitude of 1350 m.a.s.l and receives a mean annual rainfall of 1486 mm, with mean minimum and maximum temperature of 17.51°C and 29.12°C, respectively (Appendix Table 2). The dominant crops grown within the district are sorghum, maize, finger millet, sesame and root crops. Nitosol is the major soil type followed by some type of Orthic Acrisols [15].

Description of Varieties Tested: A total of 14 sorghum genotypes, including 11 lowland (released between the year 1976 and 2009 from MARC and SRARC), Adukara, a variety in a pipe line to be released from AsARC, a local check collected from Kamashi district and, Rufe, a local variety from Melkassa area were evaluated for their performance.

Experimental Design, Procedure and Field Management: The experiment was laid out in randomized complete-block design (RCBD) with three replications each. The plot size was 5 x 3m (15 m^2). During planting, the seeds were manually drilled @ 8 kg ha^{-1} into five meters long four row plot spaced 0.75 m apart. At approximately 21 days after planting the seedlings were thinned to 0.20 m distance between plants. Nitrogen and phosphorus fertilizer were applied in the form of urea (46% N) and DAP (18% N and 46% P_2O_5) @ 50 kg ha^{-1} urea and 100 kg ha^{-1} of DAP respectively. DAP fertilizer was applied at the time of planting (as basal application), whereas urea was applied in the form of split application, half of it together with DAP and the rest as top dressing before heading at knee stage of the crop. Hand weeding was practiced as frequently as needed.

Data Collection: Data were collected in both plant and plot basis. For data collection on a plant basis ten plants were taken randomly from the two middle rows of each

plot and then pre- tagged. Days to flowering was recorded as the number of days from the date of emergency to the time when 50% of the plants in a plot produced their first flower. Days to physiological maturity was also recorded as the number of days from the date of emergency to the time when 95% of the plants in a plot reached maturity (formation of black layer on kernels), plant height (cm) which was recorded by measuring the height of 10 pre-tagged plants from the base of the plant (soil surface) to the tip of the head and above ground biomass (kg ha^{-1}) which was recorded using spring balance from each harvestable plot after it has been well dried by sun. The above ground biomass datum needs measuring frequently until the current weight measured become equal with the previously measured weight and finally converted in to kilogram per hectare.

Data were collected on head number of effective tillers per plot (no.), grain yield (kg ha^{-1}) and thousand kernel weight (g) and harvest index (%). Grain yield was determined by harvesting all plants from the central two rows of each plot. Grains were weighed with a sensitive balance and adjusted to 12% moisture content using a grain-moisture tester. Thousand kernels were counted from a bulk of threshed grain of each plot; their moisture was adjusted and weighed to get thousand kernels weight.

Procedures of Farmers' Evaluation of Lowland Sorghum Varieties: The lowland sorghum varieties were evaluated using farmers' selection criteria. A total of twenty farmers of both sexes (male = 13, female = 7) participated in the study. First, a single focus group discussion (FGD) was held to identify challenges/constraints of sorghum production and productivity in the study district then the listed problems were prioritized and farmers set the solutions for pre-mentioned problems. Finally, evaluation was carried out at maturity stage of the crop. Farmers were allowed to set their own selection criteria at this stage and then both male and female participants prioritized and jointly agreed on four characters (grain yield, bird damage resistance, earliness and tillering ability). All of them were tabulated in a matrix scoring table and each selection criterion was compared with another in a pair-wise fashion. The rank assignments were determined from the number of times each selection criterion was preferred by the group. A direct matrix table was prepared by putting the varieties listed in the row and characteristics preferred by farmers in the column. Scores were given to each variety based on the selection criteria (5 = very good, 4 = good, 3 = average, 2 = poor and 1 = very poor). During direct matrix ranking farmers have given rating of importance (a relative weight) of a selection criterion ranked from 1 to 3 (3 = very important, 2 = important and 1 = less important) and rating of performance of a variety for each traits of interest (selection criteria) was given based on their level of importance on the basis of common agreement of evaluators'. The score of each variety was multiplied by the relative weight of a given character to get the final result and then added with the results of other characters to determine the total score of a given variety. Scoring and ranking were done on consensus and differences were resolved by discussion as indicated by [13].

Statistical Data Analysis: The data were analyzed using PROC ANOVA in SAS software version 9.00 (SAS, 2002) with treatment and replications as the class variables and the response variables were the traits on which data were collected. Mean separation was carried out using Duncan's Multiple Range Test (DMRT) at 0.05 probability level.

RESULTS AND DISCUSSION

Performance Evaluation of Lowland Sorghum Varieties: The analysis of variance (ANOVA) presented in Table 1 indicated that there was highly significant ($P<0.01$) differences among the tested sorghum varieties for all characters measured except number of effective tillers, which was significant at ($P<0.05$). This study confirmed the results of previous studies [15, 16, 17], they found that the growth and phenological parameters as well as yield and yield related traits are significantly affected by cultivar (genotypic) differences in grain sorghum, which could be due to the genetic potential of the genotypes used.

The mean values of grain yield and other studied parameters of 14 sorghum genotypes are presented in Table 2. Genotypes had significant difference on phonological characters like number of days to 50% flowering and days to physiological maturity, which determine maturity range of sorghum varieties. In case of days to flowering, the earliest varieties were Teshale (67.67 days), Abshire and EH-2 (68.67 days) while the latest varieties were Adukara (113.33 days) and local check (113.00 days). For days to physiological maturity, the earliest varieties were ESH-2 (109.5days), Gubiye (110.0) and Abshir (111.0). The latest maturing varieties

Table 1: Mean squares analysis of Variance of agronomic measured agronomic traits of sorghum varieties grown at Kamashi district in 2013

Varieties	DTF	DPM	PLH	NET (No.)	TKW (g)	GY (kg ha^{-1})	AGBM (kg ha^{-1})	HI (%)	BIRD Damage (%)
Rufe	84.00^{b}	131.33^{c}	244.43^{b}	1.06^{fg}	18.33^{j}	3183.3o^{cd}	10083.30^{cd}	31.69^{defg}	0.00^{j}
Gambella	74.67^{cd}	121.67^{d}	190.33^{cd}	2.72^{abcd}	28.67^{defg}	2500.00^{ef}	8350.00^{def}	29.97^{efgh}	11.67^{ghi}
Seredo	72.00^{cde}	124.67^{d}	180.30^{cde}	2.19^{abcdef}	22.33^{i}	3366.70^{c}	8850.00^{cde}	38.09^{ab}	5.00^{ij}
Abshir	68.67^{efgh}	111.00^{hij}	137.60^{h}	1.83^{bcdefg}	26.00^{h}	2600.00^{def}	6666.70^{fgh}	39.33^{a}	18.33^{defg}
Gubiye	69.67^{efgh}	110.00^{ijk}	135.97^{h}	1.64^{cdefg}	27.33^{fgh}	1983.30^{fgh}	6316.70^{fgh}	31.45^{defg}	21.67^{cde}
Teshale	67.67^{fghi}	115.33^{fgh}	176.03^{def}	2.75^{abc}	23.00^{i}	1483.30^{h}	5266.70^{h}	28.09^{gh}	26.67^{bc}
Abuare	71.33^{def}	115.33^{fgh}	154.00^{g}	1.59^{defg}	25.67^{h}	2066.70^{fgh}	7883.30^{efg}	26.57^{h}	23.33^{cd}
Hormat	70.33^{efg}	112.67^{hij}	195.50^{c}	2.97^{ab}	31.33^{abc}	3266.70^{c}	9416.70^{cde}	34.65^{bcd}	15.00^{efgh}
Misker	74.67^{cd}	120.00^{defg}	175.13^{def}	1.55ef^{g}	26.33^{gh}	2833.30^{cde}	10450.00^{cd}	27.12^{gh}	13.33^{fgh}
Girana	75.67^{c}	120.33^{def}	194.67^{c}	1.83^{bcdefg}	32.00^{abc}	3950.00^{b}	10933.30^{bc}	36.37^{abc}	13.33^{fgh}
Melkam	71.67^{cdef}	115.67^{fgh}	190.63^{cd}	1.87^{bcdef}	30.67^{abcd}	4166.70^{a}	12866.70^{b}	32.49^{cdef}	8.33^{hi}
ESH-2	68.67^{efgh}	109.50^{jk}	174.45^{def}	2.43^{abcd}	28.00^{efgh}	1700.00^{gh}	6050.00^{gh}	27.85^{gh}	33.33^{ab}
Adukara	113.33^{a}	177.67^{a}	191.50^{cd}	1.00^{g}	26.33^{gh}	4650.00^{a}	12633.30^{b}	36.84^{abc}	5.00^{ij}
Local	113.00^{a}	166.33^{b}	404.67a	1.11^{fg}	33.00^{a}	2934.00^{cde}	16622.20^{a}	17.64^{i}	20.00^{cdef}
Means	75.44	122.37	187.91	2.03	27.59	2699.11	8666.98	31.84	18.24
CV (%)	2.88	2.22	4.85	29.51	4.68	12.71	13.48	7.64	22

**Highly significant at 1% probability level, ns = non-significant at 5% probability level, where; DTF= Days to 50% flowering, DPM= Days to Physiological Maturity, PLH= Plant height, NET = Number of effective tillers, TKW = Thousand kernel weight, GY = Grain yield, AGBM = above ground biomass, HI=Harvest index, BIRD (%) = Bird damage estimation in % and BORER= Stalk borer insect pest severity (1-9 scales).

Table 2: Mean values of measured agronomic traits of evaluated sorghum varieties grown at Kamashi district in 2013

Sources of variance	Degree freedom	DTF (days)	DPM (days)	PLH (cm)	NET (no.)	TKW (g)	GY (kg ha^{-1})	AGBM (kg ha^{-1})	HI (%)	BIRD Damage (%)
Replication	2	6.06^{ns}	4.1^{ns}	132.3^{ns}	0.53^{ns}	0.1^{ns}	5416.7^{ns}	516548.2^{ns}	3.96^{ns}	3.24^{ns}
Treatment	13	628**	1097**	10683**	1.5*	45**	2507895**	29805900**	82**	312**
Error	26	4.72	26.44	114.3	0.35	1.67	120490.2	1365944.0	5.91	16.11
Mean		75.4	122.4	187.9	2.03	27.59	2699.1	8666.9	31.84	18.24
C.V. (%)		2.9	2.2	4.9	29.51	4.68	12.7	13.5	7.64	22.00

Means in the same column followed by the same letters are not significantly different at 5% level of significance according to Duncan's Multiple Range Test (DMRT).

ranged from 166.3 days for the local cultivar to 177.6 days for the genotype Adukara (Table 2). Generally, the improved varieties took shorter number of days to attain flowering and physiological maturity stages than the genotype Adukara, local cultivar as well as Rufe (which is Melkassa area local cultivar).

The mean values of growth parameters like plant height indicated the variety Gubiye recorded the shortest plant height of 135.97cm and the local check gave the tallest plant height of 404.67cm. Above ground biomass is an important growth parameter for small-scale sorghum production in the semi-arid tropics to meet the multiple interests of farmers. Farmers consider other traits of sorghum as an important factor because it is used as a feed for animals, fire-wood and also to make fences. There were significant differences among sorghum varieties tested for above ground biomass ($P<0.01$) as shown in Table 2. The lowest above ground biomass production was recorded for Teshale (5266.7 kg ha^{-1}) while the highest above ground biomass weighted 16622.20 kg ha^{-1} from the local check followed by the improved varieties Melkam (12866 kg ha^{-1}) and Girana (10933). This result is inconsistent with the findings of [18] who reported that the improved varieties Melkam, Misiker and Girana gave the highest above ground biomass yield than the rest of the improved varieties evaluated both at Melkassa and Meiso districts.

As indicated in Table 2, the performance of tested varieties differed significantly for yield and yield components of sorghum. Thousand kernel weight values ranged between 18.33 and 33.00 g with a mean of 27.59 g. The highest thousand kernel weight was exhibited by the local check; whereas the lowest weight was recorded by Rufe. Harvest index, which reflects the partitioning of photosynthates between grain and vegetative plant parts, is very important parameter to be considered in varietal evaluation. The mean harvest index ranged from 17.64% for local check to 39.33% for the variety Abshir. Mean grain yield among tested varieties ranged from 4650.00 kg ha^{-1} for the genotype Adukara to 1483.30 kg ha^{-1} for the variety Teshale with an overall mean of 2699.11 kg ha^{-1}. The grain yields obtained from Melkam (4166.70 kg ha^{-1}),

Girana (3950.00 kg ha^{-1}) and Seredo (3366.70 kg ha^{-1}) were significantly ($P \leq 0.01$) higher than all the other varieties tested except the best genotype Adukara. At Kamashi district, increase in grain yield of improved varieties of sorghum over the farmers' local check were 42, 34.63, 14.78 and 10.97% for the varieties Melkam, Girana and Seredo, respectively. Similar results were also reported that the improved varieties Melkam (5101 kg ha^{-1}), Girana (5017 kg ha^{-1}) and Misiker (4739 kg ha^{-1}) gave higher grain yield at Melkassa area while Melkam (4907 kg ha^{-1}), Hormat (4866 kg ha^{-1}) and Misiker (4842 kg ha^{-1}) exhibited higher grain yield at Miesso district [17]. The lowest grain yields were recorded for the varieties, Teshale (1483.30 kg/ha) and ESH-2 (1700.00 Kg/ha) high damage caused by bird injury at grain filling period. In line with this result, the released lowland sorghum varieties are early-maturing and are liable to bird attack [4]. With regard to mean percentage of bird damage, Rufe (0%), Seredo (5%) and Adukara (5%) were found to be significantly tolerant to bird damage. Rufe, which is Melkassa local, had no bird damage recorded in the study site; this might be due to its laxy panicle and brown grain color (high tannin content) that causes bitter taste to birds. The released variety Melkam had also a relatively lower mean bird injury with a record of 8.33% while, varietiesESH-2 and Teshale were the most susceptible ones with mean values of bird injury recorded as 33.34% and 26.67%, respectively.

Farmers Evaluation of Lowland Sorghum Varieties: Male and female evaluators were lumped together during evaluation as presented in Picture 1. The selection criteria suggested by farmers were grain yield, bird damage resistance, tillering ability and earliness at maturity stage of the crop. Pair-wise matrix ranking was used to identify the prioritization order of the farmers' selection criteria. Grain yield and earliness were proposed as very important criteria based on farmers' pair-wise ranking of selection criteria. This is in line with the findings of [12], who found the same selection criteria as the most important farmers' criteria for wheat varieties. In addition, [18] reported that farmers selected finger millet variety, Tadesse over the other varieties due to its high grain yield and earliness. Moreover, farmers' identified grain yield, cob size, grain size and earliness as the most important criteria for adoption of maize varieties [19]. Although most of the released early maturing varieties had problems related to bird damage, earliness remains as an important selection criterion for farmers of the study area in particular and in the region in general as the local varieties are late maturing types. Moreover, early maturity allows the crop to escape drought and to quickly provide food and cash to the household. The other important criteria set by farmers were bird damage resistance and tillering ability. In the study area bird damage resistance was by no means considered as the least, as continuous birds attack cause total loss of the grain yield in the area especially at grain filling stage. In addition, tillering ability of the varieties was considered as an important criterion by the farmers. This is in agreement [11] who similarly found tillering ability as selection criterion on PVS of barley.

According to the direct matrix ranking, farmers identified Melkam, Girana, Misiker and Adukara as the best varieties while ESH-2 as the least preferred (Table 3). Based on pair-wise ranking, evaluators identified Melkam, Girana, Misiker and Adukara as the most important ones where as ESH-2 as the least (Table 4). Farmers' overall evaluation of the lowland sorghum varieties based on both direct matrix and pair-wise ranking identified Melkam, Girana, Adukara and Misker as most and ESH-2 as the least preferred varieties (Picture 1).

Farmers indicated that the new varieties evaluated in the experiment and selected from farmers perspectives because of its early maturity and higher grain yield produced as compared to the local landraces. However, Adukara, which seems the best looking variety for every agronomic parameter in measured traits ranked third and second in a direct matrix and pairwise ranking methods of evaluation, respectively because of its late maturity. This result revealed that earliness was the most preferred selection criterion as important as grain yield for the evaluators. Even though some of the released varieties like Abshir and Gubiye were high yielders, early maturing and produce more number of tillers, evaluators did not like some of their traits such as shorter plant height and reduced biomass yield. On the contrary, the tested varieties Seredo and Rufe had important merits like high yielding, disease and pest resistance, but they were not preferred by evaluators because of the negative traits-related to size and color of the grain. If farmers participate during the variety development process, they will often reject new varieties that do not fulfill their multipurpose values [5]. The results of the PVS agreed with the ANOVA result in identifying the varieties which suit best for the farmers as well as the environment. Farmers' preference in some cases coincided with the breeders' selection [20]. The varieties that showed better agronomic performance at all locations were also accepted from farmers' evaluation perspectives.

Picture 1: Farmers' evaluation of sorghum varieties at Kamashi district during 2013

Table 3: Direct matrix ranking evaluation of lowland sorghum varieties by group of farmers'

	Grain yield	Bird damage resistance	Early maturity	Tillering ability	Total score	Rank
Relative weight	3	2	3	1	-	-
Rufe	12(4)	10(5)	9(3)	2(2)	33	12
Gambella	12(4)	8(4)	12(4)	3(3)	35	9
Seredo	15(5)	10(5)	9(3)	2(2)	36	7
Abshir	9(3)	6(3)	15(5)	5(5)	35	10
Gubiye	12(4)	6(3)	15(5)	5(5)	38	5
Teshale	9(3)	6(3)	15(5)	4(4)	34	11
Abuare	12(4)	8(4)	12(4)	4(4)	36	7
Hormat	12(4)	8(4)	12(4)	5(5)	37	6
Misker	15(5)	8(4)	12(4)	5(5)	40	3
Girana-1	15(5)	8(4)	12(4)	4(4)	39	4
Melkam	12(4)	10(5)	15(5)	4(4)	41	1
ESH-2	9(3)	4(2)	15(5)	3(3)	31	13
Adukara	15(5)	10(5)	12(4)	4(4)	41	1
Local	15(5)	6(3)	9(3)	1(1)	31	13

N.B. Number of participants = 20 (M = 13 and F = 7), numbers in parenthesis indicated the performance rating value of each variety given from 1-5 (5= excellent, 4=very good, 3= good, 2= poor and 1=very poor), numbers written in the bold indicate total score of a variety as per each selection criteria, which was obtained by multiplying the relative weight of each selection criteria with that of the performance rating number in the parenthesis

Table 4: Farmers pairwise ranking of lowland sorghum varieties at Kamashi district during 2013 main cropping season

Varieties	Rufe	Gambella	Seredo	Abshir	Gubiye	Teshale	Abuare	Hormate	Misker	Girana	Melkam	ESH-2	Adukara	Local	Total score	Rank
Rufe	x														2	12
Gambella	Gambella	x													5	9
Seredo	Seredo	Seredo	x												6	8
Abshir	Abshir	Abshir	Seredo	x											4	10
Gubiye	Gubiye	Gubiye	Gubiye	Gubiye	x										7	6
Teshale	Rufe	Gambella	Seredo	Abshir	Gubiye	x									1	13
Abuare	Abuare	Gambella	Abuare	Abuare	Abuare	Abuare	X								7	6
Hormate	Hormate	Hormate	Hormate	Hormate	Hormate	Hormate	Hormate	X							9	5
Misker	Misker	Misker	Misker	Misker	Misker	Misker	Misker	Misker	X						11	3
Girana	Girana	Girana	Girana	Girana	Girana	Girana	Girana	Girana	Misker	X					10	4
Melkam	Melkam	Melkam	Melkam	Melkam	Melkam	Melkam	Melkam	Melkam	Melkam	Melkam	X				13	1
ESH-2	Rufe	Gambella	Seredo	Abshir	Gubiye	Teshale	Abure	Hormat	Misker	Girana	Melkam	X			0	14
Adukara	Adukara	Adukara	Adukara	Adukara	Adukara	Adukara	Adukara	Adukara	Adukara	Adukara	Melkam	Adukara	X		12	2
Local	Local	Gambella	Seredo	Local	Gubiye	Local	Abuare	Hormat	Misker	Girana	Melkam	Local	Adukara	X	4	10

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