Farmer's Knowledge of Horticultural Traits and Participatory Selection of African Eggplant Varieties (*Solanum aethiopicum*) in Tanzania

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Summary

Participatory selection was conducted in 2008 through 2009 to identify farmers' preference for species and horticultural traits that may constitute future breeding objectives. Vegetable farmers were selected from Moshi and Arusha regions, test population comprised twenty-six accessions from four Solanum species (eggplant and relatives). Purposive sampling was used to select the farming communities with high African eggplant production activities; a multistage random sampling procedure was adopted to select farmers from three regions for participatory meeting. The focus group discussion sessions identified fruit shape, taste, earliness, medicinal properties, marketability and resistance to diseases as farmers' preferred traits in S. aethiopicum*; taste and marketability for* S. melongena*, taste and medicinal properties among S. macrocarpon and S. anguivi. Fruits characterized by cream colour at commercial harvest are most preferred compared to green, to a lesser extent is purple. Interestingly high fruits per plant, fruits per cluster and fruit cluster per plant best described* S. anguivi*. Fruit yield was superior in Db_3 (S. aethiopicum Gilo group), top five accessions for organoleptic properties are Db_3, Ab_2, MM 1619, S00052 and MM 1086. Characters indicated above may constitute breeding objectives and population identified may serve as pollen parents for development of new varieties in African eggplant. Intraspecific hybridization within* S. aethiopicum *Gilo cultigroup, hybridization among Gilo and Shum cultigroups and interspecific hybridization between* S. aethiopicum *and S.* anguivi *may evolve new population aimed at improving fruit yield.*

Résumé

La connaissance des fermiers en horticulture et la sélection participative des variétés d'aubergine africaines (*Solanum aethiopicum*) en Tanzanie

La sélection participative a été conduite en 2008 et 2009 pour identifier les espèces préférées par les agriculteurs ainsi que les traits horticoles pouvant constituer les objectifs de l'amélioration de la plante dans l'avenir. La sélection des horticulteurs a été faite dans les régions de Moshi et d'Arusha. La population testée était composée de vingt-six collections venant de quatre espèces de Solanacées (l'aubergine et apparentées). L'échantillonnage a été utilisé pour sélectionner la communauté des fermiers produisant beaucoup plus d'aubergines; la procédure d'échantillonnage aléatoire et répétitive a été utilisée pour choisir les fermiers de ces trois régions. Les séances de discussion en groupe ont permis d'identifier l'apparence extérieur, le goût, la précocité, les propriétés médicinales, la commercialisation et la résistance aux maladies suivant la préférence des fermiers trouvée dans l'espèce S. aentiopicum*; le goût et la commercialisation pour* S. melongena*; le goût et les propriétés médicinales qu'on trouve dans S.* macrocarpon *et* S. anguivi*. Au moment de la récolte et pour des fins commerciales, les fruits de couleur jaunâtre sont préférés à ceux de couleur verte et pourpre.* S. anguivi *est caractérisée par le nombre élevé de fruits par rameaux et par conséquent par plante. Le rendement était meilleur pour Db_3 (*S. aethiopicum *Gilo group), sur base des propriétés organoleptiques seulement cinq variétés à savoir Db_3, Ab_2, MM 1619, S00052 et MM 1086 sont classées meilleures. Les caractères cités ci-haut peuvent constituer la base des objectifs de l'amélioration des plantes et les populations identifiées peuvent être des parents donneurs pour la création de nouvelles variétés des aubergines. L'hybridation interspécifique au sein de l'espèce* S. aethiopicum *du groupe Gilo, l'hybridation entre les groupes Gilo et Shum, et l'hybridation interspécifique entre les espèces* S. aethiopicum *et* S. anguivi *peuvent générer de nouvelles populations qui amélioreraient le rendement.*

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Introduction

The common name eggplant includes three closely related cultivated species that belong to subgenus Leptostemonum: *S. melongena* L., brinjal eggplant or aubergine, *S. aethiopicum* L., scarlet eggplant; and *Solanum macrocarpon* L., gboma eggplant (4). *Solanum anguivi (*referred hereafter as African eggplant) and *Solanum dasyphyllum* are similar on the basis of morphological traits (9, 10) they constitute important fruit and leaf vegetables in West Africa and East Africa after tomatoes, onions, pepper and okra (15). In Tanzania the fruity forms (*S. aethiopicum* Gilo group) are important component of vegetable diet, sold in grocery stores and retail outlets in Arusha, Moshi, Mbeya and Dar es Salam. The fruit consists of 80% water, 8% carbohydrates; 1.4% protein and 1.5% fibre, and are increasingly important in ensuring food security and nutrition balance. Cholera, diabetes, asthma, bronchitis, dysuria, tooth ache and decrease in cholesterol are examples of health disorders on which eggplant has positive effects. Cultivation takes place throughout the year wherever water is not limiting. Both men and women are involved in production, consumption and marketing. In 2008 about 147,000 ha of eggplants were harvested in African countries (5), the cultivation of *S. aethiopicum* is on the increase in Tanzania, though information on yield is yet available. In northern Tanzania, a maximum of three production cycles are possible per year, usually under monoculture. One negative aspect, which needs to be addressed, is the presence of a number of spirosaline alkaloids, which has a bitter tasting.

Farmers' Participatory Selection (PVS) helps breeders identify farmer-valued traits that breeding programmes should focus on, it accelerates adoption and consistently enables breeding programs to "break through" adoption bottlenecks caused by low levels of acceptability of new varieties by poor farmers. On-station farmer participatory evaluation is increasingly important in many research stations; it strengthens cooperation between researchers (especially breeders) and farmers in evaluating plant germplasm, taking into account farmer's needs, preferences and circumstances. Production is challenged by non availability of improved varieties (fruit number/yield, size, shape and taste), resistance to soil borne diseases (Fusarium and Verticillium wilts) and Red spider mites. Farmers' knowledge in cultivation, management of diseases and insect pests, post harvest handling and marketing are important in designing breeding objectives and development of new varieties. Breeding and seed production activities in Solanum species (eggplant) in sub Sahara Africa is limited compared to tomatoes, peppers and onions, despite its acceptability and availability in most markets in the continent. Farmers' choice of a new variety depends on a combination of horticultural traits (fruit number, fruit size, fruit shape, fruit production period and resistance to insect pests and diseases, good taste and storability and long fruit production period). African eggplant has no known incompatibility with the norms and beliefs of communities in Tanzania, both men and women are involved in production, consumption and marketing of fruits and seeds. The importance of this crop and challenges posed by biotic and abiotic stresses makes it imperative to conduct participatory selection with stakeholders, to identify farmer and market traits, constraints in production, marketing and utilization that could be modified as research objectives and select productive and diverse eggplants accessions acceptable to stakeholders in Arusha and Moshi regions. We present progress in using farmers' knowledge to identifying farmers' preferred horticultural traits that could constitute future breeding objectives and identify promising accessions among four Solanum species (eggplant and African eggplant) for genetic enhancement and commercialization.

Materials, location and experimental design

Test population comprised 26 accessions from four Solanum species (*S. aethiopicum, S. anguivi, S. melongena, S. macrocarpon*) collected from different locations in Africa, Europe and Asia. Field trials were conducted during the 2008 and 2009 at the research field of Agricultural Seed Agency (ASA)/Horticultural Research and Training Institute (Horti–Tengeru) Arusha, Tanzania (lat 4.8°S long 3.7°E; alt. 1290 m). Field experiments were conducted in August 2008 and repeated in August, 2009. A randomized complete block design with two replications was used; each plot consisted of two ridges 7 m long and 0.30 m high, with 0.60 m between ridges. Seedlings were raised in multipot seedling trays for four weeks, thereafter transplanted to the sides of the ridges with 0.50 m space between plants. The experiment was furrow-irrigated every two days for the first two weeks after transplanting, then once a week thereafter, weeding was carried out manually. Fertilizer NPK (20-10-10) was applied at the rate of 200 kg/ha during transplanting. Urea was applied at the rate of 90 kg/ha in a split application 30 days after transplanting and 30 days thereafter. Insecticidal and fungicide spray of Selecron EC and Ridomil were done as when the need arises.

Purposive sampling was adopted to select three regions namely; Arusha, Meru and Moshi due to high agricultural activities related to production, consumption and marketing of eggplant. A multistage random sampling procedure was used; the first stage involves selecting the districts, then the villages, the participants who are the African eggplant farmers registered with the Extension Service Department district were randomly selected. We recognized that information retrieved from individual interviews with farmers may contain variability resulting from differences in individual intelligence, thinking patterns, understanding, and structural conditions such as sex, age, division of labour and social interaction (6). Therefore the need to ensure that farmer' responses to certain questions reflected shared experiences and knowledge at each locality (13). In order to crosscheck information collected from the farmers and ensure that responses reflect famers knowledge and experience (3, 16), seven development agents were selected as key informants (six extension personnel from the Ministry of Agriculture and Food Security, a research officer and field technician from Horti–Tengeru, Tanzania), respondents were interviewed using open-ended semi-structured questionnaire. These development agents worked very closely with farmers and are familiar with production and marketing of eggplant in the study area. Participatory selection was conducted during 2008 and 2009 evaluation to select accessions, horticultural traits preferred by respondents. Over trial periods, 270 farmers randomly selected from study areas were involved in selection exercises. During the focus group discussion sessions, farmers provided a list of preferred horticultural traits and responses were ranked. They select best accession for specific trait by dropping between one and four seeds (1=extremely poor, 2= poor, 3= good and 4= excellent) in containers placed in front of each accessions. Responses were adapted to a four point Likert Rating Scale (LRS), as very high (VH)= 4, High (H)= 3, Low (L)= 2, Very low (VL)= 1. The mean score was computed as 4+3+2+1= 10/4= 2.50. Using the interval score of 0.05, the upper limit cut-off was determined as 2.50 ± 0.05 and the lower limit as 2.55 ± 0.05= 2.45. On the basis of this, mean score (MS) below 2.45 (i.e.< 2.45) were ranked 'low', those between 2.45 and 2.54 were considered 'medium' (i.e. 2.45 ≥ MS ≤ 2.54), while the mean score greater than or equal to 2.55 (i.e. MS ≥ 2.55) were considered 'high'. Demographic and farmers preferences for each entry were subjected to descriptive statistics (frequency and percentages).

Results and discussion

Demographic characteristics of the respondents indicated that production of African eggplant in the study area skewed to the male sex, majority of the respondents interviewed are married and actively young, within the age category of 20 and 40 years. Preponderance of men in production of the four Solanum species deviated from views of Shippers (15) among Solanum (eggplant) and Sabo and Dia (14) among vegetable farmers in Mubi, Nigeria. In general respondents interviewed are vegetable farmers, who cultivated African eggplants alongside other vegetables. In most cases they have fair working knowledge of this crop, and cultivated less than one

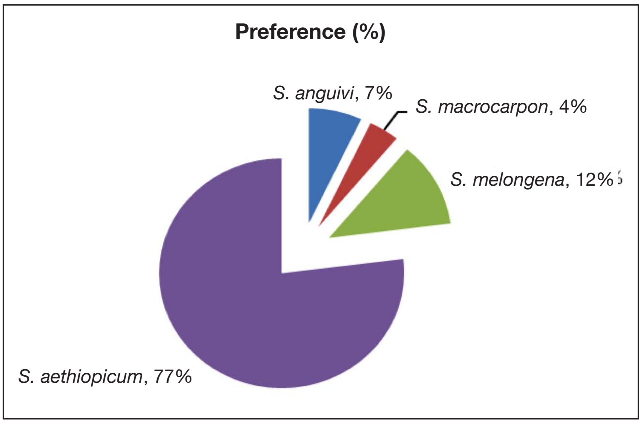

Figure 1: Distribution of respondents by preference and economic importance of each Solanum species (eggplants) among vegetable farmers in Arusha, Moshi and Meru regions, northern Tanzania.

hectare with household size between one and three. The outcome of the participatory selection reflects the consensus of opinion among farmers during on-station evaluation, farmers select preferred accessions and traits, based on intuition, experience in production and marketing. The outcome of the participatory exercises showed 77% of the respondents' preferred *S. aethiopicum*, compared to 12%, 4%, and 7% who showed preference for *S. melongena*, *S. macrocarpon* and *S. anguivi* respectively (Figure 1).

This lends weight to previous report of Sabo and Dia (14), and Shippers (15), they reported high production and consumption of *S. aethiopicum* (Gilo) in sub Sahara Africa compared to *S. macrocarpon* and *S. anguivi,* and are popular among farmers in West Africa. However production and consumption of *S. melongena* is on the rise in East Africa, although production and consumption is high in South Africa. Further respondents indicated that fruit shape, taste, earliness, medicinal properties, marketability and resistance to diseases are farmers preferred and demand driven traits in *S. aethiopicum;* taste and marketability to *S. melongena*, taste to *S. macrocarpon* and medicinal properties among *S. anguivi* (Table 1).

The focus group discussion sessions identified top seven agronomic and fruit quality traits expected of a good eggplant variety (Table 1), these traits should be component of any breeding program. Interestingly preference was high for resistance to diseases and insect pests, this was consistent for each year of evaluation and pooled. Respondents were affirmative that Fusarium and Verticillium wilts are common diseases and Red spider mite a popular insect pest in these regions. Fruit colour showed high preference and importance compared to fruit yield, this is consistent with its rank for each year and pooled, though higher than recorded for fruit yield. This trend may be associated with the fact that the fruit colour is important for assessment of quality; it is the first trait that attracts the eyes of potential farmers and consumer.

Table 1
Preference for fruit quality traits by species and farmers preferred horticultural traits by rank among farmers during 2009 and 2010 in Arusha and Meru regions, Tanzania (n= 270)

Species	Preference frequency	Percentages (%)	Preference indicators		
S. aethiopicum	208	77	Fruit shape, taste, earliness, medicinal properties, marketability and resistance to diseases		
S. melongena	32	12	Taste and marketability		
S. macrocarpon	10	4	Taste		
S. anguivi	20	7	Medicinal		
S. integrifolium	0	0	Nil		
S. viarum	0	0	Nil		
Farmers preferred horticultural characteristics	Rank (2009)			Rank (2010)	Pooled
Resistance to diseases and pests'	1		Resistance to diseases and pests	1	1
Fruit colour (cream)	2		Fruit colour	2	2
Fruit yield	3		Fruit yield	3	3
Fruit size	6		Fruit size	4	5
Marketability	4		Marketability	7	6
Long fruit production period	7		Long fruit production period	6	7
Taste	4		Taste	5	4

Source: Field data 2008 and 2009.

Fruit color differences in fruits are basically due to two color pigments' and their effects on appearance are controlled by more than one gene (11, 12). This investigation showed that over years respondents are in agreement that better tasty fruits (taste) and fruit shapes are important traits of a good variety, though not consistent in rank for each year. The study showed that respondents diverge over taste [less bitter (tasty), bitter, extremely bitter], high preference for less bitter (tasty) fruits is similar to findings reported by Polignano *et al.* (12).

The participatory selection indicated that fruit characterized by cream colour at commercial harvest was highly preferred, followed by green and to a lesser extent are pigmented fruits (purple). Confirming earlier result of high preference for *S. aethiopicum* indicated in figure 1. Using fruit colour as a selection criteria, farmers' participatory selection picked four accessions namely; Db_3, MM 803, MM1619 (*S. aethiopicum*) and MM 10181 (*S. macrocarpon*). They outperformed other accessions and are largely preferred. On the contrary fruits of MM 1619 marked poorly preference percentage for fruit size compared to Db_3 (Table 2). Several authors have indicated the relevance of fruit color, size, shape and taste as most noticeable traits that show differences among in Solanum (eggplants) (2, 4, 6, 7, 11).

Top four entries for fruit number are RCA and Taumbot (*S. anguivi*), MM1619 (*S. aethiopicum*) and MM 12126 (*S. dasyphyllum*), they marked high frequency compared to other entries. Interestingly high fruits per plant, fruits per cluster and fruit clusters per plants best described *S. anguivi* (RCA and Taumbot), though fruits are small and bitter taste (12). From plant breeders point of view accessions of *S. anguivi* could serve as donor parent, whenever genetic improvement is sought to increase fruit number, but not for simultaneous improvement for fruit yield (fruit size), as Db_3 and MM 1619 outperformed other entries for this trait. High fruit number among *S. anguivi* is consistent with reports of Lawande and Polignano *et al.* (8, 12). Fruit yield was best in Db_3 (*S. aethiopicum* Gilo group), followed by CR001 (*S. macrocarpon*), MM 1619, MM 1107 and MM 10251 (S. *aethiopicum* Kumba group). Considering fruit size and shape preference percentage was high for fruits that are twice as long as broad (Db_3 and MM 1619). Conversely fruits which are several times as long as broad (*S. melongena)* was least preferred. Three accessions, one from *S. aethiopicum* (MM 1619) and *S. anguivi* are best for long fruit production, they constitute medium flowering group. These accessions could serve as a donor parent in any breeding program aimed at improvement in yield. Fruit production period is an important horticultural trait in production and marketing of fresh fruit vegetables, it avail farmers advantage of multiple harvests and sales and circumvent within season glut. The inclusion of accessions of *S. anguivi* (RCA), *S. aethiopicum* Gilo group (MM 1619 and Db_3), *S. aethiopicum* Shum (MM 1119) in diallel cross may evolve best combiners for multiple traits (fruit number, fruit colour, fruit production period and fruit yield) and development of hybrids and open pollinated varieties. Respondents indicated that Db_3, MM 1619, MM 457 and MM 803 will attract considerable market demand due to high performance for multiple traits.

Fruit seediness, fruit layer thickness, taste and fruit

Table 2
Percentage distribution of farmers' preference and rank for preferred traits among four Solanum (eggplant) species during 2009 and 2010 (n= 270)

	Fruit colour			Fruit yield			Fruit number			Fruit size			Marketability			Medium flowering		
Accession	Freq	(%)	Rank	Freq	(%)	Rank	Freq	(%)	Rank	Freq	(%)	Rank	Freq	(%)	Rank	Freq	(%)	Rank
MM 1619	47	17	3	24	9		30	11	3	25	9	3	30	11	3	57	21	1
MM 803	34	13	2	5	2		6	2		0			15	5		-		
MM 10181	35	14	4	28	10	3	6	2		10	4		18	7		5	2	
DB_3	70	26	1	32	12		25	10	5	72	27	1	60	22	1	-		
MM 268	20	7	5	41	15	2	6	2		5	2		15	5		-		
MM 10086	23	9	6	27	10	5	11	4		3	1		15	5		-		
MM 2008	2	0.7	7	0			0			5	2		15	5		-		
Acc 65	25	9		3	1		11	4		5	2		22	8		24	9	
Acc 70	6	2	8	0			0			5	2		0			-		
MM 12126	-			40	15	3	26	10	4	13	5		0			27	10	5
MM 232110	-			47	17	1	0			0			37	14	2	9	3	
CR001	1	0.3		21	8		0			28	10	2	28	18		5	2	
Acc 76	0			0			0			24	8.3	4	-			30	11	2
MM 714	0			0			5	2		21	7	5	-			4	1	
MM 368	2	0.7		0			0			15	6		-			22	8	
MM 1381	1	0.3		0			2	0.7		10	4		-			14	5	
MM 1473	1	0.3		2	0.7		1	0.3		14	5		-			-		
MM 1107	2	0.7		0			9	3.3		0			-			-		
MM 268	0			0			9	3.3		-			-			-		
MM 10251	0			0			2	0.7		-			-			-		
MM 2321	0			0			25	9	5	10	4		15					
MM 0119	0			0			0			-			-			29	11	4
S00023	0			0			25	9	5	2	0.7		-			15	6	
MM 347	0			0			2	0.6		5	1		-			29	11	2
RCA	0			0			34	13	2	-			-			-		
Taumbot	0			0			35	13	1				-			-		

Source: Field data 2008 and 2009.

Table 3
Likert scale tests for fruit seediness, fruit layer thickness quality and organoleptic properties among selected accessions four Solanum species (*S. aethiopicum, S. melongena*, *S. macrocarpon* and *S. anguivi*) n= 270

Accessions	Species	Extremely liked (4)	Moderately liked (3)	Moderately disliked (2)	Extremely disliked (1)	Mean score	Rank
Fruit seediness							
MM 1619	*S. aethiopicum*	214(3.17)	56 (0.62)	0 (0.00)	0 (0.00)	3.79	2
Db_3	*S. aethiopicum*	224 (3.32)	46 (0.51)	0 (0.00)	0 (0.00)	3.83	1
AB_2	*S. aethiopicum*	200 (2.96)	70 (0.78)	0 (0.00)	0 (0.00)	3.74	3
MM10181	*S. macrocarpon*	137 (2.03)	111 (1.23)	22 (0.16)	0 (0.00)	3.42	4
Acc 65	*S. aethiopicum*	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0	
MM 10086	*S. aethiopicum*	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0	
CR001	*S. macrocarpon*	34 (0.50)	209 (2.32)	27 (0.25)	0 (0.00)	3.07	5
S00052	*S. macrocarpon*	7 (0.05)	220 (2.44)	40 (0.30)	3 (0.01)	2.80	
Var 20	*S. melongena*	0 (0.00)	2 (0.02)	148 (1.10)	120 (0.44)	1.56	
Var 22	*S. melongena*	0 (0.00)	21 (0.23)	162 (1.20)	87 (0.32)	1.75	
Taumbot	*S. anguivi*	5 (0.02)	127 (1.41)	132 (0.98)	6 (0.02)	2.43	
RCA 1	*S. anguivi*	20 (0.15)	108 (1.20)	142 (1.05)	0 (0.0)	2.40	
Fruit layer thickness							
MM 1619	*S. aethiopicum*	200 (2.96)	70 (0.77)	0 (0.00)	0 (0.00)	3.73	3
Db_3	*S. aethiopicum*	240 (3.56)	30 (0.33)	0 (0.00)	0 (0.00)	3.89	1
Ab_2	*S. aethiopicum*	220 (3.26)	40 (0.44)	10 (0.07)	0 (0.00)	3.77	2
MM10181	*S. macrocarpon*	120 (1.78)	140 (1.56)	10 (0.16)	0 (0.00)	3.34	
Acc 65	*S. aethiopicum*	86 (1.27)	184 (2.04)	0 (0.00)	0 (0.00)	3.31	
MM 10086	*S. aethiopicum*	94 (1.39)	176 (1.96)	0 (0.00)	0 (0.00)	3.35	
CR001	*S. macrocarpon*	0	0	137 (1.01)	133 (0.49)	1.50	
S00052	*S. macrocarpon*	0	0	120 (0.89)	150 (0.56)	1.45	
Var 20	*S. melongena*	0	0	136 (1.01)	134 (0.50)	1.92	
Var 22	*S. melongena*	0	0	121 (0.90)	149 (0.55)	1.45	
Taumbot	*S. anguivi*	127 (1.88)	143 (1.59)	0 (0.00)	0 (0.00)	3.47	5
RCA 1	*S. anguivi*	132 (1.96)	138 (1.53)	0 (0.00)	0 (0.00)	3.49	4
Organoleptic taste							
MM 1619	*S. aethiopicum*	72 (1.06)	198 (2.20)	0 (0.00)	0 (0.00)	3.26	3
Db3 (check)	*S. aethiopicum*	150(2.22)	120 (1.33)	0 (0.00)	0 (0.00)	3.55	1
AB2	*S. aethiopicum*	98 (1.45)	172 (1.91)	0 (0.00)	0 (0.00)	3.36	2
MM10181	*S. macrocarpon*	62 (0.91)	82 (0.91)	47 (0.35)	79 (0.29)	2.46	
Acc 65	*S. aethiopicum*	58 (0.86)	112 (1.24)	50 (0.37)	50 (0.19)	2.66	
MM 10086	*S. aethiopicum*	55 (0.81)	152 (1.69)	33 (0.24)	30 (0.11)	2.85	5
CR001	*S. macrocarpon*	4 (0.07)	199 (2.21)	37 (0.27)	30 (0.11)	2.66	
S0052	*S. melongena*	20 (0.30)	200 (2.22)	40 (0.44)	10 (0.04)	3.00	4
Var 20	*S. melongena*	0	0	20 (0.15)	250 (0.93)	1.08	
Var 22	*S. anguivi*	40 (0.59)	121 (1.34)	54 (0.40)	56 (0.21)	2.54	
Taumbot	*S. anguivi*	0 (0.00)	20 (0.22)	30 (0.22)	220 (0.81)	1.25	
RCA 1	*S. anguivi*	0	24 (0.27)	37 (0.27)	209 (0.77)	1.31	

Source: Field data 2008 and 2009.

shape and size were subjected to Likert scale test, considering fruit seediness, findings indicated that four accessions (CR001, Db_3, MM 1619, Ab_2 and MM 10181) marked high mean score in excess of 3.0; this is consistent with high preference by respondents associated with low fruit seediness (Table 3). Conversely Taumbot and RCA (*S. anguivi*), Var 20 and Var 22 (*S. melongena*) marked low mean score and are least preferred. In another study (12) had reported high seed yield among *S. anguivi,* close to this was *S. aethiopicum and S. macrocarpon*. Fruit seediness is important for seed commercialization, on the other hand it is undesirable, as it makes eating (fruit) unpleasant compared to moderate and seedless fruits. For fruit layer thickness, Db_3, MM 1619 and Ab_2, RCA 1 and Taumbot represent top five accessions; they recorded mean score above average, and implied high preference for thin fruit layer. Accessions of *S. macrocarpon* and *S. melongena* recorded low mean score and are characterized by thick fruit layer. Organoleptic properties combine taste and odour sensation, and is easily defined as sweetness or bitterness. In this investigation consumer panels were involved to determine eating sensation of the fruits. Thirteen accessions were evaluated for organoleptic properties; top five accessions are Db_3, Ab_2, MM 1619, S00052 and MM 1086, they marked mean value in excess of 3.00; they are preferred over and above other entries. Two accessions [one to *S. melongena* (Var 20) and another to *S. anguivi* (RCA)] marked least mean score, and are least preferred due to bitter taste. High preference for Db_3, Ab_2, MM1619 (*S. aethiopicum* Gilo) and S00052 (*S. macrocarpon*) implied acceptability among the respondents. An important aspect which need to be addressed is the presence of a number of spirosaline alkaloids including Solanine and Solanidine which have bitter tasting, the proportion of spirosaline alkaloids vary within specie and between species, however bitterness should not be systematically eliminated from the breeding materials because the consumer preference differed for this trait.

Conclusion

This investigation indicated that *S. aethiopicum* Gilo group is largely preferred over and other species in Arusha and Meru regions, Tanzania. The participatory selection indicated that preference for resistant varieties to diseases and insect pests attack, fruit colour, fruit yield, fruit size, long fruit production period and marketability are possible traits that should constitute breeding objectives to rapidly develop new varieties. Intraspecific hybridization within *S. aethiopicum* (DB_3 and MM 1619) and interspecific hybridization between *S. aethiopicum* and *S. anguivi* (RCA and Taumbot) may develop new population with improved performance for fruit yield, long fruit production period and taste. Fusarium and Verticillium wilts and Red spider mites constitute limitations to production in the study area. Screening of germplasm collection for reaction to Fusarium and Verticillium wilts may identify donor parents, and introgression of the resistant genes into commercial varieties. Best lines identified though participatory selection had been recommended for multilocation trials and possible release in Tanzania.

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