# Quantitative Traits Diversity in Anchote (*Coccinia abyssinica* (Lam.) Cogn.)) Accessions from Ethiopia

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## Abstract

*Anchote (Coccinia abyssinica (*Lam.) Cogn*.) is an indigenous root crop that used as food and nutritional security and socioeconomically important crop in Ethiopia.Although, the crop has a greate potential, lower attention was given by the research and development programe in the country. Eventhough very few studies have been done regarding the genetic diversity of anchote on a few numbers of accessions, the present study included more accessions from vast production areas of the crop. The present study was conducted to assess the genetic diversity within and among 400 accessions of anchote from Ethiopia using quantitative traits. The field trials were laid out in randomized triple lattice design with three replications. Data on 22 quantitative traits were collected and subjected to analysis of variance and multivariate analysis. Results of the analysis of variance indicated except number of locules per fruit and 6 locules per fruit, all traits showed significant variation ($p \leq 0.01$) among the accessions. Wide ranges have been exhibited among the accessions for all root traits; root number per plant (1-13), root weight per plant (0.02-3.52 kg), total root yield (1.67-293.33 t/ha), root length (6.4-30.08 cm), root width (6.09-33.16 cm) and root dry weight (12.9-55g/100g). Similarly, fruit and seed traits also exhibited wide ranges. Highest positive and significant correlation was resulted between root traits; total root yield (r=0.37**, root diameter(r=0.34**). Root yield was negatively correlated with seed yield(-0.001) but fruit length was positively correlated with all root traits. The cluster analysis showed the existence of five divergent groups in which they were diverse and varied irrespective of their collection areas. The results of principal component analysis (PCA) indicated that the accessions were grouped into seven components based the evaluated traits, significant (eigen value > 1) and explained 55.08 % of the total variability. The variation exhibited in this experiment could be attributed to environmental and genetic factors. The variability exhibited among anchote germplasm of Ethiopia will be an excellent approach in the screening and selection of promising and contrasting genotypes of anchote in future works.*

Keywords: Anchote, Ethiopia, quantitative traits, indigenous, root crop

# Introduction

Anchote *[(Coccinia abysinica* (Lam.) Cogn**.]** an indigenous, perennial underutilized vine crop in Ethiopia. It is a multi-species crop that belongs to the genus *Coccinia and* family *Cucurbitaceae.* The genus *Coccinia* comprises 27 species, all of which are confined to sub-Saharan Africa where it is diversified into various habitat types (Demissie et al., 1996). A total of eight species of *Coccinia* are found in Ethiopia (Abera *et al*. 1995). Among these species, *C. abyssinica* is the only species cultivated for its edible tuberous roots and the young shoots used as leaf vegetables (Abera *et al*. 1995).

The name 'anchote' is derived from native language of Oromo, Afan Oromo in Ethiopia, and refers to the edible tuber of the cultivated races of *Coccinia abyssinica*.

It is also known by different vernacular names at different places and tribe such as anchote in Wollega, Jimma, Iluababor, Buno Bedelle, and Benishangul Gumuz, '*Yeamora misa*' in Gonder, Gojam, Wollo, and central Ethiopia, 'Ushushe' in Walaita, 'Shushe/ Ashushe' in Dawero, 'Ajo' in Kaffa, 'Wechecho' in Tigray (Amsalu *et al*., 2008; Desta, 2011; Abera, 1995; Amare, 1974b; Habtamu and Kelbessa, 1997; Demel *et al*., 2010).

However, its cultivation as a root crop is common in Wollega, Iluababor, Jimma, Kaffa, and Sidama (Amare, 1973 and Desta *et al*., 2021), it is not well known by other parts of Ethiopia and the world. It is mainly grown for its storage root yield eventhough its young leaf and immature fruit also used as a side dish in western Ethiopia. Anchote is a very important crop due to its economic, food, feed, income, medicinal and socio-cultural values (Abdisa, 2000; Abera,1995). It is a good source of vitamins, minerals, protein, carbohydrate, and calcium compared to other root crops and can be used as a strategic crop to alleviate protein deficiency in areas of nutrition with low protein sources (Amsalu *et al*., 2008). Tubers of anchote are boiled and prepared with local butter and served with '*injera*' during special ceremonies like wedding, betrothals, circumcision, birthdays, the Finding of the True Cross '*Meskel*' and New Year holidays. Tubers of wild anchote are not edible although widely used for animal fattening in West Wollega areas (Abera, 1995; Desta *et al*.; 2021). Ethiopian traditional medicinal practitioners use anchote to treat different type of diseases such as diabetes, gonorrhea, tuberculosis, asthma, cancer, and cholesterol lowering (Amare, 1985).

In spite of its importance as food and nutritional security crop, the genetic diversity based on morphological, biochemical and molecular level on anchote germplasm collected from all producing areas of Ethiopia were not studied.

Study on the patterns of genetic variability among and within

populations is a valuable tool that may help to develop conservation sterategy and future breeding programs. Genetic diversity assessment has potential uses in evolution, breeding and conservation of genetic resources. Genetic diversity based on morphological characters is therefore the backbone of classification, conservation and genetic improvement of the crop for both present and future use.

According to Din *et al*. (2010) scientific classification of the plant still relies on quantitative traits, this technique is much easier, cost effective, simple to score, requires less time and no need of any technical knowledge (Tewodros, 2016). Besides, it is also powerful taxonomic tool and has been utilized for the preliminary grouping of landraces prior to their characterization using more precise marker technologies.

Therefore, the aim of this study is to investigate the extent and pattern of diversity within and among 400 accessions of anchote using agro-morphological quantitative traits.

# Materials and Methods

## Plant material

Four-hundred anchote seed accessions were collected from western and south western and north western Ethiopia, ten administrative zones (East Wollega, West Wollega, Kelem Wollega, Horro Guduru Wollega, Buno Bedelle, Iluababor, Jimma, Bench Maji, West Shewa and Hulet Ej Enese; 40 woredas and 127 kebeles from the altitude range of 1412 to 3025 m above sea level (Figure 1 and Appendix Table 1). The seeds were collected from women farmers across the collection areas, as they are the sole responsible for the seed maintenance.

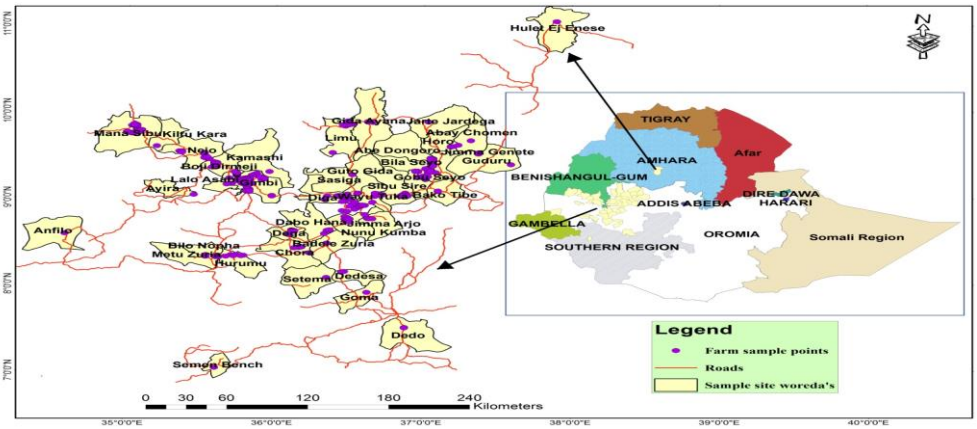


Figure 1. Anchote accessions collection areas from different producing areas of Ethiopia

## Study site

The study was conducted at the research site of Debre Zeit Agriculture Research Centre (DZARC), Bishoftu during the off-seasons of 2017 and 2018 by using irrigation. DZARC is located at latitude 08°44' N and

longitude of 38°58' E, with an altitude of 1860 meters above sea level *(m.a.s.l.).* The area receives mean annual rainfall of 851 mm with mean minimum and maximum temperature of 8.9°C and 24.3°C, respectively and the soil at the site is the vertisols, heavy black (DZARC, 2008 and Desta *et al*., 2011).

## Experimental design

The field trials were laid out in randomized triple lattice design with three replications (Patterson and Williams, 1976), four ridges per plot with spacing of 0.6 m between rows and 0.2 m between plants, and ten plants per ridge. Anchote accessions were randomly distributed in twenty blocks in each replication. Planting was carried out at off season, in March and harvested in July, using seeds in a single row on the ridge. All the recommended cultivation practices for anchote such as weeding, watering and fertilizer application rates were followed.

## Data collection and analysis

Morphological quantitative traits of all the 400 accessions were scored using CIP-standard descriptors of sweet potato (Hijmans, 1991), report of a Working Group on Cucurbits (ECPPGR, 2010), minimum descriptors for *Cucurbita* spp., cucumber, melon and watermelon (ECPGR**,** 2008), descriptors for melon **(**IPGRI. 2003), and morphological and agronomic descriptors for the of cassava (Fukuda *et al*., 1998).

A total of 22 quantitative; 16 aerial and 6 storage root characters were evaluated for each accession (Table 2). Data recorded for aerial parts were average expressions of characters of 10 sample plants for each trait. Storage root descriptors were recorded considering the most representative expression of the character shown in medium-to large sized storage roots of ten plants. Data analysis was made with SAS 9.3.1 software (SAS Institute, 2000).

**Table 2.** Morphological quantitative traits measured in 400 anchote accessions

| Trait | Code | Description |
|---|---|---|
| Number of root per plant | RNPP | The clustered number of roots per plant were counted for 10 plants |
| Root weight per plant (kg) | RWPP | 10 sampled roots was measured using a sensitive balance (BP 16000-S) and the average was recorded |
| Total root yield (t/ha) | RYLD | Total weight from 24 plants from the middle three rows |
| Root length(cm) | RL | 10 sampled roots measured using ruler |
| Root diameter(cm) | RD | 10 sampled roots measured using caliper |
| Root dry matter (%) | RDWT | The dry weight of 100g fresh root after oven dried at 105 $^{o}$C for 24 hours |
| Fruit length(cm) | FL | Length of the fruit measured for 10 samples from top to bottom using ruler |
| Fruit diameter (cm) | FD | Width of the 10 sampled fruit is measured using a caliper |
| Number of strip lines on fruit surface | NST | The strip lines on the surface were counted from 10 sampled fruits |
| Number of locules per fruit | NLF | 10 sampled fruits were cut longitudinally and the locules extracted and counted |
| Number of seeds per fruit | NSPF | After cutting the fruit longitudinally the seeds were extracted, washed and counted |
| Number of seeds per plant | NSPL | Number of seeds were counted from all the fruits of 10 sampled plants |
| Fruit weight (g) | FW | 10 sampled fruits were weighed using a sensitive balance |
| Thousand seed weight (g) | THSW | 1000 seeds counted and weighed using a sensitive balance |
| Vine length(cm) | VL | Vines of 10 sampled plants measured using ruler |
| Seed yield(kg) | SYD | Seed yield per plant(kg) |
| Flower length and width(cm) | FLOL, FLOW | Flower size measured for 10 sample flowers using ruler |
| Number of sepal and petal | NSE, NPE | Counted from the flowers |
| Petiole length(cm) | PL | Petiole length measured for 10 sample leaves using ruler |
| Days to maturity | DM | Days to maturity recorded when > 90% of the leaves turned yellow |

# Results and Discussion

Significant variability within and among the 400 anchote accessions have been observed. The comparison of range, standard deviation, and mean showed variations among accessions for all traits except the number of locules per fruit which is the same, 6 per fruit, for all accessions. The storage root traits with sufficient discriminative power to differentiate the accessions were identified based on their significant p-value ($P < 0.001$). Wider ranges among traits have been exhibited for all root traits (root number per plant, root weight per plant, root yield, root length, root diameter, root dry weight), fruit and seed traits (number of seeds per locule, number of seeds per fruit, fruit weight, thousand seed weight, seed yield per plant), and vine length. The average root yield of anchote was 60.11 tones per hectare (Table 3). As the yield and yield related traits are controlled by a set of genes, besides being influenced by environmental factors, which justifies their high amplitude, confirms the degree of difference among anchote accessions of Ethiopia which may implicate the potential for selection and other improvement

methods. Similar findings were reported on 202 anchote accessions collected from western and south western Ethiopia by Bekele *et al*. (2017), and Desta *et al*., (2011) on 36 anchote accessions.

Table 3. Variance analysis of 22 quantitative traits of 400 anchote accessions

| Traits | CV (%) | Mean ± SE | Range | Traits | CV (%) | Mean ± SE | Range |
|---|---|---|---|---|---|---|---|
| RNPP | 48.82 | 3.00(1.60) | 1.00-13.00 | NSPF | 31.88 | 103.04(34.22) | 26.60-1094.00 |
| RWPP | 41.71 | 0.72(0.34) | 0.02-3.52 | FW | 21.70 | 330.33(73.26) | 107.18-678.20 |
| RYLD | 41.71 | 60.11(28.39) | 1.67-293.33 | THSW | 19.39 | 43.53(11.00) | 10.80-71.20 |
| RL | 18.08 | 11.11(2.22) | 6.40-30.08 | SYD | 51.77 | 441.07(264.35) | 18.50-1520.00 |
| RW | 18.46 | 11.12(2.26) | 6.09-33.16 | VL | 29.09 | 2.61(0.77) | 0.50-5.20 |
| RDWT | 10.61 | 32.78(8.48) | 12.90-55.00 | FLOL | 20.35 | 2.05(0.44) | 1.00-5.33 |
| FL | 25.00 | 5.33(0.89) | 2.80-9.40 | FLOW | 26.84 | 2.18(0.62) | 1.00-9.17 |
| FW | 16.14 | 4.09(0.45) | 2.80-7.00 | NSE | 5.13 | 4.98(0.26) | 3.67-6.00 |
| NST | 6.48 | 8.88(0.59) | 6.40-10.80 | NPE | 3.54 | 5.01(0.18) | 3.33-6.00 |
| NLF | 0.00 | 6.00(0.00) | 6.00-6.00 | PL | 17.60 | 3.00(0.55) | 1.00-5.40 |
| NSPL | 19.97 | 18.27(3.69) | 6.40-73.60 | DM | 10.51 | 129.34(15.68) | 95.00-155.00 |

Key: RNPP- Root number per plant, RWPP- Root weight per plant(kg), RYLD- Total Root yield(t/ha), RL- Root length(cm), RD- Root diameter(cm), RDWT -Root dry weight(g), FRL- Fruit length(cm), FRD- Fruit diameter(cm),NST- Number of strips on fruit surface, NLF- Number of locules per fruit, NSPL- Number of seeds per locule, NSPF- Number of seed per fruit, FW- Fruit weight(g), THSW- Thousand seed weight(g), SYD- Seed yield per plant(g), VL- Vine length(m), FLOL- Flower length(mm), FLOW- Flower width(mm), NSE- Number of sepals, NPE- Number of petals, PL- Petiole length, DM- Days to maturity

The correlation coefficient between quantitative characters of accesions of anchote is presented in table 4. Correlation coefficients show strong relationships between some quantitative traits, while some traits have no relationship at all or are negatively related with one another. The highest positive and significant correlation is shown by correlation between root weight per plant and root yield ($r = 0.99^{**}$) and root length with root diameter (0.74**) followed by root number per plant with root weight per plant (0.44**), root yield (0.44**), root length (0.38**), and root diameter (0.43**). The root yield was negatively correlated with the seed yield (-0.001) but positively with root length (0.45**) and root diameter (0.58**), may be due to the competition for accumulation of assimilates between the roots and the seeds . The fruit length was positively correlated with most root traits; root number per plant (0.21**), root weight per plant (0.37**), total root yield (0.37**), root length (0.19**), and root diameter (0.34**). Similar findings were reported by Desta *et al*., 2011; Bekele *et al*., 2017, Hassen *et al*., 2013 on anchote accessions.

**Table 4 . Correlation coefficients**

| | RNPP | RWPP | YLD | RL | RD | FRL | FRD | DWT | NST | NSPL | NSPF | FW | THSW | SYD | VL | FLOL | FLOW | NSE | NPE | PL | DM |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| RNPP | | 0.44** | 0.44** | 0.38** | 0.43** | 0.21** | 0.01 | 0.02 | 0.03 | -0.02 | -0.00 | 0.02 | 0.22 | 0.04 | 0.01 | 0.01 | 0.01 | 0.01 | 0.02 | -0.03 | -0.02 |
| RWPP | | | 0.99** | 0.45** | 0.57** | 0.37** | 0.001 | 0.01 | 0.02 | 0.02 | 0.02 | 0.01 | 0.01 | 0.002 | -0.03 | 0.02 | 0.03 | 0.01 | 0.02 | 0.02 | -0.02 |
| YLD | | | | 0.45** | 0.58** | 0.37** | -0.001 | 0.01 | 0.01 | 0.01 | 0.02 | 0.01 | 0.01 | -0.001 | 0.03 | 0.02 | 0.02 | 0.01 | 0.02 | 0.02 | -0.02 |
| RL | | | | | 0.74** | 0.19** | 0.01 | 0.01 | -0.01 | -0.01 | -0.03 | -0.04 | 0.01 | -0.02 | 0.04 | 0.02 | -0.002 | 0.01 | 0.02 | 0.01 | -0.04* |
| RD | | | | | | 0.34** | 0.02 | 0.001 | -0.002 | 0.01 | -0.01 | -0.01 | 0.01 | -0.03 | 0.03 | 0.02 | 0.002 | 0.004 | 0.01 | 0.01 | 0.03 |
| FRL | | | | | | | 0.004 | 0.01 | -0.001 | 0.01 | 0.01 | 0.01 | 0.002 | -0.02 | -0.01 | 0.01 | 0.001 | -0.03 | -0.01 | 0.01 | 0.03 |
| FRD | | | | | | | | 0.37** | 0.28** | 0.25** | 0.31** | 0.31** | -0.03 | 0.04* | 0.01 | 0.001 | -0.02 | 0.02 | -0.04 | 0.003 | -0.02 |
| DWT | | | | | | | | | 0.21** | 0.21** | 0.35** | 0.35** | 0.04 | 0.08* | 0.03 | 0.06** | 0.03 | 0.02 | -0.02 | -0.02 | -0.04 |
| NST | | | | | | | | | | 0.15** | 0.11** | 0.16** | 0.01 | 0.03 | 0.03 | 0.01 | 0.04 | -0.05 | -0.01 | 0.02 | -0.02 |
| NSPL | | | | | | | | | | | 0.24** | 0.26** | 0.01 | 0.03 | 0.03 | 0.03* | 0.03 | 0.03 | -0.02* | -0.02 | 0.01 |
| NSPF | | | | | | | | | | | | 0.18** | 0.01 | 0.002 | -0.002 | 0.01 | 0.02 | 0.04 | -0.02 | -0.01 | 0.01 |
| FW | | | | | | | | | | | | | 0.003 | 0.04 | 0.002 | 0.05* | 0.02 | 0.01 | 0.001 | -0.03 | -0.03 |
| THSW | | | | | | | | | | | | | | 0.17** | -0.014 | -0.001 | -0.02 | 0.01 | 0.04 | -0.06** | -0.01 |
| SYD | | | | | | | | | | | | | | | -0.015 | 0.01 | 0.04 | 0.02 | -0.01 | -0.07** | 0.04 |
| VL | | | | | | | | | | | | | | | | 0.07** | 0.02 | 0.07** | 0.04* | -0.01 | 0.06* |
| FLOL | | | | | | | | | | | | | | | | | 0.47** | -0.06 | -0.03 | 0.03* | -0.04* |
| FLOW | | | | | | | | | | | | | | | | | | -0.06* | -0.06* | 0.01 | -0.08** |
| NSE | | | | | | | | | | | | | | | | | | | 0.04* | -0.01 | 0.03 |
| NSP | | | | | | | | | | | | | | | | | | | | 0.01 | 0.03 |
| PL | | | | | | | | | | | | | | | | | | | | | -0.06** |
| DM | | | | | | | | | | | | | | | | | | | | | |

Key: RNPP- Root number per plant, RWPP- Root weight per plant(kg), RYLD- Total Root yield(t/ha), RL- Root length(cm), RD- Root diameter(cm), RDWT -Root dry weight(g), FRL- Fruit length(cm), FRD- Fruit diameter(cm),NST- Number of strips on fruit surface, NLF- Number of locules per fruit, NSPL- Number of seeds per locule, NSPF- Number of seed per fruit, FW- Fruit weight(g), THSW- Thousand seed weight(g), SYD- Seed yield per plant(g), VL- Vine length(m), FLOL- Flower length(mm), FLOW- Flower width(mm), NSE- Number of sepals, NPE- Number of petals, PL- Petiole length, DM- Days to maturity

The number of clusters determined based on the pseudo-F and $t^2$ values, such that the pseudo-F reaches its pick and at the same time, it is larger than values before and after it in the list, while the pseudo $t^2$ is being at its minimum then followed by large numbers. Thus, cluster analysis grouped the 400 anchote accessions based on their similarity in to five different groups with different sizes based on 22 quantitative traits (Figure 2). The number of accessions grouped into each cluster was diverse and varied irrespective of their collection areas from 152 in cluster I to 16 in cluster V. This result agrees with Bekele *et al*. 2017 for 202 anchote accessions collected from mostly western Ethiopia and planted at Holeta. Cluster I was the largest and consisted 152 (38%) of the total accessions and cluster IV and III were consisted 114 (28.5%) and 90(22.5%) respectively (Table 5).

Table 5. Distribution of 400 anchote accessions into 5 clusters based on quantitative traits.

| Clusters | No. of accessions in each cluster | Accession numbers | Contribution in % |
|---|---|---|---|
| I | 152 | 1,2,3,11,19,21,26,27,28,30,41,45,46,47,49,50,51,54,57,58,65,67,68,73,74,79,81,83,85,89,92,93,100,101,102,103,104,109,110,112,113,114,119,120,121,123,124,125,127,130,132,133,134,136,137,140,141,146,147,153,154,155,159,160,162,163,166,168,169,170,172,173,176,177,178,180,182,184,188,193,194,195,199,201,205,206,207,209,210,211,213,214,215,216,224,227,231,236,237,246,250,251,257,258,260,261,262,265,270,271,273,274,276,279,280,283,287,291,293,297,298,299,304,305,314,316,318,319,321,323,324,325,329,335,339,345,348,349,350,351,353,364,371,375,380,381,385,386,394,395,397,399 | 38.00 |
| II | 28 | 94,150,151,158,233,242,249,253,254,255,272,284,296,346,354,356,358,360,365,366,367,370,372,373,388,390,392,393 | 7.00 |
| III | 90 | 36,38,40,42,43,48,52,66,84,86,87,88,90,91,92,95,96,97,98,99,116,128,129,131,139,142,143,144,145,148,149,152,156,157,165,167,179,185,191,196,198,200,217,229,230,234,235,238,239,240,241,244,245,247,248,252,256,259,263,264,266,267,268,269,275,281,282,289,290,300,302,336,337,338,342,344,347,352,355,357,359,363,368,369,382,383,384,387,391,396,400 | 22.50 |
| IV | 114 | 4,5,6,7,8,9,10,12,13,14,15,16,17,18,20,22,24,25,29,31,32,33,34,35,37,44,53,56,59,61,62,63,64,69,70,71,72,75,76,77,78,80,82,105,106,107,108,111,115,117,118,122,126,135,161,164,171,174,175,181,183,187,189,190,192,197,202,203,204,208,212,218,219,220,221,222,223,225,226,277,278,285,286,288,294,295,301,303,306,307,308,309,310,311,312,313,315,317,320,322,326,327,328,330,332,333,334,340,343,374,376,377,378,379 | 28.50 |
| V | 16 | 341,401,402,403,404,405,406,407,408,409,410,411,412,413,415,416 | 4.00 |

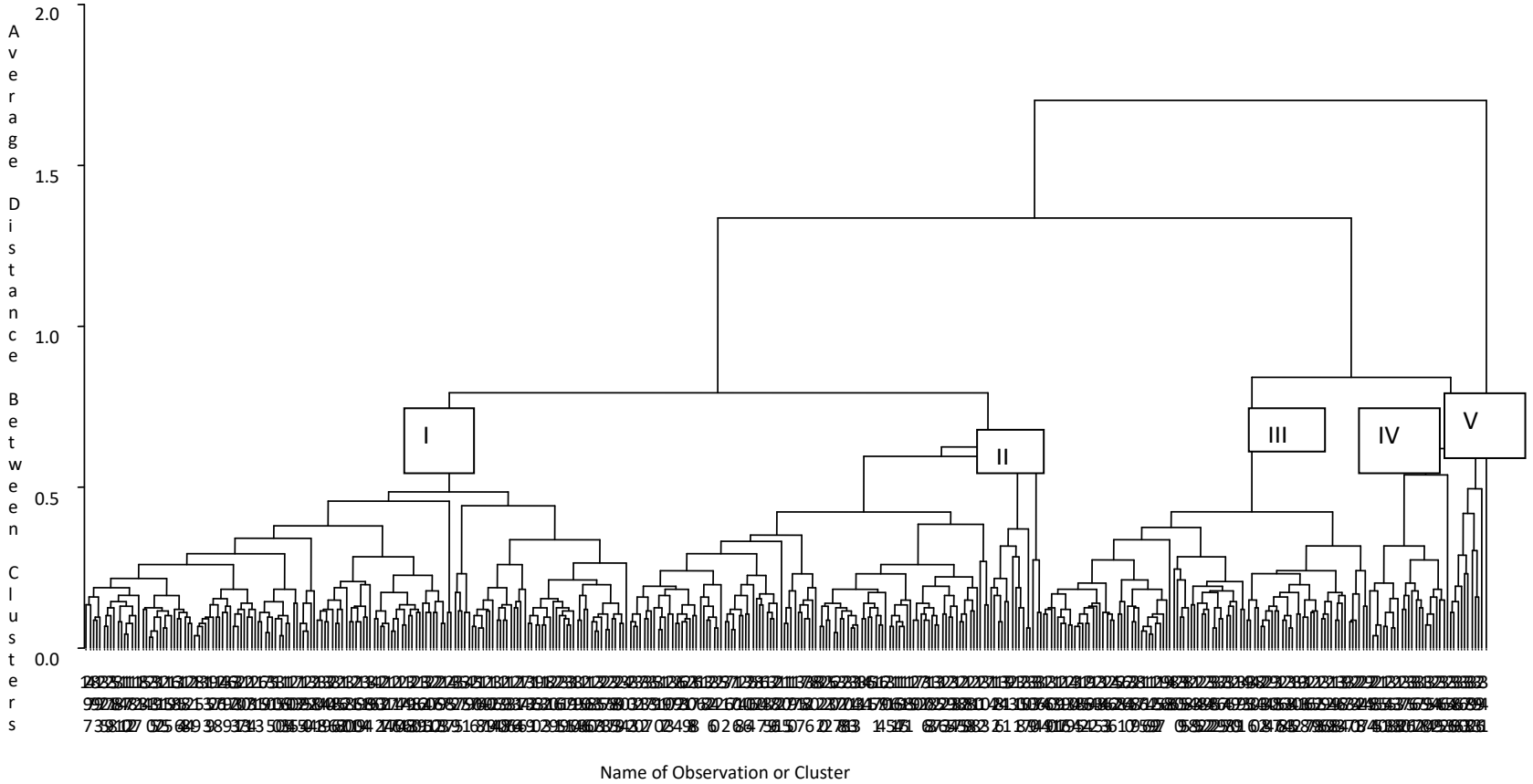


Figure 2. Dendrogram of hierarchical clustering patterns of 400 anchote accessions (UPGMA) based on 22 quantitative traits

**Table 6.** Membership of ten administrative zones of anchote accessions' origin in five clusters

| **Administrative zones** | **Clusters** | | | | | **Sub Total** |
|---|---|---|---|---|---|---|
| | **I** | **II** | **III** | **IV** | **V** | |
| Buno Bedelle | 12 | 5 | 6 | 5 | 1 | 29 |
| East Wollega | 53 | 6 | 29 | 56 | 11 | 155 |
| Horro Guduru Wollega | 2 | 3 | 6 | 5 | 4 | 20 |
| Iluababor | 2 | 9 | 9 | - | - | 20 |
| Kelem Wollega | 2 | - | - | - | - | 2 |
| West Wollega | 78 | 7 | 34 | 46 | - | 165 |
| Jimma | - | 1 | 2 | 2 | - | 5 |
| Kaffa | - | - | 1 | - | - | 1 |
| West Shewa | - | - | 2 | - | - | 2 |
| Gojam | - | - | 1 | - | - | 1 |
| **Total** | | | | | | **400** |

Regarding the share of the collection sites with adminstrative zones, East Wollega and West Wollega contributed 39 % and 41.25% respectively as both both adminstrative zones were the major producing areas than the remaining collection areas (Table 6).

The cluster means of 22 quantitative characters based on the five clusters showed that cluster I had the highest value in most of the characters that considered in this study; root number and weight per plant, total root yield, root length, fruit length, number of seeds per locule, thousand seed weight and petiole length. Cluster II showed high performance in number of seeds per fruit, vine length, and flower sizes while cluster III was good in fruit diameter and number of strip lines on the fruit surface and the early days to maturing. Cluster IV was better only in root diameter while cluster VI showed highest fruit diameter, root dry weight, number of seeds per fruit, fruit weight, seed yield per plant, sepal and petal number, and days to maturity (Table 7).

**Table 7**: Cluster mean and standard deviation for morphological quantitative traits of 400 anchote accessions grown at DZARC

| Clusters | | Variables | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | rnpp | rwpp | tyld | rl | rd | frl | frd | dwt | nst | nlc | nspl | nspf | fw | thsw | syd | vl | flol | flow | nse | npe | pl | dm |
| I | Mean | **2.97** | **0.72** | **59.19** | **11.14** | 10.79 | 32.51 | 5.41 | 4.07 | 8.76 | 6.02 | 18.30 | 101.19 | 326.30 | 46.17 | 448.58 | 2.70 | 1.93 | 2.07 | 5.01 | 5.01 | 3.0 | 134.40 |
| | Stdev. | 1.76 | 0.44 | 35.97 | 4.71 | 1.69 | 8.45 | 1.47 | 0.46 | 0.72 | 0.00 | 5.60 | 20.59 | 79.05 | 28.78 | 272.39 | 0.83 | 0.34 | 0.55 | 0.43 | 0.20 | 0.62 | 14.11 |
| II | Mean | **2.96** | 0.70 | **58.45** | **10.31** | 10.42 | 29.94 | 5.46 | 4.05 | 8.89 | 6.00 | 18.14 | 103.21 | 326.19 | 43.86 | 516.65 | 2.85 | 1.98 | 2.15 | 5.04 | 5.05 | 2.94 | 134.11 |
| | Stdev. | 1.35 | 0.37 | 30.94 | 2.04 | 2.17 | 10.93 | 0.81 | 0.45 | 0.52 | 0.00 | 2.56 | 19.28 | 71.30 | 9.90 | 280.71 | 0.69 | 0.40 | 0.51 | 0.33 | 0.15 | 0.93 | 15.99 |
| III | Mean | **2.95** | **0.65** | 53.87 | **11.05** | 11.08 | 30.76 | 5.55 | 4.12 | 8.91 | 6.00 | 17.76 | 102.35 | 328.87 | 45.50 | 498.89 | 2.82 | 1.94 | 1.99 | 5.04 | 5.04 | 2.96 | 130.55 |
| | Stdev. | 1.47 | 0.26 | 21.47 | 2.70 | 2.90 | 8.34 | 1.09 | 0.59 | 0.55 | 0.00 | 2.97 | 21.61 | 75.10 | 10.60 | 258.44 | 0.72 | 0.34 | 0.50 | 0.32 | 0.28 | 0.43 | 15.08 |
| IV | Mean | 2.69 | 0.67 | **56.16** | **11.12** | 11.24 | 30.66 | 5.28 | 4.05 | 8.76 | 6.00 | 18.04 | 99.81 | 317.21 | 41.02 | 356.85 | 2.73 | 1.91 | 2.07 | 5.00 | 5.04 | 2.92 | 135.72 |
| | Stdev. | 1.51 | 0.31 | 26.12 | 2.76 | 2.93 | 7.90 | 0.82 | 0.45 | 0.71 | 0.00 | 3.47 | 20.88 | 63.02 | 11.01 | 222.23 | 0.80 | 0.33 | 0.50 | 0.28 | 0.24 | 0.56 | 15.38 |
| V | Mean | **2.88** | 0.61 | 50.42 | **10.53** | 10.56 | 33.14 | 5.58 | 4.13 | 8.88 | 6.00 | 17.29 | 109.70 | 372.99 | 41.36 | 585.28 | 2.38 | 1.76 | 2.12 | 5.10 | 5.06 | 2.53 | 140.94 |
| | Stdev. | 1.78 | 0.18 | 15.05 | 1.33 | 1.44 | 9.89 | 1.25 | 0.41 | 0.57 | 0.00 | 3.36 | 19.57 | 92.90 | 9.37 | 319.20 | 0.77 | 0.28 | 0.57 | 0.38 | 0.25 | 0.72 | 11.58 |

Key: RNPP- Root number per plant, RWPP- Root weight per plant(kg), RYLD- Total Root yield(t/ha), RL- Root length(cm), RD- Root diameter(cm), RDWT -Root dry weight(g), FRL- Fruit length(cm), FRD- Fruit diameter(cm),NST- Number of strips on fruit surface, NLF- Number of locules per fruit, NSPL- Number of seeds per locule, NSPF- Number of seed per fruit, FW- Fruit weight(g), THSW- Thousand seed weight(g), SYD- Seed yield per plant(g), VL- Vine length(m), FLOL- Flower length(mm), FLOW- Flower width(mm), NSE- Number of sepals, NPE- Number of petals, PL- Petiole length, DM- Days to maturity

Cluster II showed high performance in number of seeds per fruit, vine length, and flower sizes while cluster III was good in fruit diameter and number of strip lines on the fruit surface and the early days to maturing. Cluster IV was better only in root diameter.

Cluster VI showed highest fruit diameter, root dry weight, number of seeds per fruit, fruit weight, seed yield per plant, sepal and petal number, and days to maturity.

The results of principal component analysis (PC) in this study reduced the observed characters to seven principal components with eigen value that were greater than 1.0 and explained the diversity among 22 traits of 400 anchote accessions tested for 55.08% (Table 8). On the loading plots the traits' relationships (Figure 3) the first PC resulted mainly from variations in root number per plant, seed yield, fruit diameter, root diameter, root length, thousand seed weight, root weight per plant and number of sepals, while the second PC was based on variations innumber od seed per fruit, flower length, fruit length, flower width, and number of strips on the fruit. The present result agrees with similar works on anchote germplasm by Bekele *et al*., 2017 and Desta *et al*., 2011.The principal components, PC1to PC7 accounted for 16.52%, 10.44%, 7.18%, 5.85%, 5.38%, 4.93% and 4.77% of total variation respectively. Root triats; root number per plant, root weight per plant and total root yield contributed positively across all the principal components. The quantitative traits that contributed more positively to PC1 were root number per plant, root weight per plant, fruit diameter, number of locules per fruit, thousand seedweight, vine length, flower length, and days to maturity, while the remaining 13 traits were negatively associated with PC1. All root traits except root diameter, root dry weight, fruit weight, number of sepals, number of petals and petiole length have positive contribution to PC2, whereas the rest of traits were negatively associated. PC3 exhibited positive association with all root traits, fruit length, number of strips per fruit, number of seeds per fruit and plant, thousand seed weight, flower width, number of sepals and number of petals while the remaining traits were negatively associated. All root traits except the root yield exhibted positive contribution to PC4. Root number and weight per plant, root length and diameter, fruit length, number of strips on fruit surface, number of seeds per fruit and plant, thousand seed weight, sepal and petal number, and petiole length traits were positively associated to PC5. All root traits except root length, fruit length and diameter, root dry weight, number of locules, seed yiled per plant, and vine length contributed positively to PC6 and all the traits except total root yield, seed yield per plant and flower length in PC7 had positive contribution.

**Table 8.** Variant component scores of 22 traits of the first seven principal components for 400 anchote accessions

| Variables | PC1 | PC2 | PC3 | PC4 | PC5 | PC6 | PC7 |
|---|---|---|---|---|---|---|---|
| Root no./plant | 0.3342 | 0.4758 | 0.4768 | 0.3835 | 0.442 | 0.2988 | 0.0163 |
| Root weight/plant | **0.4543** | **0.4645** | **0.3308** | **0.3889** | **0.3125** | **0.4346** | 0.0962 |
| Root yield(t/ha) | -0.1118 | 0.6586 | 0.6699 | -0.1902 | -0.1309 | 0.0822 | -0.1731 |
| Root length(cm) | -0.1176 | **0.5795** | 0.6006 | 0.1541 | 0.1273 | -0.4014 | 0.2002 |
| Root diameter(cm) | -0.2584 | -0.2258 | 0.6182 | 0.1523 | 0.4462 | 0.2681 | 0.3866 |
| Fruit length(cm) | -0.1969 | -0.2364 | 0.2092 | 0.2135 | 0.5488 | 0.4126 | -0.4785 |
| Fruit diameter(cm) | **0.4448** | -0.2084 | -0.3531 | 0.3017 | -0.5688 | 0.202 | 0.3352 |
| Root dry weight(g) | -0.2345 | 0.2176 | 0.3917 | -0.2382 | -0.2459 | 0.4714 | 0.3556 |
| Number of strips on fruit surface | -0.1648 | -0.1704 | 0.3149 | 0.2241 | 0.2079 | -0.5035 | 0.6268 |
| Number of locules per fruit | 0.2222 | -0.1959 | -0.1945 | -0.2734 | -0.4986 | 0.2398 | 0.5238 |
| Number of seed per locule | -0.2564 | -0.2561 | 0.4499 | 0.2928 | 0.3117 | -0.3209 | 0.3217 |
| Number of seed per fruit | **-0.6494** | -0.1831 | 0.3736 | 0.1916 | 0.2143 | -0.3022 | 0.2237 |
| Fruit weight(g) | -0.2388 | 0.2179 | -0.2729 | 0.491 | -0.5635 | -0.2202 | 0.2918 |
| Thousand seed weight(g) | 0.2555 | -0.1408 | 0.3205 | -0.7219 | 0.4791 | -0.1286 | 0.1287 |
| Seed yield per plant | -0.3099 | -0.2465 | -0.2471 | 0.6596 | -0.2145 | 0.2035 | -0.2323 |
| Vine length(cm) | **0.4878** | -0.2772 | -0.2699 | 0.3527 | -0.3573 | 0.2323 | 0.4649 |
| Flower length(cm) | **0.5991** | -0.2266 | -0.1787 | -0.1787 | 0.4434 | -0.2538 | -0.4506 |
| Flower width(cm) | -0.1396 | -0.1277 | 0.5962 | -0.6457 | -0.1221 | -0.2416 | 0.2169 |
| Number of sepals | -0.0727 | 0.0526 | 0.0687 | 0.0792 | 0.0685 | -0.6868 | 0.6924 |
| Number of petals | 0.0585 | 0.0459 | 0.6262 | -0.7609 | 0.1431 | -0.0249 | 0.02915 |
| Petiole length(cm) | 0.0025 | 0.7054 | -0.7087 | -0.0053 | 0.0075 | -0.0021 | 0.0032 |
| Days to maturity | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Eigenvalue | 3.4691 | 2.1929 | 1.5072 | 1.2288 | 1.1304 | 1.0353 | 1.0019 |
| Prportion (%) | 16.52 | 10.44 | 7.18 | 5.85 | 5.38 | 4.93 | 4.77 |
| Cumulative (%) | 16.52 | 26.96 | 34.14 | 39.99 | 45.37 | 50.3 | 55.08 |

The first two PCs were plotted to observe the relationship between 400 accessions of anchote based on 22 traits (Fig. 3) as similarly reported by Bekele *et al*., 2017 and Wondimu *et al*., (2014) in anchote accessions and Tairo *et al*. (2008); Afuape *et al*. (2011) and Ravishanker *et al.*, (2013) in sweet potato genotypes.

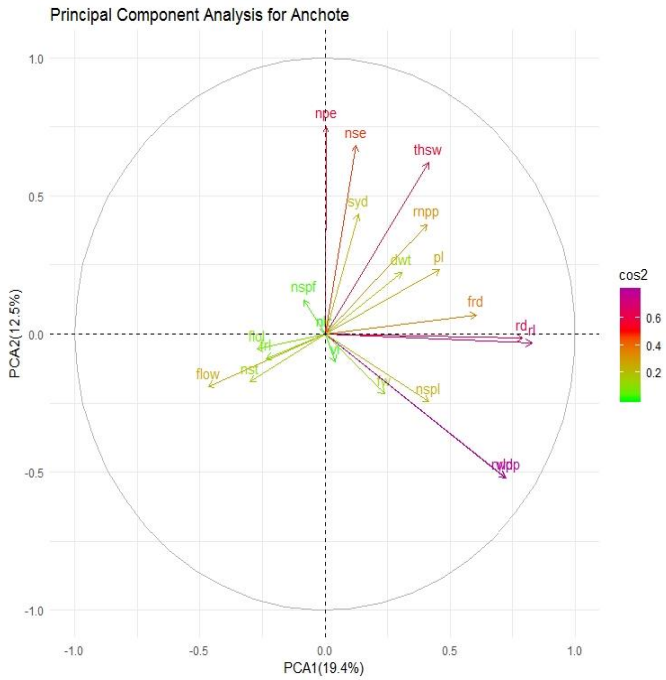


Figure 3. Scattered diagram of first two principal components based on mean values of 22 quantitative traits and anchote accessions

The projection of component traits on PC 1 and PC 2 revealed that the number of tubers per plant, root dry weight (g), root diameter (cm), root length(cm), fruit diameter(cm), fruit weight(g), seed yield per plant(g), root weight per plant(kg) and thousand seed weight(g) are positively associated with total root yield. In contrast flower length and width, number of strips of the fruit surface, and fruit length were associated negatively and not important to be considedred in morphological diversity studies. The dissimilarity coefficient of genotypes ranged from 1.49 to 155.64, showed a wider considerable variability among the anchote accessions. Depending on the above facts and figures, the evaluated anchote accessions have showed wider genetic base. From all the characters, root weight per plant, root length, fruit diameter, number of seeds per fruit, vine length, and flower length were found to be the most discriminative parameters differentiating accessions collected from different parts of Ethiopia. Thus, the given technique of analysis could be helpful to select diverse parents and helps to widen the gene-pool of anchote in future breeding programs.

# Conclusion and Recommendation

Identifying the quantitative diversity among the accessions of anchote helps to promote research and development of the crop. The result of analysis of variance indicated significant variations among the 400 anchote

accessions for all the root, fruit and seed traits, and vine length from the 22 quantitative parameters.

136 accessions from the 400 tested in this study were the most yielders with more than the average root yield;60.11 tones/hectare of which accessions; 117, 147, 161, 175, 262, 267, 301, 310, 326, 349, 367, 368, 370, 374, 375, 377, 388, 393 and 407, were the top 20. In contrary, accessions 285, 150, 280, 261, 31, 49, 155, 7, 25, and 11 were the top lowest yields.

The yielding potential variability showed a high genetic diversity of anchote germplasm in Ethiopia and this work proved to be an excellent approach in the screening and selection of promising and contrasting genotypes of anchote. Genetic resources of anchote revealed in this study represent a valuable asset for the breeding programs of the crop. The variations among the tested 400 anchote accessions could be due to genotype, geographical sources and agronomic practices.

The highest correlation coefficint has been exhibited between root weight per plant and root yield($r = 0.99^{**}$) and root length with root diameter(0.74**) and the root yield was negatively correlated with the seed yield(-0.001) but positively with root length (0.45**) and root diameter(0.58**). The fruit length was positively correlated with most root traits; root number per plant, root weight per plant, total root yield, root length, and root diameter. The cluster analysis of quantitative traits revealed the existence of five divergent groups with, 89% of the accessions represented by clusters I, III and IV, regardless of the geographical locations where the accessions were collected.

All the variables were grouped in seven principal components of which root and fruit traits were significant (Eigen value> 1) explaining 55.08% of the total variability. The variation is attributed to genetic and environmental factors. The results obtained from this study confirmed the existence of variability among the accessions which indicates huge potentials for selection and crossing of ly superior anchote genotypes for yield and yield related traits. What are your future directions.

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# References

Abera Hora, 1995. ANCHOTE: An Endemic Tuber Crop. Jimma

College of Agriculture. Jimma, Oromia-Ethiopia.

Afupe, S.,Okocha P.,and Njoku, D. 2011. Multivariate assessment of the agromorphological variability and yield components among sweet potato (*Ipomoea batatas* L. Lam) landraces. Afr.J. Plant Sci., 5:123-132.

Amare Getahun. 1973. Developmental Anatomy of Tubers of Anchote: A potential dry land crop. *Acta Horticultrae, Technical Communications of ISHS*. 51–63.

Amsalu Nebiyu, Weyessa Garedew, Assefa Tofu, Wubishet Abebe, Asfaw Kifle and Edosssa Etisa, 2008. Variety development of taro, cassava, yam, and indigenous root and tuber crops of Ethiopia. Pp.303-315. In: Gebremedhin Woldegiorgis, Endale Gebre and Berga Lemaga (Eds). Root and Tuber Crops: The Untapped Resources. EIAR, Addis Ababa, Ethiopia.

Asfaw Zemede, 1997**.** Conservation and Use of Traditional Vegetables in Ethiopia. Pp. 57-65. In: Guarino, V. (Ed). Traditional African Vegetables: Proceedings of the IPGRI International Workshop 2001. Initial national communication of Ethiopia to the United Nations Framework Convention on Climate Change (UNFCCC). National Meterological Services Agency. Addis Ababa, Ethiopia

Desta Fekadu, Sentayehu Alamerew, Kibebew Assefa and Mandefro Nigussie. 2021. Biochemical and Mineral Composition of Anchote (Coccinia abyssinica (Lam.) Cogn.) Accessions from Ethiopia. *Ethiopian Journal of Crop Sciences*, Vol. 9(1), ISSN 2072-8506.

DZARC, 2008. Annual Research Report, 2004/2005. Debre Zeit, Ethiopia

Desta Fekadu,. 2011. *Phenotypic and NutritionalCharacterization of Anchote [Coccinia abyssinica (Lam.) Cogn] Accessions of Ethiopia. M.Sc. Thesis for the Degree of Master of Science in Horticulture (Vegetable Science)*. Jimma University, Ethiopia.

ECPGR. 2008. Minimum descriptors for Cucurbit spp., cucumber, melon and weter melon. The European Cooperative Programme for Plant Genetic Resources, pp 1-15.

Fukuda W,. Guevara C, Kawuki R, and Ferguson M. 1998. Selected morphological and agronomic descriptors for the characterization of cassava. Documentos 78, EMBRAPA-CNPMF, 1998, 38 pp. ISSN 0101 – 5171.

Tairo F,. Mneney, E., and Kullaya, A. 2008. Morphological and agronomical characterization of sweet potato [*Ipomoea batatas* (L.) Lam.] germplasm collection from Tanzania. Mikocheni Agricultural Research Institute. In: African Journal of Plant Science Vol. 2(8). Dar-Es-Salaam, Tanzania.

SAS Institute. 2000. Statistical Analytical Systems SAS / STAT user's guide version 8(2) cary NC: SAS institute Inc.

Serbessa Bekele, Feyissa Tilye., Tesfaye Kassahun. 2017. Genetic diversity of anchote (*Coccinia abyssinica* (Lam.) Cogn.) from Ethiopia as revealed by ISSR markers. Genet. Resour. Crop Evol. 2014;61:707–719. doi: 10.1007/s10722-014-0090-9.

Wondimu Tilahun, Alamerew Sentayehu., Ayana Amsalu., Gredew W. Variability and association of quantitative traits of anchote (*Coccinia abyssinica* (Lam.) Cogn.) in Ethiopia. Int. J. Plant Breed. Genet. 2014;8:1–12.

Yassin Hassen., Mohammed Ali., Fekadu Desta., Hussen Seid. Effect of Flower Bud Removal on Growth and Yield of Anchote Root (*Coccinia abyssinica* (Lam.) Cogn.) Accessions at Bishoftu. Adv. Res. J. Plant Anim. Sci. 2013;1:7–13.

# Appendix

Table 1. List of 400 anchote accessions with their areas of collection

| Accession no. | Zone | Woreda | Kebele | Longitude | Latitude | Altitude |
|---|---|---|---|---|---|---|
| 001/09 | E.W | Sibu Sire | Sire 01 | 9°02'29.46"N | 36°52'15.02"E | 1834 |
| 002/09 | E.W | Sibu Sire | Burka Talo | 9°01'49.00"N | 36°50'52.04"E | 1791 |
| 003/09 | E.W | Wayu Tuka | Wara Babbo Migna | 9°03'52.98"N | 36°52'05.77"E | 1889 |
| 004/09 | E.W | Wayu Tuka | Wara Babbo Migna | 9°03'37.54"N | 36°52'34.88"E | 1840 |
| 005/09 | E.W | Wayu Tuka | Wara Babbo Migna | 9°03'47.65"N | 36°52'56.35"E | 1877 |
| 006/09 | E.W | Wayu Tuka | Kura Migna | 9°02'29.71"N | 36°51'00.51"E | 1825 |
| 007/09 | E.W | Wayu Tuka | Kura Migna | 9°01'52.93"N | 36°51'01.64"E | 1799 |
| 008/09 | E.W | Wayu Tuka | Kura Migna | 9°02'15.02"N | 36°51'10.74"E | 1830 |
| 009/09 | E.W | Chingi | MajaAle | 9°02'43.31"N | 36°43'10.25"E | 1823 |
| 010/09 | E.W | Wayu Tuka | Gute | 9°02'04.84"N | 36°40'22.64"E | 1884 |
| 011/09 | E.W | Chingi | Gobu | 9°02'55.33"N | 36°43'18.10"E | 1843 |
| 012/09 | E.W | Chingi | Gordommo/Gaba Sanbata | 9°02'33.16"N | 36°43'13.09"E | 1797 |
| 013/09 | E.W | Chingi | Ale Gordomo | 9°02'27.23"N | 36°42'23.13"E | 1735 |
| 014/09 | E.W | Chingi | Gordommo | 9°03'06.28"N | 36°42'10.24"E | 1935 |
| 015/09 | E.W | Chingi | Ebicha | 9°01'54.27"N | 36°40'49.14"E | 1863 |
| 016/09 | E.W | Chingi | Jarte/Birbo Gibbi | 9°01'55.46"N | 36°40'40.97"E | 1857 |
| 017/09 | E.W | Ukke | Adu Bukke | 9°30'39.23"N | 36°33'28.60"E | 1439 |
| 018/09 | E.W | Ukke | Chari | 9°30'18.64"N | 36°33'27.18"E | 1412 |
| 019/09 | E.W | Leka Dullecha | Ale Qawusa | 9°16'36.62"N | 36°31'31.19"E | 1435 |
| 020/09 | E.W | Leka Dullecha | Ale Qawusa | 9°02'25.94"N | 36°29'12.92"E | 2222 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 021/09 | E.W | Digga | Demeksa | 9°01'20.43"N | 36°27'10.81"E | 2178 |
| 022/09 | E.W | Digga | Demeksa | 9°01'19.32"N | 36°26'59.71"E | 2192 |
| 023/09 | E.W | Digga | Geracho | 9°02'03.81"N | 36°26'53.86"E | 2203 |
| 024/09 | E.W | Leka Dullecha | Horda Qawusa | 9°01'47.65"N | 36°25'39.68"E | 2110 |
| 025/09 | E.W | Leka Dullecha | Horda Qawusa | 9°01'58.86"N | 36°25'38.05"E | 2090 |
| 026/09 | E.W | Leka Dullecha | Horda Qawusa | 9°01'59.79"N | 36°25'21.80"E | 2064 |
| 027/09 | E.W | Leka Dullecha | Gatama 01 | 8°53'54.90"N | 36°29'07.96"E | 2170 |
| 028/09 | E.W | Leka Dullecha | Horda Qawusa | 9°01'28.09"N | 36°25'29.94"E | 2114 |
| 029/09 | E.W | Leka Dullecha | Horda Qawusa | 9°01'46.27"N | 36°25'06.82"E | 2103 |
| 030/09 | E.W | Leka Dullecha | Horda Qawusa | 9°01'59.35"N | 36°25'20.75"E | 2065 |
| 031/09 | E.W | Leka Dullecha | Horda Qawusa | 9°01'56.76"N | 36°25'10.01"E | 2078 |
| 032/09 | E.W | Leka Dullecha | Horda Qawusa | 9°02'01.91"N | 36°25'20.10"E | 2056 |
| 033/09 | E.W | Leka Dullecha | Horda Qawusa | 9°01'57.79"N | 36°25'05.08"E | 2079 |
| 034/09 | E.W | Leka Dullecha | Geracho | 9°01'40.61"N | 36°26'04.45"E | 2153 |
| 035/09 | E.W | Leka Dullecha | Horda Qawusa | 9°00'05.95"N | 36°29'13.56"E | 2244 |
| 036/09 | E.W | Leka Dullecha | Horda Qawusa | 9°00'19.37"N | 36°29'13.28"E | 2225 |
| 037/09 | E.W | Leka Dullecha | Horda Qawusa | 9°00'30.41"N | 36°29'13.32"E | 2225 |
| 038/09 | E.W | Leka Dullecha | Horda Qawusa | 8°59'59.66"N | 36°28'49.76"E | 2240 |
| 039/09 | E.W | Leka Dullecha | Horda Qawusa | 8°59'22.32"N | 36°29'40.70"E | 2264 |
| 040/09 | E.W | Leka Dullecha | Horda Qawusa | 8°59'55.44"N | 36°30'31.60"E | 2209 |
| 041/09 | E.W | Leka Dullecha | Horda Qawusa | 8°59'21.87"N | 36°30'25.81"E | 2227 |
| 042/09 | W.W | Gimbi | Jogir | 9°10'12.00"N | 35°46'58.28"E | 1776 |
| 043/09 | W.W | Gimbi | Jogir | 9°10'10.87"N | 35°46'31.44"E | 1727 |
| 044/09 | W.W | Gimbi | Aba Sena | 9°01'39.43"N | 35°58'50.01"E | 1650 |
| 045/09 | W.W | Gimbi | chuta Goch | 9°12'18.85"N | 35°44'27.29"E | 1857 |
| 046/09 | E.W | Digga | Demeksa | 9°01'26.43"N | 36°26'11.65"E | 2129 |
| 047/09 | W.W | Gimbi | Inango Dambali | 9°10'05.05"N | 35°42'31.00"E | 1843 |
| 048/09 | W.W | Gimbi | Chuta Goch | 9°12'15.88"N | 35°44'16.34"E | 1867 |
| 049/09 | W.W | Gimbi | Chuta Goch | 9°12'06.03"N | 35°44'03.15"E | 1870 |
| 050/09 | W.W | Gimbi | Inango Dambali | 9°10'08.88"N | 35°41'45.15"E | 1888 |
| 051/09 | E.W | Digga | Demeksa | 9°02'26.20"N | 36°27'17.84"E | 2199 |
| 052/09 | W.W | Gimbi | Inango Dambali | 9°09'49.25"N | 35°40'39.86"E | 1820 |
| 053/09 | W.W | Gimbi | Aba Sena | 9°02'00.08"N | 35°58'42.00"E | 1637 |
| 054/09 | W.W | Gimbi | Bikiltu Tokkumma | 9°11'30.45"N | 35°47'16.52"E | 1837 |
| 055/09 | W.W | Gimbi | Gimbo 03/Gimbi Town | 9°10'38.30"N | 35°50'10.18"E | 1930 |
| 056/09 | W.W | Gimbi | Choli | 9°12'55.57"N | 35°49'27.30"E | 1864 |
| 057/09 | W.W | Gimbi | Walo Anchabi | 9°14'00.50"N | 35°41'56.80"E | 1888 |
| 058/09 | W.W | Gimbi | Lalisa Yesus | 9°24'43.28"N | 35°35'50.16"E | 1892 |
| 059/09 | W.W | Gimbi | Lalisa Yesus | 9°24'47.14"N | 35°36'09.86"E | 1943 |
| 060/09 | W.W | Gimbi | Lalisa Yesus | 9°25'10.49"N | 35°35'43.05"E | 1917 |
| 061/09 | W.W | Lalo Asabi | Garjo Siban | 9°27'29.22"N | 35°32'47.00"E | 1732 |
| 062/09 | W.W | Lalo Asabi | Harojji Harowwa | 9°27'57.57"N | 35°32'26.10"E | 1798 |
| 063/09 | W.W | Lalo Asabi | Harojji Harowwa | 9°28'04.40"N | 35°31'26.28"E | 1851 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 064/09 | W.W | Boji Dirmaji | Lata Bobine | 9°21'41.84"N | 35°36'22.79"E | 1959 |
| 065/09 | W.W | Mana Sibu Mandi | Gombo Kiltu Jale | 9°50'50.05"N | 35°04'29.09"E | 1753 |
| 066/09 | W.W | Mana Sibu Mandi | Gombo Kiltu Jale | 9°50'45.38"N | 35°03'35.58"E | 1651 |
| 067/09 | W.W | Mana Sibu Mandi | Gombo Kiltu Jale | 9°50'16.38"N | 35°02'38.49"E | 1616 |
| 068/09 | W.W | Mana Sibu Mandi | Gombo Kiltu Jale | 9°51'33.05"N | 35°03'03.65"E | 1583 |
| 069/09 | E.W | Gobbu Sayyo | Tibbe Hara | 8°59'18.78"N | 36°20'56.98"E | 1619 |
| 070/09 | E.W | Gobbu Sayyo | Tibbe Hara | 9°01'47.42"N | 36°21'58.99"E | 1897 |
| 071/09 | E.W | Leka Dullecha | Fododdo/Gatama | 8°53'35.16"N | 36°33'09.89"E | 2013 |
| 072/09 | E.W | Arjo | Kumba | 8°45'25.03"N | 36°29'25.67"E | 2427 |
| 073/09 | E.W | Leka Dullecha | Fododdo/Gatama | 8°53'32.25"N | 36°33'52.30"E | 2028 |
| 074/09 | E.W | Leka Dullecha | Fododdo/Gatama | 8°52'32.89"N | 36°32'50.56"E | 1973 |
| 075/09 | E.W | Gobbu Sayyo | Tibbe Hara | 9°05'11.09"N | 36°21'50.67"E | 1441 |
| 076/09 | E.W | Arjo | Kumba | 8°46'06.66"N | 36°29'07.73"E | 2430 |
| 077/09 | E.W | Leka Dullecha | Shakko | 8°51'35.58"N | 36°27'24.85"E | 2474 |
| 078/09 | E.W | Leka Dullecha | Bollo | 8°51'05.11"N | 36°29'44.01"E | 2190 |
| 079/09 | E.W | Leka Dullecha | Fododdo/Gatama | 8°54'21.85"N | 36°34'02.04"E | 1902 |
| 080/09 | E.W | Leka Dullecha | Shakko | 8°57'26.16"N | 36°32'30.67"E | 1986 |
| 081/09 | E.W | Nunnu Kumba | Nunnu | 8°46'10.08"N | 36°37'51.14"E | 2313 |
| 082/09 | E.W | Nunnu Kumba | Nunnu | 8°46'04.84"N | 36°38'26.40"E | 2338 |
| 083/09 | E.W | Leka Dullecha | Kawusa | 8°56'09.70"N | 36°31'12.17"E | 2182 |
| 084/09 | E.W | Leka Dullecha | Kawusa | 8°54'40.67"N | 36°30'02.87"E | 2133 |
| 085/09 | E.W | Leka Dullecha | Haro Shakko | 8°58'06.93"N | 36°28'29.72"E | 2249 |
| 086/09 | E.W | Nunu Kumba | Amuru Botoro | 8°46'01.74"N | 36°39'15.28"E | 2253 |
| 087/09 | E.W | Leka Dullecha | Badh'o | 8°57'53.82"N | 36°27'57.20"E | 2248 |
| 088/09 | E.W | Arjo | Qumba | 8°48'54.34"N | 36°36'26.70"E | 2248 |
| 089/09 | E.W | Sibu Sire | Home Baro | 9°02'12.41"N | 36°53'05.23"E | 1842 |
| 090/09 | E.W | Sibu Sire | Burka Talo | 9°01'52.57"N | 36°51'01.05"E | 1800 |
| 091/09 | E.W | Bonaya Boshe | Ejersa Gute | 8°57'33.64"N | 36°39'52.77"E | 1759 |
| 092/09 | E.W | GudeyaBila | Gonka Ija | 9°14'53.50"N | 36°57'56.26"E | 1943 |
| 093/09 | E.W | GudeyaBila | Gonka Ija | 9°14'55.42"N | 36°57'40.82"E | 1934 |
| 094/09 | E.W | GudeyaBila | Gonka Ija | 9°14'48.15"N | 36°57'27.68"E | 1949 |
| 095/09 | E.W | GudeyaBila | Kalala | 9°15'49.79"N | 36°59'41.92"E | 1989 |
| 096/09 | E.W | GudeyaBila | Gonka Ija | 9°14'41.02"N | 37°00'26.13"E | 1910 |
| 097/09 | E.W | GudeyaBila | Gonka Ija | 9°15'01.93"N | 37°00'31.92"E | 1943 |
| 098/09 | E.W | Gobbu Sayyo | Adare Tiksa | 9°19'03.77"N | 36°57'04.14"E | 1924 |
| 099/09 | E.W | Gobbu Sayyo | Adare Tiksa | 9°19'02.66"N | 36°57'03.43"E | 1921 |
| 100/09 | E.W | Gobbu Sayyo | Adare Tiksa | 9°18'54.99"N | 36°56'50.76"E | 1941 |
| 101/09 | E.W | Gobbu Sayyo | Adare Tiksa | 9°18'49.47"N | 36°57'03.27"E | 1965 |
| 102/09 | E.W | Gobbu Sayyo | Adare Tiksa | 9°19'09.47"N | 36°57'15.54"E | 1953 |
| 103/09 | E.W | Gobbu Sayyo | Adare Tiksa | 9°19'20.05"N | 36°56'54.49"E | 1957 |
| 104/09 | E.W | Gobbu Sayyo | Adare Tiksa | 9°18'32.61"N | 36°57'38.33"E | 1965 |
| 105/09 | W.W | Gimbi | Kombo Mikael | 9°05'40.07"N | 35°49'37.35"E | 1885 |
| 106/09 | W.W | Gimbi | Kombo Mikael | 9°05'54.10"N | 35°49'55.34"E | 2006 |
| 107/09 | W.W | Gimbi | Kombo Mikael | 9°05'53.27"N | 35°49'19.04"E | 1860 |

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| 108/09 | W.W | Gimbi | Kombo Mikael | 9°06'25.19"N | 35°49'56.17"E | 2008 |
| 109/09 | W.W | Gimbi | Kombo Mikael | 9°06'22.67"N | 35°49'07.07"E | 2009 |
| 110/09 | W.W | Gimbi | Kombo Mikael | 9°06'27.21"N | 35°48'42.00"E | 1919 |
| 111/09 | W.W | Gimbi | Kombo Mikael | 9°05'49.93"N | 35°48'44.90"E | 1916 |
| 112/09 | W.W | Gimbi | Kombo Mikael | 9°05'36.96"N | 35°48'32.01"E | 1938 |
| 113/09 | W.W | Gimbi | Kombo Mikael | 9°05'20.43"N | 35°48'38.52"E | 1911 |
| 114/09 | W.W | Gimbi | Kombo Mikael | 9°06'10.49"N | 35°48'21.41"E | 1995 |
| 115/09 | W.W | Gimbi | Kombo Mikael | 9°06'25.75"N | 35°48'21.28"E | 1986 |
| 116/09 | W.W | Gimbi | Kombo Mikael | 9°04'57.80"N | 35°48'43.66"E | 1860 |
| 117/09 | W.W | Gimbi | Kombo Mikael | 9°04'48.21"N | 35°48'31.84"E | 1875 |
| 118/09 | W.W | Gimbi | Kombo Mikael | 9°05'05.80"N | 35°48'53.27"E | 1868 |
| 119/09 | W.W | Gimbi | Kombo Mikael | 9°04'41.37"N | 35°49'06.57"E | 1917 |
| 120/09 | W.W | Gimbi | Kombo Mikael | 9°07'52.61"N | 35°48'27.40"E | 2028 |
| 121/09 | W.W | Gimbi | Kombo Mikael | 9°08'13.31"N | 35°48'29.14"E | 2015 |
| 122/09 | W.W | Gimbi | Kombo Mikael | 9°09'27.31"N | 35°48'35.53"E | 1888 |
| 123/09 | W.W | Gimbi | Kombo Mikael | 9°09'26.10"N | 35°49'01.32"E | 1892 |
| 124/09 | W.W | Gimbi | Kombo Mikael | 9°05'05.24"N | 35°49'11.10"E | 1848 |
| 125/09 | W.W | Gimbi | Garjo Bikilal | 9°13'46.15"N | 35°54'47.05"E | 1753 |
| 126/09 | W.W | Gimbi | Garjo Bikilal | 9°14'02.64"N | 35°55'19.48"E | 1729 |
| 127/09 | W.W | Gimbi | Garjo Bikilal | 9°14'12.69"N | 35°55'22.72"E | 1726 |
| 128/09 | W.W | Gimbi | Garjo Bikilal | 9°14'17.42"N | 35°55'07.21"E | 1734 |
| 129/09 | W.W | Gimbi | Garjo Bikilal | 9°14'17.49"N | 35°54'33.69"E | 1739 |
| 130/09 | W.W | Gimbi | Garjo Bikilal | 9°14'20.22"N | 35°54'13.16"E | 1750 |
| 131/09 | W.W | Gimbi | Garjo Bikilal | 9°14'34.03"N | 35°54'11.09"E | 1704 |
| 132/09 | W.W | Gimbi | Garjo Bikilal | 9°14'57.66"N | 35°54'30.61"E | 1661 |
| 133/09 | W.W | Gimbi | Garjo Bikilal | 9°14'54.55"N | 35°53'54.15"E | 1650 |
| 134/09 | W.W | Gimbi | Garjo Bikilal | 9°12'46.20"N | 35°54'39.48"E | 1842 |
| 135/09 | W.W | Gimbi | Garjo Bikilal | 9°13'31.18"N | 35°55'02.51"E | 1762 |
| 136/09 | W.W | Gimbi | Garjo Bikilal | 9°13'39.76"N | 35°55'39.86"E | 1771 |
| 137/09 | W.W | Gimbi | Garjo Bikilal | 9°13'43.95"N | 35°55'39.17"E | 1770 |
| 138/09 | W.W | Gimbi | Garjo Bikilal | 9°15'01.84"N | 35°53'17.62"E | 1780 |
| 139/09 | W.W | Gimbi | Garjo Bikilal | 9°17'24.34"N | 35°52'47.19"E | 2140 |
| 140/09 | W.W | Gimbi | Garjo Bikilal | 9°16'40.84"N | 35°51'39.96"E | 2052 |
| 141/09 | W.W | Gimbi | Garjo Bikilal | 9°16'00.38"N | 35°50'54.60"E | 1973 |
| 142/09 | W.W | Gimbi | Garjo Bikilal | 9°16'02.38"N | 35°50'35.87"E | 1942 |
| 143/09 | W.W | Gimbi | Garjo Bikilal | 9°15'59.99"N | 35°50'20.79"E | 1889 |
| 144/09 | W.W | Gimbi | Garjo Bikilal | 9°15'28.22"N | 35°50'26.16"E | 1891 |
| 145/09 | W.W | Gimbi | Lalo Choli | 9°13'26.57"N | 35°49'14.83"E | 1831 |
| 146/09 | W.W | Gimbi | Lalo Choli | 9°13'51.03"N | 35°49'11.40"E | 1806 |
| 147/09 | W.W | Gimbi | Lalo Choli | 9°14'20.70"N | 35°49'45.08"E | 1730 |
| 148/09 | W.W | Gimbi | Lalo Choli | 9°14'13.95"N | 35°48'38.07"E | 1793 |
| 149/09 | W.W | Gimbi | Lalo Choli | 9°14'03.40"N | 35°48'26.41"E | 1790 |
| 150/09 | W.W | Gimbi | Lalo Choli | 9°13'56.66"N | 35°47'55.64"E | 1824 |
| 151/09 | W.W | Gimbi | Lalo Choli | 9°13'41.94"N | 35°48'02.11"E | 1838 |
| 152/09 | W.W | Gimbi | Lalo Choli | 9°13'07.44"N | 35°48'03.32"E | 1847 |
| 153/09 | W.W | Gimbi | Lalo Choli | 9°13'02.91"N | 35°48'13.15"E | 1827 |
| 154/09 | W.W | Gimbi | Lalo Choli | 9°12'49.36"N | 35°47'56.95"E | 1824 |
| 155/09 | W.W | Gimbi | Lalo Choli | 9°13'02.03"N | 35°47'55.28"E | 1814 |
| 156/09 | W.W | Gimbi | Lalo Choli | 9°13'29.23"N | 35°47'57.03"E | 1845 |
| 157/09 | W.W | Gimbi | Lalo Choli | 9°13'16.14"N | 35°48'16.95"E | 1846 |
| 158/09 | W.W | Gimbi | Lalo Choli | 9°13'40.52"N | 35°48'15.06"E | 1826 |
| 159/09 | W.W | Gimbi | Lalo Choli | 9°13'35.80"N | 35°48'25.60"E | 1793 |
| 160/09 | W.W | Gimbi | Lalo Choli | 9°13'40.75"N | 35°46'07.29"E | 1839 |
| 161/09 | W.W | Gimbi | Lalo Choli | 9°12'59.74"N | 35°47'27.49"E | 1811 |

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| 162/09 | W.W | Gimbi | Lalo Choli | 9°12'50.07"N | 35°45'07.71"E | 1814 |
| 163/09 | W.W | Gimbi | Lalo Choli | 9°12'42.65"N | 35°47'28.12"E | 1819 |
| 164/09 | W.W | Gimbi | Lalo Choli | 9°12'33.55"N | 35°47'32.15"E | 1809 |
| 165/09 | W.W | Gimbi | Didisa Bikilal | 9°16'04.73"N | 35°44'32.94"E | 1835 |
| 166/09 | W.W | Gimbi | Didisa Bikilal | 9°16'00.39"N | 35°44'16.65"E | 1854 |
| 167/09 | W.W | Gimbi | Didisa Bikilal | 9°15'55.18"N | 35°44'07.13"E | 1846 |
| 168/09 | W.W | Gimbi | Didisa Bikilal | 9°16'00.01"N | 35°44'16.75"E | 1853 |
| 169/09 | W.W | Gimbi | Didisa Bikilal | 9°16'07.72"N | 35°44'03.88"E | 1839 |
| 170/09 | W.W | Gimbi | Didisa Bikilal | 9°16'19.41"N | 35°44'34.50"E | 1864 |
| 171/09 | W.W | Gimbi | Didisa Bikilal | 9°16'30.82"N | 35°44'20.96"E | 1832 |
| 172/09 | W.W | Gimbi | Didisa Bikilal | 9°16'30.91"N | 35°44'38.31"E | 1875 |
| 173/09 | W.W | Gimbi | Didisa Bikilal | 9°16'33.28"N | 35°44'54.60"E | 1886 |
| 174/09 | W.W | Gimbi | Didisa Bikilal | 9°16'42.27"N | 35°44'58.50"E | 1885 |
| 175/09 | W.W | Gimbi | Didisa Bikilal | 9°16'56.56"N | 35°44'33.78"E | 1849 |
| 176/09 | W.W | Gimbi | Didisa Bikilal | 9°17'03.59"N | 35°44'52.60"E | 1870 |
| 177/09 | W.W | Gimbi | Didisa Bikilal | 9°17'08.52"N | 35°44'34.16"E | 1845 |
| 178/09 | W.W | Gimbi | Didisa Bikilal | 9°17'08.70"N | 35°44'12.03"E | 1841 |
| 179/09 | W.W | Gimbi | Didisa Bikilal | 9°17'17.24"N | 35°44'45.32"E | 1831 |
| 180/09 | W.W | Gimbi | Didisa Bikilal | 9°17'35.46"N | 35°44'40.77"E | 1802 |
| 181/09 | W.W | Gimbi | Didisa Bikilal | 9°17'24.18"N | 35°44'13.73"E | 1830 |
| 182/09 | W.W | Gimbi | Didisa Bikilal | 9°17'37.21"N | 35°44'23.71"E | 1780 |
| 183/09 | W.W | Gimbi | Didisa Bikilal | 9°17'48.43"N | 35°44'29.76"E | 1766 |
| 184/09 | W.W | Gimbi | Didisa Bikilal | 9°18'26.52"N | 35°43'56.80"E | 1846 |
| 185/09 | W.W | Mana Sibu Mandi | Guyo Sachi | 9°45'13.68"N | 35°01'35.14"E | 1574 |
| 186/09 | W.W | Mana Sibu Mandi | Guyo Sachi | 9°45'13.64"N | 35°01'35.19"E | 1619 |
| 187/09 | W.W | Mana Sibu Mandi | Guyo Sachi | 9°45'29.26"N | 35°01'17.20"E | 1575 |
| 188/09 | W.W | Mana Sibu Mandi | Wajitu Mandi | 9°47'10.51"N | 35°05'37.63"E | 1689 |
| 189/09 | W.W | Mana Sibu Mandi | Wajitu Mandi | 9°47'10.42"N | 35°05'22.03"E | 1677 |
| 190/09 | W.W | Mana Sibu Mandi | Wajitu Mandi | 9°46'58.16"N | 35°04'58.74"E | 1637 |
| 191/09 | W.W | Mana Sibu Mandi | Wajitu Mandi 01 | 9°47'14.30"N | 35°06'00.61"E | 1688 |
| 192/09 | W.W | Mana Sibu Mandi | Wajitu Mandi | 9°46'58.65"N | 35°04'46.44"E | 1629 |
| 193/09 | W.W | Mana Sibu Mandi | Wajitu Kiltu Lubo | 9°44'43.66"N | 35°02'22.39"E | 1597 |
| 194/09 | W.W | Mana Sibu Mandi | Wajitu Kiltu Lubo | 9°44'56.57"N | 35°02'50.72"E | 1555 |
| 195/09 | W.W | Mana Sibu Mandi | Wajitu Mandi | 9°46'18.84"N | 35°04'37.03"E | 1608 |
| 196/09 | W.W | Mana Sibu Mandi | Wajitu Mandi | 9°46'28.09"N | 35°04'29.06"E | 1611 |
| 197/09 | W.W | Mana Sibu Mandi | Wajitu Mandi 01 | 9°46'24.42"N | 35°04'13.55"E | 1607 |
| 198/09 | W.W | Mana Sibu Mandi | Wajitu Kiltu Lubo | 9°45'01.32"N | 35°03'14.45"E | 1572 |
| 199/09 | W.W | Mana Sibu Mandi | Wajitu Mandi | 9°46'32.96"N | 35°04'01.11"E | 1603 |
| 200/09 | W.W | Mana Sibu Mandi | Wajitu Kiltu Lubo | 9°45'13.20"N | 35°03'34.14"E | 1585 |
| 201/09 | W.W | Mana Sibu Mandi | Wajitu Mandi 01 | 9°46'58.27"N | 35°04'18.97"E | 1622 |
| 202/09 | W.W | Mana Sibu Mandi | Wajitu Mandi | 9°47'44.78"N | 35°04'44.43"E | 1590 |
| 203/09 | W.W | Mana Sibu Mandi | Wajitu Mandi 01 | 9°47'48.34"N | 35°04'29.22"E | 1589 |
| 204/09 | W.W | Mana Sibu Mandi | Wajitu Kiltu Lubo | 9°44'56.88"N | 35°03'46.19"E | 1574 |
| 205/09 | W.W | Mana Sibu Mandi | Wajitu Kiltu Lubo | 9°45'29.51"N | 35°03'53.50"E | 1587 |
| 206/09 | W.W | Mana Sibu Mandi | Wajitu Mandi | 9°48'07.68"N | 35°04'40.67"E | 1610 |
| 207/09 | W.W | Mana Sibu Mandi | Wajitu Kiltu Lubo | 9°45'30.49"N | 35°04'13.43"E | 1567 |
| 208/09 | W.W | Mana Sibu Mandi | Wajitu Kiltu Lubo | 9°45'14.14"N | 35°04'36.22"E | 1595 |
| 209/09 | W.W | Mana Sibu Mandi | Wajitu Mandi 01 | 9°48'22.76"N | 35°04'32.51"E | 1610 |
| 210/09 | W.W | Mana Sibu Mandi | Wajitu Kiltu Lubo | 9°45'14.21"N | 35°04'51.49"E | 1596 |
| 211/09 | W.W | Mana Sibu Mandi | Wajitu Kiltu Lubo | 9°45'36.34"N | 35°05'34.92"E | 1622 |
| 212/09 | W.W | Mana Sibu Mandi | Wajitu Mandi | 9°46'54.39"N | 35°05'55.53"E | 1627 |
| 213/09 | W.W | Mana Sibu Mandi | Wajitu Kiltu Lubo | 9°46'13.01"N | 35°05'53.05"E | 1652 |
| 214/09 | W.W | Mana Sibu Mandi | Wajitu Kiltu Lubo | 9°45'56.74"N | 35°00'29.85"E | 1543 |
| 215/09 | W.W | Mana Sibu Mandi | Wajitu Kiltu Lubo | 9°45'46.48"N | 35°00'37.54"E | 1536 |

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| 216/09 | W.W | Mana Sibu Mandi | Wajitu Kiltu Lubo | 9°45'46.71"N | 35°00'47.09"E | 1558 |
| 217/09 | W.W | Mana Sibu Mandi | Wajitu Mandi 01 | 9°47'06.51"N | 35°06'15.89"E | 1688 |
| 218/09 | W.W | Boji Dirmaji | Gumbo Boji | 9°23'14.75"N | 35°36'03.09"E | 2004 |
| 219/09 | W.W | Boji Dirmaji | Lata Bobine | 9°23'23.60"N | 35°35'57.02"E | 2000 |
| 220/09 | W.W | Boji Dirmaji | Lata Bobine | 9°23'28.25"N | 35°36'12.30"E | 1965 |
| 221/09 | W.W | Boji Dirmaji | Gumbo Boji | 9°21'34.11"N | 35°34'51.96"E | 1944 |
| 222/09 | H.G.W | Horro | Doyyo Bariso | 9°36'09.82"N | 37°11'33.91"E | 2399 |
| 223/09 | H.G.W | Horro | Doyyo Bariso | 9°36'12.85"N | 37°11'33.27"E | 2392 |
| 224/09 | H.G.W | Horro | Doyyo Bariso | 9°36'19.70"N | 37°11'42.36"E | 2381 |
| 225/09 | H.G.W | Horro | Doyyo Bariso | 9°36'15.30"N | 37°11'54.53"E | 2390 |
| 226/09 | H.G.W | Horro | Doyyo Bariso | 9°36'05.22"N | 37°12'00.61"E | 2385 |
| 227/09 | W.W | Boji Dirmaji | Lata Bobine | 9°23'47.77"N | 35°35'42.86"E | 1964 |
| 228/09 | H.G.W | Horro | Doyyo Bariso | 9°36'22.08"N | 37°12'14.99"E | 2371 |
| 229/09 | H.G.W | Horro | Didibbe Kistana | 9°37'20.12"N | 37°14'26.98"E | 2369 |
| 230/09 | H.G.W | Guduru | Walkitumma | 9°40'30.30"N | 37°19'43.49"E | 2426 |
| 231/09 | H.G.W | Guduru | Walkitumma | 9°40'28.33"N | 37°19'11.57"E | 2432 |
| 232/09 | H.G.W | Abay Chomen | Fincha/forest | 9°31'57.98"N | 37°23'22.20"E | 2245 |
| 233/09 | Iluababor | Ale | Ale | 8°26'16.33"N | 36°11'31.46"E | 1974 |
| 234/09 | E.W | Gute | Kichi | 9°01'34.40"N | 36°40'00.42"E | 1840 |
| 235/09 | Iluababor | Ale | Ale | 8°25'50.73"N | 36°10'59.04"E | 1965 |
| 236/09 | B.B | Bedelle | Ale | 8°29'01.27"N | 36°21'35.78"E | 2030 |
| 237/09 | W.W | Gimbi | Gimbi 03 | 9°11'13.38"N | 35°49'42.19"E | 1890 |
| 238/09 | Jimma | manna | Koche | 7°54'50.64"N | 36°37'33.99"E | 1615 |
| 239/09 | E.Gojjam | hulet eju | Mota zuria | 11°03'27.14"N | 37°53'11.56"E | 2441 |
| 240/09 | W.W | Gimbi | Choli | 9°12'14.19"N | 35°49'22.29"E | 1885 |
| 241/09 | E.W | Sibu Sire | Tuqa | 9°01'46.96"N | 36°53'17.77"E | 1815 |
| 242/09 | jimma | Dedo | Dedo zuria | 7°30'27.26"N | 36°52'03.20"E | 2212 |
| 243/09 | H.G.W | Abay Chomen | Nashe | 9°32'00.54"N | 37°22'18.84"E | 2281 |
| 244/09 | Bench Madji | Andracha | Kufe | 7°02'19.25"N | 35°36'46.57"E | 1457 |
| 245/09 | H.G.W | Abay Chomen | Mazoria | 9°31'09.43"N | 37°22'37.92"E | 2269 |
| 246/09 | Q.W | Dembi Dolo | Gida Gebo | 8°35'11.84"N | 34°35'02.99"E | 1498 |
| 247/09 | Iluababor | Ale | Sotelo | 8°26'37.00"N | 36°10'50.29"E | 1970 |
| 248/09 | E.W | Jimma Arjo | Guddanne | 8°45'41.04"N | 36°28'44.67"E | 2297 |
| 249/09 | W.W | Gimbi | Aba Sena | 9°01'50.27"N | 35°58'33.26"E | 1630 |
| 250/09 | Q.W | Dembi Dolo | Gida Gebo | 8°35'09.69"N | 34°35'40.21"E | 1541 |
| 251/09 | E.W | Guto wayu | Gute | 9°03'21.83"N | 36°41'16.00"E | 1971 |
| 252/09 | Iluababor | Ale | Sotelo | 8°26'32.00"N | 36°11'01.82"E | 1952 |
| 253/09 | E.W | Guto wayu | Gute | 9°03'42.50"N | 36°40'20.09"E | 2133 |
| 254/09 | E.W | Digga | Digga Leqa | 9°03'07.28"N | 36°29'09.13"E | 2187 |
| 255/09 | W.W | Gimbi | Gimbi Adventist | 9°10'14.94"N | 35°50'23.85"E | 1945 |
| 256/09 | Jimma | Dedo | Dedo Zuria | 7°30'11.60"N | 36°52'12.49"E | 2294 |
| 257/09 | E.W | Guto wayu | Gute | 9°03'26.70"N | 36°40'36.65"E | 2066 |
| 258/09 | E.W | Digga | Digga Leqa | 9°01'54.52"N | 36°27'26.24"E | 2207 |
| 259/09 | W.Sh | Bako Tibbe | Tibbe | 9°05'06.06"N | 37°06'20.86"E | 1658 |
| 260/09 | E.W | Digga | Digga Zuria | 9°01'47.10"N | 36°26'03.21"E | 2174 |
| 261/09 | E.W | Jimma Arjo | Guddanne | 8°44'54.98"N | 36°29'27.24"E | 2450 |
| 262/09 | E.W | Digga | Digga zuria | 9°02'25.58"N | 36°29'03.58"E | 2214 |
| 263/09 | W.sh | Bako Tibbe | Bacha Oda Gibe | 9°05'27.02"N | 37°06'02.52"E | 1695 |
| 264/09 | E.W | Gudeya Bila | Haro Gudisa | 9°13'51.21"N | 37°01'23.90"E | 1877 |
| 265/09 | E.W | Gudeya Bila | Haro Gudisa | 9°13'25.52"N | 37°01'54.19"E | 1888 |
| 266/09 | E.W | Gudeya Bila | Haro Gudisa | 9°13'33.28"N | 37°01'56.71"E | 1886 |
| 267/09 | E.W | Gudeya Bila | Haro Gudisa | 9°13'51.97"N | 37°01'28.74"E | 1877 |
| 268/09 | E.W | Gudeya Bila | Haro Gudisa | 9°14'04.49"N | 37°01'47.56"E | 1877 |

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| 269/09 | E.W | Gudeya Bila | Haro Gudisa | 9°14'15.32"N | 37°01'49.49"E | 1879 |
| 270/09 | E.W | Gudeya Bila | Haro Gudisa | 9°14'18.65"N | 37°01'35.30"E | 1890 |
| 271/09 | E.W | Gudeya Bila | Hena Jawaja | 9°14'09.72"N | 37°01'31.09"E | 1883 |
| 272/09 | E.W | Gudeya Bila | Hena Jawaja | 9°13'50.59"N | 37°01'19.67"E | 1877 |
| 273/09 | E.W | Gudeya Bila | Hena Jawaja | 9°14'17.30"N | 37°01'13.26"E | 1923 |
| 274/09 | E.W | Gudeya Bila | Hena Jawaja | 9°14'27.02"N | 37°01'01.46"E | 1964 |
| 275/09 | H.G.W | Horro | Burkitu Oborra | 9°27'53.61"N | 37°04'06.99"E | 3014 |
| 276/09 | H.G.W | Horro | Burkitu Oborra | 9°27'49.76"N | 37°04'06.83"E | 2806 |
| 277/09 | H.G.W | Horro | Burkitu Oborra | 9°27'24.62"N | 37°04'00.75"E | 2903 |
| 278/09 | W.W | Mana Sibu Mandi | Guyo Sachi | 9°44'44.99"N | 35°03'33.58"E | 1590 |
| 279/09 | W.W | Kiltu Kara | Dandi Gudi | 9°31'52.40"N | 35°22'19.50"E | 1799 |
| 280/09 | W.W | Kiltu Kara | Dandi Gudi | 9°32'04.39"N | 35°22'30.93"E | 1817 |
| 281/09 | W.W | Kiltu Kara | Dandi Gudi | 9°32'09.40"N | 35°22'09.30"E | 1793 |
| 282/09 | W.W | Kiltu Kara | Dandi Gudi | 9°32'32.55"N | 35°22'27.27"E | 1747 |
| 283/09 | W.W | Kiltu Kara | Dandi Gudi | 9°32'33.33"N | 35°21'50.32"E | 1694 |
| 284/09 | W.W | Kiltu Kara | Dandi Gudi | 9°32'40.79"N | 35°22'13.50"E | 1717 |
| 285/09 | W.W | Boji Dirmaji | Lata Bobine | 9°24'12.07"N | 35°35'26.52"E | 1896 |
| 286/09 | W.W | Boji Dirmaji | Lata Bobine | 9°24'20.62"N | 35°36'18.70"E | 1918 |
| 287/09 | W.W | Boji Dirmaji | Lata Bobine | 9°23'50.10"N | 35°35'44.46"E | 1976 |
| 288/09 | W.W | Nejo | Humna Wakayyo | 9°30'32.40"N | 35°31'10.33"E | 1901 |
| 289/09 | W.W | Kiltu Kara | Chara Gudi | 9°31'45.47"N | 35°22'30.00"E | 1839 |
| 290/09 | W.W | Boji Dirmaji | Lata Bobine | 9°27'13.65"N | 35°33'15.48"E | 1853 |
| 291/09 | W.W | Boji Dirmaji | Gumbo Boji | 9°28'42.70"N | 35°32'21.80"E | 1805 |
| 292/09 | W.W | Nejo | Humna Wakayyo | 9°31'20.80"N | 35°31'32.35"E | 1914 |
| 293/09 | W.W | Mana Sibu Mandi | Guyo Sachi | 9°49'56.69"N | 35°03'56.82"E | 1694 |
| 294/09 | W.W | Mana Sibu Mandi | Lafto Salga | 9°49'46.33"N | 35°04'36.46"E | 1759 |
| 295/09 | W.W | Mana Sibu Mandi | Lafto Salga | 9°50'05.95"N | 35°04'48.14"E | 1718 |
| 296/09 | W.W | Nejo | Humna Wakayyo | 9°31'09.60"N | 35°31'28.18"E | 1913 |
| 297/09 | W.W | Nejo | Humna Wakayyo | 9°31'36.07"N | 35°31'31.17"E | 1890 |
| 298/09 | W.W | Mana Sibu Mandi | Guyo Sachi | 9°50'09.75"N | 35°03'36.54"E | 1650 |
| 299/09 | W.W | Mana Sibu Mandi | Guyo Sachi | 9°50'17.03"N | 35°03'53.42"E | 1661 |
| 300/09 | W.W | Mana Sibu Mandi | Guyo Sachi | 9°50'29.80"N | 35°03'50.10"E | 1655 |
| 301/09 | E.W | Limmu | Bolale | 9°50'21.70"N | 36°28'48.42"E | 2149 |
| 302/09 | E.W | Limmu | Sakata Kiltu Babbo | 9°51'04.95"N | 36°29'27.52"E | 2181 |
| 303/09 | E.W | Limmu | Muka Arba Dima | 9°51'13.49"N | 36°28'22.20"E | 2134 |
| 304/09 | E.W | Limmu | Sapera | 9°51'49.78"N | 36°31'30.58"E | 2192 |
| 305/09 | E.W | Limmu | Degem Silassie | 9°51'46.82"N | 36°30'46.08"E | 2133 |
| 306/09 | E.W | Limmu | Bolale | 9°51'03.51"N | 36°29'03.25"E | 2170 |
| 307/09 | E.W | Limmu | Degem Silassie | 9°51'25.62"N | 36°30'09.88"E | 2151 |
| 308/09 | E.W | Limmu | Sapera | 9°51'34.09"N | 36°29'36.91"E | 2115 |
| 309/09 | E.W | Limmu | Muka Arba Dima | 9°51'29.62"N | 36°29'03.18"E | 2149 |
| 310/09 | E.W | Limmu | Sakata Kiltu Babbo | 9°51'05.03"N | 36°27'02.75"E | 2122 |
| 311/09 | E.W | Gida Ayana | Gute Gudina | 9°53'33.86"N | 36°37'03.19"E | 1970 |
| 312/09 | E.W | Gida Ayana | Gaba Jimata | 9°53'15.79"N | 36°39'41.04"E | 2085 |
| 313/09 | E.W | Gida Ayana | Gute Gudina | 9°53'13.79"N | 36°37'13.93"E | 2060 |
| 314/09 | E.W | Gida Ayana | Gaba Jimata | 9°53'33.86"N | 36°37'03.19"E | 2049 |
| 315/09 | E.W | Gudeya Bila | Chali Jima | 9°53'00.99"N | 36°39'39.42"E | 2629 |
| 316/09 | E.W | Gida Ayana | Gaba Jimata | 9°53'07.17"N | 36°39'51.96"E | 2098 |
| 317/09 | E.W | Gudeya Bila | Alito | 9°19'22.55"N | 37°02'22.78"E | 2194 |
| 318/09 | E.W | Gudeya Bila | Chali Jima | 9°19'37.40"N | 37°02'24.96"E | 2192 |
| 319/09 | E.W | Gudeya Bila | Chali Jima | 9°19'26.06"N | 37°02'06.92"E | 2315 |
| 320/09 | E.W | Gudeya Bila | Alito | 9°19'34.34"N | 37°02'02.38"E | 2339 |
| 321/09 | E.W | Leka Dullecha | Badh'o | 8°55'13.31"N | 36°34'48.24"E | 1892 |
| 322/09 | E.W | Leka Dullecha | Badh'o | 8°55'15.97"N | 36°34'57.55"E | 1887 |

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| 323/09 | E.W | Leka Dullecha | Badh'o | 8°55'10.07"N | 36°35'12.47"E | 1863 |
| 324/09 | E.W | Leka Dullecha | Badh'o | 8°55'04.73"N | 36°35'24.52"E | 1847 |
| 325/09 | E.W | Leka Dullecha | Ale Qawusa | 8°55'02.77"N | 36°34'25.45"E | 1899 |
| 326/09 | E.W | Leka Dullecha | Badh'o | 8°55'18.16"N | 36°35'32.22"E | 1871 |
| 327/09 | E.W | Leka Dullecha | Badh'o | 8°55'17.25"N | 36°36'11.20"E | 1825 |
| 328/09 | E.W | Leka Dullecha | Badh'o | 8°55'28.47"N | 36°35'39.29"E | 1855 |
| 329/09 | E.W | Leka Dullecha | Badh'o | 8°55'29.25"N | 36°35'38.82"E | 1854 |
| 330/09 | E.W | Jimma Arjo | Hara Kekko | 8°47'34.62"N | 36°28'33.67"E | 2478 |
| 331/09 | E.W | Jimma Arjo | Wayu Warke | 8°46'52.62"N | 36°29'22.35"E | 2355 |
| 332/09 | E.W | Jimma Arjo | Wayu Qiltu | 8°45'46.77"N | 36°29'19.93"E | 2455 |
| 333/09 | E.W | Jimma Arjo | Abayyi | 8°45'52.41"N | 36°30'49.37"E | 2313 |
| 334/09 | E.W | Jimma Arjo | Hara Gabato | 8°45'37.63"N | 36°29'16.52"E | 2424 |
| 335/09 | E.W | Jimma Arjo | Hara Gabato | 8°44'18.16"N | 36°29'45.85"E | 2349 |
| 336/09 | E.W | Jimma Arjo | Hara Gabato | 8°44'03.37"N | 36°29'25.09"E | 2294 |
| 337/09 | E.W | Jimma Arjo | Hara Gabato | 8°44'18.73"N | 36°29'05.08"E | 2308 |
| 338/09 | E.W | Jimma Arjo | Tibbe Chafe | 8°43'37.06"N | 36°30'48.99"E | 2456 |
| 339/09 | B.B | Makko | Dambali Sophe | 8°37'46.55"N | 36°07'42.97"E | 2081 |
| 340/09 | B.B | Makko | Dambali Sophe | 8°37'42.79"N | 36°08'02.82"E | 2061 |
| 341/09 | B.B | Makko | Dambali Sophe | 8°37'34.06"N | 36°07'57.73"E | 2037 |
| 342/09 | B.B | Makko | Dambali Sophe | 8°37'37.15"N | 36°07'47.12"E | 2088 |
| 343/09 | B.B | Makko | Dambali Sophe | 8°37'29.41"N | 36°07'48.25"E | 2072 |
| 344/09 | B.B | Makko | Dambali Sophe | 8°37'57.74"N | 36°07'45.24"E | 2044 |
| 345/09 | B.B | Makko | Dambali Sophe | 8°38'05.50"N | 36°07'20.15"E | 2082 |
| 346/09 | B.B | Makko | Dambali Sophe | 8°37'51.48"N | 36°07'12.78"E | 2078 |
| 347/09 | B.B | Makko | Dambali Sophe | 8°37'46.43"N | 36°07'17.95"E | 2055 |
| 348/09 | B.B | Makko | Dambali Sophe | 8°37'33.12"N | 36°07'22.82"E | 2087 |
| 349/09 | B.B | Makko | Dambali Sophe | 8°37'24.84"N | 36°07'27.57"E | 2079 |
| 350/09 | B.B | Makko | Dambali Sophe | 8°37'20.96"N | 36°07'44.91"E | 2072 |
| 351/09 | B.B | Makko | Dambali Sophe | 8°37'02.04"N | 36°08'10.31"E | 2101 |
| 352/09 | B.B | Makko | Makko 01 | 8°34'43.13"N | 36°06'54.51"E | 2266 |
| 353/09 | B.B | Chora | Umbe | 8°35'37.51"N | 36°06'50.21"E | 2218 |
| 354/09 | B.B | Chora | Bero Sariti | 8°25'38.96"N | 36°08'28.38"E | 1944 |
| 355/09 | Iluababor | Hurumu | Mettu Mechi | 8°20'40.18"N | 35°42'54.96"E | 1803 |
| 356/09 | Iluababor | Hurumu | Mettu Mechi | 8°20'07.06"N | 35°43'29.91"E | 1822 |
| 357/09 | Iluababor | Hurumu | Mettu Mechi | 8°21'00.88"N | 35°44'14.66"E | 1636 |
| 358/09 | Iluababor | Hurumu | Yobidola | 8°21'00.18"N | 35°44'24.56"E | 1695 |
| 359/09 | Iluababor | Hurumu | Mettu Mechi | 8°19'54.58"N | 35°43'55.64"E | 1789 |
| 360/09 | Iluababor | Hurumu | Mettu Mechi | 8°20'19.89"N | 35°47'56.08"E | 1535 |
| 361/09 | Buno Bedelle | Chora | Abdella | 8°22'14.47"N | 36°14'58.79"E | 1947 |
| 362/09 | Iluababor | Mettu | Tulubbe | 8°19'28.43"N | 35°32'25.43"E | 1694 |
| 363/09 | Iluababor | Mettu | Tulubbe | 8°19'49.75"N | 35°32'17.86"E | 1699 |
| 364/09 | Iluababor | Mettu | Adale Bishe | 8°19'28.26"N | 35°36'39.14"E | 1670 |
| 365/09 | Iluababor | Mettu | Adale Gumar | 8°19'51.57"N | 35°36'37.08"E | 1710 |
| 366/09 | Iluababor | Mettu | Adale Bishe | 8°19'10.18"N | 35°36'21.29"E | 1668 |
| 367/09 | Iluababor | Mettu | Mettu Mechi | 8°19'15.42"N | 35°37'52.79"E | 1760 |
| 368/09 | Iluababor | Mettu | Adale Gumar | 8°19'03.01"N | 35°37'06.00"E | 1686 |
| 369/09 | Iluababor | Mettu | Tulubbe | 8°20'42.11"N | 35°32'36.68"E | 1702 |
| 370/09 | Iluababor | Mettu | Mettu Mechi | 8°19'39.85"N | 35°40'06.85"E | 1770 |
| 371/09 | Iluababor | Mettu | Adale Gumar | 8°19'56.80"N | 35°46'07.38"E | 1429 |
| 372/09 | B.B | Didessa | Sasso | 8°35'39.43"N | 36°20'25.99"E | 1659 |

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| 373/09 | B.B | Didessa | Masara | 8°38'15.24"N | 36°22'43.41"E | 1671 |
| 374/09 | B.B | Didessa | Yembero | 8°38'00.28"N | 36°22'26.22"E | 1427 |
| 375/09 | B.B | Didessa | Yembero | 8°37'54.75"N | 36°22'20.67"E | 1432 |
| 376/09 | B.B | Didessa | Sasso | 8°37'45.79"N | 36°22'04.73"E | 1459 |
| 377/09 | B.B | Didessa | Sasso | 8°37'46.82"N | 36°22'02.86"E | 1463 |
| 378/09 | Jimma | Gumay | Naga Agayo | 8°09'17.74"N | 36°28'21.92"E | 2096 |
| 379/09 | Jimma | Gumay | Naga Agayo | 8°08'50.42"N | 36°27'56.25"E | 2244 |
| 380/09 | B.B | Didessa | Sasso | 8°37'48.74"N | 36°21'58.97"E | 1470 |
| 381/09 | B.B | Didessa | Yembero | 8°37'51.56"N | 36°21'28.53"E | 1427 |
| 382/09 | B.B | Didessa | Sasso | 8°37'58.10"N | 36°22'24.76"E | 1427 |
| 383/09 | B.B | Didessa | Yembero | 8°38'07.58"N | 36°22'16.42"E | 1450 |
| 384/09 | H.G.W | Jimma Geneti | Bikila Nagaro | 9°25'53.75"N | 37°04'00.90"E | 3016 |
| 384/10 | H.G.W | Jimma Geneti | Bikila Nagaro | 9°25'53.98"N | 37°04'20.75"E | 2945 |
| 386/09 | H.G.W | Jimma Geneti | Gidami Dabsho | 9°24'30.06"N | 37°03'54.72"E | 2929 |
| 387/09 | H.G.W | Jimma Geneti | Gidami Dabsho | 9°24'16.42"N | 37°03'53.10"E | 2911 |
| 388/09 | H.G.W | Jimma Geneti | Gidami Dabsho | 9°24'25.81"N | 37°04'13.78"E | 2703 |
| 389/09 | H.G.W | Jimma Geneti | Gidami Dabsho | 9°24'10.84"N | 37°04'13.18"E | 2706 |
| 390/09 | H.G.W | Jimma Geneti | Gidami Dabsho | 9°23'45.36"N | 37°04'03.17"E | 2843 |
| 391/09 | E.W | Gudeya Bila | Lanfaji | 9°17'55.86"N | 37°02'26.65"E | 2042 |
| 392/09 | E.W | Gudeya Bila | Lanfaji | 9°18'03.82"N | 37°02'24.11"E | 2051 |
| 393/09 | E.W | Gudeya Bila | Lanfaji | 9°18'10.48"N | 37°02'19.92"E | 2063 |
| 394/09 | E.W | Gudeya Bila | Lanfaji | 9°18'02.31"N | 37°02'51.32"E | 2060 |
| 395/09 | E.W | Gudeya Bila | Lanfaji | 9°17'55.39"N | 37°02'50.81"E | 2049 |
| 396/09 | E.W | Gudeya Bila | Walane Lemu | 9°21'03.48"N | 37°02'08.19"E | 2251 |
| 397/09 | E.W | Gudeya Bila | Walane Lemu | 9°20'53.47"N | 37°02'16.31"E | 2289 |
| 398/09 | E.W | Gudeya Bila | Walane Lemu | 9°20'40.41"N | 37°02'35.54"E | 2277 |
| 399/09 | E.W | Gudeya Bila | Walane Lemu | 9°20'33.35"N | 37°02'46.15"E | 2329 |
| 400/09 | E.W | Gudeya Bila | Walane Lemu | 9°20'14.80"N | 37°02'55.30"E | 2238 |
| 401/09 | E.W | Gudeya Bila | Walane Lemu | 9°20'09.92"N | 37°02'47.05"E | 2192 |
| 402/09 | E.W | Gudeya Bila | Walane Lemu | 9°20'10.43"N | 37°02'11.83"E | 2252 |
| 403/09 | E.W | Gudeya Bila | Walane Lemu | 9°20'25.56"N | 37°02'18.44"E | 2230 |
| 404/09 | E.W | Gudeya Bila | Walane Lemu | 9°20'44.94"N | 37°01'50.14"E | 2332 |
| 405/09 | E.W | Gudeya Bila | Walane Lemu | 9°21'00.44"N | 37°01'54.05"E | 2338 |
| 406/09 | E.W | Gudeya Bila | Walane Lemu | 9°19'55.93"N | 37°02'15.88"E | 2216 |
| 407/09 | H.G.W | Jimma Geneti | Gamo Nagaro | 9°22'45.81"N | 37°04'18.96"E | 2509 |
| 408/09 | E.W | Gudeya bila | Bilo | 9°18'26.50"N | 37°03'11.15"E | 2117 |
| 409/09 | E.W | Gudeya bila | Ejere | 9°15'21.32"N | 37°02'41.72"E | 1974 |
| 410/09 | E.W | Gudeya bila | Chali | 9°18'09.28"N | 37°05'55.89"E | 2803 |
| 411/09 | E.W | Gudeya bila | Chali | 9°18'17.31"N | 37°05'41.32"E | 2873 |
| 412/09 | E.W | Gudeya bila | Gute Chacho | 9°19'26.04"N | 37°03'17.75"E | 2257 |
| 413/09 | E.W | Gudeya bila | Gute Chacho | 9°19'11.72"N | 37°03'24.73"E | 2237 |
| 414/09 | H.G.W | Horro | Burkitu Oborra | 9°28'13.59"N | 37°03'45.56"E | 2699 |
| 415/09 | H.G.W | Horro | Burkitu Oborra | 9°28'05.24"N | 37°03'17.31"E | 2676 |
| 416/09 | H.G.W | Horro | Burkitu Oborra | 9°27'08.97"N | 37°03'43.07"E | 3025 |
| | **10** | **40** | **127** | | | **1412-3025** |

**Key:** E.W-East Wollega, W.W-West Wollega, Q.W-Qellem Wollega, W.Sh-West Shewa, H.G.W-Horro Guduru Wollega, B.B- Buno Bedelle