# Effective Processing Methods on Intresinc Quality of Sidama & Yirgacheffee Coffee Types

**Abebe Assefa[1] Taye Kufa[2] Bizuayehu Tesifaye[3] John Barnabas[4]**
[1,2]Department of Horticulture [4]Department of Plant Science
[1,4]Gambella University, Post Box-126, Gambella, Ethiopia [2]Ethiopian Institute of Agricultural Research Centre, Holeta Agricultural Research Centre, Holeta, P.O. Box 31, Ethiopia
[3]Jimma Agricultural Research Center, P.Box 192, Jimma, Ethiopia

*Abstract*— Coffee quality can be affected by variety, climate and soil factor, field management practices and post-harvest handling and processing techniques. Arabica coffee (Coffee arabica L.) is an economically important crop, which is contributing the highest of all export revenues in Ethiopia. The study was undertaken in Dilla zuria and Yirgacheffee districts, representing the known Sidama Yirgacheffee coffee brands, respectively, in South National Nationalities Peoples' Regional State. The objective of study were to examine the effect of methods of processing on intrinsic quality of Sidama and Yirgacheffee coffees and to identified the best methods of processing that can keep the inherent quality of coffee landrace of Sidama and Yirgacheffee specialty coffee .For this, fully ripe red cherries were hand collected from local coffee types . The harvested cherries were separately study under three processing methods (washed, semi-washed and sundried) at the two locations. In each case the treatment arranged in factorial experiment in completely randomized design with three replication. Data on intrinsic quality (acidity, body, flavour and cup quality) were recorded .The result indicated acidity, body, flavour and cup quality were significantly different due to methods of processing at both sites. Among the processing method the wet processing resulted in the superior coffee qualities as compared to others at the two study areas. In addition, most quality traits significantly differ due to the interaction effects arising from location and processing method. The result finding also demonstrated that Yirgacheffee coffee was better than Sidama coffee types in terms of raw quality attributes, possibility due to positively effect of increased altitude in terms of quality attribute. The present findings would help at a small measure, on optimum processing practices to be applied at each locality and thus improve the inherent quality of Sidama and Yirgacheffee specialty coffees as the faces of increasing market demand for best coffee type. Nonetheless further repeated studies should be undertaken by taking into account among other the present physical and sensory attributes, other compounds and biochemical constitutes (caffeine, sugar. Etc.) With view of mapping the quality profile off Sidama and Yirgacheffe coffees grown under the various site and environmental conditions.

***Key words:*** Coffee, Methods of Processing, Quality, Acidity, Body, Flavour

## I. INTRODUCTION

Coffee is produced in more than 70 countries and is the mainstay of most of these countries, accounting for over a large proportion of their total export earnings. Over 97% of the total coffee production in the world is, however, produced by 45 producing countries. For most of these coffee producing countries, it is the major source of foreign currency earnings as well as a significant proportion of tax income and gross domestic product. Ethiopia is one of the countries which heavily depend on coffee, being the sixth producers in the world (ITC, 2002).

Ethiopian Economy is highly dependent on agriculture. Among the agricultural production, Coffee sub-sector plays a major role in the economy of the country. Arabica coffee is the biggest source of foreign currency earning and has a major contribution to Gross Domestic Product (GDP) (Surendra and Ann, 2000), Which takes the lion's share of the foreign exchange earnings, fetching up to 35% the total GDP. Coffee cultivation plays a vital role both in the cultural and socio-economic life of the nation. About 25 %,( 15 million) of the Ethiopian population depend, directly or indirectly on coffee production, processing and marketing (Esayas, 2005).

Quality is defined by international organization for standardization (ISO) as "the ability of a set of inherent characteristics of a product, system or process to fulfill requirement of customers and other interested parties". Generally, Coffee quality comes from a combination of the botanical variety, topographical conditions, weather conditions, and the care taken during growing, harvesting, processing, storage, export preparation and transport (ITC, 2002). Therefore, in present context of over production and low prices of the coffee market, improvement and valorisation of coffee quality could provide the coffee chain with a new momentum.

The Yirgacheffee and Dilla Zuria Woredas is the main coffee growing area of SNNPRS (MOARD, 2006). In Yigacheffee, from total area of 30,407ha, 20.080ha is covered by coffee production, with improved or new planted, stumped trees and mother trees covered 2950ha, 1184.31ha and 15945ha respectively. In Dilla zuria woreda from total of 13,934ha, 10,372ha is covered by coffee production with improved, stumped and mother trees. According to Bartolo (2008) the Yirgacheffe coffee the king of the flavour in the world with unique character of test and flavour incompetent quality. This idea also supported by Bellachew et al (2006) Yirgacheffee and Sidama brand are now internationally recognized and registered as properly right to Ethiopia with their distinct character /flavour and taste. AS ISO (2003a) stated most importers prefer wet processed coffee rather than dry processed which have superior price with superior quality. In both area, the wet processing of coffee products play major role for farmer sustainability. Even if dry processing methods are highly dominate in the areas, the farmers are getting premium price from wet processed coffee.

According to Silvetz and Desrosier (2005) the method of processing of coffee determines the quality. The three main methods of processing are wet, dry and semi-

 

washed. Wet processing is preparation of coffee by using apple amount of water that involves cherry harvesting, pulping and mucilage removal, dry processing is preparation of coffee by using natural sun involves harvesting, drying and hulling and the semi-wash process is the skin of the fresh cherry is physically removed by a pulpier machine with addition of water, as with full-wash processing. Notably this process does not ferment the mucilage as it is mechanically removed. Immediately after pulping, the clean parchment is ready for drying until the bean inside reaches 12% moisture.

According to ISO (2004) quality in coffee is keeping the inherent characteristics of cherries this is mostly affected by genotype, environment, processing methods, fermentation, storage conditions etc. Proper management and appropriate process can not at all improves the inherent quality of an input, it rather maintain it (Kamau and Warugun, 2002). On the other hand, bad processing can easily spoil the very good inherent quality of an input. Poor quality inputs can never be improved by good processing. Therefore, quality coffee can only be obtained from the field, which means proper selection of seed from the farm (Asledu, 1990).

Wet method is mainly used on Arabica coffee and is extensively used in Kenya. It produces superior quality coffee, which require more care than dry processing, Hence, the beans appearance, thus rendering the batches more valuable (Michael, 1963). Any coffee, be it Arabica or another type, does not belong to this superior category but still processed by the wet method, is qualified as wet. In Ethiopia, wet processed coffee only covers 30% and 70% prepared by dry processing (MOARD, 2008). Fully washed is the name given to coffee prepared by wet processing that has been fermented (Michael, 1963)

The main problem of wet processing in coffee quality is fermentation time. Under and over fermentation cause a great problem in both raw and cup quality of coffee (FAO, 2002). According to Silvetz and Desrosier (2005) little over fermentation cause onion flavor in cup and final over fermentation leads to development of stinker beans, which affect all lot of parchment coffee cause, foul or urea test in cup, decrease raw attractiveness of coffee, and become red color in appearance. In addition, the methods of processing affect the inherent quality of by damaging the physical appearance of coffee and by changing its superior quality when test.

Since, due to this existing gap concerning coffee processing to keep inherent quality, and method of processing have a significant effect on coffee quality so that the objective of study were to examine the effect of methods of processing on intrinsic quality of Sidama and Yirgacheffee coffees and to identified the best methods of processing that can keep the inherent quality of coffee landrace of Sidama and Yirgacheffee specialty coffee. Therefore, it is undoubtedly very crucial to carry out research activities in order to properly manage our green gold resource coffee and to be competent in the worldwide by keeping its unique inherent quality standards.

## II. MATERIALS AND METHODS

### *A. Description of Study Area*

The study was conducted in the Gedeo zone, Dilla Zuria and Yirgacheffee woredas during the main coffee-harvesting season. They are located 365km and 395 km, respectively, south of Addis Ababa –Moyale road in South Nation Nationalities and Peoples Regional State (SNNPRS). The studies were conducted at Dilla Zuria Woreda at Chichu coffee wet processing Limited Company and at Yirgacheffee Woreda Huffurisa coffee wet processing co-operative Company.

The Yirgacheffee site was located within latitude of $8^0$20'N and longitude $42^0$16'E and at an elevation of 2400 m.a.s.l .The area had a humid climate with an average annual air temperature of $20^0$ C. The monthly mean temperature ranges from highest $28^0$ C to the lowest $12^0$ C. The average annual precipitation was about 2150 mm, which ranges from 1800 to 2500 mm. The high rainfall felled between August and November and the medium rainfall season felled between March and June. Concerning the agro-ecological coverage, 92 % was highland (dega) and 8 % was medium altitude (woina dega). From total area of 30407 ha, 20,080 ha was covered by coffee production, with improved (new planted), stumped trees and mother tress covered 2950 ha, 1184.31 ha and 15945.69 ha respectively. Concerning coffee growing peasant Associations from 30 peasants, 24 were major, 4 were medium and 3 were low coffee produces. The area had both wet and dry processing plants/companies. There were 38 wet processing companies of which 29 were owned by private companies, and 9 were owned by co-operative companies. And also 16 dry processing companies, of which 12 privately owned, 1 owned by co-operative and 3 owned by government.

The Dilla Zuria site was located within latitude of $6^0$20' N and longitude $38^0$ 16'E and at an elevation of 1500 m.a.s.l. It was possess sub-humid tropical climate receiving mean annual rainfall of 1500 mm, which ranges from 1200 to 1800 mm. The rainfall pattern was bi-modal, with short rainy season between March and May, accounting for about 30 % of total rainfall, and long rainy season lasts between July and October, accounting for more than 60 % of total annual rainfall. The mean monthly air temperature was $21.5^0$ C with mean monthly maximum and minimum temperature of $25^0$ C and $18^0$ C, respectively. From total area of 13,934 ha, 10,372 ha was covered by coffee production, with improved (new planted), stumped and mother trees. The area had both wet and dry processing company. There were 18 wet processing plants, of which 14 were private companies owned and 4 were co-operative companies. There were also 16 dry processing companies, 14 were privately owned, and 2 were owned by co-operative.

### *B. Materials*

The materials that were used in the experiments are coffee cherries, plastic fermentation pot, pH meter, shading materials, fermentation water, pulping machine, washing pot, coffee drying bed, cups, moisture measurement instrument, roasting machine, screen saver, spoons. The coffee fruits were collected from the local farmer.

 

### *C. Experimental Design & Layout*

Two experiments were carried out in the two locations, Dilla Zuria and Yirgacheffee woredas. The experiment was carried out to compare the quality different between natural (sundry), wet and semi-washed processing with three replication. Hence, the total treatment combinations were 6 in the two study sites. Completely randomized design (CRD) with three replications was used to analyze the data under the more homogeneous laboratory conditions, where environmental effects are relatively easy to control (Gomez and Gomez, 1984).

### *D. Experimental Procedure*

Harvesting coffee: The ripe red coffee cherries were selectively picked by hand.

*1) Sorting Coffee*

Before pulping, any foreign materials were selectively sorted. Also over ripen, under-ripen, empty cherries and dry beans were sorted out.

*2) Pulping Coffee*

The selectively picked and sorted red cherries were pulped by using pulping machine.

*3) Pre-Grading Parchment*

All floater beans and unpupled bean husks were removed from pulped coffee.

*4) Fermentation of Coffee*

The selectively pre-graded coffee cherries were fermented in plastic fermentation pot under shade condition.

*5) Drying*

The fermented parchment coffee was dried by passing different stage of drying until the moisture reach to 10.5%.

*6) Coding*

Each sample was coded according to the procedures employed under the coffee Quality Inspection & Auction center for the lab analysis

*7) Raw Coffee Evaluation*

The raw coffee was evaluated according to parameters set by Quality Inspection & Auction center for the lab analysis

### *E. Amount of Red Cherry*

The composition of coffee fruits and clean coffee yields varies depending on coffee type and variety (Coste, 1992).

For Arabica coffee, 100 kg of ripe cherries decompose into about:

- 39 kg of dry pulp (16 kg of dry pulp)
- 22 kg of mucilage
- 39 kg of moist parchment coffee
- 100 kg of moist parchment coffee provides about:
- 79 kg of dry parchment coffee
- 54 kg of dry clean coffee

Since the coffee in this experiment area was Arabica species, it was conducted by using 120 kg of ripe fruit per replication. This was provided 39 kg of moist parchment coffee and this amount was decomposed to six treatments, 7.8 kg per treatment. This was yield 6.12 kg of dry parchment per treatment. Finally, this was provide 4.12 kg of dry clean coffee. The same amount of ripe fruit cherries were used for the experiment of methods of processing

### *F. The Amount of Water*

The amount of water used to ferment 1kg of moist parchment is 3 lit (coste, 1992). In this experiment, for each treatment 7.8kg x3lit=23.4lit of pure water was used. For total treatments 54.6kg x 3lit =163.8lit of pure water was used. The size of pots for fermenting 7.8 kg of moist parchments coffee was 0.023 $M^3$.

### *G. Sampling & Sample Size*

Three farmers to each site were selected with criteria that have high yielding coffee trees and best cultivation practices. From each farmer the coffee trees, which have best production randomly selected to each treatment, that means selection of high yielding coffee trees per treatments. Therefore, total sizes of samples were 42 high yielding coffee trees in both sites. The coffee cherries were collected from young or old stumped high yielding trees.

### *H. Parameters*

Both qualitative and quantitative coffee quality parameters were taken. The laboratory measure was done in Addis Ababa Quality Control and Auction center.

*1) Qualitative Parameter*

Parchment analyses were taken and overall observation of parchment like color, fermentation (over or under), improper fermentation, etc. were seen and evaluated. .

*2) Quantitative Parameter*

a) Cup Quality Coffee Analysis

To analysis cup quality, five cups were filled with liquor and at least three cuppers were evaluated, the average of three cuppers were taken and evaluated from 60 %. The cup quality analysis accounts for 60 % depending on the following standard parameters.

(1) Acidity

It indicates the sweetness of coffee. This parameter was evaluated from 20 %. If the acidity of coffee is pointed, it was score 20 %. If the acidity of coffee is medium/pointed, medium, light and lacking it was scored 15 %, 10 %, 5 % and 2 % respectively.

(2) Body

It indicates fullness of coffee throughout in mouth. This parameter was evaluated from 20 %. If the body of coffee is full in mouth, it was score 20 %. If the body of coffee is medium/full, medium, light and thin in mouth, it was score 15 %, 10 %, 5 %, and 2 %, respectively.

(3) Flavor/character

It indicates the origin of coffee. This parameter was evaluated from 20 %. If the flavor of the coffee very good (shows the origin of production), it was score 20%. If the flavor of the coffee is good, average and fair, it was score 15 %, 10 % and 7 %, respectively.

(4) Combined parameter

The cup quality value of each replication was taken and evaluated the coffee from 60 % and analyzed.

### *I. Statistical Analysis*

Quantitative data for each parameters was subjected to analysis of variance (ANOVA) using the procedures described by Gomez and Gomez (1984). SAS computer software was employed for data analysis. Simple correlation coefficients between the relevant parameters were made.

 

## III. RESULT & DISCUSSION

### *A. Acidity & Body*

Both acidity and body were significantly (P<0.05) influenced by the methods of processing at both experimental areas. The highest value of acidity was observed m wet processed coffee in both experimental areas. This result indicated that wet pressed coffee was found to be more acidic than that of dry processed coffee. The highest values were 20.00 and 18.33 for Yirgacheffce and Sidama coffee, respectively (Table 1). This is because the acidity of coffee increased when the altitude increased. The higher body value was observed in sun dried coffee at both areas. This showed that sundry processed coffee had heaver body than that of wet processed coffee. The higher value for Yirgacheffc was 20 and for Sidama was 18.33 (Table 1). These values indicated that when altitude increased the fullness of coffee in mouth (body) also increased.

This result agreed with Jackcels and Jackels (2005) who indicated the fermentation in wet processed coffee had two things it broke down the cellulose of the mucilage layer converting the parchment husk enclosing the bean and it increased the acidity of the coffee. The result in line with Vincent (1987), Davids ( 2001) and Anon (2001); that carefully produced dry processed coffee can be as good or even better (with its more complex fruity sweet and lull bodied flavor) than wet processed coffee. Davids (2001) confirmed that coffees processed by the dry and semi dry (pulped naturals) methods tend to be the fruitiest, most complex and have the most body owing to the longer contact with fruit residue during drying.

This was confirmed by Si vetz (1972) who reported that the acidity levels should be the greatest and the body the least in wet processed coffees. On the contrary, the body should be the greatest and the acidity the lowest in samples of dry processed coffee. This agreed with Wrigley (1988) in that the process method where the mucilage is left on the parchment (semi- washed). The acidity and body levels can be around the average. Castle et al (2006) who showed that dry processed coffees can exhibit more variance from cup to cup and a slightly lower acidity but fuller body than their wet processed counters parts. This agreed with Bacon (2005) who reported that the drying of the whole cherry imparts full body and natural sweetness to the beans.

The two-way interaction effect between location and processing method was significant (P<- 0.05) on the acidity and body of coffee. The highest values for acidity and body were observed lot the wet and dry processed Yirgacheffe coffees respectively. The lowest acidity value was observed in the sun dried and semi-washed coffee. In addition, the least body was record semi-wet processed coffee. In case of Sidama coffee, the highest acidity value was observed for the wet processed coffee. Whereas, sun drying resulted in the highest body and in the lowest acidity (Table 1)

| Location Processing method | Acidity | Body | Flavor |
|---|---|---|---|
| Sidama Sun dried | 10.00” | 16.33s | 7.00c |
| Washed coflee | 16.33“ | 11.67" | 16.00“ |
| Stint-washed | 13.30" | I2.33‘ | 10.67” |
| LSD (P - 0.05) | 4.71 | 4.48 | 3.58 |
| CV (%) | 16.97 | 16.67 | 15.68 |
| Yirgacheffe Sun dried | 11.67b | 18.33*’ | 9.00” |
| Washed | 18.33* | 13.67 ’ | 16.67s |
| Semi-washed | U.67h | 12.57” | 9.00” |
| LSD(P = 0.05) | 5.57 | 5.76 | 5.1! |
| CV (%) | 20.78 | 20.78 | 20.57 |

Table 1: Influence of Methods of Processing on the Cup Quality of Coffee

Mean values showed by the same lctter (s) within a column are not significantly different at 0.05

The acidity of coffee was very highly positively significant correlated with cup quality (r= 0.91***), highly positively significant correlated with flavour (r=-0, 90**) and negatively highly significantly correlated with body (r= -0.59**) in the Sidama coffee. Moreover, the acidity of Yirgacheffe coffee very highly positively significant correlated with total quality (r =0.91 * * ) highly positively significant correlated with flavour (r =0.85**), cup quality at (r= 0.89**) and negatively highly significantly correlated will body (r = -0.44**). The body of Sidama coffee was very highly positively significantly correlated with cup quality (r = 0.39*••) and highly positively significant correlated with flavour (r = 0.69**). In addition, the body of Yirgacheffee very highly positively significant correlated with cup quality (r = 0.06***) and highly positively significant correlated with flavour (r = 0.67**)

### *B. Coffee Flavour*

At both locations the different processing methods had highly significant (P<0.01) effect on Coffee flavour Hence. The highest value of flavour is observed in wet processed coffee at both experimental areas (Table 6). The highest respective value of' 16.67 and 20.00 was obtained for Sidama and Yirgaeheffe coffees. The result indicated that the wet processed coffee Cherries had pleasant flavour as compared with the methods. The result also showed that the coffee produced in higher altitude had Spicy flavour than the coffee processed in lower altitude. The result corroborated with the work done by Alpizar and Bertrand (2004) in that when the altitude increased the flavour of coffee increased from floral to Spicy.

The present finding is line with Clarke (1985) that wet processed coffee had increased flavor and body and thus the coffee develops sweet berry flavour. In contrast sundry and semi-washed can help in mechanically removing the mucilage from the coffee bean. Davids (2001) reported that where the coffee was pulped and fermented., consistently good acidity and sweet fruity flavours were recorded as opposed to the sun dried and semi-wet processed coffee .This was supported by Kubale (1979) in that prepared using wet processing was described as sweet, Clean, tangy, good acidity, floral and nutty flavour. Whereas some of the samples produced with the sundry were described as harsh, sour and astringent flavor. Bytof et al. (2000) suggested that post-harvest process can affect the balance in low molecular Weight compounds, key precursors of coffee aroma and flavour. As Selmar et. al. (2001) indicated, the wet processed Arabica clones had higher levels free Carbohydrates (glucose; fructose and galactose); Organic acid (quince, phosphoric and oxalic acid): mineral compounds ($K^{+}$, Ca +, Mg*2 and Cu+2) and trigonelline, Moreover, Balyayu and Clifford (1995) found wet processing can result in higher

 

levels of chorogenic acid, lipids and cell wall polysaccharides (arabinogatactans) and Storage polysaccharides (mannas).

The effect of the interaction of methods of processing and location had significant effect (P<_0.05) on flavour. The highest value Observed at Yirgachetïe coffee processed by wet whereas the lowest value observed in sundry and semi-wet. The coffee processed Sidama, the highest value Observed in wet and lowest value in sundry coffee (Table 1).

The flavour of positively very highly significantly correlated with cup quality (r= 0.74***) and in the Yirgacheffee coffee. In addition, the flavor of coffee positively very highly significantly correlated with Cup quality(r = 0.92***).

### *C. Cup Quality*

The cup quality of coffee was significantly (P<0.01) influenced by the methods of processing coffee at the both experimental areas. The result indicated that the methods of processing had a large impact on the liquoring quality (cup quality) of the coffee. The wet processing of coffee had highest value (50, 34 and 46.00) at Yirgacheffee and Sidama coffee respectively than that of sundry and semi-wet processed coffee (table 2). This showed that the wet processed coffee produce superior cup quality than that of sundry and semi-wet processed because coffee was not over and under fermented in both experimental areas. Even if there was no significantly (P>_0.05) differences between the semi-wet and sundry processed coffee, the semi-wet had score higher value (46.07 and 37.00) Yirgacheffe and Sidama respectively than that of sundry coffee.

| Location | Processing method | Cup quality | Total quality |
|---|---|---|---|
| Sidama | Sun dried | 35,3032223$^{b}$ | 64.07$^{b}$ |
| | Washed coffee | 42.00$^{a}$ | 87.33$^{a}$ |
| | Semi-wet | 37.00$^{b}$ | 65.00$^{b}$ |
| | LSD (P=0.05) | 5.81 | 8.13 |
| | CV (%) | 7.18 | 5.62 |
| Yirgacheffee | Sundried | 39.00$^{ba}$ | 64.66$^{b}$ |
| | Washed coffee | 49.07$^{a}$ | 90.33$^{a}$ |
| | Semi-washed | 46.07a | 67.00b |
| | LSD(P=0.05) | 9.03 | 14.34 |
| | CV (%) | 11.24 | 10.29 |

Table 2: The Influence of Methods of Processing on the Cup Quality and Total Quality of Sidama and Yirgacheffee Coffee

Mean values showed by the same letters (s) within a column are not significantly different

The report by Castle et al. (2006) is in line with the present result of semi-washed processing methods, which did not significantly offer from that of the natural sun dried coffee. Hence, there is no risk of unripe cherries interfering with the cup. Either method was yield coffees that were sweeter and somewhat less acidic than those that undergo a fully washing process (wet processes). As kulaba (1979) reported wet processing generally produces a more consistent quality compared to dry processing: however, even wet processing does not guarantee perfect quality as many factors can go wrong if not carefully managed. For example, delays in processing after harvest can lead to fermentation within the fruit giving off tastes.

This result in line with Selmar et al.(2001) using fermentation (wet processes) instead of mechanically removing the mucilage growers believe the flavour increases as well as the body and the coffee develops sweet berry flavour finally with best cup coffee quality . While dry processing can produce a coffee with more body and more complex fruity flavor with less acidity, occasionally these coffees will be strong and harsh in taste and contributed to less cup quality.

The research done by Clarke (1985) indicate that samples pulped but not fermented (i.e. the mucilage is left on the parchment and dried or semi-wet) produced the best quality coffee with good acidity and body, sweet fruity flavour and smooth balanced pleasant cup. On his finding the fully fermented (wet processed) coffee best quality than semi-wet if only if the coffees was over fermented. The result also agreed with Vincent (1987) reported the poorest quality coffee was from the beans that were dried in the fruit (sundry). These coffees described as being defective, astringent, better, sour, over fermented, rough, medicinal and winey. As the result showed that, the methods of processing with higher value seen the coffee processed at Yirgacheffe. This is because Yirgacheffeee coffee produced at higher altitude than that of Sidama coffee, when the altitude increased, the cup quality was increased.

The effect of the interaction of methods of processing and location had significant effect (P<_0.05) on the cup quality of coffee. The higher value observed at Yirgacheffe in coffee processed by wet and lowest value observed in sundry processed coffee. In Sidama coffee, on the higher value observed in wet processed coffee lowest value observed in sundry processed coffee (table 2).

## IV. SUMMARY & CONCLUSION

The quality of coffee is primarily determined by agro-ecology, genetic make-up management practices applied to coffee trees and post-harvest processing handling. It is highly associated with consumers' satisfaction and is an important aspect to remain in the increasing competitive global market. In this regard, maintenance of the inherent quality of the known Ethiopian specialty coffees is of paramount importance. This requires above focused efforts of expanding the improved technologies including pre-and post-harvesting operations.

This effect, this study was carried out to evaluate the effect or processing methods on the quality of Sidama and Yirgaeheffe coffees. The result depicted significant differences due to main treatment and their interaction effects. The effect of location in washed coffee was evident, largely indicating contribution of factors including temperature. With regard to processing methods the wet processed coffees had the most desirable qualities at both localities. Suggesting the need to enhance the use of low-cost and environmentally friendly small-scale pulping. The results indicated that the methods of processing influencing the liquor quality of coffee .At both locations, semi-wet processing resulted in medium quality responses. The result also revealed that wet processed had superior cup quality as

 

compared with other processing treatments. This was particularly the case when the coffee was not over or under fermented. Moreover, the result underlined that the body of dry processed coffee had fuller body than the wet and semi-wet processed coffee. However, the wet processing resulted in good acidity when compared with other methods. The combined effect of location by processing was found significant for most quality parameters such as acidity, body, and flavour and cup quality.

From the result we can recommended the best methods of processing is wet processed methods. In all case maximum care should be taken not to over-ferment the coffee above the optimum period at each location. But further works involving among others, the diverse coffee varieties, environmental conditions and field management practices, harvesting, processing and storage of dry coffee should deserve focused attention in improving the inherent quality of specialty coffees in the different agro-ecologies and production of Sidama and Yirgacheffee areas.

## REFERENCE

[1] Anon (2001).coffee processing .coffee research organization.P1-10
[2] Alpizar E.and Bertrand (2004). Incidence of elevation on chemical compostion and beverage quality of coffee in Central America. Available on line at www.asic.Com/pdf
[3] Asledu J.J(1990).Processing tropical crop technological approach.ELBS Edition .Hong
[4] Bacon C (2005). Confronting the coffee crisis:can fair trade,organic and specialty coffees reduce small-scale farmer vulnerability in northern Nicaragua. World Devel. 33:479-511
[5] Bartole J,D (2008).Ethiopia Yirgacheffee coffee review, New York coffee minister
[6] Balyaya DK.J.and Clifford M.N. chlorogenic acid and caffeine contents of monsoon Indian
[7] Arabica and robusta coffees compared with wet and dry processed coffees from the same geographic area. In:proceedings of 16th ASIC
[8] Bellachew Bayetta and Labouise J (2006).arabica coffee local landrace development strategy in its center of origin and diversity. International Conference coffee Science 21st Montpellier,France
[9] Bytof G.,Selmar D.,and Schieberle P (2000). New aspect of coffee processing: how do the different post-harvest treatments influence the formation of potential flavour precursors applied botany,74 (200),131-136
[10] Castel T and Starr J (2006). Green coffee processing. Montly magazine published by coffee board of india. Available on line at www.supramatie.com//coffee--1.htm
[11] Clarke, R.J (1985). Green coffee processing. In coffee botany,biochemistry and production of beans and beverage. Clifford, M.N&Willson,K.C.Ed.1985
[12] Coste R (1992). Coffee: the plant and product. The Macmillan press L.TD, Hong, Kong
[13] Davids,K.(2001). Processing: Flavor and processing method in coffee Review,reference section p1-4
[14] Desrosier and Sivetz. (2005). Coffee technology Westport,connectical.AVI publishing company
[15] Esayas, A. 2005. Molecular genetic diversity study of forest coffee tree population in Ethiopia: Implication for conservation and Breeding. Doctoral thesis, Alnarp, Sweden.
[16] Food and Agricultural organization (2002). Post-harvest handling and processing of coffee in
[17] African countries. FAO CoRpoATE Document Repository. Available on line at http:/www.fao.org
[18] Gomez, K.A.and GomezA.A. (1984). Statistical procedures for agricultural research 2nd ed,JSohn Willy and Sons.Inc.,New York.
[19] International Trade Center (ITC). 2002. Coffee, product and market development, an exporter's guide. UNSTAD / WTO. Geneva
[20] International organization for standardization (2003a) .International Standard ISO 6673-2003
[21] International organization for Standardization (2004). International standard ISO 10470:2004
[22] Jackeles S cand Jackels CF. (2005). Characterization of the Coffee Mucilage Fermentation process using chemical Indicators:A Field Study in Nicaragua. J.Food sci.70:C321-C325
[23] Kamau and Warugunu A. (2002). General information on the process coffee undergoes before
[24] getting to the final consumer: Available on line http://WWW batian peak coffee.com/coffee-101,htm
[25] kublaba,G.W (1979). Coffee processing. Research a review Kenya Coffee 44,P23-34
[26] Michale S.M (1963). Coffee processing technology aromatization,properties ,brewing and Ministry of Agriculture and Rural development (2006). Sustainable production and supply of fine Arabic coffee to the world.Addis Ababa, Ethiopia
[27] Ministry of Agriculture and Rural development (2008). Sustainable production and supply of fine Arabic coffee to the world.Addis Ababa, Ethiopia selmar ,D.,Butof,G.,Knopp E(2001). New aspect of coffee processing: the relation between seed germination and coffee quality. 19th ASIC proceedings (2001)
[28] Sivetz (1972). How acidity affects coffee flavor. Food technology champaign 26. 70-77
[29] Surendra, K., and Ann, G. 2000. ICO/CFC Study of Marketing and Trading Polices and Systems in Selected Coffee producing countries: Ethiopia Country Profile.
[30] Vincent, J.C (1987).Green coffee processing. Coffee volume 2 P1-33, London
[31] Wrigley, G (1988). Coffee. Longman Scientific and Technical LtD., England

 