

Identification of Variety and Its Suitable Cherries Processing Method for Improving Specialty Arabica Coffees from Dry Climate Area at Flores Island of Indonesia

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SUMMARY

Flores island is one of an important specialty coffee origins from Indonesia. The island lays on the Lesser Sunda islands chain of eastern Indonesia which is characterized by a relatively dry agro-ecological climate.

A study to identify Arabica coffee varieties grown in the area and suitable processing for each variety to improve specialty coffee quality in Flores was conducted during the 2009 harvest season. Variety identification was conducted by making survey at the Arabica coffee farms in Ngada Bajawa highland. Three processing methods consisted of wet process by dry hulling (WPDH) or 'full-washed', wet process by wet hulling (WPWH) or 'wet-hulled' and decascado or pulped natural (PN) were applied to three dominant varieties. Quality here was observed by sensory analysis to mean cup quality. Cup taste profiles were judged by 44 domestic and international panelists by evaluating fragrance and aroma, flavor, acidity, body, after taste, balance and preference (overall).

The result showed that the three dominant Arabica coffee varieties being grown by smallholder farmers in Flores were 'Juria' (Typica type), S 795 and Hybrid of Timor (HdT) progeny. Based on cup profile the most preferred variety under Flores conditions was S 795, which was sequentially followed by HdT and Juria. S 795 presented an excellent cup profile with nice balance and strong sweet tones. In general, there was no significant effect on cup taste profile when the three different processing methods when applied to S 795. However, WPDH resulted better flavor, acidity and after taste than that of WPWH and PN. In contrast WPWH showed better body, balance and preference than that of WPDH and PN. PN only showed better fragrance and aroma than that of WPDH and WPWH. Therefore to have excellent cup profile it is suggested to apply WPDH and/or WPWH on S 795 under Flores condition.

HdT is also promising to be grown in Flores, especially for less fertile soils. Since the variety still presents morphological heterogeneity, breeding measures must be carried out mainly through selection to identify the best progeny. The best processing method to be applied in this variety was WPWH, which resulted in a better performance according to all taste components compared with that of WPDH and PN. This research emphasizes the continued importance of local conditions in determining recommendations for quality improvement based on both planting materials and processing methods.

INTRODUCTION

Indonesia produces a number of specialty coffees having distinct and unique taste profiles from different geographic origins.

Consumption of specialty coffee is growing such as in the USA which 17 % of the adult population consumed a gourmet beverage on a daily basis in 2008 compared with 14% in 2007 (NCA-USA, 2009). Specialty coffee (including espresso, cappuccino, latte, and ice blend) consumption in Canada also increase from 6 % in 2007 to be 7 % in 2008 (Elliot, 2008).

Taste and flavor requirements vary considerably with market segments. For instance, in northern Europe there is a general preference for acidity, light body and pleasant flavor of the cup, while in the south the coffee should taste sweet with a full body and strong flavor (Barel and Jacquet, 1994 cit. Van der Vossen, 2009).

Result from a study in Honduras showed that high altitudes and annual rainfall of less 1500 mm were favorable factors for the sensory quality, and an optimum roasting time must be sought for each type of coffee, hence for each *terroir* (Decazy et al., 2006).

Flores Island is considered as dry area and it also consists of a number highland area suitable to grow Arabica coffee, including Ngada Bajawa highland at the slope of Inerie volcano. This study was aimed to identify varieties of coffee Arabica suitable for Flores highland condition dealing with taste profile.

MATERIAL AND METHOD

This study was carried out at Arabica coffee growing area of Ngada Bajawa highland in the island of Flores during harvesting season of 2009. The area is characterized by fertile volcanic soil and dry climate.

Variety survey was conducted over 5 villages representing 14 villages by making morphological identification of different varieties grown by the farmers. Variety proportion of each variety was estimated by making consultation with the local peoples. Three dominant varieties were chose for processing trial in order to identify suitable method for such variety.

Three processing methods consisted of wet process by dry hulling (WPDH) or 'full-washed', wet process by wet hulling (WPWH) or 'wet-hulled' and *decascado* or pulped natural (PN) were applied to three dominant varieties. Quality here was observed by making sensory analysis to mean cup quality. Cup taste profiles were judged by 44 domestic and international panelists by evaluating fragrance and aroma, flavor, acidity, body, after taste, balance and preference (overall).

RESULT AND DISCUSSION

Variety identification

There were 7 Arabica coffee varieties identified in Ngada Bajawa highland as mentioned in Table 1.

Table 1. Arabica coffee variety grown by farmers at Ngada Bajawa highland of Flores island.

No.	Identified variety	Estimated proportion at village of (%)					Average
		Susu	Bomari	Ubedolumolo	Mangulewa	Were 1	
1	Andungsari 1	0	0	1	0	0	0.2
2	Catimor (unidentified)	3	2	2	1	0	1.6
3	Juria	5	10	15	15	20	13.0
4	Kartika 1	5	5	10	7	5	6.4
5	Kartika 2	2	3	2	2	0	1.8
6	S 795	55	45	40	40	35	43.0
7	Timor Timur (Hybrid of Timor)	30	35	30	35	40	34.0

Table 1 shows three dominant Arabica coffee varieties grown by the farmers are S 795 (43.0%), HdT (34%), and Juria (13%). S 795 is a progeny of natural hybrid of *C. Arabica var. Typica* and *C. liberica* selected in India. HdT is a progeny of natural hybrid of *C. Arabica var. Typica* and *C. canephora var. Robusta* found in Timor Leste (Van der Vossen, 2009). Juria is a local name for *C. Arabica var. Typica*. The three dominant varieties were harvested for cup profile identification by using different processing methods.

Preference of panelists to each variety

Preference most of the panelists to cup taste profile of such variety is presented in Figure 1. The highest percentage of prefer most of the panelists was belonged to variety S795 (48%), followed by Juria (27%) and HdT (26%). In contrast, the highest percentage of prefer least of the panelists was belonged to Juria (40%), followed by HdT (46%) and S 795 (24%). Mid preference was belonged to HdT.

However, the often heard assumption, that it is an interspecific hybrid and therefore should have many characteristics intermediate between Arabica and Robusta coffees including lower cup quality than a pure Arabica, does not appear to hold. The fully washed arabica coffees from Timor-Leste, in particular those grown at higher altitudes, are considered speciality arabicas comparable to some of the best mild Arabica coffees. Apparently, the coffee trade has been unaware of the fact that practically all these coffees are produced by HdT trees (Van der Vossen, 2009).

Typica variety is assumed by many people having excellent flavor, but in this study the taste panelists provided preference least for the variety. Taste deterioration could be mainly caused by defoliation due to coffee leaf rust (*Hemileia vastatrix*) attack. Defoliation caused over bearing so that the coffee beans were not fully filled. This situation will bother on the formation of taste precursors such as chlorogenic acid, caffeoylquinic acid, trigonellin, etc.

Agwanda et al. (2003) mentioned that the success of a new variety of Arabica coffee (*Coffea arabica* L.) depends to an important extent on its liquor and bean qualities. These families

were best differentiated for bean sizes in the site where moisture supply was optimal throughout berry expansion and filling stages, whereas discrimination on the basis of liquor traits were best observed in the site where moderate moisture stress occurred during bean filling stage.

Trigonelline and 3,4-dicaffeoilquinic acid and, to a lesser extent, caffeine, showed association with good cup quality, for both green and light roasted coffee. The fact that similar correlations between cup quality and chemical attributes were observed that chemical analysis of green beans may be used as an additional tool for evaluating coffee quality (Farah et al., 2006).

Genetic analysis indicated that caffeine content in seeds was quantitatively inherited and controlled by genes with additive effects. The estimates of broad-sense heritability of caffeine content in seeds were high for both generations (Priolli et al., 2008).

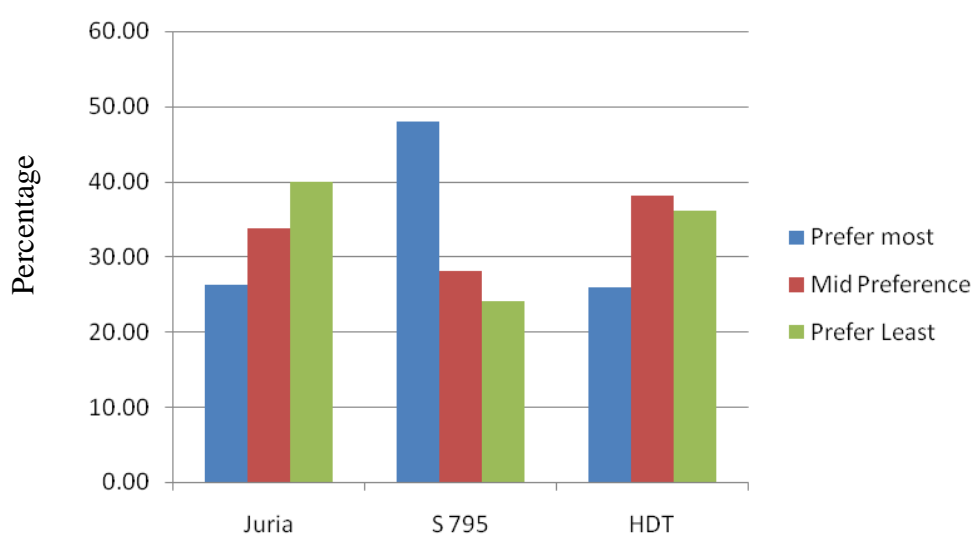


Figure 1. Preference of panelists to cup profile performed by each variety.

Cup profile of each variety

Cup profile of each variety processed by three different methods as mentioned in Figure 2. Under Ngada Bajawa highland of Flores island condition, S 795 variety performed the best cup profile compare to HdT and Juria varieties. Variety of S 795 performed excellent balance of fragrance and aroma, flavor, acidity, and body. An excellent sweetness characteristic was also detected on the variety.

Cup taste profile of HdT was slightly better than that of Juria. HdT performed better flavor, acidity, balance and aftertaste that that of Juria, however fragrance and aroma as well as body of the two varieties was similar.

Result of cluster analysis of cup profile based on three different varieties and three different processing methods as mentioned at Figure 3. There three groups of the treatments namely Group 1 (SFWPD, SFPN and SFWP), Group 2 (HFWPW), and Group 3 (JFWPW, HFPN, JFWPD, HFWPD, and JFPN).

Different processing methods have not affected on cup profile of S 795 under Flores condition. HdT was suitable to be processed by using wet hulling method. Dry hulling and pulped natural processing methods on HdT provided similar cup quality to Juria. As observed on S 795, the different processing methods application on Juria variety has not performed different cup profile as well.

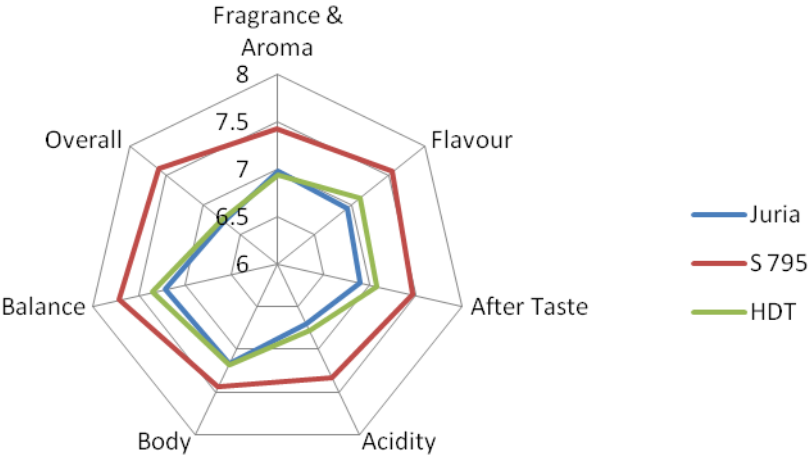


Figure 2. Average of cup profile on each variety processed by three different methods.

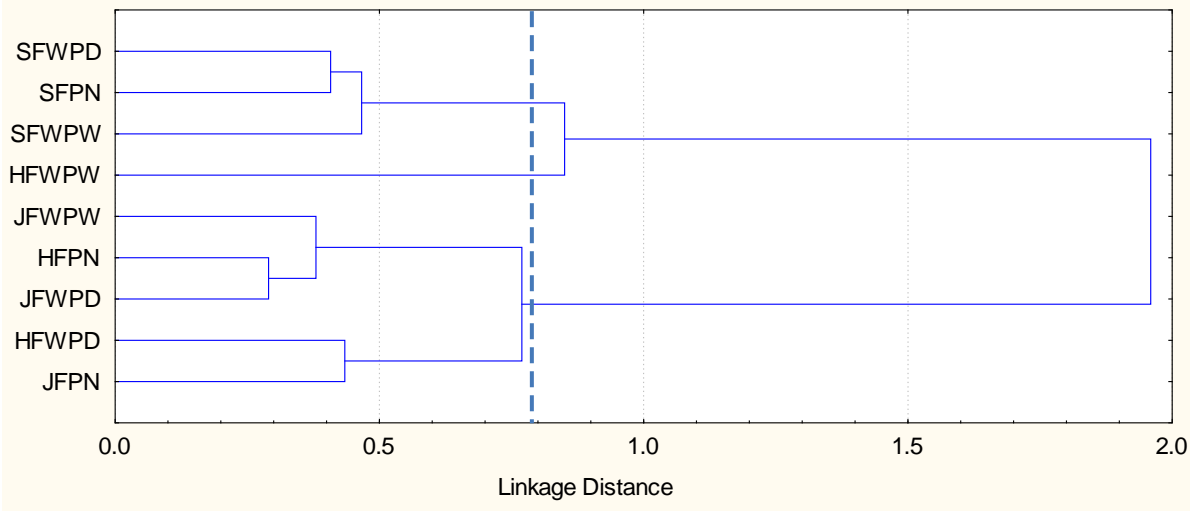


Figure 3. Cup profile similarity of three different varieties processed by three different methods. Note: SF – S 795 Flores, HF – Timor Hybrid Flores, JF – Juria Flores, WP – Wet Processed, PN – Pulped Natural (descascado), W – Wet hulling, D – Dry hulling.

Individual effect of each processing methods on S 795 variety is mentioned on Figure 4. Dry hulling method provided better flavor, acidity and after taste than that of the other two methods. In contrast, better body, balance and overall evaluation were performed by wet hulling. Pulped natural processing only performed better fragrance and aroma.

Wet hulling performed the best cup profile on HdT variety than that of the two methods, it followed by dry hulling (Figure 5). HdT apparently is not suitable to be processed by pulped natural (*descacado*) under Flores condition.

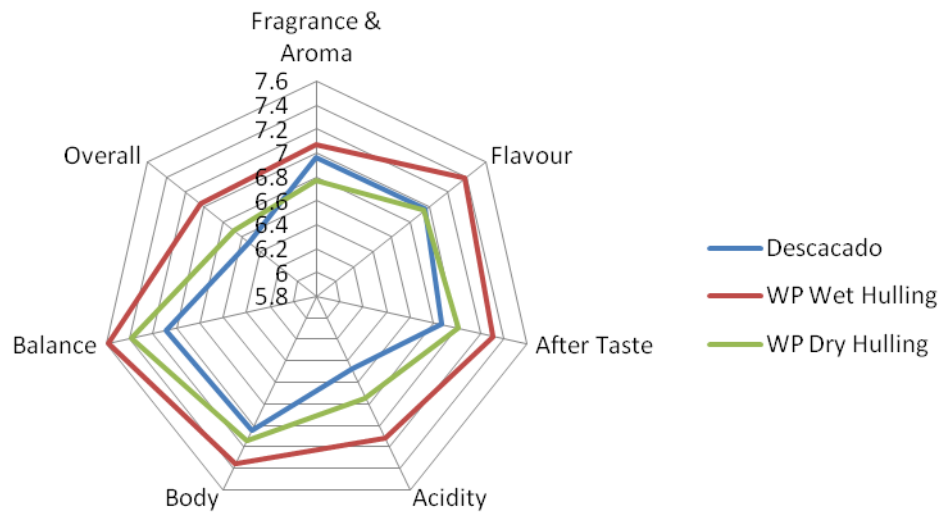


Figure 4. Cup profile performed by S 795 under three different processing methods.

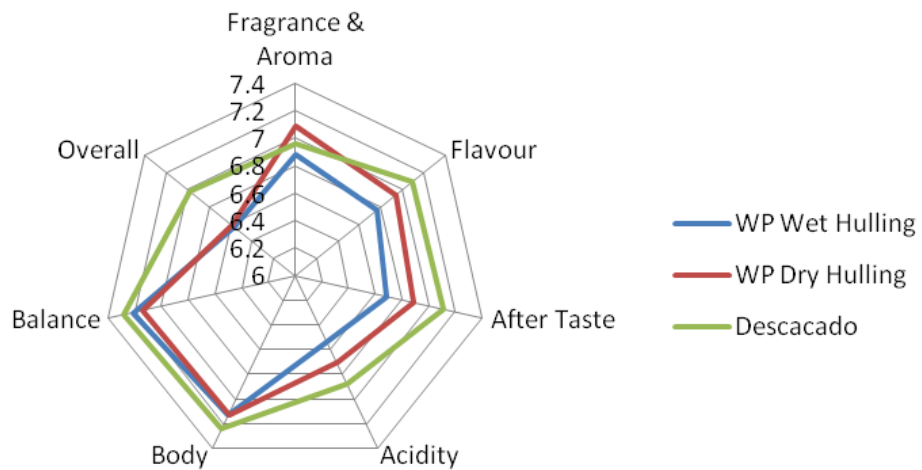


Figure 5. Cup profile performed by Timor Hybrid under three different processing methods.

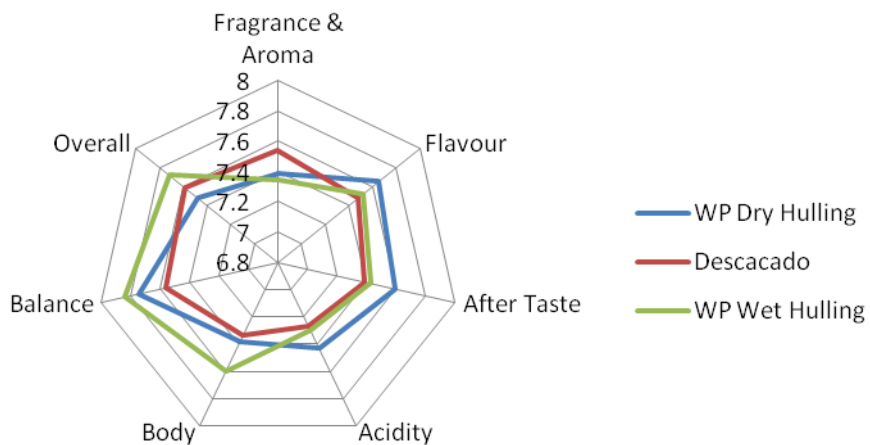


Figure 6. Cup profile performed by Juria (Typica) under three different processing methods.

Under Flores condition, pulped natural method is most suitable for Juria (Typica) variety. It performed the cup profile than that of two other methods, followed by dry hulling. Wet hulling method apparently was not suitable for Juria variety (Figure 6).

Considering variety traits in relation to growing area (*terroir*) is essential in producing specialty coffee. Sera (2001) mentioned that late cultivars should be avoided in cold regions to reduce irregular maturity and, similarly, early cultivars should not be planted in hot areas to reduce incomplete chemical maturity. Earlier or later cultivars should be also used according to the rainfall pattern in the region to avoid excessive moisture at harvest. Late cultivars should be avoided in areas prone to frosts which affect unripe fruits.

In addition, Avelino et al. (2005) mentioned that a positive relation was found between altitude and taster preferences in both *terroirs*. A negative relation was also found between yield and beverage acidity. In both *terroirs* the caffeine, trigonelline, fat, sucrose and chlorogenic acid contents were not well correlated with the sensory characteristics.

CONCLUSION

There were three dominant Arabica coffee varieties grown by smallholder farmers in Flores namely 'Juria' (*Typica* type), S 795 and Hybrid of Timor (HdT) progeny. Based on cup profile the most panelists preferred S 795. The variety performed an excellent cup profile with nice balance and strong sweet tones. In general, there was no significant effect on cup taste profile when the three different processing methods to be applied on S 795.

The best processing method to be applied on HdT variety was Wet Processed Wet Hulling, which resulted better performance of all taste components compared to Wet Processed Dry Hulling and Pulp Natural.

Local variety of Juria performed lower cup profile than that of S 795 and HdT. Pulped Natural processing performed best cup profile than that of other processing methods.

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