

I. GMAC OVERVIEW.

I.1 Background information

GMAC "Green Mountain Arabica Coffee" Ltd is a company farmer, processor and exporter of green coffee incorporated by Rwandan law in 2012. The company is registered under RDB with a TIN number: 102868989, and under NAEB with an export code: 054. The company was renting a coffee washing station since 2012 and from the coffee business profit, was able to buy its own coffee washing station in 2017. The coffee washing station bought is located in Eastern province, Rwamagana District, Karengye Sector, Kabasore Cell. The Coffee washing station processes the coffee from its own coffee plantation (above 2,000 coffee plants) and purchases coffee from 600 coffee farmers' partners. After processing coffee, the company works with Coffee Business Center partner in milling services and Ikawa House partner in marketing services. The company works with different buyers such as OLAM through Free on Truck (FOT) or FOB (Free on Board) contract close.

I.2 Vision

To become a leading company in coffee production, processing and export coffee in Rwanda.

I.3 Mission

To promote the production and processing of specialty coffee in Eastern part of Rwanda, Rwamagana District and Karengye Sector. This will be achieved through farmer training program to improve coffee farming practices and staff training program to improve coffee processing in order to access better market.

I.4 Values

Integrity: is the quality of having strong ethical or moral principles and following them at all times, no matter who is watching. A person with integrity acts with honesty, honor, and truthfulness.

Trustworthiness: is the quality of a person that inspires reliability. A person can be known for trustworthiness in keeping promises.

Accountability: is the quality of a person who understands and accepts the consequences of his actions for the areas in which he assumes responsibility.

When roles are clear and people are held accountable, work gets done efficiently and effectively.

Risk taking: is the quality of a person who is willing to do things that involve risks in order to achieve a goal.

Innovation: is the quality of person who has an idea that can be transformed into practical reality. For a company, it is a product, process, or business concept, or combinations that can be activated in the marketplace and produce new profit and growth.

I.5 Partnership

Government partnership (Rwanda Development Board, National Agricultural and Export development Board, Rwanda Agriculture Board, Eastern Province, Rwamagana District, Karengwe Sector, Kabasore Cell, Kabasore village). · Farmer partnership (600 coffee farmers) · Private sector partnership (Coffee Business Center Ltd, Ikawa house Ltd).

1.6 GMAC Operational area

GMAC operates in Eastern Province of Rwanda, Rwamagana District, Karengye Sector, Kabasore Cell and Kabasore village. Geographically, the CWS is located at 2.069603 South-latitude, at 30.321110 East longitude and at 1359 m of altitude. The rainfall averages between 1500 to 1600mm and the temperature ranges between 18 to 22° C, with a soil acidity between 4.5 to 6. The area receives two rainy seasons, which are normally March-May and second rain from September to November.

1.7 GMAC operational practices

Operational practices in coffee production

Soil management

GMAC Ltd promotes the use of soil cultivation techniques that will improve coffee Production without causing soil degradation. The GMAC group is determined to produce coffee under suitable and sustainable soil conditions to ensure the high productivity. Such techniques will enhance biodiversity and environmental conservation GMAC Ltd have embarked on an afforestation program with our coffee farmers in areas with no coffee as well as all sloppy areas i.e. Riverbanks and others have been left with natural vegetation which also include indigenous trees. The GMAC group is committed to maintain good soil texture structure fertility and prevent soil erosion.

Fertilizer use

GMAC Ltd always endeavours to use fertilizers as per the crop requirements in line with NAEB recommendations. Fertilizers are stored according to the laid down procedures. GMAC Ltd does not apply fertilizers banned in Europe and North America

and aspect the various schedules as given in the Standards. Fertilizer application will be based on results of soil sampling to be done once every two years within the regions/zones.

Crop Protection Products

The management of the GMAC group recognizes that among other things their core business is coffee production, processing and marketing. The management acknowledges that coffee quality and quantity can deteriorate due to unmanaged use of Agrochemical products. GMAC Ltd acknowledge that coffee quality and quantity depend among other things on proper use of crop protection products. GMAC Ltd therefore will ensure that crop protection is carried out according to established guidelines, standards and policies conforming to industry standards and NAEB guidelines. The management of GMAC Exports Ltd makes a commitment to using crop protection products that meet the market requirements (Banned chemicals in Europe and USA as per the List of Prohibited Pesticides by various standards SAN F.L.O. List, are not applied). The GMAC group will collaborate with various authorities and laboratories to establish the right types and qualities to use at any one time for specific cases.

Integrated Pests Management

GMAC Ltd has set out a detailed procedure is to ensure that the right approach is followed to control pest in an event of attack or infestation. Protection of the crops against diseases and pests, the farmers are advised to use biological, cultural, and mechanical control measures. The use of industrial crop protection product is used as the last option Pesticides applications will be based on pest's thresholds and only applied as per pesticides label. Those banned in Europe, USA and JAPAN is strongly advised not to be used for certified crop.

Crop harvesting

Maximum hygiene practices are observed to ensure that no contamination of cherry occurs at all stages of harvesting. Only the red ripe cherries are harvested for Processing to ensure high quality coffee is obtained. The calibrated equipment's are Used to ensure accurate measurement and recording. The coffee farmers must be explained the importance of harvesting the ripe cherry (red) and not green cherry (not yet ripen), yellow cherry (waiting to ripen) and black cherry (over ripe). After coffee farmers having harvested ripe cherries, it is advisable to bring them at wet mill for being processed in less than 6 hours to avoid ripe cherries to over ferment. It is very important to note that the ripe cherries must not stay long (beyond 6 hours) without being processed because this affects seriously the quality of coffee. The materials used during cherry harvesting are baskets or bags which are clean and without any foreign things such as stones, metals, to name few. Never use bags that have contained fertilizer or other chemicals.

The Do's and DON'Ts of crop harvesting

- Harvest only fully ripe cherries (red ones), including unripe cherries results in black coffee beans.
- Overripe cherries can result in discolored coffee beans and fermented flavors when the coffee is brewed.
- Ripe cherries give better quality coffee and therefore more money.
- Sort out immature, diseased, pest infested or overripe cherries and process them separately.
- Remove all extraneous materials such as twigs, leaves, stems and stones.
- Keep harvested coffee cherries in containers such as baskets.
- At the end of the season, harvest all remaining mature cherries and process separately.
- Do not strip all cherries off the branch.

- Do not dry the coffee on bare earth because this causes the coffee to acquire an earthy smell and soil microbial contamination.

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Operational practices in coffee processing

Post - harvest Handling

GMAC Ltd ensures that coffee is handled hygienically to avoid contamination all the way from the field to the final product. This entails personal hygiene of the worker, cleanliness of harvesting containers and transporting vehicles. Ideally, numerous buying agents in the villages buy cherry from farmers, record and transport it to the respective washing stations on the same day. On arrival at the washing stations, the cherry is sorted, weighed, recorded and emptied into the cherry hopper. Using a floatation system, the cherry is pre graded and pulped on the same day. After pulping the parchment is fermented, washed, soaked, washed, graded and dried then stored in stores awaiting delivery to the dry mill. Wet process at the washing stations produces both solid (pulp) and liquid (waste water) waste. The pulp is channelled to a designated holding

area while the waste water is directed to lagoons strategically located away from the water source to avoid contamination. The postharvest handling is the stage of coffee production immediately following the harvesting to avoid losses, ensure safety and maintain the quality of coffee harvested. It includes: proper transportation, wet processing and dry processing.

Transportation

This part plays also a major role in coffee quality activities. It is recommended that cherries should be transported alone without mixing with other foreign things. Before transporting the coffee cherries to the wet mill, the farmer must check the bags are not dirty (The wet mill Manager or Quality controller have to advise to the farmers to use always the good material thing or bags to take the coffee cherries which are not contacted with oil; pesticides; dusty or other impurities. The vehicle or truck which is transporting the coffee cherries must be very clean with free of foreign odors and other impurities). The coffee cherries which is transported must not mixed with other products in the vehicle which can spoil the quality of coffee cherries like oil products, pesticides, fuel and other products. The coffee cherries must be transported in safely conditions.

SOP1: COFFEE RECEPTION AND HAND SORTING PROCESS

Step 1• The farmers bring the heterogeneous coffee to GMAC.

Step 2• The receptionist receives the heterogeneous coffee and put them on the electronic balance of serial number series number of 1606055 and which is regular checked by E. S.J Weighing.

Step 3• The total weight of the heterogeneous coffee is recorded in the register by the receptionist.

Step 4• The receptionist helped with the casual workers undertake hand sorting of cherries coffee according to size, and degree of maturity according to SOP RBS 2014 (RS258:2014page 3) and remove the immature, diseased, insect damaged and dry berries as well as the leaves and twigs

Step 5• The receptionist takes records of Quantity of ripen cherries, Quantity of unripen cherries (with green color and yellow color), Quantity of infected cherries, Quantity of over-ripen cherries (with dark color).

Step 6• The agronomist to verify the quality and quantity of all different cherries and to ensure the correctness of records taken by the receptionist.

Step 7• The agronomist submits the register to the CWS Manager for approval of quantities of the ripen cherries

Step 8• The agronomists starts the floating process.

SOP2: STEPS IN FLOATING AND PRE-CLEANING PROCESS

Step 1• The homogeneous Coffee cherries are disposed in prior floating tank after hand sorting

Step 2• The casual workers wash and separate the homogeneous cherries by letting them float in water with half of float container

Step 3• After floating Receptionist of GMAC CWS record the following information: Quantity of coffee cherries with highest density (big size and ripe cherries which are sink down in the water), Quantity of coffee cherries with lowest density (smaller size and unripen cherries are suspended

Step 4• The agronomist verifies the quality and quantity of all different cherries

Step 5• The Manager of CWS approves the quantity of all different cherries and directs the receptionist to prepare the invoice to the the farmer

Step 6• The agronomists start the pulping process

SOP3: STEPS IN PULPING PROCESS

Step 1• Coffee cherries are disposed separately according density in prior pulping tank

Step 2• The machinist put coffee in the pulper machines called MACKNNON that possess three pulper disc for pulping one for separating coffee into grade (A1,A2,A3) and another for removing pulp (outer skin) from coffee cherries

Step 3• There is no weighing of quantity of those different grades

Step 4• The agronomist verifies if the pulping process is ended and call the CWS Manager to instruct for fermentation process

Step 5• After the approval of CWS Manager the agronomist starts the fermentation process

SOP 4: STEP IN WET FERMENTATION PROCESS

Step 1• The pulped wet parchments coffee are disposed to separately fermented tank according to their grade

Step 2• The Agronomist takes the record of initial starting time, initial starting temperature and initial starting PH

Step 3 • The parchment are soaked in the quart of water into the fermented tank for 8-12 hours in order to obtain good quality of green coffee beans (refer to SOP RBS 2014 (RS259:2014 page 4)

Step 4• The Agronomist continue the monitoring of temperature until reaching 29°C, PH until reaching 4.6 and then parchment became green-blue color and call the Manager for Approval.

Step 5 • After the approval of CWS Manager the washer man starts washing process

SOP 5: STEPS IN WASHING PROCESS

Step 1• The wash man brings the fermented coffees to washing canal

Step 2• The wash man separates the skin residues from parchments using hand and all traces of the mucilaginous mesocarp from the surface of the parchment are removed by water d refer to SOP RBS 2014(RS259:2014 page 4)

Step 3• The wash-men separate coffee according grade (Grade A1 with highest density, Grade A2 with middle density, Grade A3with lowest density) by floating with water

Step 4• The agronomist verifies the quality and quantity of all different grade and reports to the Manager for approval

Step 5• The CWS Manager approve the report and instructs the wash men to place the washed coffee in different bags and transport the to the to pre-drying tables

SOP 6: STEPS IN PRE-DRYING PROCESS

Step 1• After washing, coffee beans are directly on pre-dried table that have wire mesh (black plastic material) for preventing rust from dried table material in order to prevent ultraviolet from sunlight and facilitate final hand sorting.

Step 2• The CWS agronomist record the starting time and moisture content.

Step 3• The agronomist takes final records of ending time and final moisture content After 3-4 hours on pre-drying table and reports to the Manager.

Step 4• The manager avails and authorises the casual workers to transport the coffee from the pre-drying tables to the drying tables under the sunlight

Step 5• Dry coffee only in thin 3-5cm in depth which is equivalent to 25-35kg/m² of fresh parchment and the coffee is covered during the hottest part of day from 10.30 a.m to 300 p.m in order to avoid cracking of coffee parchment.

SOP 7: STEPS IN DRYING PROCESS

Step 1• Drying process may take up to 14 days before the cherries are dried depending on the weather conditions. (Refer to SOP RBS (RS 259:2014 page 9)

Step 2• The Casual workers Turn over the coffee layer constantly during the day time to allow faster drying and it is prohibited to mix different types of coffee of different days of harvest

Step 3• The casual workers ensure for the appropriate ventilation of the wet coffee during the night in order to avoid condensation.

Step 4• The agronomists ensures that the drying yard area is protected from animals in order to avoid biological contamination for the drying coffee

Step 5• The casual workers regularly control the Coffee Berry Bora and other pest by using Integrated Pest Management by hand sorting

Step 6• The agronomist supervises the hand sorting process of the Coffee Berry Bora and other pest by using Integrated Pest Management and ensures that the re-wetting is avoided by using the covers of a polythene sheets and heap the coffee during the night and rainy weather

Step 7• The agronomist regularly monitors the moisture content until it reaches 12.5% and

Step 8• After verification of moisture content of all different grade by CWS Agronomist and approved by CWS Manager They place them in different bags and bringing out to store

SOP 8: STEPS IN STORAGE OF COFFEE BEANS PROCESS

Step1• After the dried stage the storekeeper kept coffee beans in the stores of GMAC KARENGE

Step 2• Storage conditions: on wooden pallets 0.5m above ground level ,0.5m away from the walls in order to protect from re-wetting degradation, cross-contamination ,to allow good air circulation and, humidity is kept below 60%. Refer to SOP RBS (RS 259:2014 page 10)

Step 3• If humidity is above 80% the coffee will start to absorb water

Step 4• We prefer that the coffee shipped in alternative containers, such as multi-layer plastic bags, which protect the beans from moisture, odors and other outside factors that can affect the flavor.