GUIDELINES FOR HYGIENE AND HAZARDS ANALYSIS CRITICAL CONTROL POINTS (HACCP) IMPLEMENTATION IN OLIVE OIL MILLS

OliveCulture
Holistic and Multi-professional Mechanism for a Pakistani Olive Oil Value Chain

2023

ITALIAN AGENCY FOR DEVELOPMENT COOPERATION

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1. Introduction

The legislation requires that all food processing units shall implement a documented system of self-control of hygiene using the principles on which the HACCP system is based. The protocol is aimed at defining and controlling or "preventing" the risks for the consumer's health. In this regard, it should be noted that, compared to other agro-food sectors, no dramatic episodes of intoxication or serious damage deriving from the consumption of olive oil have ever been reported. This is motivated by the extraction technology that does not involve any chemical manipulation and the presence of natural substances (polyphenols) that make the growth of microorganisms in the oil extremely difficult.

In this sense, these Guidelines for hygiene and self-control plans establish the basic hygiene standards to be implemented and specify the documentation needed. The quantities of olive oil absorbed make it extremely difficult to recognize any acute pathologies associated with it. On the other hand, it is not possible to exclude "prior" pathological manifestations which, assuming a chronic nature, could become manifest in the long term and not be directly associated with its consumption. This is the case of the consumption of oil stored in an inadequate manner or for too much time in which there is the formation of secondary oxidation compounds (free radicals, aldehydes, ketones, and acids, etc.) which can cause damage to the human body.

1.1 Field of Implementation

These guidelines refer to the olive oil sector starting from the reception of the olives in the mill and consider the different technological phases of oil extraction (removal of leaves and branches, washing, crushing, malaxing, its conditioning-storage, packaging, and distribution). The products referred to are the categories of edible virgin olive oil as defined by the Pakistani Standard PS5159 – 2010.

The Guidelines are complemented and integrated with several Annexes (from A to D) which clarify, highlight, and emphasize the overall process and steps.

Based on the mentioned documentation, each Unit/ Mill/Processing Plant shall prepare its own HACCP Plan.

1.2 Normative References

PS 5159-2010: PAKISTAN STANDARD SPECIFICATION FOR OLIVE OIL, VIRGIN AND REFINED OLIVE – POMACE OIL.
ISO 22005:07: Traceability in the feed and food chain — General principles and basic requirements for system design and implementation.
Pakistan Pure Food Laws (PFL), 1963: Regulations address purity issues in raw food and deal with additives, food preservatives, food and synthetic colors, antioxidants, and heavy metals.
The Pure Food Ordinance, 1960: To ensure purity of food being supplied to people in the market and, therefore, provides for preventing adulteration.
The Pakistan Standards and Quality Control Authority (PSQCA) Act, 1996: To inspect and test products and services, including food items, for their quality, specification, and characteristics during use, and for import and export purposes.

Pakistan Standards and Quality Control Authority Act of 1993: Constitution of the Authority

1.3 Terms and Definitions

Lot/Batch: "A set of units of a product which have been produced and/or processed or packaged under similar circumstances"; "The batch is determined by the manufacturer or packer of the food product and is affixed under his responsibility".
HACCP - Hazard Analysis and Critical Control Points: the method established by Codex Alimentarius (FAO) establishing the general principle of food hygiene.
Critical Control Point (CCP): A step at which a control measure or control measures, essential to control a significant hazard, is/are applied in a HACCP system.
Critical Limit: A criterion, observable or measurable, relating to a control measure at a CCP that separates acceptability from unacceptability of the food.
Deviation: Failure to meet a critical limit or to follow a GHP procedure.
Hazard: A biological, chemical, or physical agent in food with the potential to cause an adverse health effect.
Significant Hazard: A hazard identified by a hazard analysis, as reasonably likely to occur at an unacceptable level in the absence of control, and for which control is essential given the intended use of the food.
Hazard Analysis: The process of collecting and evaluating information on hazards identified in raw materials and other ingredients, the environment, in the process or the food, and conditions leading to their presence to decide whether or not these are significant hazards.
Prerequisite Program: The program includes good hygiene practices, good manufacturing practices, as well as other practices and procedures such as training and traceability, that establish the basic environmental and operating conditions that set the foundation for implementation of a HACCP system.
Monitor: The act of conducting a planned sequence of observations or measurements of control parameters to assess whether a control measure is under control.
Food Handler: Any person who directly handles packaged or unpackaged food, equipment and utensils used for food, or surfaces that come into contact with food and that is expected, therefore, to comply with food hygiene requirements.
Food Hygiene: All conditions and measures necessary to ensure the safety and suitability of food at all stages of the food chain.
Food Hygiene System: Prerequisite program, supplemented with control measures at CCPs, as appropriate, that when taken as a whole, ensures that food is safe and suitable for its intended use.
Food safety: Assurance that food will not cause adverse health effects to the consumer when it is prepared and/or eaten according to its intended use.
Food Suitability: Assurance that food is acceptable for human consumption according to its intended use.
Good Hygiene Practices (GHPs): Fundamental measures and conditions applied at any step within the food chain to provide safe and suitable food.
HACCP Plan: Documentation or set of documents, prepared following the principles of HACCP to ensure control of significant hazards in the food business.
HACCP System: The development of a HACCP plan and the implementation of the procedures for that plan.

Traceability: The ability to follow the movement of a feed or food through specified stage(s) of production, processing, and distribution.
Traceability System: Totality of data and operations that is capable of maintaining desired information about a product and its components through all or part of its production and utilization chain.
Farmer/Grower: Registered and recognized subject that cultivates and produces higher quality olives, exclusively within the Pakistani territory.
Olive Mill: Structure used for processing the product that meets the requirements of the mandatory legislation. It could also act as a storage and/or packaging entity.
Packer: Registered and recognized subject that stores, bottles, packs, and places the finished product on the market.
Self-Control: Verification of compliance with the requirements of the HACCP method implemented.
Conformity Control: Act by which the Control Authority verifies compliance with the defined requirements of a batch of Olive Oil or table olives, as specified in this document.
Non-Conformity*:* Failure to comply with a specified requirement.
Corrective Action*:* Activity carried out to analyze and remove the cause of non-conformity and prevent the repetition.
Correction: Action carried out to immediately remove the non-conformity.
Labeling: The wordings, indications, brand, images, or symbols present on bottles, packaging, documents, cards, labels, ribbons, and strips that accompany or concern the indication of the product.

2. Description of the Processing Plant, Facilities and Building

In Pakistan, at present, about 30 olive processing units of various capacities are installed in the olive-growing areas. Although these plants are from different manufacturers, with different capacities and operating procedures, the basic principles for maintaining good quality and precautions against the occurrence of unpleasant events which deteriorate quality parameters are the same for all units.

At present, they don't comply with the criteria established for adoption of the HACCP, however, they must be aligned on the course of action of establishing the Olive Value Chain with the mentioned HACCP standard criteria.

The processing plants would be structured as follows[1]:

2.1 The building/shelter must be large enough to ensure smooth operations for each section of the processing. The area occupied by the unit/plant should be divided into different sections:

[1] **The olive processing plants to be established afresh in Pakistan would follow the described scheme, in use in the countries having an established Olive Sector. For the existing plants, adaptation must be sought. Moreover, the current ownership is mostly belonging to Public Sector. In the documentation prepared, this document and the Annexes, the term "Company" defines the owner/manager entity of the mill.**

- An external area**:** It must have a gated entrance, partly covered, used for storing the olives in the bins and partly uncovered for the reception, weight determination, and handling of the olives.
- An Internal area: The premises consist of an entrance, waiting room, office, and a large room for the olive oil processing plant. The main access shall have a paved floor, with tiles up to a height of 2.20 meters in the walls in the processing area. From the processing area, a room is used for the unloading of pomace and a room for storage and conditioning of oil.

The facility must have a supply of water and equipped for sewage. Shall have natural ventilation, by the presence of various windows (with a thin net) and adequate doors. Given the high temperatures recorded in the existing plants at the starting of the milling season (September), and partly October, it is recommended that the processing area would be air-conditioned. This is anyway necessary for dedicated rooms for the storage and packaging. Sufficient lighting to ensure good visibility should be provided by LED lights, distributed at various points through an electrical system.

2.2 The standard unit/plant consists of:

- ✓ A loading stainless-steel hopper with a rubber conveyor belt;
- ✓ A stainless-steel leaf remover for olives;
- ✓ A stainless-steel washer with flowing water;
- ✓ A rubber conveyor belt for washed olives;
- ✓ A hopper for loading the olives into the mill by means of a stainless-steel screw;
- ✓ A crusher with replaceable hammer and sieves;
- ✓ One or more stainless steel malaxers with a heating/cooling system;
- ✓ A stainless-steel transport pump for olive paste;
- ✓ A horizontal decanter with an outlet for oil and a transport screw for olive pomace;
- ✓ A pump for transferring the oil.

The following components are suitable, depending also on the manufacturer and if the machine is operating on the 3-phase system:

- ✓ An automatic centrifugal separator, present only on Pieralisi mills.
- ✓ Stainless steel tanks, to be used for the storage of oil,
- ✓ A filter-press, on the two-phase system (Mori Team mills),
- ✓ A stainless-steel weight filler for bottles and cans of oil, equipped with automatism for argon gas.

3. Personnel involved in the Process

Key operators of the olive mills should be identified as per the following tasks and responsibilities:
Manager: Food Technologist/Post-harvest horticulturist.
Engineer: Mechanical/electrical, for the assistance and maintenance of the olive mills machineries and tools.
Operators/Handlers: Experts in handling procedures, in number variable according to the capacity of the plant.
Workers: For cleaning and maintenance of the structure.

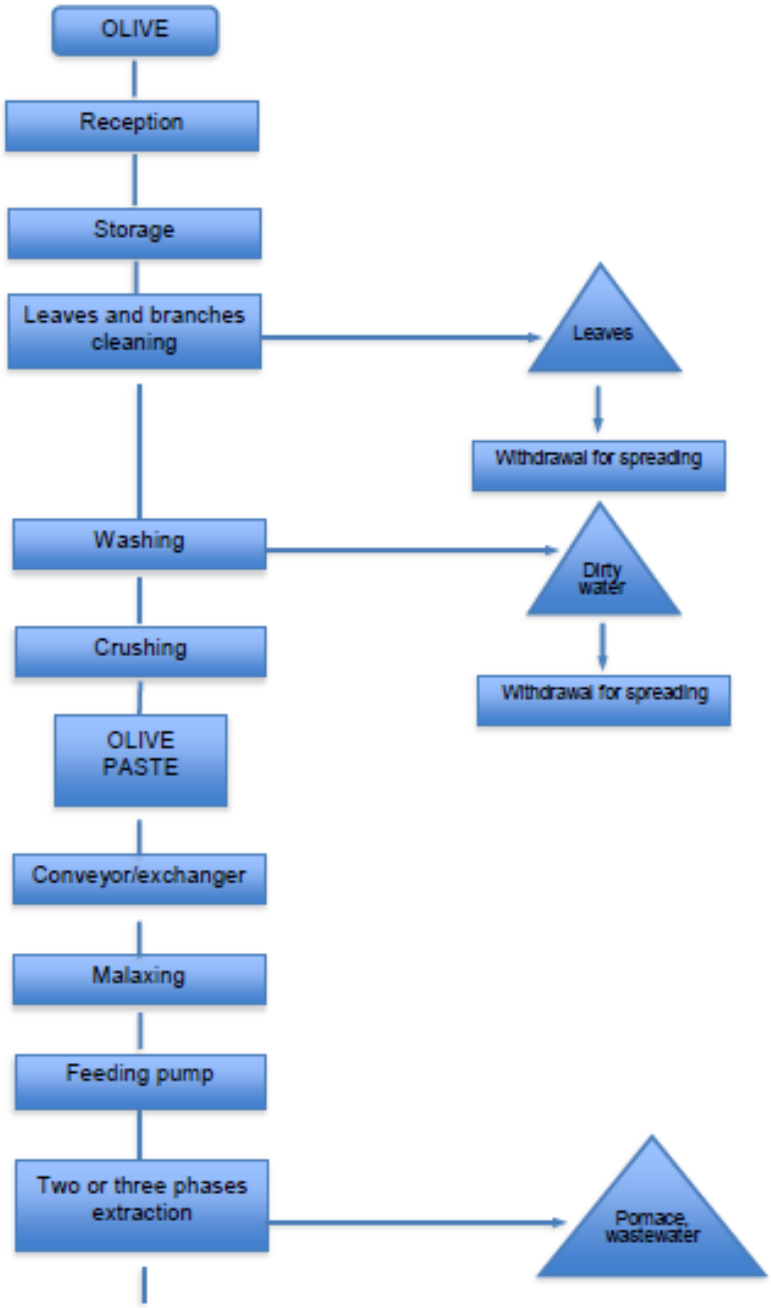
The Manager, whose technical knowledge and experience derives from the technical courses or university study of Food Science and Technology or Post-harvest horticulture, would be in-charge of the plant. He/she will coordinate the logistics, oversee, and train the staff, and monitor the processing, quality, and safety of the finished product through chemical-physical and sensory analyses entrusted to licensed and accredited laboratories.

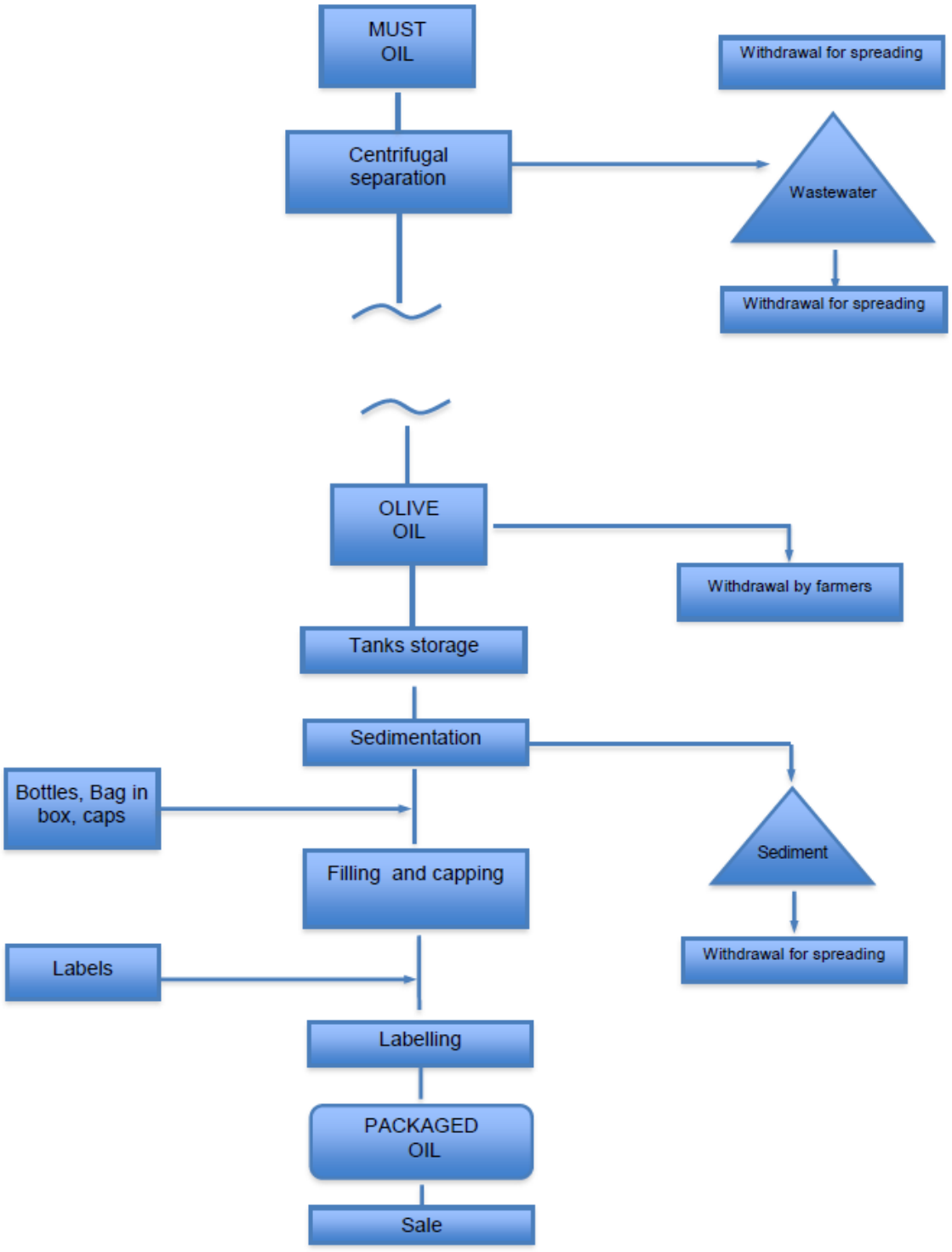
4. The Production Process

To ensure proper management of the harvest, farmers should agree in advance, with the miller, the day their olives will be processed. This will minimize the duration of post-harvest time before the oil extraction. After extraction, the oil should be stored in preferably stainless-steel and air-tight containers at 15-18 C and in dark rooms where the temperature fluctuation should be minimized. After 7-10 days the settled residues from the bottom would be removed. This is if the filtration was not done.

One of the first steps of the HACCP analysis is related to the description of the entire process, from the field to the delivery of the final product. This analysis should be conducted and verified on site and the results expressed in a flow chart, as follows:

FLOW CHART (as an example)




MUST OIL
Withdrawal for spreading
Centrifugal separation
Wastewater
Withdrawal for spreading
OLIVE OIL
Withdrawal by farmers
Tanks storage
Sedimentation
Bottles, Bag in box, caps
Sediment
Filling and capping
Withdrawal for spreading
Labels
Labelling
PACKAGED OIL
Sale

4.1. Delivery and Storage of Raw Materials

The olives harvested are transported by the farmers to the mill on the same day, in plastic crates or bins (which can be supplied by the olive mill), which are emptied on the floor. It must be stressed that the use of bags (of any material) must be avoided because the weight of the fruits causes a fermentation process. The olives must be processed within 24-48 hours after harvesting. During the time that elapses between harvesting and processing, no heating or mold phenomena shall occur.

The olives harvested both manually and with the help of mechanical means originated from different varieties, which have different periods of ripening. Therefore, the olives must be processed in different stages, as a sole variety by blending two or more of them, considering the characteristic of oil that the grower or the packer desires to obtain, which depends on the demand of the market. Also, olives can be processed well ripe or green. It is very important to highlight that fruits that are in poor health condition (presence of anthracnose, mold, fermented, or dropped fruits) shall not be accepted for milling.

The milling season, in the different regions of Pakistan, usually begins in September and ends in December. The plants work during the day, and in some cases till late and on Saturday, to complete the processing of the batches.

4.2. The Processing

4.2.1 Working Capacity

The actual working capacity of the different plants in Pakistan ranges from 100 to 600 kgs/hour. Some examples of the process taking place in the different sections are as follows:

- **Milling:** For an average crushing capacity and malaxing of about 25 minutes (from 20 to 30 minutes), the full capacity of the Pieralisi mills present in Pakistan of 600 kgs/hour is fully achieved. The processing time for each operation from crushing to centrifugation is calculated anti-clockwise so that the processing can be started accurately by maintaining the proper time duration between the batches and to avoid the delay or over-processing of any batch.
- **Malaxing:** Two malaxers having a combined theoretical capacity of 500 kgs (250 kgs each) is the characteristic of several plants of Mori Tem. They must, however, work continuously, in line, to ensure that the capacity is fully achieved.
- **Centrifugal Separation:** Is present in the Pieralisi mills only (three phases). The oil after the decanter is transferred by a single screw pump from the collection tank to the tank above the centrifugal separator. The separation takes place after passing by centrifugal force at 6000/7000 rpm through 72 rotary filter plates, which retain part of the sediment.

4.2.2. Process Control

The water supply for washing the olives, rinsing them with the pressurized continuously flowing in the washing tank, for the decanter, for the separator, and in any use in the plant shall be compliant with the potability requirements imposed by law.

The control on the process must be exerted as regards the crushing temperature, which shall be around 25-26 degrees Celsius, for which the water is either warmed up by means of resistances or supplied from a boiler if the external temperature is too low, or cooled if the external temperature exceeds the limits, through a chiller.

The duration of the malaxing time, which has been significantly reduced compared to the past, shall not exceed the recommended time given by the manufacturer, to not be harmful to the quality of the oil.

In conclusion, the two most important process parameters to monitor the quality of the extracted oil will be temperature and time.

4.2.3. System Maintenance and Hygiene – PRP (Pre-Requisites Program)

Both the premises and the equipment of the plant are subject to cleaning, washing, and sanitizing at the beginning and end of the milling campaign.

During the milling campaign, cleaning and rinsing of machinery and equipment in contact with the olive paste are carried out several times, depending on the duration of the campaign, with detergents. The cleaning related to the workplaces (defoliation and washing area, press and separation area) is carried out daily. The water used for washing should be continuously flowing. The detergents or sanitizing substances are stored in special rooms and the relative technical sheets are attached to the self-control plan.

Extraordinary maintenance is generally carried out before the starting of the olive processing campaign, paying attention to the painting of non-washable parts, possibly damaged during the processing period, and to the replacing and painting of parts of machinery and equipment that are rusting, whereas the mills are manufactured with stainless steel on all the surfaces which are in contact with food. The most common failures during the working period are related to malfunctions of the electrical and mechanical parts of the various machinery and equipment, which shall be replaced with relevant gaskets and spare parts. The necessary equipment, greases, lubricants, and specific substances are stored in a special cabinet.

In case of processing the olives as a service provider to the farmers, as it is the case of the entire Pakistan, the olive oil extracted is immediately withdrawn by them. However, when the payment of the service is done by keeping 10% of the oil extracted, the storage in the mill would be done in appropriate tanks in stainless steel of various capacities. They must be equipped with a floating stainless-steel plate for hermetic sealing and possibly some to be equipped with a system with food

nitrogen or argon for linger conservation. The storage room shall be thermo-conditioned and separated from the processing area. It is also strongly recommended to filter the olive oil produced.

4.3. By-Products and Wastewater

The olive pomace resulting from the manufacturing process is unloaded into a hopper and transported by means of a screw to a special underground paved tank. The sewage water resulting from the process and the washing water are conveyed through a special pipe to the external collection tank. Subsequently, a special tanker should be provided for the final storage by the subject in charge of disposal as required by law.

5. Packaging and Marketing

The rooms intended for packaging, distinct and separated from the processing of the olives, should be paved with ceramic tiles, and the surrounding walls treated with washable paint approved for food industry. They are served by a water system and a siphoned water collection well. The ventilation occurs naturally from the window and opening communicating with the outside (ever adequately screened to avoid insects and infestants entrance) and the lighting by means of a lighting system per the law. The packaging process will take place by taking the oil previously stored in special stainless-steel tanks and filling the cans and bottles of various capacities, using a specific equipment. Stainless steel scales may be equipped with a kit for injecting food nitrogen into the headspace of bottles or cans. The capping, closing with the heat-shrink capsule, and labeling operation will be done manually.

The containers, stored in a suitable way, will be previously cleaned through compressed air for the elimination of any foreign bodies; their compliance with the requirements of the law is certified by the supplier's declarations attached to the self-control plan.

6. Staff

All the workers involved in the production processes and produce handling are needed to be adequately trained on hygiene and safety procedures in the olive mill and should be healthy at the recruitment. The responsible of the mill must ensure that the hygiene rules are applied in production and that the staff is continuously trained and acting in compliance with the hygiene rules.

The staff working in the mill shall be trained on how to carry out the activities. The training program, carried out relevant institutions or by the mills, includes:

- General hygiene,
- Obligations and responsibilities of the food industries,
- Hygienic risks associated with production, handling, and packaging,
- Prevention measures to be adopted in relation to the job performed.

7. Development of the Self-Control Plan

In addition to the general risks associated with the entire process, the possible detectable hazards are pre-identified, the control of which is essential for guaranteeing the hygiene and safety of the product.

At least once per year, and in any case every time some changing in the process and/or machines happens, a complete internal assessment is foreseen. The scope of the assessment is to evaluate, at any step all the implemented measure, the efficacy, and efficiency of the implemented HACCP plan.

When the mill is operating for farmers, is obliged to guarantee immediately before the processing the self-control of hygiene, aimed at avoiding both accidental contamination and the pollution of a batch of olives with any harmful substances (e.g. residues of pesticides, soil, sand, mold, etc.) present in the batch.

The HACCP method identifies specific hazards and measures for their prevention and control to ensure food safety. This tool is used to assess hazards, estimate risks, and establish specific control measures by emphasizing prevention and control rather than employing traditional inspection and testing methods.

The HACCP method can be traced back to seven basic principles as defined in Codex Alimentarius (ALINORM 97/13 A, Appendix II):

1. Conduct hazard analysis and risk assessment;
2. Determine critical control points;
3. Establish critical limits and specific control standards for each critical point;
4. Monitor each critical point;
5. Establish corrective actions to be implemented when a critical point is not under control;
6. Establish procedures for verification;
7. Archiving records.

This method, which is based on the seven basic principles mentioned above, is aimed at identifying Critical Control Points (CCPs) for each individual product, each process step, and each production facility.

A hazard is identified by a hazard analysis, as reasonably likely to occur at an unacceptable level in the absence of control, and for which control is essential given the intended use of the food.

The hygiene self-control manual will include the following documents:
- Manual – shall describe, when necessary, also the Procedures adopted,
- The PRP – the Program of Pre-Requisite (as per Annex A: Pre-requisite Programme),
- Technical Data Sheets of the marketed product (as per annex B: TS_Olive Oil),
- Procedures,

- Documents and records.

The General Part describes analytically the methodology applied, the organization of the company structure, processes and products, as well as the documented system of prevention, management of raw materials and hygiene provisions.

The Olive Data Sheet contains specifics about its characteristics; the flow chart, hazard analysis and preventive measures, identification of Critical Control Points (CCPs) and control actions are all parts of the procedures, documents and records.

7.1 Definition of HACCP Group

As already stated, the olive milling process takes place in a limited period of the year (from the start of September to the end of December in Pakistan), employing about four to six seasonal workers or more, depending to the dimension and working capacity of the plants. The extraordinary maintenance of machinery and general cleaning of the same and of the premises, in general, precede and end the real phase of the milling activity. Seasonal workers have to perform all duties. The Technical Manager has the responsibility to ensure fruit and oil safety and quality, and instruct and train the staff. The HACCP group will be established from year to year, in relation to the staff hired and their role, involving the host institution and at least one experienced employee (per shift, if are organized in two or more).

To set up a HACCP Plan the Company/Owner must identify the team. The HACCP team is responsible for developing the HACCP plan to ensure that the appropriate knowledge and expertise are available for the development of an effective HACCP system. This may be achieved by assembling a multidisciplinary team responsible for different activities within the operation, e.g. Technical Engineer for maintenance, Quality responsible for quality control, cleaning, and disinfection.

7.2. Hazard Analysis

The HACCP group starts to analyze the entire process to evaluate the potential risks and hazards at any step and considering the control activities at any stage to avoid any risk to food safety. The analysis should continue considering the significant risk factors during the process as described above and once identified, establish in which stages of the process it is necessary to keep the causes of risk under control to ensure the healthiness of the product (if any raised). So, all the steps of the process should be analyzed in deep, and control measures at any stage defined with the aim of avoiding any risk.

The analysis has to consider the three potential categories of risks that could affect the product: microbial, chemical, and physical, as shown in the following table.

Microbial Hazards	Chemical Hazards	Phyisical Hazard
• Thermic treatment (cooking, heating, cooling, ……); • Acidification (Fermentation, pH control); • Salt or **oil** addition (or others preservatives); • Drying. 	• Product origin Control (suppliers qualification); • Process control; • Adequate tools and installations; • Packaging useful for food and conform to the laws 	• Raw material control • Production control (filters, stone remover, metal detector, others) 

A CCP, Critical Control Point, is defined as a step at which a control measure or control measures, essential to control a significant hazard, is/are applied in a HACCP system. At any CCP identified, a critical limit is defined. A critical limit is defined as a criterion, observable or measurable, relating to a control measure at a CCP which separates acceptability from unacceptability of the food.

7.2.1. Hazards Analysis – An example

Process stage	Hazard	Preventive action	Verification activity	Corrective action
1.Olives reception	Residues of pesticides.	Request, to the farmer, a declaration of compliance with the times of decadence (active ingredient used, dose, and date of the last treatment); raise awareness of olive growers, the establishment of a register of suppliers.	Periodic analytical check on olives or olive oil.	Refuse olives. Wash the system after processing insufficiently qualified batches.
	Dirtiness and/or development of toxicogenic molds.	Requires adequate hygienic conditions for storage/transport; raise awareness of olive growers/transporters, establish a register of suppliers.	Visual inspection of the olives.	Refuse olives. Wash the system after processing suspicious batches.
2. Storage of olives	Excessive oxidation and development of toxicogenic molds.	Prepare ventilated rooms with suitable humidity and temperature parameters. Minimize olive storage times (implementation of a milling calendar). Proper washing of the olives.	Visual inspection.	Restore optimal conditions. Re-train employees.
	Dirtiness	Take care of the hygiene and management of the premises (application of a cleaning procedure).	Visual inspection.	Retrain employees.
3.Defoliation and olive washing	Accumulation of pesticides, mud, foreign bodies, and dirtiness.	Frequent washing and final rinsing water of the olives.	Visual inspection.	Restore optimal conditions. Re-train employees.
4. Processing	Metal residues (from working parts (e.g.: defoliator).	Use plants and equipment suitable for food processing.	Periodic analytical verification/visual inspection.	Restore optimal conditions by replacing the parts that result in damage or that are no longer suitable. Re-train employees.

	Pollution with mineral oils.	Apply a maintenance procedure of the plant	Visual inspection.	Carryout improvements. Re-train employees.
	Oxidations and molding of paste residues in the systems (filters, kneaders, pipes, augers, etc.).	Take care of hygiene and sanitation of equipment and plants (application of a washing procedure).	Periodic analytical verification/visual inspection. Organoleptic test of the oil.	Restore optimal conditions. Discard the spoiled oil.
5. Olive oil storage	Transfer of substances by tanks.	Use tanks suitable for food	Periodic check/visual inspection. Olfactory examination.	Replace tanks that are damaged or no longer suitable for food. Discard the altered product.
	Fermentation of sediment and sediment.	Carry out frequent purging or racking.	Periodic analytical verification. Organoleptic test.	Discard the altered product. Restore optimal conditions.
	Free radicals	Use oxygen-tight and light-shielding containers. Provide storage systems in a modified atmosphere (Nitrogen or Argon gas). Prepare the air conditioning system for the storage room. Provide internal thermostatic systems in the tanks.	Periodic analytical verification. Organoleptic test.	Discard the altered product. Restore optimal conditions. Re-train employees.
6. Bottling	Glass residues and organic fragments of insects and vertebrate animals.	Check bottle supplies. Properly clean and store empty bottles.	Visual inspection in acceptance and in the bottling phase.	Discard bottles. Blow in a jet of compressed air.
7. Packaging in other types of containers (cans, Bag in box)	Transfer of substances by the containers. Organic fragments of insects and vertebrate animals.	Use of suitable containers for food. Check supplies. Properly store empty containers.	Visual inspection in acceptance and in the filling phase.	Discard containers. Blow in a jet of compressed air.
8. Packaged product storage	Free radicals	Use oxygen-tight and light-shielding containers. Provide storage systems in a modified atmosphere (Nitrogen or Argon gas).	Periodic analytical verification. Organoleptic test.	Discard the altered product. Carry out structural improvement. Re-train employees.

		Use the air conditioning system for the storage room. Provide internal thermostatic systems in the storage room.		

7.2.2 Non-specific hazards that can occur at different moments in the process and possible control activities

Hazard	Preventive action	Verification activity	Corrective action
Pollution with environmental contaminants (Smoke, hydrocarbons, and engine vapors)	Place any boilers and combustion engines in a specific room. Avoid access to internal combustion engine vehicles.	Verification of the layout.	Carry out improvements.
Insect and rodent infestation	Structural adjustment. Control interventions (application of a pest control procedure).	Visual inspection. Verify capture of insects and rodents.	Carry out improvements. Re-train employees.
Pollution with residues of detergents and descalers	Rinse thoroughly with potable water. Applying a cleaning procedure.	Verification of the operations carried out.	Carry out improvements. Re-train employees.
Contamination of microorganisms and development of abnormal fermentations	Take care of hygiene and sanitization of premises, equipment, and systems (application of a cleaning procedure). Implement staff training.	Visual inspection to verify the cleanliness of the premises and equipment.	Carry out improvements. Re-train employees.

7.2.3 – Example of Hazard Analysis Worksheet

(1) Step*	(2) Identify potential hazards introduced, controlled, or enhanced at this step B = Biological C = Chemical P = Physical		(3) Does this potential hazard need to be addressed in the HACCP plan?		(4) Justify your decision for column 3	(5) What measure(s) can be applied to prevent or eliminate the hazard or reduce it to an acceptable level?
			Yes	No		
	B					
	C					
	P					
	B					
	C					
	P					
	B					
	C					
	P					

(*) The analysis should identify any possible associated risk (Biological, Chemical, Physical) at any step, starting from the arrival of the olives in the olive mill till the delivery of the final product (oil in bulk or in the final package).

7.2.4: Example of a CCP determination worksheet (apply to each step where a specified significant hazard is identified)

The CCPs are identified by applying a logical procedure outlined in a diagram shown below, for each phase of the process, the so-called "decision tree".

Process step	**Significant hazards**	**Q1**. Can the significant hazard be controlled to an acceptable level at this step by prerequisite programs (e.g. GHPs)? **a**.	**Q2**. Do specific control measures for the identified significant hazard exist at this step?	**Q3**. Will a subsequent step prevent or eliminate the identified significant hazard or reduce it to an acceptable level?	**Q4**. Can this step specifically prevent or eliminate the identified significant hazard or reduce it to an acceptable level? **c**.	CCP number
Identify process step	**Describe the hazard and cause**	If yes, this step is not a CCP. If no, proceed to **Q2.**	If yes, proceed to **Q3.** If no, this step is not a CCP. Subsequent steps should be evaluated for a CCP. **b**	If yes, that subsequent step should be a CCP. If no, proceed to **Q4.**	If yes, this step is a CCP. If no, modify the step, process, or product to implement a control measure. **d**	Number the CCP and include in the HACCP worksheet.

a. Consider the significance of the hazard (i.e. the likelihood of occurrence in the absence of control and the severity of impact of the hazard) and whether it could be sufficiently controlled by prerequisite programs such as GHPs. GHPs could be routine GHPs or GHPs that require greater attention to control the hazard (e.g. monitoring and recording).

b. If a CCP is not identified at questions 2–4, the process or product should be modified to implement a control measure and a new hazard analysis should be conducted.

c. Consider whether the control measure at this step works in combination with a control measure at another step to control the same hazard, in which case both steps should be considered as CCPs.

d. Return to the beginning of the decision tree after a new hazard analysis.

7.2.5: Example of a HACCP Worksheet

Critical Control Points (CCPs)	Significant hazard(s)	Critical limits	Monitoring				Corrective actions	Verification activities	Records
			What	How	When (frequency)	Who			

ANNEXES

Annex A – Pre-requisite program: a set of Good Practices to manage the risk at any step.
Annex B – Technical Sheet: information about the olives to be processed and parameters defining oil characteristics.
Annex C – The General Requirements - Checklist: a good tool to implement the HACCP method and periodically inspect its correct application.
Annex D – Basic Hygiene Rules: hygienic and safe management of the product, work environment, and behavior in olive mills.