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Application of HACCP on the production line artichoke

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ABSTRACT

The aim of this work is to apply the HACCP system in a packaging unit of fruit and vegetables production in Morocco artichoke product typically Moroccan. In this work, all microbiological, chemical and physical might occur in this production line have been identified.

The study of this line artichoke identified the presence of five steps considered CCP, from receipt of raw materials to the finished product formulation. These stages are classified according to the chronological order of production: reception, washing, rinsing, metal detector, storage room no monitoring measures and corrective actions have been established for each CCP to control any deviation limits, acceptable and thereby preserve the sanitary quality of the product, and thus reduce the number of customer complaints. © 2013 Trade Science Inc. - INDIA

KEYWORDS

Quality;
HACCP;
Danger;
Packaging;
Artichoke.

INTRODUCTION

In Morocco, the food industry occupies a prominent place in economic activity, The units involved in the food industry are distributed throughout Morocco, however, from this industry, there's those sulfur problems such as:

- The use of old manufacturing processes.
- Low productivity.
- A high manufacturing cost.
- Lack of skilled labor.
- A lack of control of GHP (Good Hygiene Practice).

It is especially this last point that raises the most concern now, because most of the poisonings are due to contaminated food products. But next to the health

consequences, this problem may cause a decline in economic activity in the food industry due to the loss of consumer confidence in product quality, and increased customer complaints, hence the need find ways to ensure the safety of our food.

The most effective system for mastering the safety of food products is the HACCP (hazard analysis critical control point). This system can be applied to all stages of preparation and production of food. Currently, the Moroccan industrial becoming interested in the concept and consider it an essential tool for improving the health of the product.

In this context, we have applied the HACCP system in an industry Moroccan artichoke. Indeed, this sector represents an important part of the food sector

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in Morocco. In addition, these products are highly perishable and provide a favorable environment for the growth of pathogenic microorganisms so this may cause a dramatic impact on public health.

TABLE 1

Step N° of CCP	Danger	Monitor Parameter	Monitoring system (principle 4)						corrective action (principle 5)	Critical limit (principle 3)
			Location	Frequency	Responsible for implementing	Responsible decision	Methodology	Recording		
CCP1 C : reception	Pesticide residues	DBH							- Inform the quality service And technical director - blocking of the goods - initiate the procedure of de NCP et CAR/PAR	DBH + Dose + approved Product Annex List of pesticides
		Certified Product	reception (weighbridge)	Each receiving	reception agent	Qualité Responsable	Control of the delivery and last pesticide traitement	- delivery paper - receipt paper - (computer backup) - plots treatment sheet		
CCP2 B: Washing (with chlorinated water 30 to 40ppm)	μ-organism such as E. coli from fruits or brought by birds, rodents	The chlorine	Washing Step	1h each	Washing agent control	Quality Manager	Controlling the rate of chlorine	Register / monitoring chlorine	- Inform the service quality - Repeat control - Start the process and NCP CAR / PAR	Free Chlorine in the wash tank between 30 and 40 cl2
CCP3 B: Rinsing (with water treated forage 0.5 to 2 ppm)	Microbial contamination (pathogenic bacteria) pesticides	Chlorine in water drilling and water washing fruits	Step Washing fruits	- twice per day for drilling water - Once / hour for Washing water	control Agent for semi-finished product	Quality Manager	test chlorine (reactive dyes)	Control the level of chlorine in the station	- Inform the service quality and maintenance manager - Start the process and NCP CAR / PAR	- 0.5 to 2ppm for water drilling - 30 to 40 ppm for the washing water
CCP4 P : Metal detector	The Presence of metal pieces in the finished product pesticides	Good operation of the metal detector	Conditioning area	Each hour	Control agent of finished product	quality Manager	Conditions of operation of the equipment with appropriate standards of material	Checklist metal detector	- Inform the service quality and the maintenance manager / Fridge - Identify the lot at risk - Start the process and NCP/ CAR / PAR	0 metal piece
CCP5 B: storage Negative Room	Microbial contamination (pathogenic bacteria) pesticides	T°C	negative room	Each 4 hour	Control agent of finished product	quality Manager	Temperature control -Calibration of recorders temperature once a companion - Control the alarm system	- Monitoring the temperature of the cold room - Monitoring input output fridge - Alarm Control cold rooms	-Inform the service quality and maintenance manager - Identify the batch ≤ -18°C in the room - Start the process and NCP/ CAR / PAR	

Our choice has focused in particular on a packaging unit of traditional Morocco artichoke, artichoke is a very food consumed by the Moroccan population. Rheological and physicochemical properties have been well studied. However, until now, no work has been done on the analysis of risks related to the manufacturing process and the application of HACCP in the chain of manufacture of this product.

The study was conducted in a packaging company located artichoke city of Kenitra, this work will serve as a model to expand the application of HACCP to other packaged products so traditionnelle.et for any company wishing to have a finished product healthy,

safe and of high quality.

MATERIALS AND METHODS

Depending on the availability of equipment, it there's microbiological and physicochemical analyzes performed along the production line artichoke happening in-house laboratory and another externally in a laboratory approved LOARC: official laboratory of Chemical Analysis and Research.

Microbiological analyzes

(a) Total coliform counting

The wash water Artichoke receipt will be considered the solution to our samples. Total coliforms and faecal germs usual digestive tract of humans and / or animals. Their existence in a medium is evidence of the degree of contamination and its hygienic quality. The culture medium used is the DCL (Deoxycholate Lac-

tose Agar). The counting is done after 48 h of incubation at 35°C. A series of dilutions from 10 to 10 is prepared, and 1 ml of each dilution was seeded at the bottom of a sterile box, the middle DCL cooled to 45°C is poured aseptically boxes with the number of colonies is between 30 and 300 are used for the enumeration.

TABLE 2

step N° of CCP	Dangers	Monitoring parameter	système de vérification (principe 6)						corrective action (principe 5)	acceptation Criteria
			place	Frequency	Execution Responsible	decision Responsible	Methodology	Recording		
CCP1 C: Reception	Pesticide residues pesticides	MRL exceedances	orchard station	Analysis twice per season for each farm	Quality Manager	Quality Manager + Director	- Perform sampling - Send the sample to a laboratory accredited to ISO 17025 - Sampling of EACCE (autonomous institution of control and coordination of exports) from the chain packing)	Bulletin of residue analysis	- Blocking of the goods - Inform management - Lock picking - Start the process and PNC CAR / PAR	- Concentration of the active Ingredient <MRL destination market - Concentration of M.A <MRL
CCP2 B: Washing (with chlorinated water 30 to 40 ppm)	µ-organism such as E. packages from fruits or brought by birds, rodents pesticides	Rite of chlorine	Washing step	Each hour	Quality Manager	Quality Manager	Chlorine control	Monitoring register chlorine	- Inform the Technical Director - Repeat control - Start the process and NCP/ CAR / PAR	Free chlorine level in the washing tub 30 to 40 ppm of cl2
CCP3 B: Rinsing (withwater Forage treated 0.5 to 2 ppm)	Microbial contamination (pathogenic bacteria) pesticides	The chlorine content of the water feed	At the tap of rinse	- Micro biological Water feed 1 time / month - Micro biological analysis of the finished product 1 time / 100 tonnes	Quality Manager + Director	Quality Manager	- Perform sampling - Send the sample to a laboratory accredited to ISO 17025	Bulletin of micro biological analysis of water and forage finished product	- blocking finished product - Inform the Technical Director - Start the process and PNC CAR / PAR	-Sample meets the microbiological drinking water - Sample of satisfactory microbiological quality
CCP4 P: metal Detector	Present of metal pieces in the finished product Pesticides	Good operation of the metal detector	Conditioning area	Once a day	Quality Manager	Quality Manager	- Checking the operating status of equipment with appropriate standards	Sheet metal detector control	- Blocking of the goods at risk (identifying the lot) - Inform the general management and maintenance service - Start the process and NCP/ CAR / PAR	Efficient operation of the metal detector
CCP5 B: Storage negative Room	Microbial Contamination (pathogenic bacteria)	Temperature below -18 °C	Positive chamber	A sample for micro biological analysis every month	Quality Manager	Quality Manager + Director	- Perform checks the temperature of the finished product - Send a sample finished product at a ISO 17025 accredited laboratory	- Temperature Monitoring - Alarm Control cold rooms - Micro biological analysis report	- Blocking of goods at risk (identifying the lot) - Inform the general direction - Start the process and PNC CAR / PAR	Sample line (no health risk to the consumer)

(b) Fecal coliform counting

The same technique will be applied to total coliform fecal coliforms but incubation is performed at 45°C for

48 hours.

Enumeration of yeasts Enumeration of yeasts is performed on PDA (potato dextrose agar), serial dilutions

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are made. The incubation was carried out at 30°C for 48 Enumeration of Mold. The mold count is conducted on PDA (potato dextrose agar), serial dilutions are made. The incubation is carried out at 30°C for 5 days.

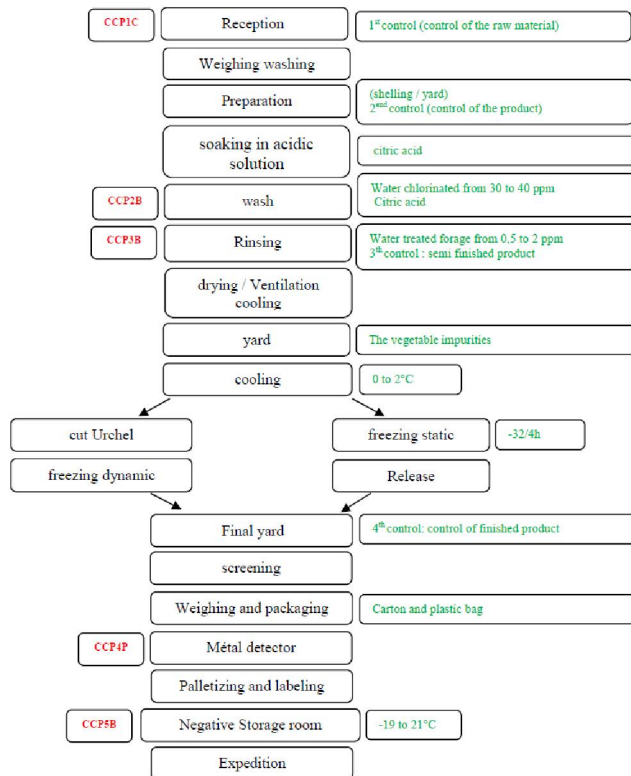


Figure 1 : Diagram of manufacturing.

Physicochemical analysis

(a) Temperature measurement

The temperature of the washing water is artichoke measured using a thermometer type.

(b) PH measurement

After calibration, the pH was measured using a pH meter Crison Micro-pH-type 2000, in a 100 ml Erlenmeyer flask, 20ml of wash water artichoke was taken directly to determine pH, Standards used were pH 4 and 7.

(c) Measure of acidity

It takes 10 ml of wash water addition artichoke which is a few drops of phenolphthalein indicator solution 1%. The titration is carried out with a solution of NaOH (N/9) until the indicator changes color to pink. The titratable acidity is expressed as a percentage of lactic acid (MW = 90.08 g) in 100 ml of brine. It is given by the following formula:

$$\% \text{ Lactic acid} = \frac{\text{Vol (NaOH)} \times \text{N (NaOH)} \times (90.08) \times (100)}{1000 \times (\text{weight of sample})}$$

RESULTS AND DISCUSS

The traditional method of packaging artichoke is shown in the following diagram.

In this production line artichokes, all the dangers that can arise at each stage were identified and analyzed^[10]. Five stages were identified as critical control points (CCP). For each CCP, we have put in place measures for monitoring and corrective actions to drift Controller acceptable limits and controls the sanitary quality of the product, every critical step is now analyzed and justified his choice as CCP through the decision tree.

CCP1: reception

On the reception they just have the three types of dangers:

Biological : bacteria, viruses, parasites, toxins...

Physics : broken glass, bone or insect Metallic body.

Chemical : excess additives, fluids, lubricants, pesticides this latter danger is a CCP chemical pesticides since high doses affects the health of the consumer, the more they are prepared and used in the field at the supplier and according to the HACCP requirements, you must:

- Mastering the CCP, he set a threshold, it set up a system of monitoring and corrective measures put him
- Establish a set of specifications with the supplier requires it to:
- Physicochemical and microbiological analyzes for soil, irrigation water and the product.
- The use of pesticides specific to our products and are named on the list of approved pesticides for agricultural purposes in Morocco.
- Respect the DAR is to say the date before harvest.
- Do not exceed the maximum concentration of pesticide by volume and surface, to avoid any adverse effect on the health of the operator and the consumer^[1,2].
- Qualification of operators with the notions acquired HACCP and CCP, and their effect on the quality of the food product^[3].
- Make effective training and a regular on good manufacturing practice (GMP) and good hygiene practices (GHP), the personnel handling the product, cleaning staff and maintenance personnel to avoid all hazards that may be found at the reception.
- Make audits at suppliers.

- Establish an effective system for cleaning and disinfecting crates and truck transportation,
- If cooling should be equipped with a refrigerant line
- Keep for each activity for each event records (training, analysis, list of pesticides,... etc..) And classified them in a manner consistent for the company must:
- Have a copy of each document or record used for each batch of the product concerned entering the supplier.
- Carry out audits at the supplier to verify compliance with the requirements of the work.

The manufacturer (the company), legal and regulatory framework.

- Take samples at the reception for physicochemical and microbiological analysis in an approved laboratory.
- Make daily checks (organoleptic).

Make effective training on a regular basis in an appropriate animated by photos or videos of preference and explained in a very simple manner by the mother tongue, and make evaluations hot and cold to validate the effectiveness of training^[11-13].

CCP2: washing

Washing is critical Biological that must be mastered well, you do the washing to eliminate or reduce the microbial load and any other solid objects such as sand, time and frequency is based of the external state of the product.

The wash water must not contain microorganisms, ca must be properly chlorinated to avoid contamination of the product, hence the need for microbiological analysis.

- The washing water to be chlorinated to 30 to 40 ppm.
- The concentration of active chlorine in the treated water for washing is checked, at least every hour, by using the comparison Lovibond This frequency depends on the flow rate of the water and the condition of the product,

And each detection of a deviation that is to say, when the rate of chlorine is less than a 30 which may provide an opportunity for the proliferation of undesirable microorganisms affecting the health of the consumer, or greater than 40 ppm considered high dose and may have an impact on human health, the quality manager sends a sheet of non-compliance in accordance with the procedure (Control of nonconforming product)

Must communicate the appropriate information to all levels of the food chain regarding safety issues related to product ISO 22000.

In this case the lot between the two controls will be identified and isolated places in observation, and depending on the severity of the hazard the product will be refurbished for a second or rejected with the authorization of the service of the state Concerned.

Each transaction records the current version are filled with a clear, correct and properly kept in a specific place according to the procedure (Master documents and records), to provide evidence of compliance with the requirements and the effective functioning of the HACCP

CCP3: rinsing

Rinsing step that follows is a wash to remove any residue or any trace of chlorine escaping microorganism washing is a critical step that must be mastered as well give it a biological CCP. It carries with drinking water quality in accordance with the standard Moroccan^[8].

Water intended to come into contact with food must be analyzed microbiological. The frequency of testing depends on the origin of water: 2 times / year for municipal water and 1 time / month for water from other sources (HACCP).

Depending on the capacity of the company, the chlorination is carried out through a system of dropwise addition or a metering pump of concentrated bleach (up to 48°), with a rate of 200 mg / l and the period of use of the water is at least 20 min to ensure disinfection. but their use requires a lot of attention from the person responsible, since we must carefully observe two parameters: time and concentration.

A high concentration of chlorine will affect the health of the consumer, and a low concentration will lead to the proliferation of pathogenic microorganisms which will likewise affect the health of the consumer.

Similarly, a low response time between water and chlorine will lead to the growth of undesirable microorganisms.

So at this level must:

- Good control of the content of active chlorine at 2 times / day
- Good control of the metering pump has an adequate frequency, and install next to another reserve pump

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- failure
- Well control the level of chlorine in the feed tank of the metering pump
- Chlorine tank must be identified and isolated food records are established and filled updated and maintained properly in a specific location, such as evidence that the system is updated to comply with the requirements

CCP4: metal detector

The metal detector is a machine that detects all types of metals in the finished product, it is a step that shows a CCP need physical well mastered so you must calibrate the machine with appropriate standards before each start, and after any stoppage of the machine, ensure proper operation of the alarm system of the machine.

Strict control^[5] is 1 time/hour and results will be recorded in the record (record control metal detector) for any deviation must isolate the lot between the two controls, identifying a retriage and repackaging, or rejection.

It should also initiate the procedure for nonconforming product and the process preventive and corrective actions

CCP5: negative room storage

Product storage room CCP negative is that he was the biological well controlled indeed any temperature rise that is to say, temperatures greater than -18°C promotes the development of undesirable microorganisms affects the product.

To do this we must

- Clean rooms negative, a statement to that effect must be written in a clear language with well detailed and displayed in strategic places.
- Validate the effectiveness of cleaning and disinfection swabbing method example.
- Do training for the cleaning crew on procedure of cleaning and effective method for cleaning various rooms and machine.
- Evaluate the training and warm cold.
- Put the finished product on pallets labeled already identified, own and install it inside the chamber in accordance with the FIFO rule (the first between the first comes out).
- Do not stick the paddles against the walls of the cold room.

- Install a new cooling system reserve in case of failure.
- Install an alarm system for any temperature rise.
- Install a generator that automatically feeds the electricity company in case of failure.
- Make each batch of samples for microbiological and physicochemical analyzes the external laboratory for verification of HACCP^[4] and keep a copy for testing the life of the product.
- Records of control established by the Quality Manager for the product or service responsible for all that is machine must be carefully filled by officers involved in a clear manner with an adequate frequency and in the 24 hours to connect the product has its origins^[9] and all else that comes in contact with him^[7].

The same way for each deviation must isolate the lot between the two controls that contains a retriage identify and repackaging, or rejection it should also initiate the procedure for nonconforming product and the process preventive and corrective actions always keep records and sort of a way that they are easily accessible by identifiable persons concerned.

CONCLUSION

Our study has allowed us to raise any problems associated with the traditional manufacturing artichoke in society and to install a monitoring system and corrective actions for critical steps identified in case of deviation. This will allow us so long to improve the production of artichoke and make a healthy, safe and better.

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