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STUDIES REGARDING THE FOOD SAFETY MANAGEMENT SYSTEM IMPLEMENTATION IN PRODUCTION OF WINE GRAPES

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Abstract:

The wines quality and safety are depending of the raw materials quality and safety, respectively black and white grapes. These two requirements (quality and safety) were arise from the need to protect consumers and are found both in EU Directions and National Legislation. In the technology of wine grapes production it can be applied a HACCP system which allows for the identification of the key elements from this process which can affect the grapes quality and safety. HACCP is the abbreviation for the English expression "Hazard Analysis and Critical Control Points". Using the HACCP system, the microbiological, chemical and physical risks existing in the wine grapes production technology are identified, in order to find the CCPs (Critical Control Points). In order to keep under control the technology of wine grapes production a single CCP-1 was identified: Integrated plant protection, with two significant hazards: a) the attack of fungi, insects and mites; b) the pesticides and heavy metals residues. Our studies formulate the good hygiene requirements and work procedures that have to be fulfilled by each company specialized in the wine grapes production.

Key words*: CCP, HACCP, hazard, residues*

INTRODUCTION

HACCP, is an acronym derived from English:**"**Hazard Analysis And Critical Control Points**"** and this is a systematic method to identify, assess and control significant hazards associated with plant and animal origin food (Pardo et al., 2005). This is designed to anticipate and control problems before they happen. It provides the most effective and sufficient way to ensure that food products are safe. The great calitologist J. Juran, 1999 said "We have to open eyes to ensure quality and food safety, if we want to live decently". Hygienic-sanitary quality is the essential condition for a food to be consumed by humans. Consumers always want the food at their disposal to be safe in terms of hygiene and sanitary quality so as to cause no illness (Mencinicopschi and Raba 2005). Hygienic quality is influenced by: - microorganisms and parasites; - pollution by: antibiotic residues in animal products, food additives, heavy metals, radioactivity, pesticides, organic substances (dioxins) and - other toxic substances: allergenic, cyanogen, antimetabolites etc.; - natural induced toxicity by: toxic plants, mycotoxins etc (Boboc, 2010). EC Regulation 852 transposed in Romania by HG 924/2004, article 5, paragraph 1, states: "Food business operators must implement and maintain a permanent procedure or procedures based on HACCP principles". In this case the white or black grapes can contain mycotoxins, pesticides and heavy metals residues above the permissible limits, being very dangerous for human health. During the technological flow of grapes producing, the hygiene rules should be respected, for does not lead to loss of product hygienic quality. Food safety management systems like ISO 22000:2005 and Hazard Analysis and Critical Control Point (HACCP) can assure the wine grapes safety by preventing potential hazard at the process source points. Using the HACCP system, we tried to identify the microbiological, chemical and physical hazards existing in the produced grapes technology, in order to indicate the CCPs (Critical Control Points) for the products hygienic quality.

MATERIAL AND METHOD

The studies were developed in a vine plantation according to the flow diagram described in Figure 1. For each process step was performed the risk analysis, in order to identify the biological, chemical and physical hazards correlated with the product and process and also the preventive actions and control measures which are necessary to keep under control these hazards (table 1). In order to establish the Critical Control Points in all steps of the technological flow of wine grapes production, where it's possible to implement specific control measures regarding food safety, it was applied the CCP decision tree (recommended by Codex). The control of each CCP, according HACCP principles are planned in a document named the HACCP plan (Table 3). The establishing and implementation of the control measures are shown by specific records. All researches and observations were made in a private company which owns vine plantations and vinification line. Each transfer of wine grapes from the farms to vinification line are accompanied by an analysis bulletin, issued by an approved laboratory.

RESULTS AND DISCUSSIONS

The technological flow of white and black grapes is shown in Figure 1. In researches it was checked each step from the technological flow of white and black wine grapes (Figure 1) in order to identify potential hazards such as: biological, chemical and physical hazards.

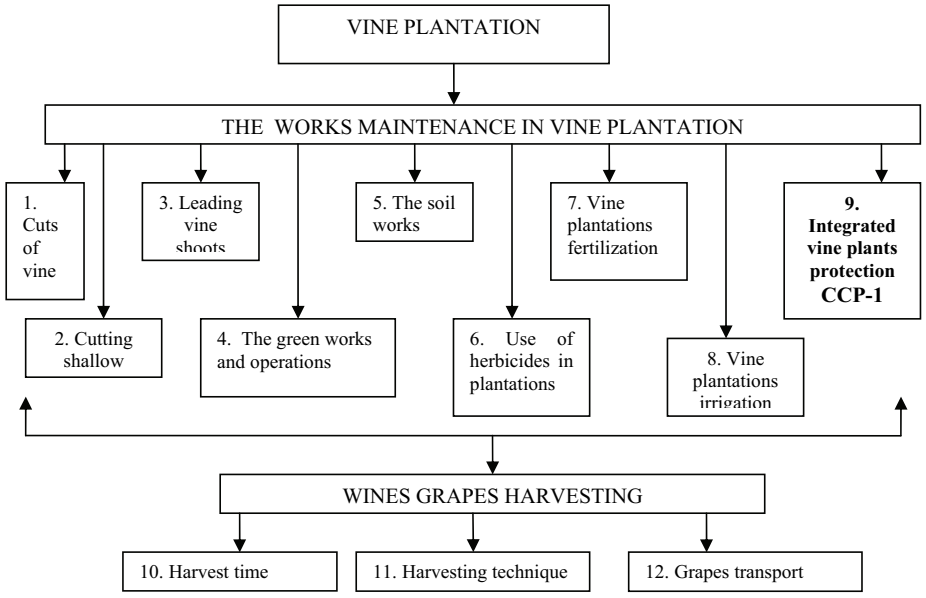

Figure 1. The technological flow of white and black wine grapes

All these hazards (Table 1) were identified by using the "decision tree" recommended by Codex Alimentarius. Each food safety hazard has been assessed according with the severity of possible adverse health effects and their appearing probability. By using the CCP decision tree (Table 2) only one CCP was identified in the technological flow of white and black wine grapes, which is focused to keep under the control the step 9 "Integrated plants protection". The Critical Control Point is a point, step, or procedure where the hazard that's associated with the food can be prevented, eliminated or reduced to acceptable levels.

Table 1. Hazard analysis in the technological flow of white and black wine grapes

Process step	Hazard	Preventive actions/Control measures
1. Cuts of vine	*B and *C - unidentified	-
	*F- incorrect cuts	Visual inspection, cutters training; checking scissors
2. Cutting shallow roots	*B and *C - unidentified	-
	*F- Incorrect cutting shallow roots	Visual inspection, cutters training; checking instruments
3.Leading vine shoots	*B and *C - unidentified	-
	*F- Incorrect leading vine shoots	Avoid strangulation through a binding strings too tight; cutters training
4. The green works and operations	*B and *C - unidentified	-
	*F- Overdose fertilises	Making accurate and timely the works in green; checking scissors, knives, penknives; operator training; visual inspection
5. The soil works	*B and *C - unidentified	-
	*F- Incorrect soil works	Making accurate and timely ground work for: maintenance and keeping the humus in soil, nutrient accessibility, activation of chemical and biological processes in the soil and weeds destroying.
6. Use of herbicides in plantations	*B–- Affecting vines by incorrect herbicide usage	Setting recipes and time of herbicide; Uniform distribution of herbicides and avoiding contact with the leaves.
	*C-unidentified	-
	*F- Overdose of herbicides	Limiting doses to a minimum; respect the manufacturer's instructions for treatments; operator's training.
7. Vine plantations fertilization	*B and *C - unidentified	-
	*F- Overdose fertilises	Use of rational fertilization to avoid the dangers of polluting products and the environment; Knowing the soil level of nutrients supply and annual consumption; Extensive use of organic fertilizers and bio-fertilizers for the extention of the ecological concept.
8. Vine plantations irrigation	……	……
9. Integrated vine plants protection	*B- Attack by fungi, insects and spider mites	The fruit health maintaining; Combined treatments; Direct visual inspection of the field.
	*C- Ineffective chemical control	Treatments at the optimum time when is most effective; Choices based on efficacy, mode of action, side effects, the reshuffle. Active substance content; manufacturer's instructions checking; operator training; suppliers selection.
	*F- Overdosing or underdosing of pesticides	Professional advice to avoid danger to the user during application, fruit waste, environmental damage, etc..
10. Harvest timing	…….	……
11. Harvesting technique	*B- Microbial contamination in mechanical harvesting application	Equipment hygiene, harvested grape antimicrobial protection
12. Grapes transport	*B- Microbial contamination	Hygiene vehicles maintenance; Drivers training; Visual inspection
	*C-unidentified	-
	*F- – grapes crushing	Respect the limit of the load; Visual inspection. Training pickers

*B= biohazard; *C= chemical hazard; *F= physical hazard

The HACCP Plan (Table 3) is one of the most important document from food safety management system, which contains the main information necessary in order to implement the control measures and keep under control the identified CCPs.

Table 2. CCP determination during processing (in according with the decision tree)

Process step	Hazard	Decision tree questions				CCP no.
		Q1- there are preventive measures to prevent the risk of identified hazards?	**Q2-** stage is specially designed for eliminating / reducing the possibilities of developing a potential hazard	**Q3-** there is the Possibility of contamination due to a potential hazard till the acceptable level?	**Q4-** can a later stage to eliminate a potential hazard identified / to reduce possibility the occurrence of a potential hazard to an acceptable level?	
9. Integrated vine plants protection CCP-1	- Attack by fungi, insects and spider mites; - Overdosing or underdosing of pesticides	yes	yes	No	no	CCP-1

Table 3. HACCP Plan for wine grapes production

Stage	Significant hazard	CCP no.	Control measures	Critical limits	Monitoring				Corective actions
					Method	Respon-sable	Frequentcy	records	
Pest and disease control	a. Attack by fungi, insects and spider mites; b. Overdosing or underdosing of pesticides .	CCP -1	a. Specific laboratory tests for mycotoxins; b. Analysis of heavy metals residues and pesticides presence	a. Over 2µg/kg; b. Heavy metals presence (As<0.2, Cd<0.01, Cu<1, Pb<0.3 mg/l); organic pesticides: 2-10 ppm	a. ELISA test; HPLC b. gas chroma-tography or spectrophoto metry	head farm laboratory	Before harvest if the attack is high	Register for pest and disease control Analises register	Preventative health maintenance in plantations . Personal training

CONCLUSIONS

The HACCP system implemented in any company with wine grapes production activity, is a preventive self-control, whose principles can be applied to all food producing sectors.

Our studies formulate the good hygiene requirements and work procedures that have to be fulfilled by each company specialized in the wine grapes production.

In order to keep under control the wine grapes production technology one CCP was identified, which is focused on "Pest and disease control".

The grapes should be sound without rotten parts, otherwise oxidative and microbial contamination can rapidly develop.

Harvesting should be conducted with greatest possible care and efficient disease management system should be applied.

Pesticides should be handled with care as they constitute chemical hazards.

At time of harvest, the grapes must have also reached correct maturity.

Pesticide and fungicide residues on surface of berries constitute chemical hazards.

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