SUMMARY

Key words: gain, pathogens, sunn-pest, Black Point, grain quality

The influence of diseases on the bakery quality of grain is a controversial subject in the context of higher and higher demand for quality flour. Grain represents the primary raw material used in milling.

The result of processing it is mainly different types of flour and bran as a secondary product.

The performance quality obtained in the baking process starts from the wheat grain quality obtained from extended agricultural land. The presence and influence that some pathogens have on the overall quality of the baking process classify it in two categories: usable and unusable.

Wheat serves as the primary cereal in international food manufacturing. From wheat, by milling, derive numerous types of flour and bran. Flour, in different extraction grades, is the primary raw material in the bread-making trade.

Bran, considered sub produce, can be used in the bread-making industry for several types of dietetic varieties of produce, as well as for feed.

The high-quality demand for obtaining the bread products is in continual growth, bread being a highlight Romanian cuisine.

To satisfy the need for high-quality baked goods, our attention must be shifted towards the wheat grain.

Grain cultures have become a challenge in the last 10 years. Cultivators have tried using different grain types from which to obtain not only a better productivity level but also an improvement in the quality of all baked goods.

On the flipside, the bread making business becomes branched out with unique merchandises that need extraordinary grain quality, a comprehensive example being frozen baked goods.

Grain associates to the Triticum family. This class incorporates a large number of forms from wild (primitive) to evolved (modern). Those formes were ranked on a number of standards all throughout the years but the trusted and universally used classification is the genetic one, based on the number of chromosomes.

Wheat has autumn forms and summer forms.

The species utilised on extended surfaces in grain cultures is *Triticum estivum* (common wheat), occupying 90% of farmlands on the globe.

Hard wheat (Triticum durum) is another kind of wheat ploughed on large surfaces, comprising the principal origin of raw material utilised in manufacturing a distinctive sort of flour. This special variety is a high quality flour and it is adopted as the main component in the production regarding pasta.

The chemical structure and composition of the wheat grain represent the foremost basis concerning the general utility of wheat, causing it to be an essential element of the entire food industry. It can be utilised milled or whole. From the anatomical point of view of the grain itself, it is comprised of the pericarp, aleuronic layer, embrionic layer and endosperm. In the milling process, these layers are divided as to obtain various produce designated to human and animal consumption. From grain farmlands, the straws that result after harvesting are used for feed, as stable bedding, at cellulose factories or for organic fertiliser.

This thesis follows the quality obtained over a period of 2 years of harvest, 2014-2015 and 2015-2016 from two great wheat cultivators in Iaşi county. The two farmers taken into consideration during the study are Moldova Țigănași and Agrofruct Plugari.

The thesis titled *Research concerning the influence of pathogens attacks on grain quality* is structured over two parts and has seven chapters followed by the bibliography and the scientific studies list.

The first part is represented by the bibliographic study on the given problem and is comprised of two chapters, and the second part encompasses the description of the natural framework in which the research has been made, the material and method utilised as well as the unique results that were obtained.

Chapter I – includes the current study of the influence of some diseases and pests on the overall grain quality and is a detailed documentation regarding the description of pathogens and pests that determine disease such as: common blight, fusarium head blight and Black Point. From the list of pests, the sunn-pest has been chosen for this study considering it determines the biggest defect in the glutenous structure with many negative impacts on the grain's quality and it's breadmaking qualities. In this chapter, a qualitative analysis has been made, on areas, for the two harvest periods: 2014-2015 and 2015-2016.

Chapter II – concerns quality control of the wheat grain and the influence of pathogens on it. The point of view of this chapter concerns the use of the wheat grain in the milling process. In the food industry, the quality control of the wheat grain is very important because of two reasons: structural (which implies a certain behaviour in the milling industry) and the safety of the consumers. The tests conducted when the wheat arrives in the mill are following national standards, that take after international measures.

The second part is comprised of – *Personal research* in regards to the treated subject in this thesis. This part is divided into five chapters.

Chapter III contains the description of the materials and methods used. The materials and methods used for the analysis are the ones specific to the mills, that have the main objective the processing of grains and the making of flour.

Chapter IV describes the natural framework and the climate conditions for the two years of harvest analysed: 2014-2015 and 2015-2016. From a thermic point of view, from 01.09.2014 to 30.06.2015, the temperatures have exceeded the previous thresholds with values from 0.4 degrees Celsius to 2 degrees Celsius.

In Moldavia the harvest year 2014-2015 was dry. The extreme drought phenomena were accentuated starting from January and continued until 15.08.2015 when rainfall reached 146 mm, a very small number in comparison with the annual average of 391.1 mm.

In the autumn and fall period of the 2015 – 2016 harvest year the climate conditions for the Moldovia area were less favourable for the preparation of the terrain, setting-up, subsequent growth and vegetation of the autumn harvest. Following the drought of 2015 in the first month of autumn, September, the rainfall was significantly smaller than the annual average, influencing the possibilities of preparing the terrain for the next harvest. The rainfall recorded in the month of October of 78mm, with 43.5 mm over the annual average as well as well above average temperatures lead to the bettering of terrain preparation conditions of the next wheat harvest.

Chapter V describes the farming technologies used: the workings of the soil, preparing the germ bedding and treatments applied in the two years taken into consideration in the study: 2014-2015 and 2015-2016.

Chapter VI represents the quality analysis obtained for the grain lots taken into consideration in the study.

Chapter VII describes the conclusions and recommendations.

Although the temperature and rainfall conditions for the two farmers were approximately the same, the final quality of the crops was different. Harvester Moldova Țigansi obtained, in general, good usable harvest, with minor defects that can be corrected in the milling process.

Harvester Agrofruct Plugari, on the other hand, obtained a bad harvest with big quality problems that could not be processed individually and without extra corrections. The wheat analysed of this harvester, in the 2014-2015 harvest, had problems concerning the humid gluten content and needed supplementary corrections. The harvest from Agrofruct Plugari, in the 2015-2016 harvest, was better from the humid gluten standpoint but very weak in gluten quality. The qualities of the humid gluten are measured by determining the rheological properties and have a very impactful influence in the breadmaking process directly influencing the behaviour of flour in the flux of production and the final quality of the obtained bread produce.

Another important factor in determining the final quality of the wheat grain is the phytopathogens and a series of pests, specific to wheat crops. The phytopathogen and pests action can have a significantly worse impact on the quality of the wheat grain.

The phytopathogens can cause permanent damage in the structure of the grain of wheat making it unusable as a bread making ingredient or can produce modifications that can be later corrected in the process by mixing it with enzymatic corrections or with other lots.

The harvesting year of 2014-2015 did not register massive attacks of the fitopatogei, the main characteristics of this year being the very low content of wet gluten and a few lots affected by malura. The lots that present malura attacks can’t be milled, they can only be used as feed.

Mălura is a disease produced by some species belonging to the Tilletia spp type.

Grain lots with a low gluten level needed supplementary corrections with vital gluten to fulfil the necessary qualities for the breadmaking process.

One of the highlights of the year 2015-2016 was the massive Black Point attack and the sunn-pest attack (*Eurygaster* sp.). The Black Point and the sunn-pest (*Eurygaster* sp.) negatively influences the bread-making properties of the wheat. The negative influence determined by the Black Point consists of the modification in the colour of the resulting flour. The negative influence of the sunn-pest (*Eurygaster* sp.) consists of the modification of the gluten structure, damaging it. The deterioration of the wet gluten structure is determined by the prothesis wich the sunn-pest introduces together with its saliva when it stings the grain.

The quality and quantity of the wet gluten from the grain of wheat are very important in the bread-making industry because they directly determine the final quality of all resulting bread produce. Wet gluten formes a tridimensional frame in the dough which serves to retain the gases that form during the fermentation process, contributing to forming of the soft interior of the bread as well as it’s volume.

For the analysed lots there has been observed a correlation between the percentage of Black Point and the percentage of sunn-pest attacks (*Eurygaster* sp.). The sunn-pest attacks are measured by analyzing the flour power. This analysis is made with an alveograph. The power of the flour is noted with W and it is an important quality parameter of the wet gluten..

The Black Point attack is measured in percentages by counting the damaged grains. In the 2015-2016 harvest, the percentage growth is positively correlated with the rapid growth of sunn-pest attacks

(*Eurygaster* sp.). Thus, the lower the measured W (a value under 100), the greater the percentage of Black Point, exceeding the accepted 8% value.

The two defects have raised many problems in the milling process as well as in the manufacturing of wheat lots and the making of flour.