THE EFFECT OF TEMPERATURE AND ENZYME ON THE BRIX OF MALT

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Abstract. Today, malt as a sweetener, flavoring and coloring can be used in different food products especially baby food, malt coffee, beverages and confectionary products. In general, several factors affect the rate of soluble solids and malt quality such as temperature and enzymes. The aim of this research was to determine the optimal level of these factors on the amount of solid material extracted from generative malt compared with normal industrial malt in the consumer market. In this regard, treatments were done at temperature level 51, 75 oC, Amiloglocosidaz, and Beta – Glucanase enzymes (Brix, PH and iodine test). According to the results, Brix and pH while the highest rate in samples processed at a temperature of 72 °¬C was observed, rising temperatures increase the Brix and pH values; however, changes in consumer glucanase and Amyloglucosidase enzymes, statistically significant differences in levels of Brix and pH samples did not show. As a result, better treatments were done in order to achieve the greatest amount of Brix from Malta. The samples were processed at a temperature of 72 °¬C, with the enzyme by passing through was introduced. The results of this study showed that as temperatures rise more than change the type of enzyme is important.

Keyword: temperature, enzymes, Brix, Malt.

Introduction. Barley is the fourth most important cereal after wheat, rice, and corn (FAOSTAT). Barley is traditionally used as a basic raw material for malting and beer production, but to date, about 70% of barley production is used for animal feed, mostly cattle, and pigs (Kumlehn and Stein, 2014). The largest value-added use for barley is the production of malt (Schwarz & Li, 2011).

Still, barley grown for malting takes up the second largest market. Barley grain represents a favorable source of starch and has a high content of crude fiber and protein. Maltsters usually demand lower protein content (12 %) (Kumlehn and Stein, 2014). The malting process comprises steeping, germination, and drying (6). It serves the purpose of converting insoluble starch and proteins in the grains into soluble sugars and amino acids, respectively, which can be easily extracted by hot water during the mashing stage to form wort for brewing and other purposes. Furthermore, malting helps reduce complex proteins, generates nutrients for yeast development, and aids in the development of enzymes [4]. Although more of the maltose-producing enzyme—β—amylase was found in sorghum malts made at 25°C and 30°C than at 20°C, it would seem that, for sorghum, malting temperatures of 20°C to 25°C were optimal as regards protein breakdown during malting.(Agu G. H. Palmer(1996) 10.1002/j.2050-0416.1996.tb00924.x).

During the malting process, the enzymatic activity of some enzymes such as amylase, hydrolyzase, glucokinase, phosphatase, protease, and phytase increases. The enzymes play an important role in dissolving the cellular membrane of barley buds and increasing the efficiency of malting. In this study, AMG (amyloglucosidase) and glucosal (beta-glucanase) enzymes, which are part of the hydrolysis group enzymes, were used. The use of hydrolyzate enzymes including AMG (amyloglucosidase) and glucosal (beta-glucanase) caused β-D glucopyranose to be separated from the non-reducing end of the starch molecule. In other words, it causes hydrolysis of amylopectin, which results in the production of dextrin and an increase in the rate of malt extraction.

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Materials and methods. Grain/malt samples and enzymes. The sorghum sample used in this study was kindly supplied by a Shahd Zagros (Derivatives Industries Limited, Iran – an independent commercial sorghum malting Company in Iran). In the present study, Malta was supplied from the Shahd Zagros plant, beta-glucanase (glucosin) enzymes and amyloglucosidase (AMG) from AEB Armenia, and treated drinking water from Behnoosh Well Co. Iod iodine was also prepared for iodine testing from Merck Germany.

The process of producing solid solvent extracted from Malta. First, the raw material was prepared and weighed for the process of producing solid solvent extracted from Malt including malt, water, glucose enzyme and amyloglucosidase enzyme. Then, according to Table 1, the treated treatments were prepared. In order to obtain the solids from the solution extracted from Malta, the barley malt was first passed through a dry roller mill. The materials from the mill were mixed with 6 liters of water and transferred to the ferrule. Then, the contents of the Arlene were heated at various temperatures (57 ° C 40 minutes and 72 ° C for 5 minutes) while in these conditions, the enzymes of the hydrolyzate group of amyloglucosidase and beta-glucanase were 0.5 grams per kilogram of malt Added. During this heating time mechanism, the starch in Malta was converted to sugars and at the end, the material was stored after filtration at 20 ° C. It should be noted that the control samples included the defined conditions (temperatures of 57 and 72 degrees Celsius, and amyloglucosidase and beta-glucanase enzymes).

Malta chemical tests. Iodine test of malt samples was done according to National Standard of Iran No. 2280, measurement of brix (amount of solvent solids extracted). Malt samples were taken in accordance with the National Standard of Iran No. 2280. To determine pH, the pH meter of the model, S123-9T and according to the National Iranian Standard Method, No. 2280 was used.

Data analysis. Two-way analysis of variance (ANOVA) was carried out to determine the impact of malting temperature and enzyme on the amount of soluble solids from Malta. Results and discussion. The results in Table I

show the pattern of α-amylase development in a sorghum variety germinated at two tropical temperatures of 28°C and 30°C. Evaluation of the results of the effect of temperature and enzyme on the brix of samples.

The results of the interaction of temperature, enzyme on the brix of the samples in Table 1 indicate that at temperatures of 57 and 72 degrees Celsius, and by adding each of the enzymes under investigation (amyloglucosidase and glucoside), the brix of the samples has been reduced. However, this difference was not statistically significant (p> 0.01). Generally, the highest brix was observed in glucose enzyme treated samples at 72° C and, then, in processed samples with glucose enzyme at 72° C, respectively. Finally, the lowest brix in samples processed with amyloglucosidase enzyme was observed at 72° C.

2Evaluation of the results of the interaction between the temperature and the enzyme on the pH of the samples

The results of the interaction of temperature, enzyme on the pH of the samples in Table 4-28 show that:

At 57 ° C, the pH of the samples is decreased by using both types of enzymes (amyloglucosidase or glucoside) although this difference is not statistically significant (p> 0.01). In addition, at a temperature of 72° C, using amyloglucosidase enzyme, the pH of the samples decreased significantly. Evaluation of the effects of the enzyme on iodine test. Samples were negatively tested for iodine by all of the samples based on the results of the interaction of temperature, the enzyme on iodine test in Table 4-29, temperature 57 degrees Celsius, nv change in the type of enzyme (glucosal and amyloglucosidase). Due to the inability of amyloglucosidase to degrade the starch hydrolysis in the formation of sugar and due to the lack of damage to starch granules, the AMG enzyme attack on the granules is low, resulting in starch not being completely hydrolyzed, the yellow color of iodine remained intact and, therefore, the test Iodine was negative, but iodine test was done at 72° C or changed the type of enzyme (glucosal and amyloglucum Zydaz) was positive.

In general, iodine testing (iodometric method) is used to examine the conversion of starch into sugar, which, in the process of extracting from the malt, reaches 72 degrees Celsius, a drop of liquid extracted from the malt is poured onto the glass rod and the plate containing iodine is added 0.02 molar. When the reaction of the starch to sugar is complete, iodine remains yellow. The positive iodine test states that starch hydrolysis has been completely performed by enzymes and since the purpose of the hot extraction, the expansion of the activity of the enzymes of malt, and the conversion of starch and insoluble matter into water-soluble compounds to achieve the maximum amount of carbohydrates is simple. The positive test for iodine is considered desirable.

Results and discussion. Evaluation of the results of the effect of temperature and enzyme on the brix of the samples. The results of the interaction of temperature and enzyme on the brix of the samples in Table 1 indicate that at temperatures of 57 and 72 degrees Celsius and by adding each of the enzymes under study (amyloglucosidase and glucoside), the brix of the samples has been reduced. However, this difference was not statistically significant (p> 0.01). Generally, the highest brix was observed in glucose-enzyme-treated samples at 72 ° C and then in processed samples with glucose enzyme at 72 ° C, respectively. Finally, the lowest brix in samples processed with amyloglucosidase enzyme was observed at 72 ° C.

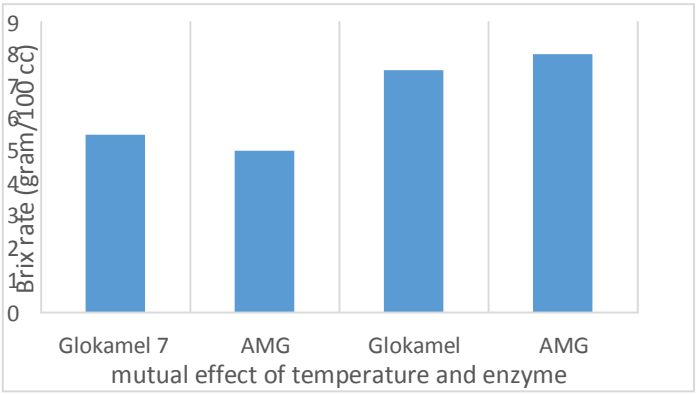
Table-Results of comparison of mean temperature interactions × enzymes × barbucks samples (grams per 100 cc)

The results of analysis of variance of temperature and enzyme interactions on brix of samples

Changes	Df	MS	SS	F
Temperature enzyme *	1	58.99	58.99	23.41

CV=5.255%

The type of enzyme	Temperature (degrees Celsius)
Amyloglucosidase Glucose	52^0c
Amyloglucosidase Glucose	72^0c



Evaluation of the results of the interaction of temperature and enzyme on the pH of the sample. The results of the interaction of temperature, enzyme on the pH of the samples in Table 2 show that at 57 ° C, using the two types of enzymes (amyloglucosidase or glucoside), the pH of the samples is reduced although this difference is not statistically

significant (p> 0.01). In addition, at a temperature of 72 ° C, using the amyloglucosidase enzyme and treatment of the treatments, the pH of the samples decreased to a greater extent.

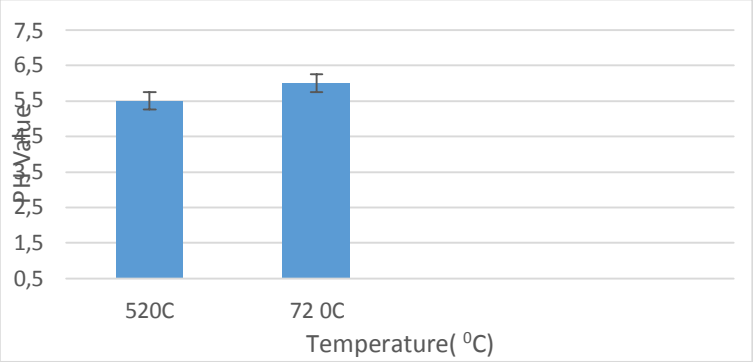
Analysis of variance of the effect of temperature on the pH of samples

Change	DF	SS	MS	F
Temperature	1	5.36	5.36	1.50

CV=5.25%

Results of comparison of mean temperature effect on pH of samples

Temperature	57o c	72o c
Average Ph	5.72	6.08



Generally, the lowest amount of brix in processed samples was observed at 57 ° C and its highest value was observed in processed samples at a temperature of 72 ° C. Also, the change in the type of enzyme (glucosyl, amyloglucosidase) did not make a statistically significant difference in the brix of the specimens. On the other hand, at constant temperatures of 57 and 72 degrees Celsius, there was no significant difference in the brix of the produced samples by changing the type of enzyme (amyloglucosidase or glucoside). Regarding the Brix factor, the highest brix was glucose enzyme, at 72 ° C, and then in processed samples with glucose enzyme at 72 ° C and process samples. The amyloglucosidase enzyme was obtained at 72 ° C. In relation to the pH factor, the temperature increased from 57 ° C to 72 ° C, but the factor was increased in samples. However, this difference was not significant between treatments.

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THE EVALUATION OF THE ART OF PERSIAN PAINTING (FROM THE BEGINNING TO THE ADVENT OF ISLAM)

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Abstract. Painting is the manifestation of expression, yearning heart, attitude and worldview represents of a territory people; hence it is an important element in the study of beliefs and the gradual perfection of their spirit. The history of painting in Iran can be found in the remains of Paleolithic period and images of caves in Lorestan - Mirmelas and Dushh; although Will Durant believes that the start of this art is from the time of painting on the pottery. Iranian paintings regardless of the period in which the image is drawn, reflect special idealism. Iranian painter would not