



## ENZYMES IMPROVE THE COLOR AND CLARITY OF FRUITS BY EXTRACTING NATURAL JUICES

**Saydaxmatova Mavluda Tolibjon qizi**

*Tashkent Institute of Chemical Technology,  
Majoring in Food safety*

**Abstract:** *Today, the use of enzymes for juicing is most commonly used. Fermentative process has been found to have several advantages over mechanical-thermal grinding of several fruit pulps. Enzymes are an integral part of modern fruit juice production and are well suited for process optimization. Their main objectives are: to increase the extraction of juice from raw materials, to improve the efficiency of processing (pressing, solidification or removal) and to create a clear and visible final product. This article discusses improving the color and clarity of fruits by using enzymes to extract their natural juices.*

**Key words.** *Juice production by enzymes, accuracy, enzymatic concentration, juice extraction, juice production, pectinase.*

**Аннотация:** *Сегодня чаще всего используют ферменты для приготовления сока. Было обнаружено, что ферментативный процесс имеет несколько преимуществ перед механическим и термическим измельчением некоторых фруктовых пульп. Ферменты являются неотъемлемой частью современного производства фруктовых соков и хорошо подходят для оптимизации процесса. Их основные цели: увеличить извлечение сока из сырья, повысить эффективность обработки (отжима, затвердевания или удаления) и создать чистый и видимый конечный продукт. В этой статье обсуждается улучшение цвета и прозрачности фруктов с помощью ферментов для извлечения их натуральных соков.*

**Ключевые слова.** *Получение сока ферментами, точность, ферментативная концентрация, экстракция сока, выход сока, пектиназа.*

### INTRODUCTION

Extraction of juice can be done by various mechanical processes, which can be achieved by diffusion extraction, decanter centrifuge, screw type juicer, fruit pulper and various types of presses. Enzymatic treatment prior to mechanical extraction significantly improves juice recovery compared to other extraction processes. Enzymatic hydrolysis of cell walls increases extraction yield, reduces sugar, soluble solids content and galacturonic acid and titratable acidity of products. Enzymatic degradation of biomaterial depends on the type of enzyme, incubation time, incubation temperature, enzyme concentration, agitation, pH, and the use of different enzyme combinations. From the technical literature we can conclude that the use of enzymes, i.e. cellulases, pectinases, amylases and combinations of these enzymes can produce



good juice with high quality of fruit juice. Pectinase enzyme can give maximum juice yield, which is 92.4% at 360 min incubation time, 37°C incubation temperature and 5 mg/100 g enzyme concentration. The combination of two enzymes, namely pectin methyl esterase (PME) and polygalacturonase (PG) can produce a maximum yield of 96.8% for plum at 120 min incubation time, 50 °C incubation temperature and 0.05 mg/100 g enzyme concentration. This article discusses the use of enzymes in fruit juice production to improve the enzyme's effect on juice recovery, clarity, and biochemical properties of fruit juices.

### LITERATURE ANALYSIS AND METHODOLOGY

Drinks from natural plant materials (vegetables, fruits, berries, grains) play a role in the modern man's diet. It depends primarily on the nutritional and physiological value of this product. Drinks made from vegetable raw materials are additional sources of carbohydrates, organic acids, minerals, vitamins and other biologically active components. In general, a drink made from natural raw materials is a complex multicomponent polydisperse system in a certain balance. A significant part of the substances that determine the specific properties of the drink (for example, taste, transparency) are in the colloidal state. During storage under the influence of various factors, the physico-chemical balance of the colloidal system of the drink is disturbed and turbidity appears in it.

Technological methods, including the use of auxiliary materials aimed at removing excess amounts of potential turbidity components, can improve clarification processes and increase the shelf life of beverages. Processing of raw materials, semi-finished products and finished products with various stabilizers is one of the urgent directions for solving the problem of increasing the stability of drinks. In this article, a stabilizing agent is understood as an agent used in the processing of raw materials, semi-finished products or finished products, which helps to eliminate the causes of turbidity in beverages and to reduce the concentration of the main turbidity agents and their complexes and, as a result, obtain a balanced colloidal system of the beverage.

### RESULTS

Colloidal substances that cause clouding of juices include pectin, starch, polyphenol compounds, proteins, and others. Pectin substances, which act as a protective colloid for suspended particles, delay their sedimentation and increase the viscosity of juices. Therefore, it is necessary to use pectolytic enzymes that have a depolymerizing effect on pectin in the enzymatic clarification of juices; Amyolytic enzymes are used to break down starch.

To clarify juices, pectolytic enzymes are used as independent clarifying agents or in a mixture with other types of enzymes or clarifying agents.

Juice purification with enzymes can be done batchwise or continuously. The batch method still dominates the juice industry. At the same time, a certain amount of pectolytic enzyme preparation is added to the juice in the form of a 5-10%



concentration suspension. The amount of drug added depends on the pectin content of the juice, pH value and temperature. However, the maximum dose should not exceed the maximum allowed by health authorities. The permissible amount of added pectolytic drug in Russia is not more than 0.03% by weight of the juice.

### CONCLUSION

Fixed doses of drugs are added to the juice, observing a certain sequence. In order to accelerate and enhance the effect of detection, it is recommended to observe the optimal conditions for the effect of drugs: temperature 40-50 ° C, pH 3.7-4.0.

Thorough mixing of the drug with juice is of great importance for the successful effect of enzyme drugs. For this, the suspension of the drug is dosed directly into the juice flow, and then additional mixing is carried out using a mixer or a rotary pump. At the same time, the circulation pump should be large enough to ensure that all the juice in the fermenter is circulated two to three times during the cleaning period.

If the sample showed the presence of pectin and starch in the juice, then pectolytic and amylolytic enzymes should be used during clarification. Preparations of both enzymes can be introduced into the juice at the same time, because the conditions of their action are approximately the same.

The presence of starch is typical for juices from summer apple varieties and juices from unripe fruits. During heat treatment, a significant part of the starch is gelatinized and enters the solution. This colloidal dissolved starch is difficult to break down by enzymes, remains in suspension for a long time, and can cause turbidity of the juice during storage. At the same time, it should be remembered that amylopectin, which has gone into solution, does not form any color with iodine, so it is not always possible to control the complete decomposition of starch with the iodine test.

### REFERENCES:

1. Николаева, М.А. Теоретические основы товароведения / М.А. Николаева. – М.: Норма, 2007. – 448 с.
2. Кириллов, В.И. Квалиметрия и системный анализ / В.И. Кириллов. – 2-е изд., стер. – Минск: Новое знание; М.: ИНФРА-М, 2013. – 440 с.
3. Gomez-Plaza, E. A review on micro-oxygenation of red wines: claims, benefits and the underlying chemistry / E. GomezPlaza, M. Cano-Lopez // Food Chemistry. – 2011. – № 3. – P. 1131–1140.
4. Dowe, S. DieMengemacht, s / S. Dowe // Getrankeindustrie. – 2012. – № 4. – P. 32–33.
5. Валуйко, Г.Г. Технология виноградных вин / Г.Г. Валуйко. – Симферополь: Таврида, 2001. – 624 с.
6. Теория и практика виноделия. Т. 3: Способы производства вин. Превращения в винах / Ж. Риборо-Гайон, Э.П. Пейно, П. Риборо-Гайон, П. Сюдру;



пер. с франц, под ред. проф. Г.Г. Валуйко. – М.: Пищевая промышленность, 1980. – 480 с.

7. Oxidation mechanisms occurring in wines / C.M. Oliveira, A.C. Ferreira, V. De Freitas, M.S. Silva Artur // Food Res. Int. – 2011. – № 5. – P. 1115–1126.