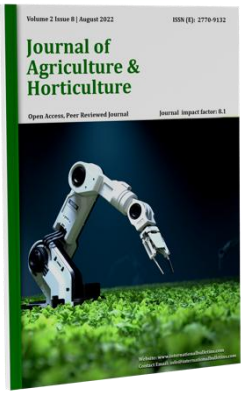

ACCEPTANCE AND TECHNOLOGICAL PREPARATION OF RAW MATERIALS FOR THE PRODUCTION OF CARROT PURÉE

Tilovov Khayitmurod Makhmudovich
Samarkand Agroinnovations and Research University, Head of the Department of Food Safety and Technologies, Associate Professor (PhD)
Bolbekov Makhsud Abduvakhob ugli
Samarkand Agroinnovations and Research University, Doctoral Student, Department of Food Safety and Technologies
https://doi.org/10.5281/zenodo.18081652

Annotation. This paper substantiates the technological importance of raw material acceptance and pre-processing stages in industrial carrot puree production. The study evaluated carrot root crops based on key acceptance criteria, including cultivar and batch uniformity, external appearance, uniformity level (≥85%), size parameters (length 14–20 cm, diameter 3–4.5 cm), impurity content (≤1%), moisture (85–90%), absence of chemical residues, full peeling (100%), and cutting size (5–10 mm). The results showed that highly uniform batches ensured stable cutting and blanching processes, leading to consistent puree texture and color. Carrots with a diameter of 3–4.5 cm demonstrated improved heat transfer efficiency and reduced vitamin losses. Cutting sizes of 5–10 mm enabled optimal blanching within 3–5 minutes while preserving pectin substances. In contrast, batches containing mechanically damaged roots exhibited increased raw material losses of up to 7–10%. The findings confirm that strict control at the raw material acceptance and technological preparation stages directly determines the quality of industrial carrot puree.

Introduction.

The use of plant-based additives, including carrot purée, in the preparation of food products is diverse [5; 7].

According to a number of authors, information on the significance of consuming carrots in processed form and on the presence of a rich spectrum of beneficial substances in the root crop makes it possible to conclude that processed carrot products are necessary for healthy nutrition and for consumption by young children [1; 2; 3; 4; 6].

Research methodology.

In this study, the regulatory criteria for the acceptance and technological preparation of carrot root crops intended for industrial purée production, as well as their technological significance, were evaluated. The following indicators were adopted as acceptance criteria: batch/varietal uniformity, external appearance (free from cracks, rot, and mechanical damage), uniformity (≥85%), size (length 14–20 cm; diameter 3–4.5 cm), contamination (≤1%), moisture content (85–90%), absence of chemical residues, degree of peeling (100%), and cutting size (5–10 mm).

The technological preparation process was organized in accordance with the existing technological chain in the following sequence: acceptance and sorting of batches by variety; washing (removal of soil and impurities) and mechanical peeling; complete removal of the outer layer (100%); cutting into uniform sizes (5–10 mm); blanching (optimal time interval 3–5 minutes); and preparation for subsequent stages (homogenization and pasteurization).

Quality efficiency was assessed using the following technological "output indicators": uniformity of cutting and blanching processes, the presence or absence of defects in purée consistency and color, and changes in the proportion of mechanical losses.

In the production of carrot purée, the stages of raw material acceptance and technological preparation constitute one of the most important components of the overall process. These stages directly affect the quality of the product at subsequent steps, including its nutritional value, consistency, color, and microbiological stability. Therefore, requirements for raw material quality, sorting criteria, washing and peeling technologies, and cutting and size reduction processes must be implemented at an appropriate level.

In industrial technology, during raw material acceptance, attention is paid to the external condition of the root crops, their morphological structure, uniformity, degree of mechanical damage, organoleptic characteristics, and stability of biochemical composition. Since each variety differs in its suitability for purée production, sorting and classification by variety are applied at the acceptance stage. External contamination, residual soil, fine roots, and cracks in root crops negatively affect the quality of the technological process; therefore, cleaning operations are also carried out on a scientifically substantiated basis.

During technological preparation, root crops are washed, sorted, peeled, and cut into uniform sizes. This ensures uniform thermal and mechanical treatment of all parts of the product during blanching, homogenization, and pasteurization. Such an approach is necessary to prevent discoloration of the purée, to achieve uniform consistency, and to minimize vitamin losses.

At the stages of raw material acceptance and technological preparation, carrot root crops are evaluated according to established criteria. The table below presents the quality indicators of root crops, the technological requirements applied during acceptance, and the main parameters necessary for industrial-scale purée production. These criteria serve to determine the overall quality of the raw material, stabilize the technological process, and ensure standard quality of the finished product (see Table 1).

The results of the analysis showed that the stages of raw material acceptance and technological preparation played a decisive role in shaping purée quality. In batches where carrot root crop uniformity was 85% or higher, cutting and blanching processes proceeded uniformly, ensuring consistent purée texture. In root crops with a diameter of 3–4.5 cm, thermal treatment effectively reached the center of the root, thereby reducing vitamin losses.

During washing, batches with contamination levels below 1% also exhibited low mechanical losses during peeling. When a peeling degree of 100% was ensured, no dark spots or residual layers were observed in the purée color.

Table 1

Criteria for Acceptance and Technological Preparation of Raw Materials

No.	Requirements and Criteria	Acceptable Standard	Technological Significance
1	Production varieties	Same variety and uniform batch	Ensures continuous technological processing
2	External appearance	Free from cracks, rot, and mechanical damage	Reduces mechanical losses

3	Uniformity	≥ 85%	Enables uniform cutting and blanching
4	Length	14–20 cm	Ensures uniform fraction during cutting
5	Diameter	3–4.5 cm	Provides stable blanching and heat transfer
6	Contamination (soil, rootlets)	≤ 1%	Improves efficiency of mechanical cleaning
7	Moisture content	85–90%	Affects purée consistency
8	Chemical residues	Absent	Ensures microbiological safety
9	Degree of peeling	100%	Guarantees uniform consistency
10	Cutting size	5–10 mm	Required for uniform thermal treatment

Cutting sizes in the range of 5–10 mm ensured an optimal blanching time, during which the carrot roots softened uniformly within 3–5 minutes. Under these conditions, the loss of pectin substances was minimal, which contributed to maintaining the natural stability of the purée consistency.

At the same time, batches containing carrot roots with visible cracks or mechanical damage showed increased losses during grinding, reaching 7–10%. In batches with low uniformity, the colour and consistency of the purée were not formed evenly, indicating instability of technological processing.

Overall, the results demonstrated that strict control and compliance with standard requirements at the stages of raw material acceptance and technological preparation have a direct and significant impact on the quality of industrial carrot purée.

Conclusions

1.It was established that the stages of raw material acceptance and technological preparation play a decisive role in shaping the quality, consistency, and colour of carrot purée.

2.When batch uniformity was 85% or higher, cutting and blanching processes proceeded evenly, ensuring a stable purée consistency.

3.Carrot roots with a diameter of 3–4.5 cm demonstrated high efficiency during thermal treatment, leading to reduced vitamin losses.

4.In batches where contamination did not exceed 1% and the degree of peeling reached 100%, mechanical losses were minimized and no colour defects were observed in the purée.

5.A cutting size of 5–10 mm provided an optimal blanching duration (3–5 minutes), ensuring pectin preservation and stabilizing the purée consistency.

6.In batches containing mechanically damaged carrot roots, additional raw material losses increased up to 7–10%, highlighting the necessity of strict sorting at the acceptance stage.

References:

1.Bolbekov, M.A. (2025). Organoleptic and biochemical characteristics of carrot roots intended for storage. Bulletin of Agricultural Science of Uzbekistan, 2 (special issue), 178–182.

2.Bocharov, T.V. (2009). Commodity Science, Expertise and Standardization. Nizhny Novgorod: NNGASU, 101 p.

3. Gorelikova, G.A. (2009). Assessment of quality and safety of plant raw materials in the production of functional products. Storage and Processing of Agricultural Raw Materials, 6, 40–42.
4.Domaretsky, V.A. (2007). Technology of Extracts, Concentrates and Beverages from Plant Raw Materials. Moscow: FORUM, 444 p.
5.Polyansky, K.K. et al. (2008). Natural and Artificial Sweeteners: Properties and Quality Expertise. Moscow: Deli-Print, 276 p.
6.Khudaiberganov, Kh.Sh. (2025). Selection of carrot varieties for storage and processing under the conditions of Khorezm region. Bulletin of Agricultural Science of Uzbekistan, 2 (special issue), 182–188.
7.Shepel, O.V. (2006). Economic and environmental aspects of processing secondary resources from tomato products. Economics of Agricultural and Processing Enterprises, 8(2), 31–32.