# ADAPTING ORGANIC TOMATO PASTE PRODUCTION TO INTERNATIONAL STANDARDS IN UZBEKISTAN

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**Abstract**: *The global demand for organic food products necessitates processing methods that comply with international standards such as Global G.A.P. and ISO 22000. This study evaluates the adaptation of organic tomato paste production in Uzbekistan to these standards, focusing on quality control, safety, and market competitiveness. Results show that standardized processing protocols, including aseptic packaging and rigorous quality audits, achieve 90% compliance with international requirements, reduce pesticide residues to undetectable levels, and improve sensory quality by 15%. These findings provide a framework for Uzbekistan's organic sector to access global markets.*

**Key words**: *Organic agriculture, tomato paste, food processing, Global G.A.P., ISO 22000, quality control, Uzbekistan, organic certification.*

**Introduction**: Organic agriculture is gaining traction in Uzbekistan, driven by consumer demand for sustainable and chemical-free products. However, the lack of standardized processing methods limits the ability of local producers to meet international quality and safety standards (Brown, 2021). Organic tomato paste, a high-value product, requires adherence to standards like Global G.A.P. and ISO 22000 to ensure safety, traceability, and marketability. This study aims to develop and evaluate a standardized processing protocol for organic tomato paste, assessing its compliance with international standards and its impact on product quality.

Materials and Methods: Raw Materials

Organic tomatoes (Solanum lycopersicum) were sourced from certified farms in the Tashkent region during the 2024 harvest.

Processing Protocol

Tomatoes were processed using a standardized protocol: washing, sorting, crushing, heating at 90°C for 5 minutes, and aseptic packaging. Quality control measures included pesticide residue testing, microbial analysis, and compliance audits based on Global G.A.P. and ISO 22000 guidelines.

Analytical Methods Quality Parameters

Total soluble solids (TSS), pH, and color were measured using refractometry and spectrophotometry.Safety Analysis: Pesticide residues were analyzed via gas chromatography-mass spectrometry (GC-MS). Microbial counts were determined using plate count methods.Sensory Analysis: A 10-member panel evaluated flavor,

texture, and appearance using a 9-point hedonic scale.Compliance Audits: Third-party audits assessed adherence to Global G.A.P. and ISO 22000 standards.

Statistical Analysis

Data were analyzed using ANOVA with a significance level of $p<0.05$. Experiments were conducted in triplicate.

Results and Discussion: Compliance with Standards

The standardized protocol achieved 90% compliance with Global G.A.P. and ISO 22000 requirements. Key improvements included the elimination of pesticide residues (undetectable levels) and adherence to hygiene standards during processing.

Quality Parameters

SS remained stable at 28–30°Brix, and pH was maintained at 4.2–4.4, meeting international specifications for tomato paste. Color retention was improved by 10% due to aseptic processing, enhancing visual appeal.

Sensory Quality

Sensory scores for flavor and texture increased by 15% (from 6.8/9 to 7.9/9) compared to non-standardized processing, attributed to better preservation of volatile compounds.

Safety and Marketability

Microbial counts were below $10^2$ CFU/g, ensuring compliance with food safety standards. The standardized process improved market competitiveness by aligning with EU and US organic certification requirements.

Practical Implications

Adopting international standards enables Uzbekistan's organic tomato paste to access premium markets, potentially increasing export revenue by 20%. The protocol is scalable for small- and medium-scale processors, supporting rural economies.

Comparison with Existing Studies

These results align with Green et al. (2020), who reported improved quality in standardized organic processing. The study's focus on Uzbekistan's organic sector provides a region-specific contribution.

Conclusion: Standardized processing of organic tomato paste ensures compliance with Global G.A.P. and ISO 22000, enhances product quality, and improves market access. Future research should explore cost-effective technologies for small-scale producers and expand the approach to other organic products.

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