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COMPARISON OF TRADITIONAL AND INNOVATIVE TECHNOLOGIES IN TOMATO DRYING

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Abstract
This article presents a scientific comparison of traditional and innovative technologies used in tomato drying. The effects of solar and convective drying methods, as well as vacuum, infrared, microwave, and freeze-drying technologies, on the quality, energy efficiency, and nutritional value of the final product are analyzed.

Keywords: Tomato; drying technology; traditional methods; innovative technologies; comparison.

Introduction

Tomato is an important agricultural product widely used in the food and processing industries. Drying tomatoes extends shelf life, reduces seasonal losses, and enables the production of export-oriented products. Under modern conditions, comparing traditional and innovative drying technologies is both scientifically and practically relevant.

Drying is one of the oldest and most effective methods of long-term food preservation and remains relevant today. Tomato drying technology is widely applied due to its economic efficiency, preservation of natural flavor, and convenience in storage and transportation. Due to high moisture content, tomatoes are highly susceptible to spoilage, mold formation, and enzymatic degradation during storage. Therefore, timely processing while maintaining quality is a critical issue.

Traditional Tomato Drying Technologies. Traditional drying methods include sun drying and convective hot-air drying. Although technically simple and economically inexpensive, these methods often result in unstable product quality. Color darkening, flavor loss, and increased microbiological risks are common.

Criterion	Traditional Methods	Modern Methods
Main method	Sun drying, shade drying, string drying	Electric dryers, ovens, industrial dryers
Energy consumption	Almost none	Requires electricity or gas
Drying time	5–15 days	6–24 hours
Weather dependence	Very high	Almost none
Hygiene level	Moderate	High
Vitamin retention	Good	Very good (controlled)
Product quality	May be uneven	Uniform and stable
Production scale	Small-scale (household)	Large-scale (industrial)
Cost	Very low	High equipment cost
Process control	Manual	Automated

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Innovative Tomato Drying Technologies. Innovative drying technologies include vacuum drying, infrared drying, microwave drying, and freeze-drying (lyophilization). These technologies allow automated process control, low-temperature drying, reduced processing time, and the production of high-quality dried products.

Comparison of Traditional and Innovative Technologies. Comparative analysis shows that innovative technologies are superior in preserving color, flavor, texture, and nutritional compounds. Although traditional methods require minimal energy input, their quality indicators are lower.

Innovative drying ensures stable quality and higher energy efficiency.

Indicator	Traditional Methods	Innovative Methods
Primary technology	Sun and shade drying	Infrared, vacuum, microwave, freeze-dry
Heat source	Natural sunlight and air	Electricity, gas, infrared radiation
Drying time	5–15 days	2–24 hours
Weather dependence	Very high	Independent
Hygiene and sanitation	Moderate	Very high
Temperature control	Almost none	Fully automated
Vitamin and color retention	Good	Very good
Product quality	May be uneven	Uniform and stable
Production capacity	Small scale	Medium and large scale
Energy consumption	None or very low	High
Cost	Low	High equipment cost
Environmental impact	Low environmental impact	Energy consumption present
Shelf life	Moderate	Long

Research results indicate that vacuum and infrared drying ensure higher retention of lycopene, vitamins, and aromatic compounds, thereby increasing the consumer value of the final product.

Traditional methods are suitable for small-scale and household applications, while innovative methods are optimal for industrial production, business development, and export-oriented processing.

Conclusion

Innovative tomato drying technologies are more efficient than traditional methods. Their implementation contributes to the production of competitive food products, improved quality, reduced losses, and increased processing efficiency. Drying technology plays a significant role in extending shelf life, preserving nutritional and biological value, and enhancing food security.

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