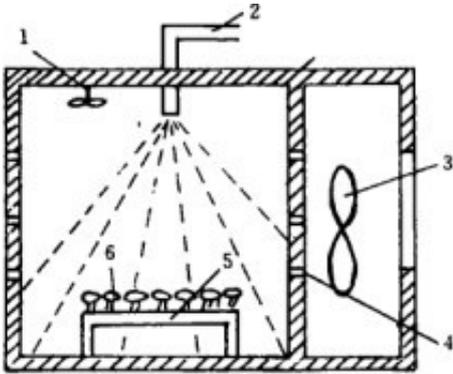


Effect of drying on the properties of yam

Abstract: in order to explore the coupling characteristics of microwave hot air for yam, the effects of different slice thickness, hot air temperature, hot air rate and microwave power density on the drying characteristics and effective diffusion coefficient of yam were studied by [microwave drying equipment](#), and the drying kinetics model was established.



The results showed that the microwave drying process of yam could be divided into two stages: acceleration and deceleration according to the change of dry base moisture content. The effective diffusivity of yam was 0.8791×10^{-6} to 8.2458×10^{-6} m²/s, which was proportional to the slice thickness, hot air temperature and microwave power density, and decreased first and then increased with the increase of hot air rate. Compared with hot air rate and t value, the effective diffusivity of yam was 0.8791×10^{-6} to 8.245×10^{-6} m²/s. Temperature, wafer thickness and microwave power density have effective diffusion coefficients for water. The effect is more obvious.

By fitting nine commonly used drying models, it is found that the R^2 average value of the two exponential models is the largest, the average χ^2 average value and the root mean square error are the smallest, which are 0.9980, 0.0002 and 0.0147, respectively.

The predicted values of the two exponential models are in good agreement with the experimental values under the same experimental conditions, which indicates that the model is suitable for the prediction of moisture content in yam during microwave-hot-air coupled drying process. The results can provide a theoretical basis for the application of Microwave-Air coupled drying technology in the drying of yam and other agricultural products.

Key words: [yam microwave drying](#); microwave hot-air coupling; drying characteristics



Yam is a tuber of *Dioscorea* genus, also known as potatoes, sweet potatoes, potatoes, hawthorn, corn and so on. It is one of the traditional food homologues in China. Chinese yam not only contains a lot of protein, vitamins and mucopolysaccharides, but also contains a wealth of saponins, choline, allantoin and other functional components. It has high edible, medicinal and health value. However, fresh yam has high moisture content, fragile texture and is vulnerable to external damage, and it is difficult to preserve at room temperature for long-term storage and long-distance transportation. In order to prolong the shelf life of yam, dehydration and drying process is usually used.

In recent years, many researchers have studied the drying technology of yam. Song Xiaoyong used far infrared assisted heat pump drying method to study the effect of this method on the quality of mountain slices. It is found that the far infrared assisted heat pump drying method can solve the problems of surface hardening, local overheating and irregular color which often occur in the traditional mountain flake drying process. This phenomenon has a significant impact. Li Li and others. The drying characteristics and mathematical model of yam heat pump were studied. The results showed that the drying characteristics of yam heat pump accorded with PAGE equation. The mathematical model can be used to predict the change of water loss rate in the drying process of yam heat pump.

Microwave-hot-air combined drying technology mainly includes two ways: one is to connect microwave and hot-air in series, that is, microwave or hot-air drying in stages to achieve the purpose of drying; the other is to connect microwave and hot-air in parallel, also known as coupled drying. That is to say, microwave and hot air drying are carried out simultaneously. In the drying process, moisture in the material is heated, transferred and evaporated under the combined action of electric field, magnetic field, temperature field and velocity field. The direction of heat and mass transfer in the Microwave-Air coupled drying process is the same, which greatly shortens the drying time, significantly improves the drying efficiency and reduces energy consumption. At the same time, the original nutrient elements of drying materials are retained to the maximum extent, and the quality of drying materials is improved. Drying quality.

Taking yam as the research object, the coupling characteristics of microwave hot air and moisture change during drying process were studied by microwave hot air coupled drying technology. The effects of different slice thickness, hot air temperature, hot air rate and microwave power density on the drying characteristics of yam were discussed. The dynamic model of microwave-hot-air coupled drying of yam was established to provide theoretical basis and technical support for the application of microwave-hot-air coupled drying technology of yam.