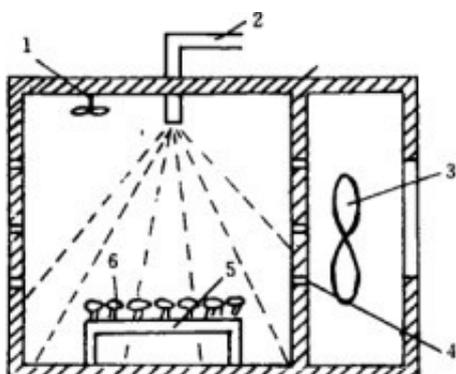


## Physical changes and mechanism of litchi fruit pruning during microwave intermittent drying



**ABSTRACT:** In order to explore the mechanism of heat and mass change of Litchi Fruit during microwave drying and reveal the physical change process of Litchi Fruit during drying. Based on the changes of [microwave drying equipment](#), energy consumption, temperature gradient, browning and pulp shrinkage of litchi, the physical change process from microwave intermittent drying of fresh litchi fruit to semi-dried litchi dried fruit was analyzed. It was proved that microwave intermittent drying technology for whole litchi fruit had the characteristics of fast drying, uniform pulp quality, low energy consumption and simple equipment. Advantages.

The results showed that under the condition of comprehensive energy consumption, color and shrinkage, the optimum heating intermittent time was 7s/65s at 700W microwave output power. The energy consumption was 2.11. The dried litchi showed uniform golden yellow. The values of  $L^*$ ,  $a^*$ ,  $b^*$  were 37.5, 14.4 and 16.4, respectively. The shrinkage of pulp followed near linear expansion/shrinkage, and there was no obvious depression on on the peel surface. The experimental study provides a reference for the selection of suitable microwave drying method for semi-dried litchi and the computer simulation model for the change of moisture and temperature of Litchi during microwave drying.

Key words: [litchi microwave drying](#), intermittent drying, physical changes



Litchi is a dominant fruit in southern China. Its fruit body structure is a multi-structure complex, including porous medium shell, flexible body pulp and cork structure core. The thermophysical parameters of each component are very different, and the drying dehydration characteristics are different from those of general porous medium and homogeneous body.

The production of litchi is seasonal and the harvest period is concentrated. The water content of fruit body is more than 80%. A large number of high-moisture litchi need to be dried in time and lack of drying equipment, which leads to the problem of litchi decay and deterioration. Solving the problem of timely and efficient drying of fresh litchi fruit has important social significance and economic value.

At present, some achievements have been made in the research of multi-layer structure drying technology of fresh litchi fruits. Researchers have carried out microwave, hot air, vacuum and heat pump microwave combined drying technology research around semi-dry litchi drying. The characteristic curves of technological parameters of continuous drying and intermittent drying of litchi have been obtained. The Poisson equation, hot air mass transfer equation and fractal model of wet phase of materials have also been studied. The overall contraction law of materials with water content was obtained, but the drying process of litchi fresh fruit layers could not be monitored effectively.

The reason is that litchi is a multi-structure complex. When analyzing the change of fruit drying process, the non-linear change of physical properties of shell, pulp and stone and the law of heat and mass transfer between layers are not taken into account, and the effect of litchi micro-pore structure on the whole fruit is neglected.

In view of this, this paper compares and analyses the changes of quality, color, shrinkage and internal and external temperature of granular fresh litchi fruits by microwave intermittent drying technology, and finds out the internal physical change process of microwave drying fresh litchi fruits, and analyses the mechanism changes of temperature rise and water loss in different stages, so as to select suitable microwave for semi-dried litchi dried fruits. The drying method and the computer simulation model of litchi moisture and temperature change in microwave drying can provide reference.