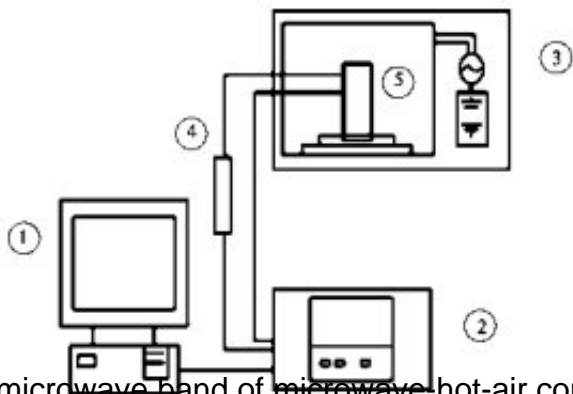


# Characteristics and Quality Evaluation of Hot Air and Microwave Combined Drying of Sweet Potato Chips

Abstract: The characteristics of hot air combined with microwave drying of sweet potato chips were studied, and the color, rehydration ratio, drying time and energy consumption of dehydrated sweet potato chips were analyzed. The results showed that the hot air section and microwave section of the [microwave drying equipment](#) for sweet potato chips were divided into two stages: increasing and decreasing.



The microwave band of microwave-hot-air combined drying can be divided into three stages: rising stage, constant stage and falling stage, while the hot-air section only has the decreasing stage. Verma model can be used to describe the hot-air section of combined drying. The microwave band of hot air-microwave combined drying was described by Logarithmic model, and the microwave band of Microwave-hot air combined drying was described by Page model. The  $L^*$  value of sweet potato chips obtained by hot air-microwave combined drying was 72.86 (+2.29), the  $a^*$  value and  $b^*$  value were 11.02 (+2.73) and 38.65 (+4.45), respectively. The browning was not obvious, and the retention effect of beta-carotene was better.

Compared with hot air drying, the drying time is 55% shorter and the energy consumption is 64% lower than that of hot air drying, and the rehydration ratio is  $2.17 \pm 0.03$ , the drying time is  $(104 \pm 4.93)$  min and the energy consumption is  $(18.71 \pm 1.05)$  kW.h/kg. The combined drying method of hot air and microwave is more suitable for the drying of sweet potato chips because of its good quality and low energy consumption.

Key words: [Microwave drying of sweet potato chips](#), hot air drying, combined drying, drying model, quality evaluation



Sweet potatoes, also known as sweet potatoes, are grown throughout the tropics and subtropics. The annual planting area and total yield of sweet potato in China rank first in the world. Recent studies have shown that sweet potatoes are not only nutritious, but also have a variety of dietary, health and medicinal value. Fresh sweet potatoes are high in water content, perishable and seasonal in production, so they are usually processed and stored in a dry way.

With the development of food drying technology, a single drying mode reveals various defects. Low energy consumption and high quality combined drying technology emerged as the times require. Combined drying refers to a composite drying technology which combines two or more drying methods according to the characteristics of materials, complements each other, and carries out in stages or at the same time. In recent years, the research on combined drying has gradually increased, and scholars have put forward some better methods of combined drying.

Because of the fast drying speed, high product quality, simple operation and less investment in equipment, microwave drying as a heat source and hot air drying has become a hot spot of researchers' attention. Zhang Bin et al.

The combined drying technology of hot air and microwave for banana slices was studied. The results showed that the combined drying method of hot air and microwave had fast drying rate, low energy consumption and similar product quality with vacuum freeze-drying. Liu Qingmei et al. studied the combined drying technology of *Fritillaria Fritillaria* by hot air and microwave. The results showed that the drying time of *Fritillaria Fritillaria* was 65% shorter than that of hot air drying, and the quality of *Fritillaria Fritillaria* was better than that of single drying method.

At present, for the drying of sweet potatoes, the single drying method is often used, and the combined drying method is seldom studied. In this paper, the characteristics and mathematical model of hot air and microwave combined drying of sweet potato chips were studied. The color, rehydration ratio, drying time and energy consumption of different drying methods were compared, which provided theoretical basis for the development of new technology and equipment of hot air and microwave combined drying of sweet potato chips.