

# Application of drying technology in processing of dehydrated vegetables

Most of the dehydrated vegetables produced in China are made by sun drying and hot air drying.

Because of the high temperature of sun drying and hot air drying, it is easy to produce quality problems such as color browning, loss of nutrients and poor rehydration performance. In China, a few enterprises adopt freeze-sublimation [microwave drying machine](#) technology, and the [dehydrated vegetables processed](#) are of good quality.

## 1 principles and characteristics

### 2.1 fundamentals of microwave drying

The water in vegetables exists in three different states: free water, colloidal bound water and combined water. Most of the free water and colloid bound water are removed during the drying process, and the hydrated water can not be removed by drying. The evaporation rate of moisture in vegetables is slower, not entirely depending on the temperature of dry air, but on the humidity saturation difference of air at this temperature, that is, the relative humidity of air, the lower the relative humidity, the faster the evaporation rate of moisture.

Microwave is a kind of thermal energy device which can absorb heat from low temperature heat source and make it be used effectively and controlled as useful heat at higher temperature. Microwave dryer consists of compressor, fan, condenser, evaporator, expansion valve, drying chamber and other parts. The principle of microwave drying is that the wet air first contacts the evaporator, and the moisture in the air cools down to the dew point and condenses. After dehumidification, the air flows forward to the condenser, absorbs the heat emitted by the condenser to make it warm up, and becomes the drying medium with high moisture loading

capacity. Then the air blower blows back to the drying chamber and convects with the material to realize the material convection. Dry.

## 2.2 characteristics of microwave drying

2.2.1 Low energy consumption microwave is an energy-saving drying device. According to the data of Guangdong Institute of Agricultural Machinery, the energy consumption of 1 m<sup>3</sup> wood drying is 1 970 kW.h for conventional airflow drying and 380 kW.h for heat pump drying. The unit energy consumption of electrothermal drying is 0.905 kW h kg H<sub>2</sub> O, while that of microwave drying is 0.557 kW h kg H<sub>2</sub> O.

2.2.2 When the drying temperature is low, the air temperature is 15-35 C, which avoids the bad influence of browning, nutrient denaturation and poor rehydration caused by high temperature during the drying process, and ensures the quality of dehydrated vegetables.

2.2.3 Working environment hygiene microwave works in a closed state, in addition to the drying process condensate, no exhaust gas, waste liquid discharge, fully in line with environmental requirements.

2.2.4 The equipment investment and operation cost are lower than the same drying capacity, the investment of microwave drying equipment is only 1/4-1/5 of freeze-sublimation drying, and the operation cost is only 1/3 of freeze-sublimation drying.