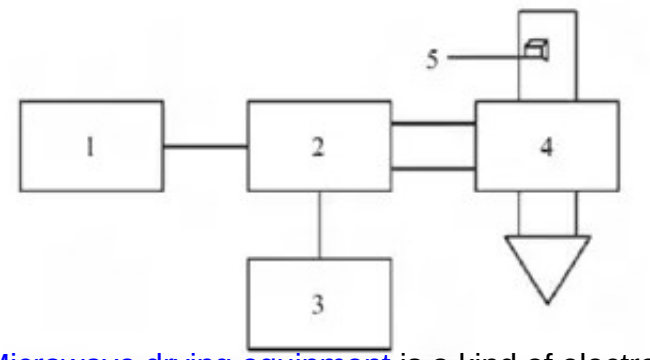
Effect of microwave drying on spinach quality



Microwave drying equipment is a kind of electromagnetic wave with frequency of (0.3-300) GHz, which has the characteristics of short oscillation period and strong penetration ability. Water molecule is polar molecule. Under the action of microwave, the water molecule in the material will polarize and arrange orderly along the direction of microwave electric field. Then it will rotate rapidly with the alternating change of high frequency alternating electric field direction, resulting in sharp friction and collision between the water molecule, so that the heat in the material is generated, and the water will leave the material. To dry purposes.

The effects of microwave drying conditions on spinach drying quality were investigated. The results showed that microwave drying of spinach could be divided into three stages: accelerated drying, constant drying and slowed-down drying, and the loss of water mainly occurred in the constant drying speed stage. With the increase of power, paving thickness and wind speed, the retention rate of VC decreases with the increase of paving thickness and increases with the increase of wind speed; the microwave drying power is 1.125 W/g, the paving thickness is 1.5 cm, and the wind speed is 75.

M/min is the best technology for microwave drying of spinach.

The spinach was dried under eight different microwave powers ranging from 90 W to 1000 W, and the drying time was reduced from 4005 s to 290 s. When the microwave power was between 350 W and 1000 W, the energy consumption was approximately the same; when the microwave power was between 750 W, the color and VC retention rate of spinach was the highest, and the energy consumption was relatively small, about 0.12 W.

KW.h.

The microwave drying kinetics of spinach under different microwave power was studied. The results showed that the microwave drying of spinach only had a slow drying stage, and Page and Two sentences models were more suitable for describing the drying law. Compared with hot air drying, microwave drying reduced the drying temperature and improved the drying rate and product quality.

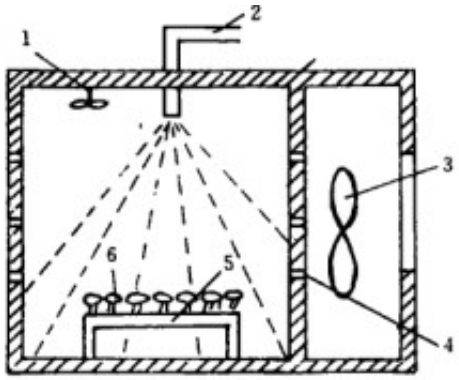
Microwave drying of spinach was carried out to study the color change kinetics of spinach under different microwave power and sample size. It was found that under all the drying conditions in the study area, the L value and B value decreased, while the a value and total color difference

increased. The first-order kinetic model can describe the L value and B value under different microwave power and sample size. The zero-order kinetic model can describe the variation of a value and total chromatic aberration, and the larger the microwave power, the less the sample size, the faster the color change rate. The moisture content of coriander was studied by microwave power.

The Midilli-Kucuk model was the most suitable model for describing the drying process of coriander. With the increase of microwave power (180 W~900 W), the drying time decreased from 14 min to 4 min, the total drying time decreased from 0.631 *10-10 m2/s to 2.195 *10-10 m2/s. Microwave power had no significant effect on the color of the product (P

The microwave drying model of celery leaves was studied and the effective diffusion coefficients of water under different microwave drying conditions were calculated. It was found that the whole drying process only had a slow-down stage. Midilli-Kucuk model was most suitable for describing the microwave drying of celery leaves. When the sample size was 25 g, the microwave power increased with the increase of 180 W~900.

W, the drying time decreased from 34 min to 8 min, the water effective diffusion coefficient increased from 0.343 x 10-10 m2/s to 1.714 x 10-10 m2/s; when the microwave power was 360 W, the drying time increased from 25 min to 49 min, and the water effective diffusion coefficient



decreased from 5.639 x 10-11 m2/s to 5.639 x 10-11 m2/s.

2.088 x 10-11 m2/s.

In microwave drying, the energy is directly coupled with the material and does not need to heat the air around the drying material. In theory, the electromagnetic wave in the drying chamber can only be absorbed by the material. Therefore, the microwave drying energy utilization rate is high and the drying speed is fast. Generally, the microwave drying of green leafy vegetables only takes a few minutes to dozens of minutes, and the heating phase is needed. For uniform, the overheating and crusting phenomena on the surface of materials are rare. However, due to the extremely short microwave drying time, it is possible to make the material over-drying, therefore, microwave drying should pay attention to the control of drying time.