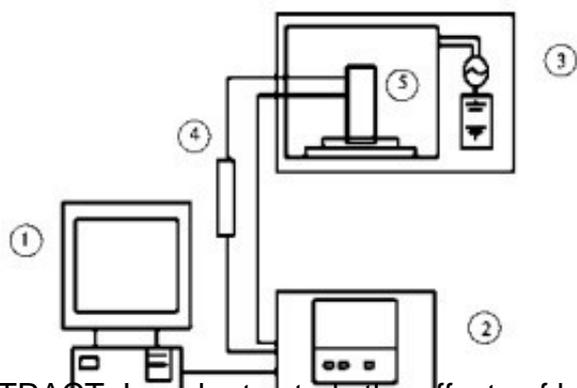


Effects of hot air, microwave and combined drying on the quality of garlic slices



ABSTRACT: In order to study the effects of hot air, microwave and their combined drying on the quality of garlic slices, the drying rate, thiosulfite content, sensory score, color L value, rehydration ratio and comprehensive score of garlic slices were used as raw materials to compare the effects of different hot air temperature and microwave power on the drying characteristics and quality of garlic slices. Wave power was the experimental factor. L (33) orthogonal experiment was designed to optimize the drying conditions of garlic slices by hot air and microwave combined drying.

The results showed that the composite scores of dried garlic slices obtained by hot air drying at 60 °C and 550 W [microwave drying equipment](#) were higher, 83.64 and 80.74, respectively. The effect of hot air temperature and microwave power on the comprehensive score of combined dried garlic tablets was extremely significant (p

Key words: [garlic microwave drying](#), hot air drying, combined drying, drying quality



Garlic is a perennial herb belonging to the genus *Allium* of Liliaceae, which is rich in nutrition. It has the functions of anti-bacterial, anti-inflammatory, improving immunity, preventing arteriosclerosis and cancer, and can alleviate and treat diseases such as hyperlipidemia, high cholesterol and diabetes. The main active ingredients of garlic are eight thiosulfite esters. Allicin (diallyl thiosulfite) is the main thiosulfite, accounting for about 70% of the total thiosulfite of crushed garlic. However, garlic has short dormancy period, easy germination and decay, and can not bear storage. Dehydrated garlic can maintain the original color, aroma, taste and nutritional components, prolong storage period. 80% of garlic harvest in developed countries is

used to produce dehydrated garlic.

Combined drying has the advantages of improving the quality of fruit and vegetable dried products, shortening drying time, energy saving, environmental protection, safety and efficiency, and overcomes the shortcomings of single drying. Wang Jing et al. used the combination of hot air and vacuum microwave to dry garlic slices. In the early stage, vacuum microwave was used for 20 minutes, and in the later stage, hot air was used for 60 minutes to dry garlic slices. The quality of the products was higher and the drying rate was increased. The drying time of garlic cloves by microwave hot air combined with Sharma G P is 80%-90% shorter than that by traditional hot air drying, and the color and flavor intensity of garlic cloves are obviously better than that by hot air drying.

Guo Xiaoning and others used short-wave infrared drying as pre-drying method. The optimum conditions for infrared drying were expansion temperature 104.24-106.22 C, vacuum temperature 54.31-55.76 C and vacuum time 2.82-3.16 h at infrared drying temperature of 60 C and power of 675 W, and variable temperature and pressure difference expansion drying. Li Y et al. [5] dried garlic under 4 kPa (absolute pressure) by microwave vacuum drying to 15% moisture content, then dried garlic under 40 C and 10 kPa (absolute pressure) vacuum to 5% moisture content. The quality of garlic products obtained was similar to that of freeze-drying.

The garlic grains were cooled to eutectic point at - 20 ~C, vacuum freeze-dried to 30% moisture conversion point at - 45 ~35 ~C, microwave vacuum dried to 6% moisture content at 90 ~ 120 kPa vacuum and 600 W power. The quality of garlic grains obtained was similar to vacuum freeze-dried, and the drying rate was significantly increased and energy consumption was saved.

However, there are few reports on the research of garlic drying by hot air microwave combined with microwave. In this paper, the effects of hot air, microwave and hot air microwave combined drying on garlic slices drying quality were studied. The aim is to determine the drying process parameters of garlic slices and to find a suitable combined drying method for garlic slices, so as to improve the quality of garlic slices and provide theoretical data for fruit and vegetable drying.