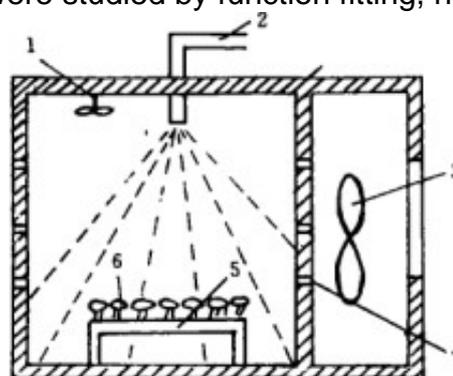


Study on quality and vitrification of rice under hot air and microwave drying

Abstract: Function fitting, near infrared spectroscopy and germination rate determination were used to study the dehydration performance, protein and amylose content and sprouting quality of paddy dried by hot air and microwave drying.

Keywords: rice hot-air drying, [microwave drying equipment](#), glass transition temperature, drying quality

In this paper, the dewatering performance of hot air and microwave drying, the content of protein, amylose and the quality of germination of rice were studied by function fitting, near



infrared detection and germination rate determination.

1 test materials and test methods

1.1 test materials

The tested rice was produced in the experimental farm of Guangzhou South China Agricultural University. The fresh rice was obtained from the newly harvested Taifeng indica rice containing stalks by hand threshing in laboratory and lifting wind to remove impurities. The rice was stored at 4 C for later test.

1.2 drying test device and test process

DHG 070B electric blast drying box was used to test hot air drying and moisture content of paddy. The temperature and velocity of hot air drying of paddy were 50 C and 50 C, respectively.

3.1 m/ s. The absolute dry temperature was 105 C and the drying time was 24 h. Microwave drying paddy was completed in a self-made P70F23P-G5 microwave device. The heating/cooling time of the device was 1 min/1 min and the drying power was 166W. The structure of the device was shown in Fig. 1.

The rice can rotate with the tray in the drying device when microwave drying. The quality

components of fresh paddy and its samples during hot air and microwave drying were determined by Foss Infratec 1241 Analyzer near infrared fast grain analyzer (FOSS company of Denmark). The thermogravimetric loss and heat flux were measured by TG / DSC comprehensive thermal analyzer STA449. Germination rate of fresh rice and its samples dried by hot air and microwave was measured and counted in RXZ-280B intelligent artificial climate box.

Fig. 1 Schematic diagram of [Microwave drying equipment for rice](#)

Fig.1 Schematic of microwave drying equipment

1. microwave oven
2. tray
3. rice
4. rotating shaft
5. bracket
6. upper bracket
7. motor
8. coupling sleeve
9. bearing
10. support plate
11. weighing sensor
12. bracket
13. sensor cable
14. computer
15. mass transmitter

After that, the germination temperature of the intelligent artificial climate box is constant temperature 30 degree and relative humidity 80%. The quality of rice during hot air and microwave drying process

JJ1000 electronic balance is completed. The water removal properties of rice hot air and microwave drying were determined respectively.

The samples were dried at 120 min and 2 min, respectively. Fresh rice, hot air drying and microwave drying were repeated three times except TG / DSC test. The number of grains in the test sample was counted by automatic particle size analyzer PME-1 (Shanghai Shan Ke instrument factory) according to 1000 grains. The suffix m and D of the sample group names of fresh rice and its hot air, microwave drying middle and end sections respectively denote the thermogravimetric loss and thermorheological change. The sample names of drying process test are shown in Table 1.

Table 1 hot air microwave drying sample name

Tab.1 Sample name of two drying methods

Drying method

Hot air microwave for types of fresh rice

Heating time at the end of intermediate segment end section / min 0240600240600

Sample group XG HX1 HX2 WB1 WB2

Sub sample XG11

XG12 XG13 HX11

HX12 HX13 HX21

HX22 HX23 WB11

WB12 WB13 WB21

WB22 WB23

Thermogravimetric sample XGm HX1m HX2m WB1m WB2m

Heat flow samples XGd HX1d HX2d WB1d WB2d

After repeated determination of grain composition in the middle and end sections of fresh paddy and its drying by different heat sources, the above-mentioned samples were weighed 1 g of paddy, crushed by low-temperature cyclone through 60 mesh sieve mesh, and sealed in powder bottles. The samples were added to the comprehensive thermal analyzer determined by Sapphire baseline, and the contents were measured at 25 C and 1 C. The rate of heat loss and heat flux of each rice sample group was increased to min at the rate of 120. At the same time, 500 samples of fresh rice, 500 samples of hot air and 500 samples of microwave drying end group were collected and stored in plastic cups with local air-exchange after removal of green and soaking for 24 hours in a constant temperature and humidity device. The germination rates of each sample group were counted and counted after 5 days storage.