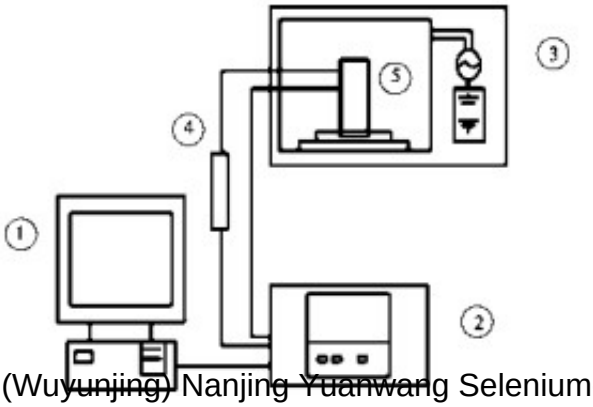
Microwave test of germinated brown rice

1.1 materials and reagents



Rice (Wuyunjing) Nanjing Yuanwang Selenium-rich Agricultural Products Co., Ltd; GABA Standard, 4-Chloro-3,5-Dinitrotrifluorotoluene Sigma Company; Selenium Standard Solution National Center for Analysis and Testing of Nonferrous Metals and Electronic Materials; Sodium Selenite West Asia Reagent Company; XBridge C18 Reversed-phase Column Waters Company; Acetonitrile, Methanol Company (All of them are chromatographic purity), nitric acid, hydrochloric acid (all of them are high-grade purity), and other chemical reagent companies are analytical pure Guoyao Group.

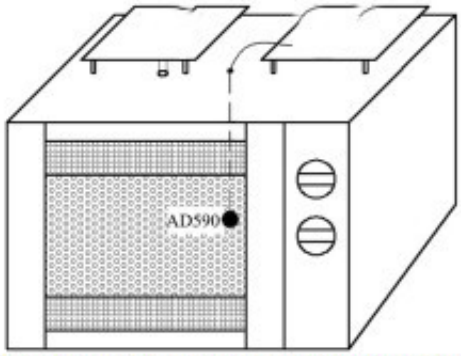
1.2 instruments and equipment

JLGJ4.5 inspection ridge machine Taizhou Grain Instrument Factory; PQX multi-section programmable artificial climate box Ningbo Southeast Instrument Co., Ltd; 101-

Shanghai Sujin Instrument and Equipment Factory; MCR-3 Microwave Chemical Reactor Xi'an Yuhui Instrument Co., Ltd; FW100 High Speed Universal Pulverizer Tianjin Tester Instrument Co., Ltd; THZ-D Desktop Thermostat Oscillator Taicang Qiangle Experimental Equipment Co., Ltd; TDL-5-A Flying Pigeon Centrifuge Shanghai Antinko Instrument Co., Ltd. Learning instrument factory; Dionex Ultimate

Thermo Fisher, USA; EXCEL Microwave Digestor, Shanghai Yiyao Co., Ltd; AFS-933 Atomic Fluorescence Spectrometer, Beijing Jitian Instrument Co., Ltd; DSE20/40D Twin-screw Extruder, Brabender Instrument, Germany, Microwave Drying Equipment.

1.3 method



Schematic diagram of microwave drying temperature control system

1.3.1 brown rice germination technology

Paddy shelling brown rice screening distilled water washing three times disinfection distilled water washing four times soaking germination washing and leaching drying Store at 4 C refrigerator.

Selenium enriched treatment of germinated brown rice 1.3.2

Selenium was enriched on the basis of the optimized technology of germinated brown rice with high GABA content. Germination conditions: soaking at 30 C for 13 h, soaking solution (pH 5.5) composition: L-glutamate 0.5 mg/mL, calcium chloride 3.5 mmol/L, VB6

0.7 mg/mL. The content of GABA and total selenium in germinated brown rice was determined after adding a certain amount of sodium selenite to the soaking solution, and the concentration of sodium selenite was 0, 2.5, 5.0, 10, 20, 40, 80 mg/L respectively. The germinated brown rice germinated at 30 C for 24 h and dried by microwave (1.3.3 knots).

Microwave drying of germinated brown rice

The microwave drying temperature was 40, 45, 50, 55, 60 C, and the samples were taken at intervals of a certain time. The changes of total selenium, GABA content and moisture content were determined, and the drying rate curve was drawn. The effects of microwave drying on total selenium and GABA content in brown rice were discussed. The selenium-enriched effect of germinated brown rice and the effect of microwave drying and extrusion on the selenium-enriched germinated brown rice were studied in this study. It was found that the selenium-enriched effect was better in the range of 10-20 mg/L of selenium concentration. High quality germinated brown rice with rich selenium could be obtained at g/L. Under this condition, the germination rate of brown rice was (97.9 +0.4)%, the total selenium content was 991.8 ug/kg, the organic selenium content was 977.6 ug/kg (98.5 +3.1)%, and the GABA content was 445.9 mg/kg.

In addition, the content of selenium and GABA in germinated brown rice was decreased by high temperature microwave drying and extrusion, but it was found that the content of selenium and GABA in germinated brown rice could be maintained by low temperature microwave drying at

40%. The content of organic selenium and GABA in the product was still increased to 29 and 5 times of raw brown rice after drying and puffing, and the effect of selenium enrichment was good. Therefore, sodium selenite can be used as an effective selenium-enriched reagent for Germinated Brown rice, and selenium-enriched germinated brown rice can be used to develop related nutritional brown rice products.