

Abstract

After 48 h germination peanuts can increase the contents of bioactive components such as resveratrol, GABA. The content of resveratrol in peanuts increased from 0 to 4.11 $\mu\text{g/g}$, GABA in peanuts increased from 31.40 to 257.44 mg/100g. Total phenol and flavonoids did not change significantly after peanut germination. The germinated peanuts required to dry for decreasing moisture content from 35% to 10%, and the 45°C cold air drying took 12 h to accomplish. Radio frequency (RF) drying 2 kg germinated peanuts at 10 kW with gap of 11 cm only required 7 min, and final temperature reached about 100°C. Therefore, RF drying rate was about 80.50 g/ min. Furthermore, RF roasting peanuts only took 2 min to increase temperature from 30°C to over 120°C. Therefore, RF can be applied in drying and roasting germinated peanuts to save time and energy.

Keywords: peanut, germination, radio frequency (RF), drying, roasting

Introduction

Resveratrol (3,4',5-trihydroxystilbene, RES) is a natural polyphenolic compound, and its biofunction includes anti-aging, anticancer, anti-inflammatory and prevention of cardiovascular disease.

Experimental design

Peanut kernel (Tainan9)



Hygienic with 0.2% NaClO

Soaking water

2 day germination

48 hr

Cold air drying

RES, GABA, flavonoids, total phenol

10 kW RF hot air drying
RF Roasting

Drying and heating curves

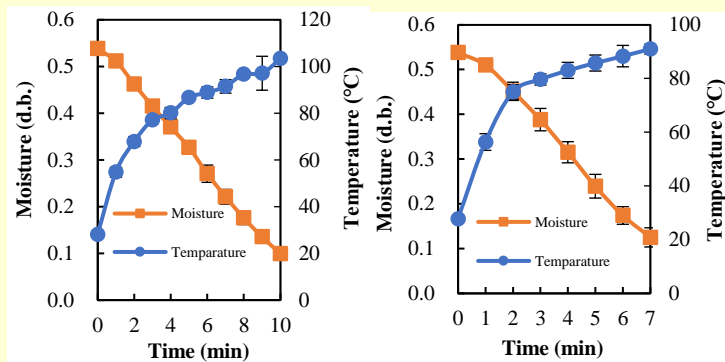


Fig. 2. The drying and temperature curves of 1 kg (left) and 2 kg (right) germinated peanuts during 10 kW, 40.68 MHz RF drying at 11 cm electrode gap.

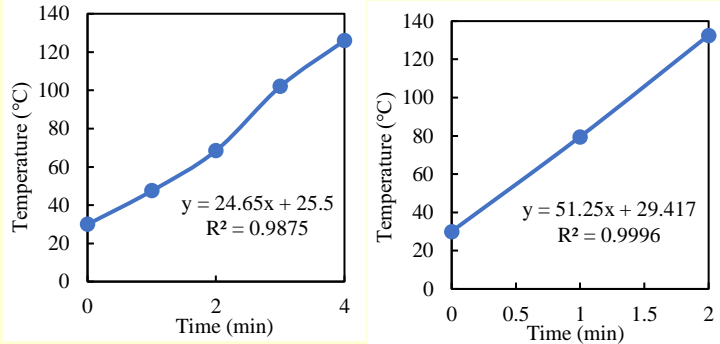


Fig. 3. The temperature curves of weight 1 kg (left) and 2 kg (right) germinated peanuts during 10 kW, 40.68 MHz RF roasting at 11 cm electrode gap.

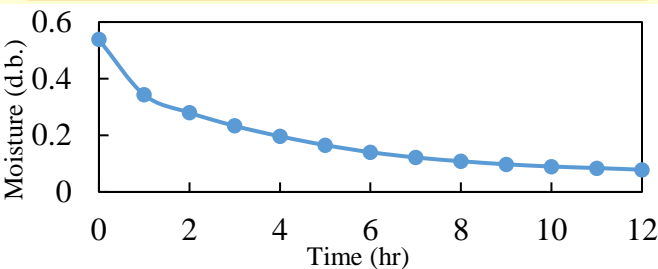


Fig. 1. Drying curve of germinated peanuts by 45°C cold air drying.

Table 1. Comparison of the bioactive components in ungerminated and 48 hr germinated peanuts

Bioactive components	Resveratrol ($\mu\text{g/g}$)	GABA (mg/100g)	Total phenol (mg gallic acid equivalent/g)	Flavonoids (μg quercetin equivalent/g)
Ungerminated	0	31.40 \pm 5.33	0.383 \pm 0.031	58.025 \pm 3.037
Germinated	4.11 \pm 0.83	257.44 \pm 25.07	0.367 \pm 0.026	57.800 \pm 4.329

Table 2. Comparison resveratrol and color in germinated peanuts by RF drying and roasting

Treatment	Resveratrol ($\mu\text{g/g}$)	L*	a*	b*
Cold air dry	4.11 \pm 0.83	60.59 \pm 0.54	6.57 \pm 0.21	17.18 \pm 0.06
RF dry	13.54 \pm 0.11	56.91 \pm 0.25	6.04 \pm 0.16	16.13 \pm 0.06
RF roasting	12.82 \pm 0.47	48.97 \pm 0.25	9.50 \pm 0.16	17.26 \pm 0.14

Conclusions

RES and GABA increased in peanuts after germination. The 2 kg germinated peanuts was dried by 10 kW RF with drying rate of 80.50 g/min, and it only took 7 min to reduce moisture from 35% to 10%. Moreover, 2 kg dried germinated peanut required only 2 min to reach 120°C by RF roasting. Therefore, RF drying and roasting is a time-saving emerging technology for germinated peanuts.