

## A Study on Storage of Major Herbal Medicine Materials, *Zingiberis Rhizoma*

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### ABSTRACT

To develop optimal storage method of root of *Zingiberis Rhizoma*, which has been grown as major cultural herbal medicine materials, root of *Zingiberis Rhizoma*, was stored for 10 months with different packing materials and sealing methods. The loss in dry weight as influenced by packing materials and sealing methods was the lowest at vacuum packing and followed by complete sealing methods with transparent polyethylene film. The ratio of root rot during the storage period was not significantly different between packing materials but was significantly different between sealing conditions. Conclusively, vacuum packing and complete sealing with polyethylene film appears to be optimal for storage of *Zingiberis Rhizoma*.

**Key Words :** *Zingiberis Rhizoma*, storage, herbal medicine materials, polyethylene film

### INTRODUCTION

*Zingiber officinale* Roscoe, herbal medicinal plant, has been grown through all the Korean Peninsula. The plant started to sprout early in May. *Zingiber officinale* is being cultivated at the middle southern area of Korea, it needs to have long growing period(Choi, 1996; Kim et al, 1997).

*Zingiber officinale* harvested on the middle of November. After harvest, shoot parts of the plant is removed by cutting and washed with fresh tap water. The root parts were dried by natural sunshine, which usually used in farmer household. In case of drying by sunshine, even though there is a little difference

according to weather, it takes 30 to 40 days to dry. After drying the materials were wrapped with polyethylene films, stored at well-ventilated place and finally shipped as major cultural herbal medicine materials.

Herbal medicine materials are generally stored until they were sold or used for medicine. During storage, temperature, humidity, and ventilation of room were very important factors to keep good quality of plants even they well dried and cleaned. The factors can influence damage in quality as well as aberration in the efficacy of chemicals(Choi, 1994; Choi et al, 1997). Several points must be considered during storage. It should be ventilated to lessen humidity, stored at cooling room, prevented from insects, and stored at airtight container. Choi (1994) reported in a previous

Table 1. Comparison of loss in weight as influenced by packing materials and sealing methods in root storage of *Zingiber officinale*

Packing materials	Sealing degree	Investigating time					
		2001		2002			
		Dec. 15	Feb. 15	Apr. 15	Jun. 15	Aug. 15	Oct. 15
T. P. E <sup>1)</sup>	C.sealing <sup>2)</sup>	1,000(g)	886(g)bx)	853(g)b	847(g)b	834(g)b	828(g)b
	Punch <sup>3)</sup>	1,000	859b	848b	832b	797c	774c
B. P. E	C.sealing	1,000	880b	875b	867b	847b	839b
	Punch	1,000	871b	863b	845b	791c	769c
G. P. E	C.sealing	1,000	881b	871b	849b	841b	836b
	Punch	1,000	876b	862b	829b	794c	780c
T. P. E	V. P. <sup>4)</sup>	1,000	956a	935a	934a	928a	910a

x) Mean separation within column by Duncan's multiple range test, 5% level of significance

<sup>1)</sup> T. P. E : Transparent polyethylene film

B. P. E : Black color polyethylene film

G. P. E : Green color polyethylene film

<sup>2)</sup> C. sealing : Complete sealing

<sup>3)</sup> Punch : Punch(5mm) on polyethylene film

<sup>4)</sup> V. P : Vacuum packing

study that herbal medicinal materials should be stored at the place where are well ventilated with low temperature, dry and prevented from insects.

Roots of *Zingiber officinale* have to be completely dried to prevent from decaying. Especially quality of goods might be lowered by fungus. This study was conducted to determine causes and their solution of loss in quantity as well as in quality during storage of *Zingiberis Rhizoma*. Loss in amount and rotting rate at different harvest time were examined according to storage of different packing materials and sealing conditions.

## MATERIALS AND METHODS

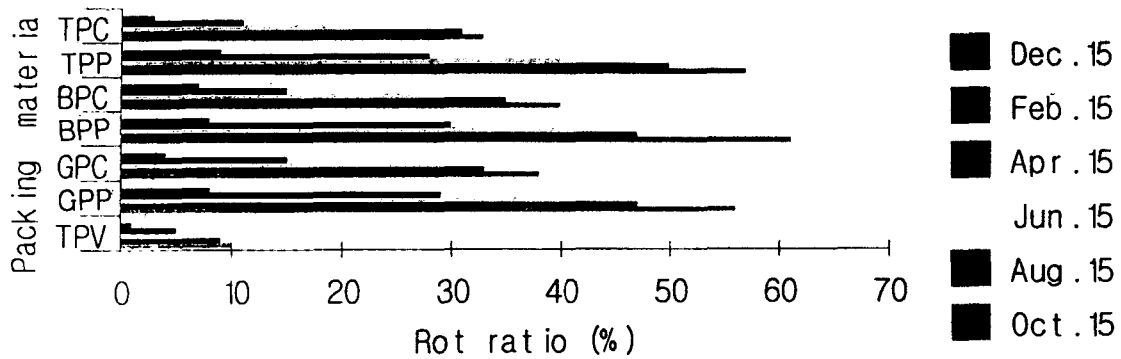
*Zingiber officinale* was planted at herb garden of Department of Oriental Medicine Resources, Sunchon National University in April, 2001. Roots of one hundred plants were carefully sampled without damage by using agricultural spades at 60cm high from soil surface in November, 2001. The roots were washed with tap water, dried under natural sunshine for 24

hours, and dried again with cold wind at 50°C for 7 days. Mean root weight a plant was about 12 grams.

The collected roots of *Zingiberis Rhizoma* were separately wrapped in different polyethylene film envelopes(15cm × 30cm × 0.05mm) with transparent, black, and green color. The envelopes containing samples were treated with vacuum packing, complete sealing, and punching method. Vacuum packing of transparent polyethylene film was using Vacuum Packer (JW-500XL). Punching on polyethylene film was made into 5mm in diameter and 10 punches an envelop were evenly given.

After packing the envelopes were dried and stored at cooling room until investigated. Loss in weight and rotten rate after storage were measured with 6 times at 2 month-intervals from December 15, 2001 to October 15, 2002. All assessment was made according to RDA Standard Methods for Field Experiment(Rural Development Administration, 1989).

## RESULTS AND DISCUSSION



TPC(Transparent Polyethylene film Complete sealing)      TPP(Transparent Polyethylene film Punch)  
 BPC( Black color Polyethylene film Complete sealing)      BPP(Black color Polyethylene film Punch)  
 GPC(Green color Polyethylene film Complete sealing)      GPP(Green color Polyethylene film Punch)  
 TPV(Transparent Polyethylene film Vacuum packing)

Fig. 1. The change of rot ratio as influenced by packing materials and sealing methods in root storage of *Zingiber officinale*

**1. Dry Weight of *Zingiber officinale* Root during Storage**

Dry weight of *Zingiber officinale* root during storage as affected by different packing materials and sealing methods was determined 6 times at 2 month-intervals in 2001 and 2002(Table 1).

No difference in dry weight among storage durations was observed, but complete sealing treatment affected dry weight of plant root. Dry weight of *Zingiber officinale* root was gradually reduced with time regardless of packing materials and sealing methods. In sealing treatment, dry weight of root stored with complete sealing with punch were more reduced than with vacuum packing.

It was thought that water from the dried roots could be naturally evaporated through complete sealing or punch with time during storage. Root dry weight of *Zingiber officinale* sealed with punch was more reduced than complete sealing without punch. In packing materials, the colors of polyethylene film did not affect root dry weight. This result showed that storage with complete sealing without punch could be better than

storage by sealing with punch for long term storage. Storage with vacuum packing did not affect root dry weight and was best among treatments. Dry weight of *Zingiber officinale* root was little bit changed by vacuum packing methods during storage. These results showed that storage methods with complete sealing or with vacuum did not affect dry weight of root because of restriction of air exchange.

Chung et al (1991) reported that complete sealing storage with polyethylene film sustained quality of kiwi-fruits for long term. Therefore, storage with complete sealing or with vacuum packing could be suitable for *Zingiber officinale* root, indicating no change in root weight, no humidity, and low infestation of insects and disease. However, more detail researches were needed for storage of other medicinal plant species.

**2. Rotten Rate of *Zingiber officinale* Root during Storage**

Rotten rate of *Zingiber officinale* root affected by different packing materials and sealing methods was

examined (Fig. 1).

There was no significance in rotten rates among colors of packing materials, transparent, black, and green polyethylene film. Rotten rate of root packed with transparent P.E. film was slightly lower than with black or green P.E. film. At 11 months after storage, rotting rate of root with vacuum packing was the least(10%) and the highest with punch storage(55-65%). The results indicates that storage by vacuum packing or by complete sealing appeared low rotting rate of *Zingiber officinale* root. However, storage with punched polyethylene film allowed diseases and insects to enter into packing or sealing materials through air punches, and so increased rotten rates. More researches on kinds of pests and infestation rate were required to better understand rotting mechanism.

Seong et al (1996) suggested that dry roots must be fumigated with chloroform and methyl bromide when agricultural products were manufactured and stored to prevent from damaging of insects and weevil. The results of present study indicate that fumigates must be applied to control pests before storage with punched P.E. film for long term storage.

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