

Effect of Storage Condition on Yield and Quality of *Angelica acutiloba* Radix

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ABSTRACT

To develop an optimal storage method of root of *Angelica acutiloba* Radix, which has been grown as major herbal medicine material to be cultivated, root of *Angelica acutiloba* Radix, 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. In conclusion, vacuum packing and complete sealing with polyethylene film appears to be most optimal for storage of *Angelica acutiloba* Radix.

Key Words : *Angelica acutiloba* Radix, storage, herbal medicine materials, polyethylene film

INTRODUCTION

Angelica acutiloba, a perennial herbal medicinal plant, has been grown through all the Korean Peninsula. The plant started to sprout early in April and bloom on July. *Angelica acutiloba* is being cultivated at the middle southern area of Korea and it needs to have long growing period(Choi, 1996; Kim et al, 1997).

Angelica acutiloba harvested on the middle of November. After harvest, tertiary roots and shoot parts of the plant are removed by cutting and washed with fresh tap water. The root parts were dried by natural sunshine, which is being usually used in farmer household. In case of drying by sunshine, even though

there is a little difference according to weather, it takes 15 to 20 days to dry. After drying the materials were wrapped with polyethylene films, stored at well-ventilated place and finally shipped as a major herbal medicine materials to be cultivated.

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 to 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

Table 1. Comparison of loss in weight as influenced by packing materials and sealing methods in root storage of *Angelica acutiloba* Radix

Packing materials	Sealing degree	Investigating time					
		1999		1998			
		Dec. 15	Feb. 15	Apr. 15	Jun. 15	Aug. 15	Oct. 15
T. P. E ¹⁾	C.sealing ²⁾	1,000(g)	876(g)bx)	867(g)b	854(g)b	850(g)b	846(g)b
	Punch ³⁾	1,000	863b	854b	836b	800c	783c
B. P. E	C.sealing	1,000	875b	885b	856b	851b	846b
	Punch	1,000	864b	856b	837b	800c	784c
G. P. E	C.sealing	1,000	873b	864b	858b	851b	848b
	Punch	1,000	864b	855b	834b	802c	781c
T. P. E	V. P. ⁴⁾	1,000	954a	942a	936b	929a	911a

³⁾ Mean separation within column by Duncan's multiple range test, 5% level of significance

¹⁾ T. P. E : Transparent polyethylene film
 B. P. E : Black color polyethylene film
 G. P. E : Green color polyethylene film

²⁾ C. sealing : Complete sealing

³⁾ Punch : Punch (5mm) on polyethylene film

⁴⁾ V. P : Vacuum packing

airtight container. Choi (1994) reported in a previous study that herbal medicinal materials should be stored at the place where are well ventilated with low temperature, dried and prevented from insects.

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

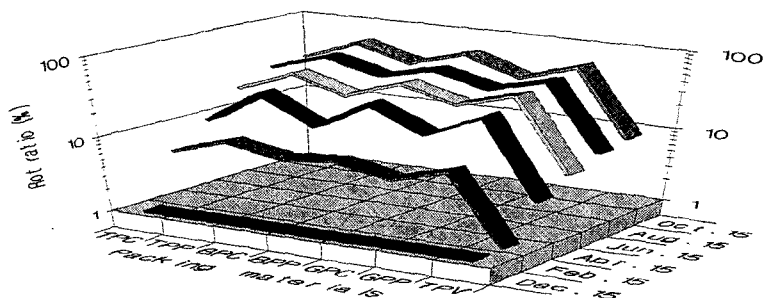
MATERIALS AND METHODS

Angelica acutiloba Radix was planted at herb garden of Department of Oriental Medicine Resources, Sunchon National University in November, 2000. 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 40 for 7 days. After drying the roots were chopped into 10 cm in length of main root. Mean root weight a plant was about 13 grams.

The collected roots of *Angelica acutiloba* were separately wrapped in different polyethylene film envelops(15cm × 30cm × 0.05mm) with transparent, black, and green color. The envelops 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 5 mm in diameter and 10 punches an envelop were evenly given.

After packing the envelops were dried and stored at cooling room until they are investigated. Loss in weight and rotten rate after storage were measured with 6 times at 2 month-intervals from December 15, 2000 to October 15, 2001. All assessment was made according to RDA Standard Methods for Field Experiment(Rural Development Administration, 1989).



T.P.E.C(Transparent Polyethylene film Complete sealing)
 B.P.E.C(Black color Polyethylene film Complete sealing)
 G.P.E.C(Green color Polyethylene film Complete sealing)
 T.P.E.V(Transparent Polyethylene film Vacuum packing)

T.P.E.P(Transparent Polyethylene film Punch)
 B.P.E.P(Black color Polyethylene film Punch)
 G.P.E.P(Green color Polyethylene film Punch)

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

RESULTS AND DISCUSSION

1. Dry Weight of *Angelica acutiloba* Root during Storage

Dry weight of *Angelica acutiloba* root during storage as affected by different packing materials and sealing methods was determined 6 times at 2 month-intervals in 2000 and 2001(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 *Angelica acutiloba* 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 punching 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 *Angelica acutiloba* 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 *Angelica acutiloba* 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 *Angelica acutiloba* 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 *Angelica acutiloba* Root during

Storage

Rotten rate of *Angelica acutiloba* 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. Rotten rate of root was about 10% at 7 months after storage but was 58% at 11 months after storage, increasing with time. At 11 months after storage, rotting rate of root with vacuum packing was the least(10%) and the highest with storage when the incomplete sealing with punching(50-60%). The results indicates that storage by vacuum packing or by complete sealing appeared low rotting rate of *Angelica acutiloba* 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.

LITERATURE CITED

- Choi, K.J. 1994. A basic study on the storage of major Chinese Herbal Medicine Materials, *Moutan Radicis* Cortex. *J. Oriental Bot. Res.* 7:183~186.
- Choi, S .K. 1998. A basic study on the storage of major Cultural Herbal Medicine Materials, *Scutellarise Radix*. *Journal of Basic Science.* 9:101~106.
- Chung, D.S., Son, Y.K., Cho, K.D., Yoon, I.W. and Han, P.J. 1991. Studies on Safe Storage Methods of Kiwifruits Res. Rept. RDA(S., F.M., & F.P.U.). 33:39~45.
- Kim, J.C., Kim, J.H., Joung, K.R., Kim, K.J. and Park, H.P. 1997. Effects of Irrigation and Sowing Time on Growth and Yield of *Bupleurum falcatum* L. *Korean J. Medicinal Crop Sci.* 5::318~324.
- R. D. A.(Rual Development Administration). 1989. Research investigation standard of agriculture (medicinal crop)
- Seong, J.D., Park, Y.J., Kim, G.S., Kim, H.T., Suh, H.S. and Kim S.M. 1996. Effects of Topping on Growth and Root Yield in *Bupleurum falcatum* L. *Korean J. Medicinal Crop Sci.* 4:153~156.

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