

Effect of Sta-Green on Leaf and Stem Production of *Angelica acutiloba*

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ABSTRACT

This study was conducted to develop effective production system in greenhouse for leaves and stems of *Angelica acutiloba* by fertilizing of Sta-Green in pots. The results obtained are summarized as follows.

Germination rate of *Angelica acutiloba* seeds collected in 2003 was 13%, while germination rate of seeds collected in 2004 was above 91%. Seed germination rate and plant biomass of *Angelica acutiloba* collected in 2004 were higher than seed gathering in 2003. Especially, plant growth and yield of *Angelica acutiloba* grown in pot (The pots was filled with soil mixtures of Sta-Green and Peat Moss mixed with 45:55 ratio.) was the highest.

These results indicate that leaf and stem production of *Angelica acutiloba* can be improved by fertilizing of Sta-Green in pots and optimizing seed collecting time in greenhouse.

Key words : organic matter, Sta-Green, *Angelica acutiloba*, seed collecting year

INTRODUCTION

In Asia, where Chinese angelica (*Angelica sinensis* Diels) has been used since the dawn of history, the herb has always been considered the premier tonic for menstrual problems, menopausal complaints, and other women's health concerns.

Korean angelica utilized as a herbal medicine material is one of perennial Umbelliferae plant and has three varieties such as *Angelica gigas* Nakai, *Angelica acutiloba* Kitagawa, and *Angelica sinensis* Diels. Physical characteristic of *Angelica acutiloba* utilized as a herbal medicine material is one of perennial Umbelliferae plants (Choi *et al.*, 2003).

Angelica acutiloba has reddish purple stems and alternate leaves, and blooms white flowers. It is in flower from June to July. The flowers are hermaphrodite (have both male and female organs) and are pollinated by Insects. Perennial growing to 1m. The seeds ripen from August to September and produce seeds with 1.8 g in 1000-seed weight.

Leaves of the plant contain 0.2-0.6% essential oil and vitamins B12 and E as the large amount. Main composition of essential oil is n-butylidenephthalide (C₁₂H₁₄O₂), n-valerophenone-o-carboxylic acid (C₁₂H₁₄O₃), and bergapten, ligustilide (James, 1995). The essential oil of angelica is used in perfumes, soaps, salves, oils, shampoos, and cigarettes. Efficacy of oriental medicine was follows.

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The root is emmenagogue, oxytotic, sedative and tonic. It is used in the treatment of women's complaints and also eases dizziness. *Angelica acutiloba* also can be utilized as a medicinal plant for vegetables because several ingredients in leaves of *Angelica acutiloba* have specific fragrance (Louis, 2000).

As flavoring agents, roots and seeds of angelica are widely used in alcoholic liqueurs such as benedictine and chartreuse, and in gin and vermouth. The fruit is used in herbal teas. The leaves are sometimes blanched, boiled, and eaten in salads or as a garnish with vegetables and meats. Leaf stalks may be candied and used in cakes and desserts (Choi and Lee, 1994).

Angelica is not usually considered a culinary herb, but fresh leaves provide a zesty accent to soups and salads. It has a fragrant aroma and a warm, vaguely sweet taste reminiscent of juniper, followed by a bitter aftertaste. We can eat steamed stems with butter, and chopped stems add flavor to roast pork (Michael, 2002).

This study was conducted to determine feasibility of production system of *Angelica acutiloba* leaf-stem by fertilizing of Sta-Green in pots

MATERIALS AND METHODS

Seeds of *Angelica acutiloba* as a native variety were seed gathering at the medicinal plant garden of Sunchon National University in August, 2003 and 2004, respectively, the seeds were used for experiment.

The seeds were stored in a refrigerator at 4°C for 14 days after collection. The seeds were planted in pot(Ø

25cm) in greenhouse of Missouri University Agronomy on 20th of August, 2004. The pots was filled with Sta-Green of 0, 15, 30, 45, 60 and 75%. Stand soil mixtures of Peat Moss.

The soil Sta-Green includes N-P₂O₅-K₂O=0.05-0.03-0.03 (Table1).

Five seeds per pot, collected in 2003 and 2004, were planted onto pots, and three seedlings per pot were finally selected for the experiment. Harvest was made when the plant height reached 8~10 cm high. The shoot and root fresh weight of whole plants were measured.

General cultural procedure and management such as weed control followed conventional culture methods for medicinal plants (RDA : Rural Development Administration, 1995).

All measurements for plant growth and yield were referred to standard measurement of RDA, Korea (RDA, 1989).

RESULTS AND DISCUSSION

Germination rate

Germination time and rate of *Angelica acutiloba* seeds by collecting year are shown in Table 2.

Germination of *Angelica acutiloba* seeds collected in 2004 was initiated from the 30th of August while those in 2003 from the 5th of September. The results show that *Angelica acutiloba* seeds collected in 2004 were more early germinated than those in 2003. Germination rate of *Angelica acutiloba* seeds collected in 2003 and 2004 was 13 and 91%, respectively, showing higher

Table 1. Composition of soil Sta-Green

Guaranteed Analysis	Content(%)	Others
Total Nitrogen(N)	0.05	Ammoniacal Nitrogen 0.01% Nitrate Nitrogen 0.01% Urea Nitrogen 0.03%
Available Phosphate(P ₂ O ₄)	0.03	Ammonium Phosphate
Soluble Potash(K ₂ O)	0.03	Potassium Nitrate

Table 2. Effect of seed collecting year on the seed germination of *Angelica acutiloba*

Seed gathering year	Germination		
	first day	date	rate(%)
'03 seed	Sep. 5	-	13
'04 seed	Aug. 30	Sep. 1	91

germination capacity in seeds collected in 2004. The result show that germination rate was lower as the seed collecting year increased. Germination was complete within 2 days after germination initiation, from August 30th to 5th of September.

These results indicate that leaf and stem production of *Angelica acutiloba* can be improved by optimizing seed collecting time in greenhouse.

Growth of Leaves-stems by Sta-Green

The result on growth of *Angelica acutiloba* as affected by Sta-Green is shown Table 3.

In control, plant height, number of leaves per plant, and fresh weight of *Angelica acutiloba* grown were 5.9 cm, 3.9 and 12.2 g, respectively. Plant height, number of leaves per plant, and fresh weight of *Angelica acutiloba* in Sta-Green treatment were 6.8~7.2cm, 4.0~5.0 and 12.9~13.5g, respectively. However, when the plants were grown in Sta-Green treatment 45% and the bigger one.

The results show that leaf and stem production of *Angelica acutiloba* can be improved by using Sta-

Green.

These results require further more detail studies on effects of treatment methods on growth responses of *Angelica acutiloba* as affected by different growing stages.

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Table 3. Effect of Sta-Green treatment on the growth of *Angelica acutiloba*

Treatment	Plant height(cm)	Number of leaf	Weight(g)
Control	5.9b*	3.9b	12.2b
Sta-Green 15%	6.8a	4.0b	12.9ab
Sta-Green 30%	6.9a	4.3ab	13.3a
Sta-Green 45%	7.2a	5.0a	13.5a
Sta-Green 60%	7.1a	4.9a	13.2a
Sta-Green 75%	6.9a	4.5ab	13.0ab

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

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