



Effect of aging on andrographolide content in *Andrographis paniculata*

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Abstract

Objective: The experiment was conducted to know the effect of aging on andrographolide content in *Andrographis paniculata* (Kalmegh) to establish the best harvesting time. **Materials and method:** The growth and yield parameters were studied at 30, 60, 90, 120 and 150 days after sowing. The andrographolide content was estimated by HPLC method. **Results and conclusion:** The best harvesting time was observed at 120 days after sowing to get higher biomass containing maximum andrographolide content.

Key words: *Andrographis paniculata*, andrographolide content, aging.

1. Introduction

The plant *Andrographis paniculata* belonging to the family Acanthaceae is an annual herb. It is widely distributed in the plains of India, Srilanka and neighbouring tropical countries. The plant is known as Mahatikta in Sanskrit, meaning "King of bitters". In the Indian Ayurvedic herbal market it is popularly known by its Bengali vernacular nomenclature 'Kalmegh' [1]. The whole herb is used medicinally. The plant is useful as bitter tonic, febrifuge, anti-dysenteric and anti-periodic. Some times it is substituted for *Swertia chiratia*

for its bitter principle, it is considered to be highly efficacious against chronic malaria, diarrhoea, cholera, fever, diabetes, jaundice, anemia, bowel complaints, and loss of appetite [2-4]. The leaves normally contains 2.5 - 3% w/w of andrographolide [5].

There are many factors which influence phytochemical profile of a plant drug. The age of plant at the time of collection is one such factor. Several medicinal plants have been reported to show variations in the secondary

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metabolites chronologically [6]. Till date there is no report on phytochemical changes in *Andrographis paniculata* due to aging and hence, this formed the basis to take up the study. This information would help in determining the best harvesting time for this plant.

2. Materials and method

2.1 Experimental site

The trial was conducted at the agronomy farm of Natural Remedies Pvt. Ltd., Bangalore, India, during 2001-2002. The experimental site was situated at an elevation of 930 m above mean sea level on latitude 12° 58' North and longitude 77° 35' East, with red sandy loam soil.

2.2 Source of starting material and nursery techniques

The *Andrographis paniculata* seeds were collected from the raw material bags of Natural Remedies Pvt. Ltd., godown. To improve the germination percentage the seeds were soaked in the water overnight. The nursery bed was prepared a day before sowing the seeds and care was taken to avoid deep sowing [7]. The nursery was maintained under uniform shade for better growth of seedlings.

2.3 Post nursery techniques

After 6 weeks of sowing, the seedlings were transplanted in the main field at the spacing of 15x15 cm. The crop was uniformly applied with 75 kg each of Nitrogen, Phosphorous and 50 kg of Potassium per hectare and cultural operations like irrigation, weeding etc., were done regularly.

2.4 Collection and preparation of samples

The plant samples were collected from the plot at the age of 30, 60, 90, 120 and 150 days after sowing. The collected samples were dried at 60°C in the hot air oven and grounded for fine powder.

2.5 Analytical method

A known quantity of powdered crude drug was extracted exhaustively (app. 5 h.) in a soxhlet apparatus with methanol. The extract was evaporated to dryness and dissolved to a known volume. This aliquot was analysed by HPLC as per the published method [8].

2.6 Statistical analysis

Results were expressed as mean \pm SEM. The data was analyzed by analysis of variance (ANOVA) followed by Dunnett's tests and the results were judged significant if $p < 0.05$.

Table 1.
Growth and yield parameters of *Andrographis paniculata*

Sl. No.	Parameter	Days after sowing (DAS)				
		30	60	90	120	150
1.	Plant Height (cm)	1.45 ± 0.12	14.85* ± 0.85	20.70* ± 1.45	36.30* ± 1.9	45.6* ± 1.33
2.	Number of leaves/plant	6.80 ± 0.33	26.10 ± 2.73	41.70* ± 4.16	165.20* ± 13.92	110.90* ± 2.41
3.	Number of branches/plant	0.0 ± 0.0	2.80 ± 0.49	12.10* ± 0.97	41.50* ± 4.47	47.80* ± 2.04
4.	Fresh wt. of plant (g)	1.02 ± 0.06	2.16 ± 0.07	7.83* ± 0.56	70.25* ± 3.05	115.37* ± 0.77
5.	Dry wt. of plant (g)	0.20 ± 0.02	0.37 ± 0.01	1.72 ± 0.13	50.12* ± 2.41	56.49* ± 1.23
6.	Leaf to stem ratio	NA	1:0.55	1:0.45	1:0.52	1:3.35

* $P < 0.01$ vs 30 DAS; Values are expressed as mean \pm SEM: n=10; NA: Not analyzed

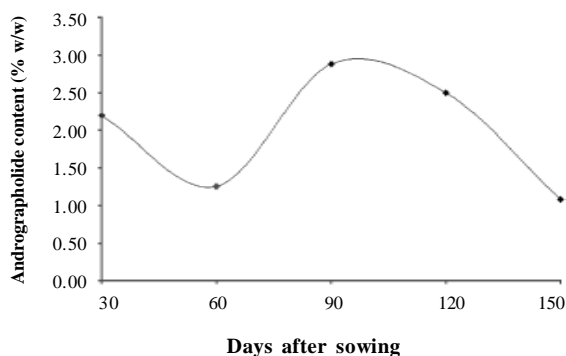


Figure 1. Andrographolide content of *Andrographis paniculata* at different growth stages.

3. Results and discussion

The data on the growth parameters showed that (Table-1), there was an increasing trend in the plant height, number of branches, fresh weight and dry weight at all the stages of crop growth. The number of leaves at 90, 120 and 150 days

after sowing were significantly high when compared to 30 days after sowing.

There was a reduction in the number of leaves per plant at 150 days after sowing when compared to plant at the age of 120 days. This may be due to the fall of aged leaves. The andrographolide content was maximum at 90 days after sowing and was minimum at 150 days after sowing (Fig 1). This decrease in the active principle content at 150 days after sowing may be attributed to increase in the stem portion and loss of leaves due to aging.

Even though there was a higher andrographolide content at 90 days after sowing, the dry matter content was very less when compared to the plants at the age of 120 days. Hence, harvesting the crop at 120 days after sowing could be beneficial.

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