

## Physiological and bio-chemical study on Kalmegh (*Andrographis paniculata* Wall. Ex. Nees.)

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### **ABSTRACT**

Kalmegh (*Andrographis paniculata* Wall. Ex. Nees) has wide range of medicinal and pharmacological applications. It is a valuable medicinal plant, chiefly used in Indian Ayurvedic system of medicine. The andrographolide (also known as kalmeghin) which is therapeutically active principle found in aerial parts of kalmegh. The percentage andrographolide was higher at flower stage both in the branches and leaves there after decreases at full bloom stage then again increases at maturity stage. Significantly higher andrographolide content was observed in the treatment Anand Local (C<sub>1</sub>) both in leaves as well as in branches at the initiation of flowering (S<sub>1</sub>). Dry weight of branches and leaves was significantly higher in the same treatment viz., Anand Local (C<sub>1</sub>) at maturity and full bloom stage (S<sub>3</sub> and S<sub>2</sub>), respectively. Interaction effect C x S was found significant for all the characters studied except plant height and number of branches.

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**Key words :** Kalmegh, Andrographolide, Astringent, Maturity.

### **INTRODUCTION**

Kalmegh is commonly known as ‘King of Bitters’. In India, it is sometimes called “Indian Echinacea”. It is distributed in tropical Asian countries, often in isolated patches. Native populations of plants are spread throughout South India and Sri Lanka which perhaps represent the centre of diversity of the species. In India it is widely distributed throughout the plains of India from Uttar Pradesh, Assam, Madhya Pradesh, Tamil Nadu and Kerala. In Gujarat, it can easily grown as wild. It is a annual herb. The herb and its isolates like andrographolide are reported to possess anti-inflammatory, astringent, tonic, and anti-pyretic properties and helps in arresting dysentery, cholera, diabetes, influenza, bronchitis, swelling and itches, piles and gonorrhoea (Prajapati *et al.*, 2003). It is also used

to treat gastrointestinal tract and upper respiratory infections (Chopra *et al.*, 1956). The andrographolide content at different days after transplanting shows variable trend among the periods. This variation may be due to the physiological stage at particular date of harvesting. The chemoprofiling study showed significant variations in the concentration of active ingredients in the leaves as well as in whole plant (Mishra *et al.*, 2010). Thus, the present investigation was undertaken to identify the appropriate physiological stage of harvest for quality produce of kalmegh.

### **MATERIALS AND METHODS**

A field study was conducted during *Kharif* season of 2006-07 to assess the physiological and biochemical parameters of kalmegh at the farm of AINRP on Medicinal and Aromatic Plants Project, Anand Agricultural University, Anand. Randomized Block Design was adopted for the study with six replications. Three different cultures were taken as treatment *i.e.* C<sub>1</sub>- Anand Local, C<sub>2</sub>- ND-1 and C<sub>3</sub>- Faizabad and observations were recorded at three physiological stages *i.e.* S<sub>1</sub>- Initiation of flowering (60 days), S<sub>2</sub>- Full bloom (90 days) and S<sub>3</sub>- Maturity stage (130 days). Seeds were sown in beds of 4.5 x 2.0 m at 45 cm spacing.

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**Table 1 : Physiological and biochemical studies in Kalmegh (*A. paniculata*)**

Treatments	Plant height (cm)	No. of branches/plant	Dry weight of branches (g)	Dry weight of leaves (g)	% Andrographolide (Branches)	% Andrographolide (Leaves)
C <sub>1</sub> - Anand Local	52.52	9.64	250.94	170.39	1.90	2.10
C <sub>2</sub> - ND-1	56.03	10.85	237.22	171.94	1.84	1.94
C <sub>3</sub> - Faizabad	56.72	10.43	232.89	198.05	1.85	1.92
SEm	0.79	0.29	6.52	5.11	0.02	0.40
CD at 5%	2.26	0.83	NS	14.60	NS	0.11
S <sub>1</sub> - Initiation of flowering	51.53	9.29	119.83	179.83	2.29	2.63
S <sub>2</sub> - Full bloom	54.62	10.37	189.17	255.28	1.53	1.53
S <sub>3</sub> - Maturity stage	59.12	11.27	412.06	105.28	1.77	1.80
SEm	0.79	0.29	6.52	5.11	0.02	0.04
CD at 5%	2.57	0.83	18.64	14.60	0.06	0.11
Interaction (C x S)						
SEm	1.37	0.50	11.29	8.85	0.03	0.07
CD at 5%	NS	NS	32.28	25.29	0.10	0.19

NS- Non-significant

Seed rate was kept at 400 g/ ha. To facilitate the sowing, the seed were mixed with fine sand as the size of seed was small. After sowing seeds were mildly covered with soil. All the remaining recommended agronomical practices were adopted to raise the crop. After 30 DAS the seedlings were transplanted in the well prepared experimental plot. Observations were recorded on randomly ten selected plants.

## RESULTS AND DISCUSSION

The results indicated that the characters plant height (56.72 cm) and dry weight of leaves (198.05 g) was significantly higher in the treatment Faizabad (C<sub>3</sub>) (Table 1). Whereas, the number of branches per plant (10.85) was significantly higher in the treatment ND-1. Dry weight of branches was non-significant but higher dry weight of branches (250.94 g) was recorded in the treatment Anand local (C<sub>1</sub>) of kalmegh. Treatment Anand local (C<sub>1</sub>) recorded significantly higher per cent andrographolide from branches (1.90 per cent) and from leaves (2.10 per cent).

The andrographolide content of kalmegh varies with the stages of plant growth and development. The characters per cent andrographolide from branches and leaves, dry weight of branches, dry weight of leaves, plant height and number of branches per plant was found significant at all the harvesting stages of the kalmegh *i.e.* initiation of flowering (S<sub>1</sub>), full bloom (S<sub>2</sub>) and maturity stage (S<sub>3</sub>). The plant height (59.12 cm), number of branches per plant (11.27) and dry weight of branches (412.06 gm) was recorded higher at maturity stage (S<sub>3</sub>). Dry weight of leaves

was found significantly higher at full bloom stage (S<sub>2</sub>) (255.28 g) followed by at initiation of flowering (S<sub>1</sub>) (179.83 g) and maturity stage (S<sub>3</sub>) (105.28 g). Higher andrographolide content in branches as well as in leaves was found at initiation of flowering (S<sub>1</sub>) (2.29 and 2.63 per cent) followed by at maturity (S<sub>3</sub>) (1.77 and 1.80 per cent) and full bloom stage (S<sub>2</sub>) (1.53 per cent in both).

Interaction effect C x S was found significant for all the characters studied except plant height and number of branches.

Finally it can be concluded that percentage andrographolide was higher at initiation and at flower stage both in the branches and leaves and then it decreased at full bloom stage then again increased at maturity stage, both in branches and leaves.

## REFERENCES

- Chopra, R. N., Nayar, S. L. and Chopra, I. C.** (1956). *Glossary of Indian medicinal plants*. NISCOM, CSIR, New Delhi, India. 18pp.
- Mishra, S., Tiwari, S. K., Kakkar, A. and Pandey, A. K.** (2010). Chemoprofiling of *Andrographis paniculata* (kalmegh) for its andrographolide content in madhya pradesh, India. *Inter. J. Pharma & Bio Sci.* 6 (2): 182-185
- Prajapati, N. D., Purohit, S. S., Sharma, A. K. and Kumar, T.** (2003). *A handbook of medicinal plants, A complete source book*, Agrobios, Jodhpur, India pp. 45-46.