

IMPACT OF *ADHATODA VASICA* ON SOIL CHARACTERISTICS

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ABSTRACT

Adhatoda vasica is a member of family Acanthaceae. It is distributed in Indonesia, Malaysia, South Asia, India and Pakistan (Malik and Ghafoor, 1988). It is a medicinal plant and has been used in Ayurvedic and Unani medicines and used locally for the last 2000 years in India (Atal, 1980). The roots and leaves of *Adhatoda vasica* are used to treat bronchitis, asthma, fever and jaundice. It grows in wastelands and degraded forests in the Aravalli hills in Alwar district of Rajasthan (Bhandari M M. 1990). Besides its allelopathic impact on herbaceous vegetation (Muller, C.H. 1969), it may affect the soil characteristics wherever it grows, hence an attempt has been made to evaluate the impact of this plant on the soil properties in the Sariska Tiger Project.

Keywords: Medicinal Plant, Allelopathic, Herbaceous. Sariska Tiger Project. Aravalli Hills, Acanthaceae.

Introduction

Adhatoda vasica Nees. is a diffuse, branched, evergreen plant, internodes short, leaves upto 20 x 8 cm, oval or elliptic lanceolate, acuminate. Flowers are white with pink or purple stripes, in dense, axillary, peduncled spikes and at the end of branches. Bracts conspicuous, capsule 2.5 x 8 cm or more, Cleavate, seeds suborbicular. It is often gregarious on the ridge adjacent hilly tracts where it occurs as a codominant shrub with *Capparis sepiarea* Linn. It is a medicinal plant. Its roots are used in fever. The leaves are used by the local people of Sariska Tiger Project in the cure of cough. It flowers from December to April. Fruit is usually loculicidal capsule and the walls are often elastically recured, leaving the central axis. The seeds are dispersed by explosive mechanism of the capsules.

Material and Method

Three study sites were selected in Kali ghati forest area of Sariska Tiger Project with and without this plant. Six soil samples were collected from 10 cm x 10 cm x 10 cm volume of soil from each site of the three study sites. Six soil samples of each site were mixed and then the soil was used for analysing its chemical properties. The soil samples were collected after the retreat of monsoon in September, October and November in first year. The soil samples were collected at the end of July, September, October and November in second year. The soil collected from each treatment was analysed for chemical properties. Soil pH was estimated by digital pH meter, electrical conductivity of conductivity bridge, salinity by salinity meter and total dissolved salts by TDS meter, organic carbon by titration method following (Misra 1968). Soil moisture content was also determined following (Misra 1968).

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Result and Discussion

The soil characteristics of study sites the soil is sandy loam and silt clay loam with pH varying from 7 to 7.7 in the different study sites (table 1). No specific impact was observed on soil pH due to the presence of this plant. Soil salinity and total dissolved salts were observed to be variable among study sites. The soil organic carbon was more in presence of this plant in the study site, where soil was less fertile. In the other study site, the soil moisture content was more in soil without this plant whereas in rest of the study sites (table 3) the soil pH varied from 6.5 and 7.5 and electrical conductivity varied from 0.15 to 0.35 in the Kali Ghata Forest area. However, no relation could be observed between soil pH, etc and presence of this plant. Percent organic carbon was more in soil where plant was present as compare to the soil devoid of this plant (table 2) However There was no effect of the density of *Adhatoda vasica* on the percentage of organic carbon in the soil.

Table 1: pH and EC of the Soil of Different Study Sites of the Sariska Tiger Project (\pm SE)

• Soil pH

Month	Site - 1		Site - 2		Site - 3	
	With <i>Adhatoda vasica</i>	Without <i>Adhatoda vasica</i>	With <i>Adhatoda vasica</i>	Without <i>Adhatoda vasica</i>	With <i>Adhatoda vasica</i>	Without <i>Adhatoda vasica</i>
Sept	7.02 \pm 0.10	7.10 \pm 0.15	7.25 \pm 0.10	7.23 \pm 0.06	7.32 \pm 0.03	7.29 \pm 0.01
Oct	7.15 \pm 0.07	7.03 \pm 0.021	7.30 \pm 0.05	7.12 \pm 0.03	7.20 \pm 0.07	7.40 \pm 0.04
Nov	7.02 \pm 0.21	7.11 \pm 0.06	6.90 \pm 0.11	7.31 \pm 0.02	7.51 \pm 0.02	7.41 \pm 0.01

• Soil EC (mho 10^2 cm $^{-1}$)

Month	Site - 1		Site - 2		Site - 3	
	With <i>Adhatoda vasica</i>	Without <i>Adhatoda vasica</i>	With <i>Adhatoda vasica</i>	Without <i>Adhatoda vasica</i>	With <i>Adhatoda vasica</i>	Without <i>Adhatoda vasica</i>
Sept	5.50 \pm 1.83	2.20 \pm 0.15	3.02 \pm 0.11	4.16 \pm 0.02	5.06 \pm 0.09	3.51 \pm 0.62
Oct	2.34 \pm 0.15	2.05 \pm 0.05	2.80 \pm 0.07	3.19 \pm 0.18	3.09 \pm 0.17	3.07 \pm 0.27
Nov	3.74 \pm 0.34	3.15 \pm 0.17	2.84 \pm 0.12	3.99 \pm 0.07	2.61 \pm 0.14	3.01 \pm 0.10

Table 2: Soil Characteristics of Different Study sites of Sariska Tiger Reserve (\pm SE)

Characteristics	Site - 1		Site - 2		Site - 3	
	With <i>Adhatoda vasica</i>	Without <i>Adhatoda vasica</i>	With <i>Adhatoda vasica</i>	Without <i>Adhatoda vasica</i>	With <i>Adhatoda vasica</i>	Without <i>Adhatoda vasica</i>
Salinity at (2ppt)	0.15 \pm 0.01	0.08 \pm 0.01	0.11 \pm 0.02	0.14 \pm 0.04	0.09 \pm 0.03	0.12 \pm 0.01
T.D.S. at (10ppt)	0.38 \pm 0.01	0.18 \pm 0.04	0.44 \pm 0.16	0.39 \pm 0.15	0.025 \pm 0.01	0.33 \pm 0.01
(%) Carbon	0.97 \pm 0.05	0.81 \pm 0.02	1.36 \pm 0.04	1.1 \pm 0.04	1.31 \pm 0.03	1.27 \pm 0.02

Table 3: Soil Moisture (%) of Different Study Sites in of the Sariska Tiger Reserve Forest

Characteristics	Site - 1		Site - 2		Site - 3		Site - 4	
	With <i>Adhatoda vasica</i>	Without <i>Adhatoda vasica</i>	With <i>Adhatoda vasica</i>	Without <i>Adhatoda vasica</i>	With <i>Adhatoda vasica</i>	Without <i>Adhatoda vasica</i>	With <i>Adhatoda vasica</i>	Without <i>Adhatoda vasica</i>
September	11.74 \pm 1.28	4.78 \pm 0.4	6.66 \pm 0.37	7.26 \pm 0.48	10.68 \pm 0.15	14.82 \pm 1.15	4.9 \pm 0.57	16.17 \pm 1.43
October	4.26 \pm 0.04	4.16 \pm 0.29	2.73 \pm 0.22	4.58 \pm 0.17	3.11 \pm 0.43	6.68 \pm 0.86	1.6 \pm 0.09	9.78 \pm 1.46
November	10.20 \pm 1.35	9.05 \pm 1.32	12.6 \pm 0.81	10.32 \pm 1.08	11.10 \pm 0.53	11.06 \pm 0.16	10.65 \pm 1.09	15.75 \pm 2.87

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