



# PHENOLOGICAL IMPRESSION OF *ACACIA MANGIUM* IN CHHATTISGARH, INDIA

Gunjan Patil<sup>1</sup> and M.N Naugraiya<sup>2</sup>

<sup>1</sup>Department of Forestry, Wildlife and Environmental Sciences, Guru Ghasidas Vishwavidyalaya, Bilaspur - 495 009 (C.G.), India.

<sup>2</sup>Department of Forestry, I.G.K.V., Raipur (C.G.), India.

## Abstract

Phenological study of *Acacia mangium* has done at Indira Gandhi Krishi Vishwavidyalaya, Raipur (CG). Two different sites viz; (i) Experimental field of department of Forestry at Indira Gandhi Krishi Vishwavidyalaya, Raipur (C.G) and (ii) Energy Park VIP road Raipur having different soil management practice was selected for study of tree phenology and seeds site –I has black cotton soil (vertisols) and while site – II has light soil (inceptisols). *A. mangium* is evergreen tree species so foliage initiation, maturity and leaf fall was not found significant differences. Foliage initiation was maximum during winter season and less in the summer at both the sites. Foliage gets matured after two weeks from their initiation. Leaf fall observed in September and February at Experimental field of Forestry IGKV and October and March at Energy park plantation. The flowers formation started from the end of August and reached peak during 2<sup>nd</sup> to 3<sup>rd</sup> week of September afterward then flowering decline and eventually stopped at the second week of October at the Experimental field, IGKV, Raipur. In case of site of Energy Park plantation the flowering started from the last week of September and peak during the 3<sup>rd</sup> and 4<sup>th</sup> week of October then declined and stopped during 2<sup>nd</sup> week of November.

**Key Words:** Phenological impression, *Acacia mangium*

## Introduction

*Acacia mangium* is native to Northern Queensland in Australia Papua New Guinea, Iran Jaya and the Moluccas Islands in Indonesia (Turnbull 1986). It belongs to family Fabaceae and commonly known as Mangium, Mangium wattle, mange, forest mangrove. The species occurred throughout the humid tropics and hence naturalized in Puerto Rico. *Acacia mangium* is the fast growing, medium sized, evergreen with phyllodes a modified leaves acting as water given tree. Tree reaches 30 m in height and 60 cm in diameter in their native range. *Acacia mangium* grows best in warm climates with 1500 to 3000 mm annual rainfall (Turnbull, 1986). It is able to grow in different types of soil. It can be grown in light acid soil with medium to low fertility status having facilities of poor to moderate drain while soil with high pH is not tolerated (Turnbull, 1986). *A. mangium* is the suitable for commercialization, reforestation and environmental protection (Patil *et al.* 2012). Its fast growth and dense shade make it an effective tool to control soil erosion and

reducing fire risk (NFTA, 1987). Leaf initiation, maturation, leaf fall, flowering and fruiting period of *A. mangium* were studied from two selected sites. The flowering strength in a seed orchard of *A. mangium* was related with family variation and provenance variation. The flowering strength assigned visually was significantly different among families and provenances. The flowering strength in lower part of tree crown was less than that on the upper part of the tree crown.

## Materials and Methods

Two different sites viz; (i) Experimental field of department of Forestry at Indira Gandhi Krishi Vishwavidyalaya, Raipur (C.G.) site-I and (ii) Energy Park VIP road Raipur site-II were selected as a research site. Sites were having different soil management practices and site-I has black cotton soil (vertisols) and while site-II has light soil (inceptisols). The plantation of *Acacia mangium* was irrigated at site-I and rainfed at site-II. Weekly observations recorded for different stages of crown foliages and their intensity in respect to initiation,

Table I: Phenological observations of *A. mangium* at two different sites.

Weeks	August					September					October					November					December					January								
	LJ	LF	FL	FR	LI	LJ	LF	FL	FR	LI	LJ	LF	FL	FR	LI	LJ	LF	FL	FR	LI	LJ	LF	FL	FR	LI	LJ	LF	FL	FR	LI	LJ	LF	FL	FR
Site-I	1	**	*	-	-	**	-	**	-	***	*	**	*	**	***	-	-	-	**	**	***	-	-	**	**	-	-	***	-	-	***	-	***	
	2	**	*	-	-	**	-	***	-	***	**	*	**	**	***	-	-	-	**	**	***	-	-	**	**	-	-	***	-	-	***	-	***	
	3	**	*	-	-	**	-	***	-	***	**	-	**	**	***	-	-	-	**	**	***	-	-	**	**	-	-	***	-	-	***	-	***	
	4	**	*	-	-	**	-	***	-	***	**	-	**	**	***	-	-	-	**	**	***	-	-	**	**	-	-	***	-	-	***	-	***	
	5	**	*	-	-	**	-	***	-	***	**	-	**	**	***	-	-	-	**	**	***	-	-	**	**	-	-	***	-	-	***	-	***	
Site-II	1	*	**	-	-	**	-	***	-	*	**	-	**	-	***	*	**	**	*	**	***	-	-	*	**	-	-	***	-	-	***	-	***	
	2	*	**	-	-	**	-	***	-	*	**	-	***	-	***	*	**	**	*	**	***	-	-	*	**	-	-	***	-	-	***	-	***	
	3	*	**	-	-	**	-	***	-	**	**	-	***	-	***	*	**	**	*	**	***	-	-	*	**	-	-	***	-	-	***	-	***	
	4	*	**	-	-	**	-	***	-	**	**	-	***	-	***	*	**	**	*	**	***	-	-	*	**	-	-	***	-	-	***	-	***	
	5	*	**	-	-	**	-	***	-	**	**	-	***	-	***	*	**	**	*	**	***	-	-	*	**	-	-	***	-	-	***	-	***	

Weeks	February					March					April					May					June					July								
	LJ	LF	FL	FR	LI	LJ	LF	FL	FR	LI	LJ	LF	FL	FR	LI	LJ	LF	FL	FR	LI	LJ	LF	FL	FR	LI	LJ	LF	FL	FR	LI	LJ	LF	FL	FR
Site-I	1	*	****	-	**	**	-	-	*	***	*	*	*	*	***	*	*	*	*	*	***	*	*	*	*	*	*	*	*	*	*	*	*	*
	2	*	****	-	**	**	-	-	*	***	*	*	*	*	***	*	*	*	*	*	***	*	*	*	*	*	*	*	*	*	*	*	*	*
	3	*	****	-	**	**	-	-	*	***	*	*	*	*	***	*	*	*	*	*	***	*	*	*	*	*	*	*	*	*	*	*	*	*
	4	*	****	-	**	**	-	-	*	***	*	*	*	*	***	*	*	*	*	*	***	*	*	*	*	*	*	*	*	*	*	*	*	*
	5	*	****	-	**	**	-	-	*	***	*	*	*	*	***	*	*	*	*	*	***	*	*	*	*	*	*	*	*	*	*	*	*	*
Site-II	1	*	**	-	****	**	-	-	****	*	*	*	*	****	*	*	*	*	*	****	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	2	*	**	-	****	**	-	-	****	*	*	*	*	****	*	*	*	*	*	****	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	3	*	**	-	****	**	-	-	****	*	*	*	*	****	*	*	*	*	*	****	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	4	*	**	-	****	**	-	-	****	*	*	*	*	****	*	*	*	*	*	****	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	5	*	**	-	****	**	-	-	****	*	*	*	*	****	*	*	*	*	*	****	*	*	*	*	*	*	*	*	*	*	*	*	*	*

LJ=Leaf initiation; LF= Leaf fall; FL= Flowering; FR= Fruiting.

maturity and falling of leaves at two different sites. Different stages and intensity of flowering and fruiting were also recorded weekly right from the initiation of bud to the maturity of fruit.

## Results and Discussion

Phenological observations were made visually for leaves, flowering and fruiting for a year presented in Table-1.

### Foliage initiation and maturation

*A. mangium* is evergreen tree so the phenomenon of foliage initiation, maturity and fall was not significantly differentiated. However foliage initiation maximum during winter season less in the summer month May at both the sites. Foliage gets matured after two week from their initiation. Leaf fall was observed in the September and February at the Experimental field of Forestry IGKV and October and March at the Energy park plantation respectively.

### Flowering initiation

The flowers formation started from the end of August and reached to peak flowering stage during 2<sup>nd</sup> to 3<sup>rd</sup> week of September afterward than flowering started to decline and finally stopped in at the second week of October at the IGKV, Raipur. In case of Energy Park plantation flowering started from the last week of September and peak flowering was recorded during the 3<sup>rd</sup> and 4<sup>th</sup> week of October than get declined and finally get stopped in the 2<sup>nd</sup> week of November.

### Fruit/ pod initiation and maturity

Pods formation started from the 1<sup>st</sup> week of October, which was gradually found to be increasing till the January when the fruiting intensity was at peak. The declining in fruiting was observed after the January and finally stopped in the April at experimental field of Department of Forestry, IGKV Raipur.

In case of Energy park plantation, the pod formation started from the end week of October month and maximum fruiting was recorded in the February afterwards it's started to decline and finally stopped in May.

Phenological variation in the reference to leaves, flowering and fruiting were observed at both sites. Variation in phenology at both sites is may be due to soil environmental conditions and genetic potential. Bhumibhavan *et al.* (1994) observed that the *A. mangium* provenances showed great variation in flowering pattern and their conversion in to trait along with significant variation in production and seed production and

characteristics. *Azadiracta indica* also varied in morphological and phenological parameters with tree height, girth at breast height, crown height and diameter. They found that climate affected growth and phenology of *Azadiracta indica*, lower temperature and high rainfall which may be probable cause of different growth parameters suggested by Pande *et al.* (2004). The variation in phenology pattern in the central part of India, probably due to climate like, rainfall, environmental conditions and geomorphological situation were observed by Newton (1988). Frankie *et al.* (1974) in their studies in the dry deciduous forest of Costa Rica observed fruiting peak during dry season. They provide the evidence that Central American forests, the timing of leaf fall flush and flowering is largely depend on the tree water status. Pande *et al.* (1999) recorded early flowering in *A. mangium* at Chhindwara in M.P. in the year 1998 during February. The present study found Peak flowering and fruiting in September-October. In India at Aravalli hills of Rajasthan flowering and fruiting were found throughout the year (Chhangani, 2003). He reported that flower buds were available throughout the year with an average 8.32 per cent with minimum of 1.13 percent in November and maximum 14.77 per cent in August. Availability of average mature flower throughout the year was 9.35%. Fruits were also available throughout the year on an average of 8.32 per cent with minimum availability of 3.23 percent in February and maximum 15.21 percent in May. Variation in the phenological characters is mostly influence by the plants genetic potential as well as environmental factors.

## Conclusion

Phenological study of *A. mangium* showed significant differences in their studied characters were due to genetic and environment effect together on it. Study helps to reveal the importance of site selection for further plantation of *A. mangium*.

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