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Ethology and Phenology of Orchids of Jharkhand with special reference to *Vanda*

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Abstract : The present paper deals with three species of *Vanda* from the Jharkhand which are ethno medicinal and ornamental. The detail ethology and reproductive phenology are discussed. Comparative study and characteristics between different *Vanda* species have been discussed. Orchids *Vanda* species are *Vanda tessellata*, *Vanda testasis* and *Vanda nana*. These three species are the main species of *Vanda* which are found in Jharkhand. Vegetative characters reveal sizeable variation among *Vanda* Orchids which can be differentiated from one another. The length of the epiphytic root ranges from 10 cm to 15 cm. The length was recorded in stem of *Vanda tessellata* 30-80 cm, *Vanda testasis* 25-70 cm and *Vanda nana* 15-30 cm. The maximum length was recorded in *Vanda tessellata*. The sessile lanceolate leaves with maximum length the raceme inflorescence found in these *Vanda* families. The flowers were exquisite and showy which exhibit different shapes and colors, the largest flower in *Vanda* are of *Vanda testasis*. Most of the species began to sprout new shoots during rainy season to winter season, the high temperature to low temperature rainfall and humidity promotes the flower bud initiation. The longevity of flowers ranges 3 to 5 Weeks.

Keywords : *Vanda*, ethnomedicinal, ethnology, phenology.

INTRODUCTION

The study of periodically occurring phenomena in plants in relation to the climate and changes of season is known as Phenology. Leith (1970)¹, Leith and Radford (1971)² first discussed the concept of phenology. Here the phenological reproductive study deals with vegetative and phase corresponding to the climate and seasonal changes in particular area and it determines the degree of reproductive synchrony with other plant species (Rathcke, 1988a,b)^{3,4}. Synchrony among species might be advantageous in which the presence of one species

facilitates increase in pollinators.⁵⁻⁷ Phenological study is important in plant management and combating afforestation, the flowering phenology differs from species to species in accordance with the ecosystem types.^{8,9} The floral initiation in orchids is determined by the genotypes and its interactions with the environmental conditions such as temperature, humidity, light and photoperiod.¹⁰ The phenological studies reflect the daily occurrence of plants and animals in total response to environment. In plants it includes vegetative and reproductive such as bud formations flowering, fruiting and seed germination, along with vegetative phase like leaf flushing and shedding. These are based on observation of periodic phenomena occurring at a given location over a period of several years.

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The micro climatic study and get actual conditions that influence plant response, the external factors modify the internal factors, among these factors are rainfall, temperature, humidity, soil moisture at different depth, light and its duration, reserve food materials etc.

MATERIALS & METHODS

Vanda belongs to Orchidaceae family there are about 80 species *Vanda* Orchids is found large scale in Jharkhand naturally. The taxonomic history of genus *Vanda* is convoluted and genus has been described most species in *Vanda* genus are (Epiphytes) meaning they grow on other plants without harming the host plants by clinging to trees. Three species are *Vanda tessellata*, *Vanda testasis* and *Vanda nana*. These *Vanda* species are collected from natural habitat found in the shadow of tree. *Vanda* has access to more sunlight in forest. There are variations in the size of *Vanda*. *Vanda* can be spread 10 to 15 feet upto half of the tree. *Vanda* grows in cluster and has unique characters. Survey work and data collection for their local abundance, conditions, habitat and flower have been done. The plants were collected from their natural habitats for the experimental studies, 3 healthy plants of each species were maintained in the forest, the chronological events of each species, the phenological detailed studies of both vegetative and phenological observation were made for two years.

A. Vegetative morphological characters :

1. Shoot height : The height of the shoot were measured from the basal to the stem and recorded in a standard unit
2. Leaf : (a) shape, (b) apex (c) size
The length and breadth of the leaves of three *Vanda* species were measured.
3. Inflorescence (a) type (b) position and length measurements of inflorescence were taken in cm from the point of emergence from the nodes to the end of the axis.

4. Floral parts: measurements of each part of flower were taken.
5. Seed pod: length measurements were taken from the point of attachment to the stalk to the tip of the capsule.

(B) Phenological characters:

The phenological observations were made from Ranchi in three phases: - phenophases, prepollination and post pollination. The prepollination observations were made from three fully open flowers and three full grown plants of each species. The meteorological parameters of the study period are as follows.

Meteorological Data

Table 1. Meteorological data of the 1st year

Sl. No.	Month	Temperature in °C monthly average		Humidity monthly average		Rainfall average (mm)
		Minimum	Maximum	Morning	Evening	
1	January	19	30	31	50	30
2	February	25	30	32	70	40
3	March	30	35	34	54	30
4	April	35	37	31	54	20
5	May	40	45	37	57	20
6	June	35	40	43	63	70
7	July	38	45	47	67	80
8	August	33	40	45	57	60
9	September	30	35	39	49	70
10	October	25	30	31	51	80
11	November	23	30	32	50	90.4
12	December	22	30	45	75	53.5

Table 2. Meteorological data of the 2nd year

Sl. No.	Month	Temperature in °C monthly average		Humidity monthly average		Rainfall average (mm)
		Minimum	Maximum	Morning	Evening	
1	January	18	30	30	60	40
2	February	24	30	31	70	50
3	March	31	35	35	60	30
4	April	32	35	32	55	20
5	May	38	40	35	60	70
6	June	30	35	40	50	80
7	July	35	40	45	60	85
8	August	30	35	45	70	75
9	September	35	40	40	65	60
10	October	25	30	30	50	50
11	November	20	25	35	45	40
12	December	25	30	40	50	30

RESULT AND DISCUSSION

Table 3. Important vegetative and floral characters.

Sl. no.	Name of the species	Shoot Nature	Shape	Apex	Type	Color	Nature	Shape
1	<i>Vanda tessellata</i>	Tuberous Shoot branching Aerial roots	Ovoid	T, Vandariner Vium	Racemes	Blue or purple/Dark Brown	Epiphyte	Rambling
2	<i>Vanda testasis</i>	Tuberous Shoot	Ovoid	<i>trinervium</i>	Raceme panicle	Yellow	Epiphyte	Rambling
3	<i>Vanda nana</i>	Tuberous Shoot	Ovoid	<i>trinervium</i>	Raceme	Pink purple	Epiphyte	Rambling

Table 4. Measurement of vegetative and floral characters

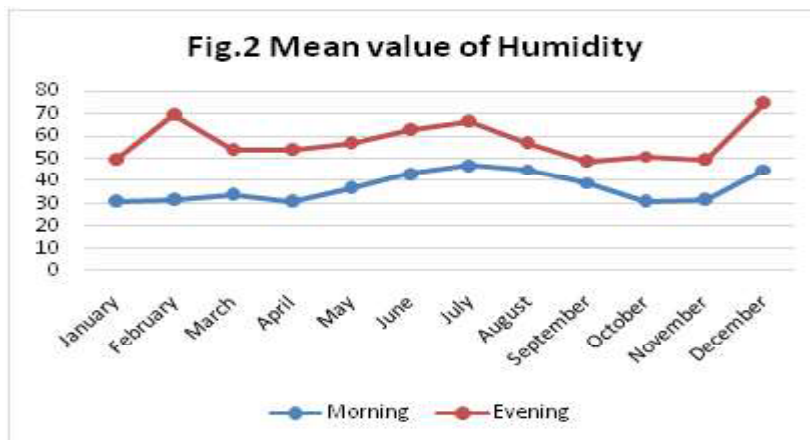
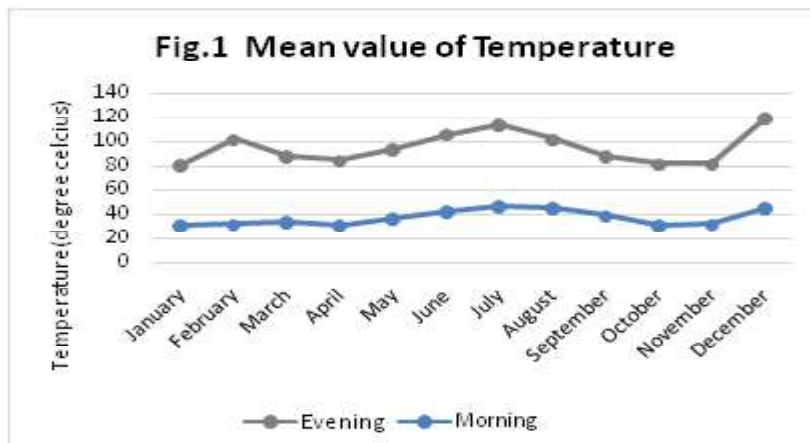
Sl. No.	Name of the Species	Stem length	Leaf Measurement			Flora bract cm			Number of flower per inflorescence
			L	B	L/B	L/B	B	L/B	
1	<i>Vanda tessellata</i>	30-80cm	20	10	20	2	2	10	6-10
2	<i>Vanda testasis</i>	25-70cm	10	30	15	2	1.5	6.6	6-20
3	<i>Vanda nana</i>	15-30cm	5	40	20	2	1.5	3.3	8-10

Abbreviations:- L=Length, B=Breadth, L/B=Length/Breadth Ratio

Table 5. Phonological Observations of Reproductive & Vegetative Phenophase

Sl. no.	Name of species	*A Month	*B Month	*C Days	*D Days	*E Month	*F Days	*G Days	*H Month	*I Month	*J Month
1.	<i>Vanda tessellata</i>	May-June	July-Aug	Aug-Sept	Sept-Oct	Oct-Dec	Nov-Dec	Dec-Jan	Jan-Feb	Feb-Mar	Mar-Apr
2.	<i>Vanda testasis</i>	June-July	Aug-Sept	Sept-Oct	Oct-Nov	Nov-Dec	Dec-Jan	Jan-Feb	Feb-Mar	Mar-Apr	Apr-May
3.	<i>Vanda nana</i>	April-May	May-June	June-July	July-Aug	Aug-Oct	Oct-Nov	Nov-Dec	Dec-Jan	Jan-Feb	Jan-Mar

*A=Initiation of Shoot, *B=Initiation of flower buds, *C= Initiation of flower buds of Anthesis, *D=Longevity of individual flower, *E=Flowering Seasons, *F= Initiation of seed pod after of pollination, *G=Maturation of seed pod *H=Broving of seed pod, *I=Brusting of seed pod, *J=Dehiscence of seed pod



Reproductive Phenology Observation:-

All these three *Vanda* species varies with respect to time. In *Vanda tessellata* shoot initiates in month of May to July flower initiates in month from July to August. Flower buds of anthesis initiates from month of August to September. Flower grows from September to October. Flowering blooms from October to December, initiation of seed pod in December to January. Browning of seed pod is from January to February. Bursting of seed pod is from February to March. Dehiscence of seed pod is from March to April. In *Vanda testasis* initiation of shoot is from June to July due to heavy rain fall and climatic condition. Initiation of flowering buds in August to September. Initiation of flower buds of anthesis. Flower grows from October to November, in some cases in December also. Initiation of seed pod after pollination is from December to January. Maturation of seed pod is from January to February. Browning of seed pod is from February to March. Bursting of seed pod is from March to April. Dehiscence of seed pod is from March to April. In *Vanda nana* shoot initiates in month of April to May flower initiates in month from June. Flower buds of anthesis initiates from month of June to July. Flower grows from September to October. Initiation of seed pod is from December to January. Bursting of seed pod is from January to February. Dehiscence of seed pod is from January to March.

CONCLUSION

Vanda is important Orchids and can adapt easily in the environment of Jharkhand. The environmental factor plays a major role in the Phenological studies. Tribes of Jharkhand use *Vanda* in eye drop and ear drop. Data obtained in the study are useful for conservation of *Vanda* orchids for medicinal and floriculture value.

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