

Germination and Growth Status of Endangered Medicinal Plant *Caesalpinia bonduc* (Linn.) Roxb. in Meerut (U.P.) India

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ABSTRACT: The present study therefore, deals the germination and growth status of *Caesalpinia bonduc* endangered medicinal plant in Meerut district U.P. *C. bonduc* of family Fabaceae is a moderately size deciduous shrub species, growing wild throughout the deciduous forest of India. *Caesalpinia bonduc* is highly valued plant species for the human beings and environment management. The plant parts like barks, leaves, root and leaves widely used for medicinally purposes. The plant species is distributed few parts of India but now it is threatened species in many areas in the country. The species does not found in Meerut areas. Hence, there is an urgent need for conservation of this species. A total 100 seeds were sowing in 10 cemented pots of size length 90 cm. into width 60 cm. containing soil: manure ratio 3:1, during the second week of May 2013. It was observed on daily, seed germinated after 6 days germination commenced. I had recorded total seed germinate 95 % within 21 days from the date of sowing. The growth parameters shoot length and girth size were recorded at June, July, August, September 2013 and April, May 2014. Final reading on plant height Mean 163.8 cm. and girth size Mean 6.66 cm. was recorded at the age of twelve months from date of sowing. The results indicate of the germination and growth status at all stages enhanced. The saplings were growing 1 m. above per year in Meerut. It is concluded that the aim of the present study is to spread awareness towards the conservation and establishment of the endangered medicinal plant *Caesalpinia bonduc* in those areas where the plant species is now does not found.

KEYWORDS: *Caesalpinia bonduc*, Endangered, Conservation, Meerut.

1 INTRODUCTION

Caesalpinia bonduc (Linn.) Roxb. is a wild highly thorny shrub belonging to the family Caesalpinaceae. It is commonly called as the Gray Nicker, fever nut. It is a large straggling, thorny shrub, leaves are compound. The flowers are pale yellow in colour, in supra-axillary racemes at the top. The fruits are inflated pods, covered with prickles, about 7.5 cm long, 4.2 cm. width and 2 seeds per pod. The seeds are globular, hard seed coat, grey in color with a smooth shiny surface. *Caesalpinia bonduc* is an important medicinal plant extensively distributed throughout India, Burma, Sri Lanka, Africa and in other tropical and subtropical regions of the world. The plant grows all over India especially in seacoast and in many forests and hills. *Caesalpinia bonduc* is used for medicinal treatment such as: plant leaves used in memory weakness, sexual weakness, painful menstruation and malaria diabetes while young shoot used in toothache and gum bleeding and flowers used for hair growing and control hair fall. The oil from the seeds is used in convulsions and paralysis. Burnt seeds with alum are good dentifrice useful in spongy gums and gum boils and its fresh fruit powder is used in fever. The juice of leaves is anthelmintic, good in elephantiasis and small pox diseases. The root bark powder with honey used in the cases of hernia. *C. bonduc* is reported to possess multiple therapeutic properties like antipyretic, antianaphylactic and anti diarrheal (Iyengar and Pendse, 1965), anti asthmatic (Gayaraja *et al.*, 1978), antidiuretic and anthelmintic (Neogi and Nayak, 1958), antiviral (Dhar *et al.*, 1968), *Caesalpinia bonduc*, a multipurpose, widely-used species with cultural and medicinal properties (Harden, 2002; Hessou *et al.*, 2009). *C. bonduc* plant parts (leaves, roots and seeds) are being used by local people in Benin and this for a wide range of purposes, from medicine, over commercialization to cultural practices and other domestic uses. Its hard seeds are roasted, ground and then boiled for medical treatments including a diuretic for diabetes and a cure for malaria (Chakrabarti *et al.*, 2005). *C. bonduc* mainly used against prostrate gland disease in traditional pharmacopoeia in Africa (Upadhyay *et al.*, 2001;

Hessou *et al.*, 2009). The seeds have been used from centuries and are still used in jewellery, prayer beads, good luck charms, and worry stones (Rancho Leona 2002, Workman 1980). *Caesalpinia bonduc* can play an important role in the biodiversity of the forests, protection of the soil and furnishing cover for wildlife. Flowers of this species are the widely source of nectar for honey bees, *xylocopa*, butter flies and other insect species. *Apis dorsata* has been known to visit flowers of *Caesalpinia bonduc* in the Nallamalai forest, Andhra Pradesh, India (Daehler, 2005). The species is sometimes planted as hedge to prevent undesired entry into property (Nelson, 1996) and can be planted for dune stabilization. The species also threatened by overexploitation of its roots (Hutton, 2001). Widespread loss and degradation of native forests is now recognised as a global environmental crisis from 2000-2005, global forest area declined by around 20 million ha/yr (Hansen *et al.*, 2010), As a consequence, many plants species are threatened and disappear more and more from their natural ecosystems (Adomou *et al.*, 2005). *C. bonduc* is classified as rare and endangered species in the world (Harden, 2002). It is also reported to be critically endangered in Malaysia (Hou D, Larsen K & Larsen SS, 1996). Further, unscientific over exploration of the plant parts like seeds, barks and leaves for medicinal purposes and destruction of habitat by anthropogenic activities drag this species towards the threshold of threatening condition and will become extinct if proper steps are not taken for its conservation. Hence, there is an urgent need for conservation of this plant species. *C. bonduc* tolerates drought condition saline soils, marshy land and occasional flooding with seawater. So, It can grow in a wide range of many areas of the country where it species not found. Meerut's soil is more fertile and has a warm subtropical climate and becomes very cold and dries in winters from December to mid February while it is dry and hot in summers from April to June. During extreme winters, the maximum temperature is around 12^o and minimum 3^o to 4^o Celsius. Summers can be quite hot with temperatures rising upto 40^o to 44^o Celsius range. The present study aim to spread awareness towards conservation and establishment of *C. bonduc* endangered medicinal plant in Meerut and those areas where It species are not found. The study will also prove to be of immense usefulness for the conservation of rare plant species in the forest.

SYNONYMS: *Guilandina bonduc* L., *Guilandina bonducella* L., *Caesalpinia bonducella* (L.) Fleming, *Guilandina crista* (L.)

MATERIAL AND METHODS

The present study was carried out at B – 16, Jwala Nagar, Ambedkar Chowk in District Meerut Uttar Pradesh for the period May to September 2013 and September to May 2014. The matured and healthy seeds were collected from Naryanganj, District Jabalpur, Madhya Pradesh by Dr. Yashwani Rai during the first week of March 2013. A total 100 seeds were sowing in 10 cemented pots of size length 90 x width 60 cm. containing soil: manure ratio 3:1 during the second week of May 2013. It was observed on daily seed germinated starts after 6 days germination commenced. I had recorded total seed germinate 95% within 21 days from the date of sowing. After four months old saplings were transplanted into the fields at urban and rural areas of District Meerut during the end of September 2013. The growth parameters shoot length and girth size were recorded at June, July, August, September 2013 and April, May 2014.

RESULTS

The result shows that the total 95% germination was observed within 21 days during end of May 2013 from date of sowing. Seedlings height Mean 27.56 cm., 62.26 cm., 100.4 cm. and 110.36 cm. and girth size also observed Mean 1.1 cm., 2.3 cm., 3.4 cm., and 5.1 cm. at June, July, August, and September 2013 respectively. After four months old saplings were transplanted into the fields, urban and rural areas of District Meerut. Final reading on plant height Mean 155.24, 163.8 cm. and girth size Mean 6.22, 6.66 cm. were recorded at the April, May 2014. Growth of all stages of *Caesalpinia bonduc* is fairly rapid and established in rural and urban areas of Meerut District. The saplings were growing 1.5 m above in one year in Meerut areas results clear table 1, 2, 3 and figures 1 to 10. As a consequence, many plants species are threatened and disappear more and more from their natural ecosystems. Seeds are still important starting materials for propagation of many vital tree species. Furthermore, the use of seeds as propagules has been considered the easiest and cheapest, and the most common means for many agro forestry and timber tree species (Akinifesi *et al.* 2007). Generally, this has been attributed to the fact that seeds are often easy to produce and handle (Black 1989). Germination and seedling establishment are two very critical phase in the life history of tree species (Ramakirshnan 1972, Gomez - Pompa & Vezques-Yanes 1974, Harper & White 1974). Developing conservation and domestication strategies for the endangered scrambling shrub *C. bonduc* (Roxb.) (Assogbadjo, A. E 2011). *C. bonduc* grows in full sun and is tolerant of shade, but can withstand areas with partial shade (Francis, 2000). Callus induction and shoot regeneration from epicotylexplants of ethnomedicinally important *C. bonduc* (Roxb). (Cheruvathur, *et al.*, 2010) Ethnic differences in use value and use patterns of the threatened multipurpose scrambling shrub (Azihou *et al.*, 2011) The present study focuses on the endangered shrub *C. bonduc* development and established in Meerut district, a multipurpose plant with species having medicinal and ecological value.

TABLE – 1: SEED GERMINATION PERCENTAGE OF CASEALPINIA BONDOC

MAY							
Days	3	6	9	12	15	18	21
Germination % (%)	–	–	20	50	70	80	95

TABLE 2. :THE PLANT SHOOT HEIGHT AND GIRTH SIZE AT JUNE, JULY, AUGUST, AND SEPTEMBER 2013, IN POTS

Months	Plant Height (Cm) Mean SD	Girth Size (Cm) Mean ± SD
June	27.56±0.30	1.1 ± 0.1
July	62.26±0.25	2.3 ± 0.1
August	100.4±0.17	3.4 ± 0.47
September	120.46±0.15	5.1 ± 0.25

TABLE 3. :THE PLANT SHOOT HEIGHT AND GIRTH SIZE AT APRIL AND MAY 2014, IN FIELD AREAS OF MEERUT

Months	Plant Height (Cm) Mean SD	Girth Size (Cm) Mean ± SD
April 2014	155.24±0.79	6.22 ± 0.26
May 2014	163.8±0.45	6.66 ± 0.32



Fig. 1. *C. bonduc* Seeds were collected by Yashwant Rai from Narayana Ganj, Jabalpur, M.P.



Fig. 2. Seeds of *Caesalpinia bonduc* in the pod



Fig. 3. Unsacrificed seed germinated 6 days after sowing



Fig. 4. View of Seedling first leaves of Caesalpinia bonduc



Fig. 5. View of Germinate saplings of C. bonduc



Fig. 6. 15th days growth of C. bonduc (after sowing)



Fig. 7. One month growth status of C. bonduc in pot (after sowing)



Fig. 8. Four months growth status of C. bonduc in pot (after sowing)

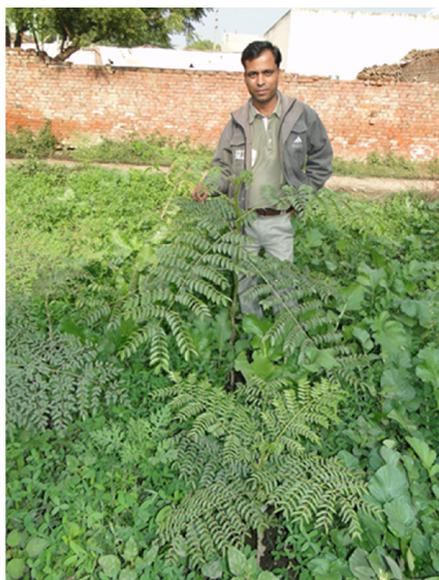


Fig. 9. Growth status at May 2014 in Village Gotka, sardhna Meerut



Fig. 10. Growth status at May 2014 in Sanjay Van, Delhi road Meerut

CONCLUSION

It is concluded that the aim of the present study is to spread awareness towards conservation of endangered medicinal plant *Caesalpinia bonduc* in those areas where the plant is now rarely found. This research work will also prove to be of immense usefulness for the conservation of endangered *Caesalpinia bonduc* species in the forest. Since this plant is beneficial for humans in many ways, therefore it is required that wide propagation and conservation of this plant should be carried out, in order to ensure that future generations can benefit from it.

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