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EFFECT OF GROWTH MEDIA ON *IN VIVO* SEED GERMINATION OF CANNONBALL TREE (COUROUPITA GUIANENSIS AUBL.): AN ENDANGERED TREE SPECIES OF JHARKHAND

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Abstract: *Couroupita guianensis* is well known as cannonball tree. It is an endangered tree species native to tropical South America which belongs to Lecythidaceae family. The tree and its whole parts have immense medicinal and pharmacological values, beneficial to human societies. The present investigation is to protect and conserve its genetic resources by its multiplication through seed germination. The seeds were grown in medium like loamy soil, sandy soil and saw dust all mixed with vermicompost in 3:1.The parameters sets were percentage of seed germination, total mean height and number of leaves emergence during seedling formation. The parameters were analysed in every weeks and in between it was sprinkled with water to check the growth and development of experimental plants. The best response was seen in mixed sandy soil where average plant mean height (16.7 cm), total leaves emergence (10) and 90% seed germination were recorded.

Keywords: cannonball tree, pharmacological, human societies, genetic resources.

INTRODUCTION

Couroupita guianensis Aubl. is a multipurpose evergreen tree belongs to family Lecythidaceae. It was named by French Botanist Jean Baptiste Aublet in 1775[1]. It is native to the tropical forests of Central and South America. In India, it was introduced which has been adopted as sacred to Hindus. The beautiful structures of tree have attracted many countries. It is a large deciduous, tropical tree grows to a height of 35 metres. It is indigenous to Amazon rainforest. The leaves vary 8-31cm in length. The inflorescence flower resembles like shivlingam shape at the centre of flower and snake hood of like pollen structure are used to worship Lord Shiva. Here the flowers bloom profusely covering entire trunk adorned with reddish and pink flower, the racemose inflorescence arise from the trunk. It smells strongly at night [2] and in early morning [3]. The fruits are huge rusty resembles cannonball hanging in clustered strings [4, 5]. The fruits are 20 to 25cm in diameter and weighing up to 1-2 kilograms; it bears around 80 to 300 small seeds in a white pulpy mesocarp [6, 7, 8]. The seed coat is covered by exotestal hairs, an adaptive features for endozoochory [9]. It gains traditional importance as parts of tree are employed to treat several diseases such as hypertension, tumors, pain, inflammation, cold, stomach pain skin problems, malaria and toothache [10, 11]. It is also well gifted with important biological properties – antibiotic, antifungal, antiseptic [12, 13, 14], immunomodulatory [15], antihelmintic [16,17], antinociceptive [18], antibacterial [19], larvicidal, insecticidal, pesticidal[20], antitumor [21], cytotoxic, anticancer [22], antiulcer, anti-arthiritic and antidiarrheal[23], antimicrobial [24], anti-inflammatory, anti-diabetic [25, 26], antioxidant [27], neuromorphological activities and many more. The several parts of tree are used to treat gastritis, scabies, bleeding piles, dysentery and scorpion poison [28]. Here the fruit pulp, bark and flowers are used as ingredients. The flower cures intestinal gas formation[29]. Leaves juices are used in skin diseases and also as herbal hand wash formulation [30], young leaves in tooth pain. Apart from above they possess volatile properties [28] like courouptine [31], isatin, indirubin, phenolics, stigma-sterol, phenolic substances etc with medicinal values [32-

[37].At present the tree is suffering from drought and desertification and fear has been expressed about its regeneration. The loss and degradation of forest ecosystem from human activity are major causes of global biodiversity loss (UNEP 2009). The tree species have great biological properties useful for both animals and human beings so it is an urgent need to conserve trees both *in situ* and *ex situ*.

MATERIALS AND METHODS

Plant Materials:

The seeds of *Couroupita guianensis* Aubl. were collected from the campus of Ram Krishna Mission T.B Sanotorium, Tupudana, Ranchi The seeds were subjected to floatation process where sound seeds sinks in water while empty, defective and dead seeds float. The good seeds used for *in vivo* germination. Here the seed coat is covered by exotestal hairs which may inhibit the germination, so it was manually scarified to fasten the availability of both water and oxygen. The seeds were kept for 24 hours into water.

The growth medium like loamy soil, sandy soil and saw dust were taken individually into three parts and all mixed with one part of vermicompost for the seed germination. Total five seeds in each growth medium were sown into nursery bags and at regular interval spray with water. After seedling and plantlet formation was transferred to clay pots and finally to open field for hardening.

RESULT AND DISCUSSION

The growth medium - sandy soil mixed with vermicompost (S.S+V) showed highest in all parameters taken that is percentage of seed germination (90%), plant mean height (16.7cm) and total leaves emergence (10) in duration of one month when compared with other growth medium. In case of other growth medium (L.S+V and S.D+V), the seed germination was 80% and 70%; plant mean height: 15.5cm and 13.5 cm; total leaf emergence: both 8 in numbers respectively (Table 1, Fig 6: Histogram). Similar study was carried out in district Meerut for the period of March 2014 to June 2014. The mature seeds of *Couroupita guianensis* were collected and total 50 seeds were sown in five pots containing soil, manure in 3:1 ratio. The germination started after seven days of sowing. It was reported that complete germination within 18 days during the end of March 2014 with total germination percentage of 95% with maximum plant height of 22.7cm and 33 leaves at last third month of observation was similar to my findings 103(109). It was asserted that when seeds of *Adansonia digitata* treated with acid for one hour showed the highest rate of germination in sandy soil than loamy soil and sawdust as growth media [36]. *Ceiba pentandra* Gaertn may fail to germinate under favourable environmental conditions and are therefore said to exhibit some degree of dormancy. The 5hrs sun dried seeds for 5days and soaked for 24 hours in water showed superior germination when compared with control. It showed improvement when pre treated 38(Apetoorgbor et al, 2003). The temperature observed strongly influence seed germination than seed sowed without pretreatment. The top soil supported early growth of *Ceiba pentandra* seedling than river sand and saw dust in terms of seedling height, number of leaf, leaf area and collar girth 39. Seeds storage behaviour studies proved the recalcitrant nature only freshly harvested mature seeds retained the germination potential upon storage at 15ºC for up to 45 days. This protocol facilitated conservation, sustainable utilization and reintroduction of this plant into its natural habitats.

It was reported that the germination and seedling establishment are two very critical phase in the life history of tree species [40, 41, 42]. Effective tree conservation may require a fitness combination of different kinds of *ex situ* and *in situ*, ecological restoration and plant reintroduction, and socio economic and regulatory considerations to truly secure them from threat[43]. According to the Red list of Threatened Plants (UNEP, 1995), 19 species are already extinct and 1236 species are threatened. Of these, threatened 41 taxa are possibly extinct in the wild, 152 are endangered, 102 are vulnerable, 251 rare, and 690 are indeterminate. (D Ramprasad et al, 2012). As a result many tree species are threatened and disappear more and more from their natural ecosystems.

Table 1:- *In vivo* seed germination of *Couroupita guianensis* Aubl. showing percentage of seed germination, plant mean height and number of leaves within 30 days

S. No.	Growth Medium taken for C.G	Percentage of seed germination	Plant mean height (cm) in days				No. of leaves formed in days			
			7D	14D	21D	30D	7D	14D	21D	30D
1.	**L.S +V**	80%	2.5	5.0	7.0	15.5	2	3	5	8
2.	**S.S + V**	90%	3.0	5.8	9.1	16.7	2	3	5	10
3.	**S.D + V**	70%	-	3.5	5.8	13.5	-	2	4	7

Fig. 1

Fig. 2

Fig. 3

Fig. 4

Fig. 5

Plate I: *In vivo* seed germination of *Couroupita guianensis* Aubl.

Fig. 1 : Seed germinated after 5th days

Fig. 2 : Response of seed on 10th days

Fig. 3 : Formation of plant after 15 days.

Fig. 4 : 25 days old plant

Fig. 5 : 35 days old *in vivo* plant

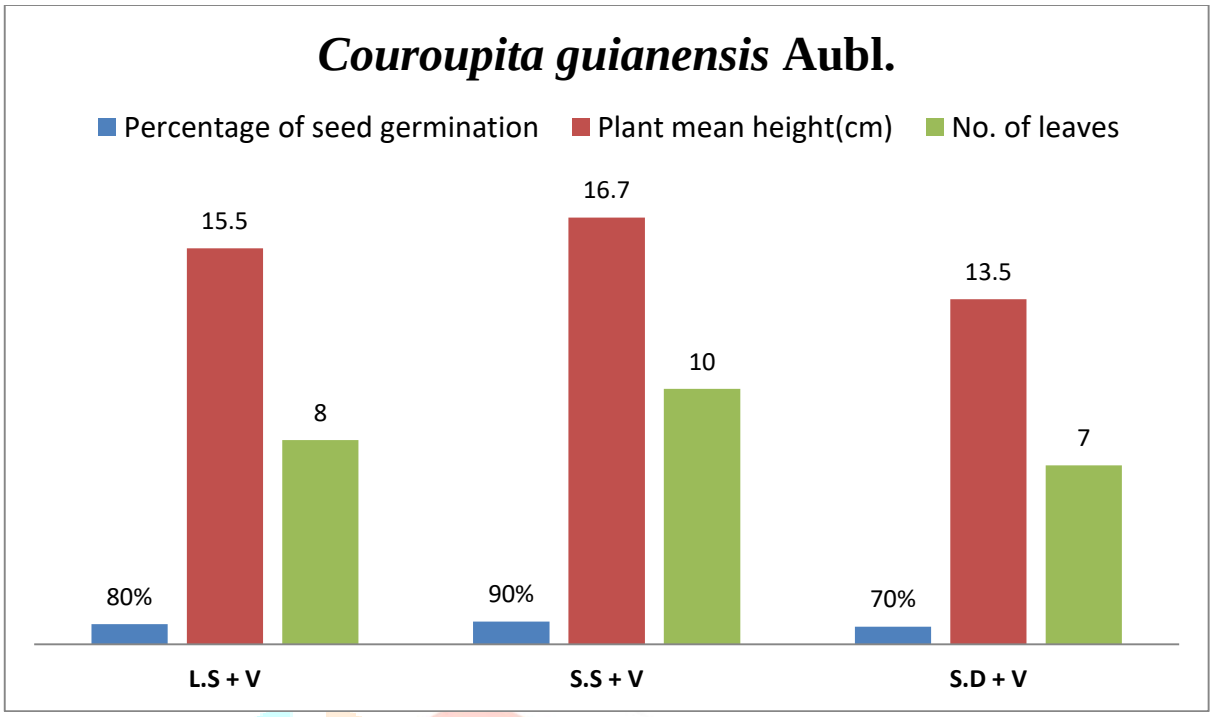

Fig. 6: Histogram showing *in vivo* seed germination of *Couroupita guianensis* Aubl. showing percentage of seed germination, plant mean height and number of leaves of one month duration.

CONCLUSION

The multipurpose trees are now in the verge of extinction. *Couroupita guianensis* is one of medicinal tree which may provide enormous benefits to the world. The measure was taken to increase its number through *in vivo* seed germination under three different medium. All growth medium resulted in good numbers of plantlets formation but the best result came in sandy soil mixed with vermicompost. Both biotic and abiotic factors plays a vital in progress of seed germination.

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ABBREVIATIONS USED

Cm: Centimeter; m: meter; C.G: *Couroupita guianensis*; L.S: Loamy soil; S.S: Sandy soil; S.D: Saw dust; V: Vermicompost; D: Days; (-): No response.

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