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Clonal Propagation of Osyris lanceolata Plant Through Air Layering at Bazawit Hill, Northern Ethiopia. An Endangered, Medicinal and sandal wood Plant in East Africa

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Abstract

In the recent years medicinal and other economical important plants are getting attention due to the presence of therapeutically important active contents; however over exploitation and propagation problems are the major concern for conservation of several economically important plant species. Among economical important plants an attempt has been made to develop a propagation method for African sandalwood (Osyris lanceolata) by air layering approach aiming at providing an alternative propagation technique to the use of seeds or cuttings that germinate or root poorly. Air layers were applied root hormone to the stem branches of Osyris lanceolata (still attached to the plant) during November 2019, at Bazawit Hill,Northern Ethiopia at edge of Blue-Nile River from its source at Lake Tana .Root initiation were starts after 12 weeks of the experiments.The factors assessed in this experiment were the effect IBA as rooting promoter at three concentrations (0,50, 100 and 150 ppm) .From the data collected it was observed 88.8% rooting were achieved from air layers in the mother plants it self those treated by IBA hormone and the controls not responding root.Making this propagation technique is a viable alternative to the use of seed or cutting propagation. Rooting response success were influenced by application of rooting hormone of IBA,soil composition and the seasons . At a rate of 150 ppm 100% all experimented plants were initiated and primarily other than other treatments responded root. The significance enhancing of root making on Osyris lanceolata plants stem via air layers is linked to the advantage of more rooting hormone concentration

Keywords: Osyris lanceolata, Air layering, , IBA application, Rooting success

Introduction

Osyris lanceolata Hochst & Steudel. commonly known as African Sandalwood .It is a shrub or small tree growing to a height of one to seven meters (Walker,1966; Palmer and Pitman, 1972; Mbuya et al., 1994).The species belongs to the Santalaceae family and is among the sandalwood species known for producing fragrant-scented wood from which sandal wood essentialoil is extracted. Sandalwood oil is used in various cosmetics and fragrance industry and has gained popularity in medicine (Walker, 1966; Iyenga, 1968; Srinivasanet al., 1992). The use of Osyris lanceolata became popular in the early 1900s following a decline in availability of Indian sandalwood, Santalum album (Eggling and Dale, 1962; Walker 1966; Iyenga, 1968; Srinivasanet al., 1992). Other species that had been considered as alternatives include S. spicatum (Erricksonetal., 1973; Srinivasan et al., 1992), S. lanceolatumandS. yassi (Walker, 1966; Srinivasan et al., 1992).Since Osyris lanceolata was identified as a suitable alternative, it could only be found in natural stands in East Africa (Burgess et al., 1998; Mbuya et al., 1994;Ruffoet al., 2002). Osyris lanceolata is distributed in African countries such as Tanzania and Kenya frequently found in arid to semiarid areas, primarily on stony and rocky soils (Kokwaro ,2009) or occasionally in rocky sites and along the margins of dry forests, evergreen bushland, grassland, and thickets at an altitude range of 900-2250 m above sea level (Giathi etal., 2011; Kamondo,2012). In East African countries, Osyris lanceolata constituted an important source of medicine (Mwang'ingo et al., 2006). A decoction of the bark and root is considered to be useful for treating diarrhoea, gonorrhea, chronic mucus infections, and urinary diseases (Teklehaimanot,2004 ; Kokwaro ,2009), a decoction of the bark in boiling water is used to treat candidiasis and related

How ever, Osyris lanceolata is critically endangred since propagation of by seeds is difficult due to a limited supply and availability of seed at the right time (being a dioecious species, the spatial distribution of trees affects the reproductive outcome (Mwang'ingo et al.,2006), storage difficulties and thus poor germination (MBUYA etal.,1994). Consequently, several interventional measures are required to conserve Osyris lanceolata. A study by (Kokwaro ,2009) on the storage and pre-sowing treatments on seed germination demonstrated that the testa covering the embryo plays a significant role in limiting germination by restricting gas and water entry and also acts as a mechanical barrier to embryo growth. However, complete removal of the testa and soaking the zygotic embryo in hot water enhanced seed germination by.

Materials and Methods

Experments were conducted in Novmbere 2019, at Bezawit Hill, near to Blue-Nile River at Bahrdar town. It is far two-and-a-half kilometres south of from the Martyrs Memorial, Bahrdar town, Northen Ethiopia.Bezawit Hill was a palace of Haile Selassie. An experiment for developing rooting and production of uniform plant through air layering in the stems of Osyris Lanceoleta plant were under take . Air layering involves rooting of stem branches without removing them from the mother plant. Experiments were carried out during dry season (Novmber,2019-March 2020).

Three factors in relation to new root formation were investigated .The effect of the season at which IBA hormone were inected in Novmber 2019 and the effect of rooting hormone concentration (Indole-3-Butyric Acid) application at concentrations of 0 , 50ppm, 100ppm and 150 ppm were expermented and the soil composition . The control set (0 ppm) was treated with distilled water. For

Figure 1: Osyris Lanceoleta in Bazawit Hill

water samples were collected for various physicochemical and biological parameters, analyses has been carried out by following standard methods. All nutrient including nitrate,nitrite, ammoniumnitrate, phosphate were analysedcolorimetrically Using UV-Vis spectrophotometer.Estimation of chlorophyll a and phyophytin was carried Out by Strickland &Parson method(1972).Phytoplankton samples. Thermal and atomic power plants. The collected samples were immediately transferred to laboratory. The animals were washed, sorted and examined fresh with a dissecting microscope, preserved in 5% seawater formalin. Identification of were collected from the surface water during low tide and high tide using plankton net(mesh size 20mm), the samples were subjected to qualitative and quantitative analyses. Fresh sample were collected on a month intervals to periodically record the macro fouling fauna in the coastal region along Dahanu and Tarapur coast. The samples were collected from the piers, jetty, boats, floating ropes, stones, shells, outboard motors and boats in the coastal zone near macrofoulers were done by following standard monograph and research papers.The identified macrofoulers were categorized according to their phylum and class [5-10].

Area of Study

The air layers experments were left on the parent trees for 20 weeks to allow root initiation. During this period, air layer experment were watered every four days and inspected every four week for showing weather it respond root or not . Each air layer treatment were replicated three times in each 50,100, 150 ppm IBA concentration and for control 0ppm or distiled water were applied at Bzawit hill ,Bahrdar.

Results

New root success were achieved in air layring approches that were conducted in Novmbere, 2019 at Bazawit Hill. The firist root responding time were at 12 weeks or 4 monthes of the experment and root responding time of each treatment were differed. However, 88 .8 % of all the treatead plants by IBA hormone were formed root after 16 weeks of the experment.Among all treatments only at 50 ppm experment one stem plants not responding rooting after 16 weeks of the experment .

The combined effect between the experment conducted season,soil composition which wre use for wraped the grild area of the steams and IBA concentration showed a good root initiation in the present study of air layer propagation technology .The treated stems of osyris lanceoleta with IBA 150 ppm initially showed root respond other than other treatmeants at 12 weeks of experiment.

Conrol Measures Of Biofouling

The simplest method for treatment of biofouling is simply to remove by mechanical cleaning eg, by treatment of the fouled surface with high-pressure water jets. TBT, Copper, UV irritation, Chlorination, Titanium alloy (2m/sec) and Silicone elastomers (for fast vessels) .Several kinds of natural antifouling agents that inhibit growth of fouling organisms have been isolated from marine organisms like bacteria, marine Algae.

Conclusion

Several coastal ecosystems along the west coast of India are now thushighly disturbed and threatened, encountering problems like pollution, siltationand erosion, flooding, saltwater intrusion, storm surges and other hazards. Marine biofouling is one of the major unsolved problems currently affecting the shipping industry and industrial aquatic processes in Maharashtra. It is commonly refers to the adverse growth of marine organisms on immersed artificial structures such as ship hulls, jetty pilings, navigational instruments, aquaculture net cages and seawater in taking pipes etc. Hence. Appropriate management strategies are needed to ensure thesustainable development and management of coastal areas and theirresources. Land-based industrial and domestic effluents further impact the abundance and composition of marine communities in coastal areas. Very little work has been carried out in India on macro-biofouling communities. Therefore, the present study has been carried out along Dahanu and Tarapur coast near thermal and atomic power plants to assess the macro-fouling pattern, monthly settlement and species dominance between two coastal areas of Palghar, Maharashtra.

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