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Vegetative propagation of Ashoka (*Saraca asoca* Roxb. De Wilde.) By stem cuttings

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Abstract
An experiment was conducted during the year 2015-16 at Biotechnology-cum-Tissue Culture Centre, OUAT, Bhubaneswar, India to induce the rooting from the stem cutting of *Saraca asoca* Roxb. De Wilde under agro-shade net controlled condition. The selected healthy branches of *Saraca asoca* Roxb. De Wilde was cut into 15 cm length having 4 to 5 nodes (with in thickness 0.5-1.5 cm).The base positions of cuttings were dipped in the 100,300,500 and 800 ppm of IBA (Indole-3-butyric acid), NAA (α-Naphthalene-acetic-acid) and IAA (Indole-3-acetic acid) respectively for four hours along with a control (without treatment). After which the cuttings were planted in the polypots filled with rooting media consists of sand, soil and farm yard manure (FYM) in the ratio of 1:2:1. Maximum sprouting (80.00%), rooting (56.66%), Number of leaves (16.00), root number (4.66), root length (16.33 cm), fresh biomass (13.37 g), dry biomass (6.38 g) were observed in cutting treated with 800 ppm NAA. Hence for production of healthy seedlings, the stem cutting of 15 cm length should be treated with 800 ppm NAA for obtaining better quality seedling.

Keywords: Cuttings, IAA, IBA, NAA, *Saraca asoca.*

Introduction
Ashoka (*Saraca asoca* (Roxb.) De. Wilde.) is an one of the sacred plants of Hindus belongs to family Fabaceae. As we know that Ashoka is the main plant useful in gynecological disorders. The estimated demand of Ashoka bark is in excess of 2000 million tons, however, the availability in the wild is extremely rare [1].Therefore, the cultivation of Ashoka plants is the key to meeting authentic and genuine raw material. There are various measures for plantation like, plantation through seed, stalk, bulb, etc. can be adopted, and out of which plantation by seed is the reliable and easy method of plantation because seed itself is the cause of perpetuating the continuity of plant kingdom [2]. Its origin is distributed in the central areas of the Deccan plateau, as well as the middle region of the Western Ghats of India and Sri Lanka. In India it is distributed in evergreen forests of up to an elevation of about 750 meters. It is found throughout India, especially in Himalaya, Kerala, West Bengal, Odisha, Tamil Nadu and whole southern region [3]. In Himalaya it is found at Khasi, Garo and Lussi hills and in Kerala state it is found in Patagiri, Kaikatty and Pothundi of Palakkad, Thrissur, Kollam and Kannur districts. In Tamil Nadu it is found in Kanyakumari, Theni and Coimbatore districts. It is becoming rarer in its natural habitat, but isolated wild, Asoka trees are still to be found in the foot hills of Central and Eastern Himalayas, in scattered locations of the northern plains of India as well as on the west coast of the subcontinent. Asoka tree has many religious and literary associations in the region. It is highly valued for its beautiful appearance, colour, beautiful foliage and abundance of its fragrant flowers. It is often found in royal palace and gardens as well as close to temples throughout India [4]. The plant is source of various types of compounds which are useful for various pharmacological activities such as antimicrobial, anthelmintic, analgesic, anti- inflammatory, larvicidal, antidiabetic, uterine tonic and the species has much economic importance in the sense that all plant parts such as bark, leaves, flowers, seeds etc. have medicinal properties. The bark of *Saraca asoca* has been commonly used in Indian medicine. Bark is astringent used in uterine infections. It has a stimulating effect on endometrium and ovarian tissue and useful in menorrhagia due to uterine fibroids, in leucorrhoea and internal bleeding haemorrhoids and hemorrhagic dysentery. Bark also contains an oxytoxic principle. The phyto constituents such as flavonoids, tannins and saponins in the *Saraca asoca* leaves are responsible for various therapeutic effects. Leaves are used in stomachalgia, flowers are also used as a uterine tonic, in biliousness, hemorrhagic dysentery and diabetes. In general, it is considered as best female tonic.

Fruits chewed as a substitute for areca nuts. Pods make good forage and the ash of plant is good for external application in rheum arthritis [4]. Plants propagated through seeds are heterozygous where as in vegetative propagation superior traits of the mother plants with respect to yield and disease resistant are maintained. Keeping in view of the importance of the crop and its propagation methods, the present experiment was designed with the objective of mass production of quality planting material through vegetative propagation of *Saraca asoca* Roxb. De Wilde.

Materials and Methods

The experiment was conducted during the year 2015-16 at Biotechnology-cum-Tissue Culture Centre, OUAT, Bhubaneswar, India. The experiment was started with the collection of stem cutting of *Saraca asoca* Roxb. De Wilde from identified plus trees. The cutting of selected healthy branches brings out which were of 15 cm lengths having 4 to 5 nodes (with in thickness 0.5-1.5 cm). The bases portions of cuttings were dipped in the 100,300,500 and 800 ppm of IBA (Indole-3-butyric acid), NAA (α-Naphthalene-acetic-acid) and IAA (Indole-3-acetic acid) respectively for four hours along with a control (without treatment). After which the cutting was planted in the polypots filled with rooting media consists of sand, soil and farm yard manure (FYM) in the ratio of 1:2:1. The polypots were put under the agro-shed net and watered as per the requirement. Observations like sprouting percentage, rooting percentage, root length (cm), number of roots, %), Number of leaves, fresh biomass (g) and mean dry biomass (g) were observed. The experiment was designed in completely randomized design (CRD) and data observed were subjected to statistical analysis as for the methods detailed by Gomez and Gomez (1984) [5]. The data were transferred from where ever required before suitability of ANOVA analyzed in statistical package SAS version 7.0.

Results and Discussion

The result obtained during the present course of investigation was carried out to visualize a significant influence of IBA (Indole-3-butyric acid), NAA (α-Naphthalene-acetic-acid) and IAA (Indole-3-acetic acid) on the cuttings of *Saraca asoca* Roxb. De Wilde. Maximum sprouting was recorded in cuttings treated with 800 ppm NAA (80.00 %) and minimum was recorded in with control (23.33 %) (Table. 1).Earliness in sprouting and increase in number of sprouts may be due to better utilization of stored carbohydrates, nitrogen and other factors with the help of growth regulators [6].Further stored food materials with the help of growth regulators have fastened the sprouting there by enhancing the utilization of carbohydrates at base of cuttings through photosynthesis [7]. According to Wright, (1975) [8] that vegetative propagation, the sprouting depends on food reserve available within the cuttings. In case of rooting percentage (Table.1) among NAA, IBA and IAA effect on rooting of cuttings of *S.asoca*, showed maximum rooting (56.66%). The effect may be due to the slow translocation property or slow destruction by auxin destroying enzyme system [9]. The minimum (0.00%) at control. The better response to optimum concentration of NAA may be attribute to increase rate of respiration, accumulation of higher level of amino acids of base after 4 hours the treatment with auxins than in control treated with distil water. This pattern is continued with nitrogenous substances accumulating in the basal part of treated cuttings, apparently mobilized in the upper part and translocated as aspergene [10]. Palanisamy and Kumar, (1998) [11] reported that exogenously applied auxins are sensitive to activate the cambium probably in the active period of cambium resulting significant root formation. The relatively poor rooting with IAA treated stem cuttings of *S.ascoa* in comparison to NAA and IBA could be explained by the sensitivity of IAA to light [12], production of more ethylene which is known to inhibit the root production and could also be due to the higher metabolic turnover. NAA and IBA is less sensitive than IAA to non biological degradation such as photo oxidation [13, 14, 15]. In general NAA 800 ppm have been found to induce better root system in *S. asoca* cuttings. The basis for this may be enhancement of hydrolysis of nutrient response (mainly starch) by auxin treatment. According to Nanda *et al.* (1968) [16] enhanced hydrolysis activity in the presence of exogenously applied hormones was responsible for the increased rooting in auxin treated cuttings. In case of number of branches maximum (4.66) was recorded a T_9 and minimum number of branches at control. The maximum number (16.00) of leaves was recorded in similar treatment T_9 and minimum number of leaves at control (0.00). Negi and Tiwari (1984) [17] also reported that higher concentration of some growth hormones promoted maximum number of roots in *Pongamia pinnata.* This may be also due to enhanced hydrolysis of carbohydrates caused by auxins treatments (Rajarama, 1997) [18]. Similarly for root length NAA 800 ppm showed maximum (16.33 cm) which may be due to its greater stability, transportability, ability to produce roots and consequently results in promoting root length and lower mortality in plants [19, 20]. Higher concentration of NAA are also beneficial for promotion of rate of rooting and heavier root system in stem cutting in *Pongamia pinnata* [17].The result of fresh biomass (Table.1) observed was maximum (13.37 g) in cuttings treated with 800 ppm NAA, the possible reason for this may be NAA treatment enhances the growth of cutting raised plants because of more root numbers, root length and faster cambial activity than the hard wood and soft wood cuttings. The higher food resources in large cuttings could be another reason for their better growth and development. Zhang *et al.* (2010) [21] reported a significant increase in root length and root biomass and shoot length of cuttings with increase in diameter of cuttings in *Feijoa sellowiana*. Similarly for the dry biomass it observed maximum (6.38 g) in T_9.This may be due to growth hormone determine cell elongation and cell division there by promoting root length [20] and consequently resulting in better growth of the cutting this might be the result in increasing the dry biomass.

Conclusion

It was concluded that the cuttings treated with NAA promotes better sprouting, rooting percent, number of leaves, root number and biomass than IBA and IAA. For the production of healthy seedlings, the cutting should be treated with 800 ppm NAA. Hence this treatment may be preferred over other treatments for vegetative propagation through stem cuttings of *S. asoca* for mass multiplication.

Table 1: Effect of Auxins on stem cuttings of *Saraca asoca* (Roxb.) De Wilde (30 DAP)

Treatment Details	Sprouting %	Rooting %	No. of Branch	No. of Leaves	No. of Root	Root Length (cm)	Fresh Biomass (g)	Dry Biomass (g)
T_1 (Control)	23.33(28.86)	0.00(0.00)	0.00	0.00	0.00	0.00	0.00	0.00
T_2 (100 ppm IBA)	30.00(33.21)	10.00(18.44)	1.66	9.66	1.66	11.66	9.66	4.86
T_3 (300 ppm IBA)	40.00(39.23)	20.00(26.56)	2.00	11.00	2.00	13.16	10.16	5.00
T_4 (500 ppm IBA)	50.00(45.00)	33.33(35.24)	2.66	14.66	2.00	14.00	12.16	5.25
T_5 (800 ppm IBA)	73.33(58.89)	46.66(43.05)	3.33	15.00	2.33	15.33	12.41	5.58
T_6 (100 ppm NAA)	33.33(35.24)	30.00(33.21)	2.66	13.33	2.00	9.33	11.00	4.41
T_7 (300 ppm NAA)	40.00(39.23)	36.66(37.23)	4.33	14.33	3.33	12.16	11.66	5.10
T_8 (500 ppm NAA)	60.00(50.77)	46.66(43.05)	4.66	15.00	3.66	13.50	12.33	5.18
T_9 (800 ppm NAA)	80.00(63.44)	56.66(48.79)	4.66	16.00	4.66	16.33	13.37	6.38
T_{10} (100 ppm IAA)	36.66(37.23)	13.33(21.29)	1.00	7.33	1.66	9.00	11.00	4.03
T_{11} (300 ppm IAA)	53.33(46.89)	30.00(33.21)	1.33	12.33	2.00	11.83	11.16	4.16
T_{12} (500 ppm IAA)	63.33(52.71)	33.33(35.24)	1.66	12.33	2.00	12.83	11.50	4.70
T_{13} (800 ppm IAA)	66.66(54.70)	43.33(41.15)	2.00	14.33	2.66	14.66	11.83	5.25
C. D. at 5%	9.69	7.06	0.93	2.57	0.71	1.01	0.73	0.57

*Figures in parenthesis are arc sin transformed values.

References

1. Komaraiah JB, Marketing of medicinal plants: challenges and strategies. 2004, 9.
2. Sircar NN, Sirkar R, Vrikshayurveda of parasara-A Treatise of plant science edition 1, Sri Sat guru publications, Delhi, India, 1996, 103.
3. Rosario S, Mapping genetic diversity of *S. ascoa* Roxb. De Wilde. M.Sc Thesis, UAS, Bengaluru, 2013.
4. Paranthaman M, Kumari R, Narayanan N, Sivasubramaniam K, Morphological Characterization and *in Vitro* Callus Induction in Ashoka [*Saraca Asoca* (Roxb.) De Wilde.] a Vulnerable Medicinal Tree. International Journal of Agriculture Innovations and Research. 2017; 5(5): 2319-1473.
5. Gomez KA, Gomez, AA, Statistical procedures for Agriculture Research (2nd edn.)John Willey and Sons, Inc., New York. 1984, 68.
6. Chandramouli H, Influence of growth regulators on the rooting of different types of cuttings in *Bursera penicilliatai* (DC) Engl. M.Sc.(Agril)Thesis, Univ. Agric. Sci. Bangalore, 2001.
7. Hassig BE, Carbohydrate accumulation and partitioning in *Pinus banksiana* seedlings and seedling cuttings. *Physiologia plantarum*. 1984; 61:13-19.
8. Wright RCM, The complete hand book of plant propagation. Macmillan, New York, 1975.
9. Debnath GC, Maiti SC. Effect of the growth regulators on rooting of softwood cuttings of guava (*Psidium guajava* L.) under mist. Haryana. J. Hort. Sci. 1990; 19:79-85.
10. Strydom DK, Hartmann HT, Absorption, Distribution, and Destruction of Indoleacetic Acid in Plum Stem Cuttings. *Plant Physiol*. 1960; 35(4):435-442.
11. Palanisamy K, Kumar P, Seasonal variation on Adventitious rooting in branch cuttings of *Pongamia pinnata* (Pierre). *Indian For*. 1997; 122(3):236-239.
12. Hartmann HT, Kester DE, Davies FT, Geneve, RL, Hartmann and Kester's Plant Propagation: Principles and practices. 7th ed. Prentice Hall, Upper saddle River. 2002, 298-342.
13. Epstein E, Ludwig-Muller J, Indole-3-butyric acid in plants occurrence, synthesis, metabolism and transport. Physiol. Plant. 1993; 88:382-389.
14. De Klerk G, Terbrugge J, Maronova S, Effectiveness of IAA,IBA and NAA during adventitious roots formation in vitro in, alus 'Jork 9'. Plant cell Tissue organ culture. 1997; 49:39-44.
15. Rout S**,** Nayak S. Vegetative propagation of Karanja (*Pongamia pinnata* L.pierre.) through stem cuttings. Journal of Applied and Natural Science. 2015; 7(2):844-850.
16. Nanda KK, Purohit AN, Mehrotra K, Effect of sucrose, auxins and gibberellic acid on rooting of stem segments of *Poplus nigra* under verifying light condition. Plant and cell physiology. 1968; 9:735-743.
17. Negi KS, Tiwari CK, Vegetative propagation in cuttings of *Pongamia pinnata* Pierre by auxin Reg. For. Res. Centre. Jabalpur. 1984; 110(7):655-659.
18. Rajarama HA, Studies on propagation of Pomegranate (*Puni granatum* L.) by cuttings. M.Sc. (Agri.) Thesis, Univ. Agric. Sci., Dharwad, 1997.
19. Shagoo P, Beigh MA, Lone RA, Nanda AB, Effect of plant growth regulators on rooting of Barbados cherry. Asian Journal of Horticulture. 2007; 2(1):152-154.
20. Abidin M, Baker A, Effect of growth substances on rooting of Cocoa cuttings. *Acta Hortculture*. 1984; 137:95-102.
21. Zhang M, Wang D, Ren S, Fan L, Lia R, Effects of *Feijoa* diameter on seedling quality. *Agril. Journal*. 2010; 5(5):139-141.