Bulletin of Environment, Pharmacology and Life Sciences
Bull. Env. Pharmacol. Life Sci., Vol 11 [8] July 2022 : 22-25

Online ISSN 2277-1808
Journal's URL:http://www.bepls.com
CODEN: BEPLAD

ORIGINAL ARTICLE **OPEN ACCESS**

Efficacy of KIN on Microporopagation of *Mecardonia Procumbens* (Mill.) Small

Deepa K, Jahirhussain G* and Karuniya Raja Viella G
PG and Research Department of Botany, Government Arts College (Autonomous), Karur-5
Affiliated to Bharathidasan University, Tiruchirrappalli-29.

ABSTRACT

Biotechnology is a breakthrough in science and development which includes processes to develop technologies and products to intensify the life of humankind. The emergence of plant tissue culture has solved the compulsion to meet the needs of the growing population by assuring rapid multiplication within short duration. Plant tissue culture has become the most prominent technique and a reliable alternative to conventional cultural methods. Plant tissue culture promises of genetically pure, disease free, mass cultivation of elite population of desired plants. Plant tissue culture technology has boosted the interest in culturing plant in short time without waiting for a long time unlike traditional method. This study was conducted to develop multiple shoots via micropropogation to get a standard concentration of hormonal medium to get millions of plantlets and uplift the conservation status of the plant. The investigation used MS basal medium supplemented with KIN and IAA for shooting and rooting. The concentration range tested was 2 -10 micromolar. The plantlets developed after 15 days of incubation and continuous subcultures were made to get clones and multiple plantlets. The parametric data's were analyzed by ANOVA and DMRT. The concentration range tested was 2 -10 micromolar in which highest concentration 10 µM KIN and IAA gave 44. 2 shoots and 10.6 roots per explants in mean average calculation using ANOVA. The well developed plantlets have been hardened and acclimatized. The study helps in comparing the in vivo and in vitro plants in their morphology, metabolites and other aspects of advanced studies.

KEYWORDS: *Micropropogation, MS media, Shoot tip explants, Hormones*

Received 12.05.2022 Revised 26.06.2022 Accepted 21.07.2022

INTRODUCTION

Agriculture and medical industry are uplifted with the invasion of technology from the verge of over exploitation and anthropogenic activities. Plant tissue culture has emerged as a powerful handy technique with broad spectrum of applications in almost every field of science. Aseptic culture technology has been implemented to have mass multiplication, fast regeneration, pure breed of superior quality and quantity in a confined area within stipulated time. The technology has given in for the refinement of metabolites and conserving plants with therapeutic abilities [1]. Numbers of protocols and methodologies have been utilized to standardize the clonal development of the plant species from tissues. Plant tissue culture serve as the base for all advanced physical, chemical, biochemical and pharmaceutical studies. Nearly all family in the phenerogames has been taken into consideration for the usage of this technology. Some families have showed tremendous response while some gave negative results. The technology has its own benefits and restrictions in some generic groups of the flora. Scrophuariaceae (Figworts family) a family with plants species of great economic value which no crops and have 65 genera and 1700 species in them. *Mecardonia* is one of the genus with 12 accepted species. The genus has herbaceous plants with axillary borne flowers. *Mecardonia procumbens* (Mill.) Small is a herbaceous plant with yellow flower. The plant is a least concerned plant of the IUCN red list which is native to subtropical America that is introduced to countries like India, Malaysia, Sri Lanka and many more. The plant is least explored and the literatures are just the taxonomical descriptions and herbaria. Since it is a least explored plant species of the genus we have considered to explore it without causing much damage to its natural habitat and adapted the technology of PTC to protect and conserve the plant.

MATERIAL AND METHODS

The shoot tip explants from the field was surface sterilized with tween, running tap water and distilled water for about 30 minutes. The sterilized explants were inoculated in the autoclaved MS medium augmented with MS salts, B5 vitamins and shooting hormone. The inoculated tubes were incubated at 25

± 2º C under 45 $m^{-2}s^{-1}$ photon density for a photoperiod of 16/8. The plantlets were transferred to rooting medium and finally hardened and acclimatized. The data's were analyzed using ANOVA and DMRT test.

RESULT AND DISCUSSION

The shoot tip explants of *Mecardonia procumbens* that was incorporated in the KIN accorded MS media showed initiation after a weak of inoculation and the shoot lets were seen distinguish from 25th day. The subcultures after a month produced finer results that were tabulated in table 1. The response of the explant increased with hormonal supplementation and remained constant throughout the culture. The lowest concentration had the lowest response frequency and the shoot number and length. The average number of shoots at 2 micromolar concentration (22.6±0.54) was quite high when compared to other micropropogatory studies of plant tissues. We observed a gradual increase in the number of shoots and length of the shoots with increase in the concentration. But a sudden uplift of shoots was seen at the maximum concentration (10 micromolar). The shoots were 31.6 in the 8 µM KIN while an average of 12 shoots increased in the next concentration. The total number of shoots found at 10 micromolar KIN was 44.2 with a shoot length of 7.46 cm which recorded to be the highest length of the shoots followed by 6.84 cm in 8 micromolar.

The developed shoots were taken for inoculation into the rooting medium (MS basal medium supplemented with IAA in the concentration range 2-10 micromolar). The rooting regeneration frequency of baby jump up showed fluctuation from null to 2%- 5% reductions between the ranges of rooting concentration. 2, 6 and 10 µM concentrations had the complete regeneration frequency. The average number of roots stood between 4- 11 and 2-4 in root length. A similar trend was observed in rooting. The minimal hormonal concentration had the lowest number of roots 4.4±0.54 and length 2.04±0.24 cm followed by 4 micromolar concentration that dropped in the regeneration frequency and it had 5.8±0.83 number of roots with length 2.32±0.19 cm. The better hormone concentration was observed in 10 µM IAA that had 10.6±0.89 roots of average length 4.12±0.33 cm. 8 µM IAA produced 7.2±0.83 roots having a root length of 3.82±0.37 cm in average. The full fledged plantlets were hardened and transferred to the field for further studies and they showed a complete survival rate in lab and field conditions.

Table 1: Effect of KIN and IAA on shoot and root induction and multiplication of *Mecardonia procumbens* (Mill.) Small

KIN (µM)	IAA (µM)	PERCENTAGE OF RESPONSE (%)	NUMBER OF SHOOTS	SHOOT LENGTH (cm)	NUMBER OF ROOTS	ROOT LENGTH (cm)
2	-	95	22.6±0.54	3.72±0.08	-	-
4	-	98	25.4±0.54	5.18±0.19	-	-
6	-	100	27.2±0.83	5.68±0.08	-	-
8	-	100	31.6±0.54	6.84±0.45	-	-
10	-	100	44.2±0.83	7.46±0.75	-	-
-	**2**	100	-	-	4.4±0.54	2.04±0.24
-	**4**	95	-	-	5.8±0.83	2.32±0.19
-	**6**	100	-	-	6.6±0.54	3.64±0.40
-	**8**	98	-	-	7.2±0.83	3.82±0.37
-	**10**	100	-	-	10.6±0.89	4.12±0.33

Mean±Standard deviation of five replicates of three experiments

Fig: 2 Shoot, root induction and multiplication of *Mecardonia procumbens* (Mill.) Small

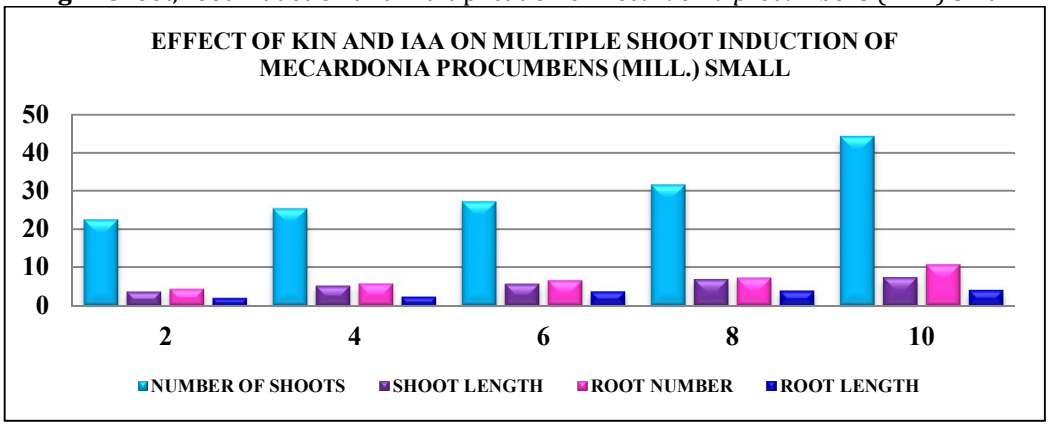
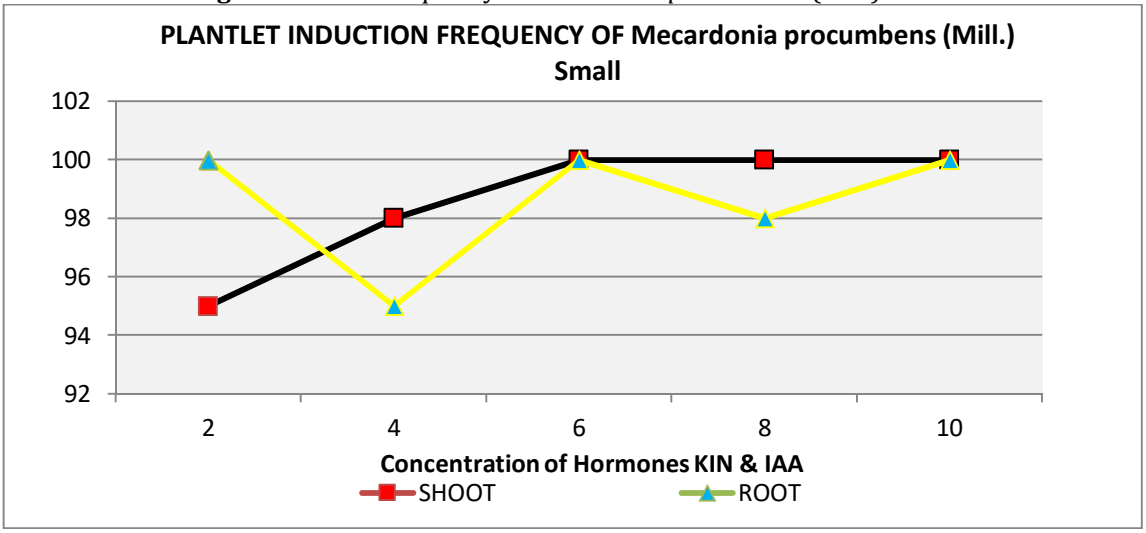


Fig. 1. Effect of KIN on multiple shoot induction from the shoot tip explant of *Mecardonia procumbens* (Mill.) Small
a. Shoot initiation from the shoot tip explant; b. & c. Shoot multiplication; d. Shoot proliferation; e. Rooting

Fig: 3 Induction frequency of *Mecardonia procumbens* (Mill.) Small



CONCLUSION

Plant tissue culture act as the major tool for conservation of red listed plant species. The technique has been of much importance in conserving the least concerned *Mecardonia procumbens.* The study standardized the procedure so that the plant can be commercially cultured and acclimatized to the environment to up lift its status. The future studies on this plant include the exploration of its secondary metabolites and biopharmaceutical studies to help human beings.

ACKNOWLEDGEMENT

The authors are thankful to the Principal, Government Arts College (Autonomous), Karur-5 for the permission rendered to carry out the result in the institution and we render our sincere gratitude to all those wonderful hearts that helped in this study.

CONFLICT OF INTEREST

The authors have no conflict of interest

AUTHOR CONTRIBUTIONS

Deepa K- Contributed in conducting experiment, collecting and analysing data, paper preparation; Dr. Jahirhussain G - Research supervisor; Saravanan A - Article correction and data analysis.

REFERENCES

1. Baskaran, P., & Jayabalan, N. (2005). An efficient micropropagation system for *Eclipta alba* – a valuable medicinal herb. *In vitro cellular and Developmental Biology- Plant.,* 41: 532- 539.
2. Zakia Shehnaz., Yousaf Zahid Najma., Yaseen Mehwish., Abbasi Nadeem., Hafiz Ishfaq., & Mohamood Nasir. (2016). Standardisation of micropropagation techniques for *Aloe vera*: A pharmaceutically important plant. *Pakistan Journal of Pharmaceutical Sciences,*. 26: 1083-1087.
3. Han Yong Park., Doo Hwan Kim., Ramesh Kumar Saini., Judy Gopal., Young-soo-Keum., & Iyyakkannu Sivanesan. (2019). Micropropagation and Quantification of Bioactive Compounds in *Mertensia maritime* (L.) Gray. *International Journal of Molecular Sciences.,* 20: 2141.
4. Nigar Fathima., & Mohammad Anis. (2012). Role of growth regulators on *in vitro* regeneration and histological analysis of Indian ginseng (*Withania somnifera* L.) Dunal. *Physiology and Molecular Biology of Plants.,* 18(1): 59-67.
5. Srinath Rao, P., Rajkumar Kaviraj, C., & Asra Parveen, P. (2012). Efficient Plant Regeneration from Leaf Explants of *Bacopa monniera* (l.) Wettst. : A Threatened Medicinal Herb. *Annals of Phytomedicine*., 1(1): 110-117.
6. Saima Malik., MuhammadZia., Riaz- ur- Rehmian., & Fayyaz Chaudhary, M. (2007). *In vitro* plant regeneration from direct and indirect organogenesis of *Memordica charantia, Pakistan Journal of Biological Sciences.,* 10 (22): 4118-4122.

CITATION OF THIS ARTICLE

Deepa K, Jahirhussain G and Karuniya Raja Viella G. Efficacy of KIN on Microporopagation of *Mecardonia Procumbens* (Mill.) Small. Bull. Env.Pharmacol. Life Sci., Vol 11 [8] July 2022 : 22-25