AJER ASIAN JOURNAL OF EMERGING RESEARCH
eISSN:2664-5211 | pISSN:2663-4988

Research Highlight

HOW DOES COLCHICINE ENHACES BIOMASS YIELD OF NAPIER GRASS?

Zunaira Nazish
Department of Bioinformatics and Biotechnology, Government College University, Faisalabad, Pakistan

Key words:
Energy resources | biofuel | renewable energy | Napier grass | genetically backup | colchicines | yield components | octoploid | root biomass

The twenty-first century is an era of the industrial revolution, however, this development has led towards deficient energy resources in most of the countries of the world. Thailand imports most of the oil, coal, natural gas as well as electricity in order to meet with the increasing energy demands. Therefore, considering this situation in recent years, experts in this country are focusing to enhance energy security by means of promoting and supporting energy use effectiveness as well as renewable energy utilization[1].

Accordingly, use of biomass to generate heat and electricity is one of the potentials of renewable energy focusing program in Thailand. In this regard, Napier grass (*Pennisetum purpureum*) is a viable option.
Napier grass which is commonly known as Uganda grass or Elephant grass belongs to the family Poaceae. It is native to Africa but is now grown in many tropical countries. It is a fast-grown perennial grass and has become more attractive regarding biomass energy production.

Pennisetum purpureum is known for its high biomass production which is about 40 t ha-1/year and it can be harvested 4-6 times per year. Besides, Napier grass requires low water and nutrient inputs[2]. Poor environmental conditions, cultural practices and genetic backup limited the Napier grass biomass yield and properties. Therefore, an alternative technique for Napier genetically breeding improvement is sorely needed.

Accordingly, scientists are working on colchicine treatment that can augment the biomass yield as well as biomass characteristics. It is reported that colchicine treatments have the ability to induce polyploidy (octoploid) in the adventitious roots of *P. ginseng* for boosting the root biomass and ginsenoside accumulation as well[3].

These facts motivated scientists in order to investigate the impact of colchicine treatment on the change of morphological properties, biomass characteristics as well as biomass yield of Napier grass. The study was factorial in complete randomized design with 35 replications. There were four treatments with five colchicine concentrations. Colchicine was treated on shoot apical meristem of stem cutting[4].

At the end of this experiment, scientists found that colchicine treatment considerably influence plant height, leaf greenness, stem diameter as well as stomatal size. The concentration of colchicine at 0.05% (w/v) was also found to significantly amplify the cellulose and

eISSN:2664-5211 | pISSN:2663-4988

lignin content as well as DNA content in comparison with the control.

Last but not the least, chemical treatment of colchicines on a shoot or axillary buds of Napier plant is a suitable method to induce genetic variations in cultivar/varieties for good agricultural characteristics. Conclusively, the colchicine treatment exhibited enhancement on plant morphological yield and yield components in the treated samples which almost tended to show the dominant characteristic.

REFERENCES

1. GNESD., 2010. Energy security in Thailand. Asian Institute of Technology School of Environment, Resources and Development, Thailand.
2. Strezov, V., T.J. Evans and C. Hayman, 2008. Thermal conversion of elephant grass *(Pennisetum Purpureum Schum)* to bio-gas, bio-oil and charcoal. *Bioresour. Technol., 99: 8394-8399*
3. Kim, Y.S., E.J. Hahn, H.N. Murthy and K.Y. Paek, 2014. Adventitious root growth and ginsenoside accumulation in *Panax ginseng* cultures as affected by methyl jasmonate. *Biotechnol. Lett., 26: 1619-1622*
4. Kamwean, P., T. Chaisan, P. Thobunluepop, C. Phumichai and M. Bredemeier, 2017. Changing of morphological characteristic and biomass properties in *Pennisetum purpureum* by colchicine treatment. *J. Agron., 16: 23-31*