



**31<sup>st</sup> Annual International Conference of The  
Biotechnology Society of Nigeria (BSN)  
Covenant University**



## **Enhancement of Pigment Production from 'Karandafi' Red Sorghum (*Sorghum bicolor* (L.) Moench). A Prospective Cure for Sickle Cell Anaemia**

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**SUNDAY 5<sup>TH</sup> – THURSDAY 9<sup>TH</sup> AUGUST 2018**

# Introduction

- Sickle cell disease affects large number of people globally
- About 89% of ss patients are in Africa
- *Sorghum bicolor* is very rich in various phytochemicals
- Its extract is used in combination with other plants to treat SCA in traditional medicine.
- Antisickling property of leaf sheath obtained from sorghum bicolor (karandafi) had been reported by NIPRD Abuja, Nigeria.
- Also reversal effect of falala made from karandafi in Katsina on ss to aa had been testified by many people in Nigeria
- Karandafi is mutant in nature

# Objectives

- Research had shown that Pigment is produced under field condition when plants are infected or stressed by abiotic factors
- Using tissue culture SM can be produced using hormone and elicitor and production can be achieved at any time of the year irrespective of climatic conditions
- The Information on 3-deoxyanthocyanidin production from 'Karandafi' *in vitro* as well as the key gene(s) responsible for the production of this important secondary metabolite is still lacking.
- In view of this, the objective of this study is to enhance the synthesis of pigment from 'Karandafi' using hormone and elicitor.

# Methodology

- Karandafi seeds were used
- Murashige and Skoog media supplemented with varying concentrations of 2,4D alone or in combination with KN or NAA was used for callus induction
- Calli were sub cultured on MS media fortified with BAP, alone or in combination with NAA, KN and 50mg/L yeast extract
- The pH of the media was adjusted to 5.8 using 0.5 M HCl and 0.5 M NaOH after preparation
- The sterilization of the media was done in an autoclave at 121°C for 15 minutes and media was dispensed into bottles
- Seeds were surface sterilized using ethanol and NaOCl

# Experimental Setting

- 5 seeds were inoculated in a bottle for callus induction, four bottles were used /treatment and this was repeated twice
- The bottles were laid in a Completely Randomized Design (CRD).
- Four test tubes were used for calli subcultured on the media fortified with BAP alone or in combination with KN NAA and 50mg/L Y.E
- Data were collected on percentage callus formation, callus fresh weight, Nature of calli, shoot length, root length, % shoots and roots formation and number of root after eight week of inoculation.
- The nature of calli obtained in the cytokinin containing media was recorded at 12 weeks of age

# Results and Discussion

- Highly significant difference ( $p < 0.001$ ) was obtained for percentage callus formation and other trait measured.
- The optimum concentration of hormone for % callus formation is 2.0 mg/L 2,4-D alone or in combination with 0.5mg/L NAA or kinetin.
- This agrees with findings of Hassan *et al.* (2014) and Sudhakar *et al.* (2008) that obtained the highest percentage callus in the media fortified with 2.0 mg/L 2,4-D but in combination with 0.5 mg/L KN
- No callus formation was observed in the hormone free media (control) instead shoots and roots were formed. Similar findings reported by Hassan *et al.* (2014)
- Pigment production was achieved in BA containing media alone or in combination with NAA, KN and 50mg/L Y.E

# Results and Discussion

PGR				Type of Calli Induced
B AP (mg/L)	KN (mg/L)	NAA (mg/L)	Y.E (mg/L)	
<b>Table : Effect of BAP alone or in combination with KN, NAA and Elicitor on callus type</b>				
0	0	0	0	Yellowish friable calli with little pigment
1	0	0	0	Reddish compact+ yellowish friable calli
2	0	0	0	Reddish compact +yellowish friablecalli
3	0	0	0	Reddish and yellowish compact calli
0	1.0	0.0	0.0	Whitish and yellowish friable calli with little pigment
1	1.0	0.0	0.0	Reddish compact + yellowish friable calli
2	1.0	0.0	0.0	Reddish compact + yellowish friable + calli
3	1.0	0.0	0.0	Reddish compact calli + yellowish friable calli
0	0.0	1.0	0.0	Reddish compact + yellowish friable calli
1	0.0	1.0	0.0	Reddish compact calli
2	0.0	1.0	0.0	yellowish friable calli with little pigment
3	0.0	1.0	0.0	Reddish compact calli
0	0	0	50	Redish compact + yellowish friable calli
1	0	0	50	Reddish compact+ yellowish friable calli
2	0	0	50	Reddish compact calli + yellowish friable calli
3	0	0	50	Reddish compact calli+ yellowish friable calli
0	1.0	0.0	50	Reddish compact calli + yellowish friable calli
1	1.0	0.0	50	Reddish compact calli + Yellowish friable calli
2	1.0	0.0	50	Reddish compact calli
3	1.0	0.0	50	Reddish compact calli
0	0.0	1.0	50	Reddish compact calli+ yellowish friable calli
1	0.0	1.0	50	Reddish compact calli
2	0.0	1.0	50	Reddish compact calli
3	0.0	1.0	50	Reddish compact calli

# Conclusions & Recommendations

- Production of red pigment had been achieved from Karandafi using hormones and elicitor. There is need for extraction and quantification of this compound of interest in order to determine the best treatment for the production. The use of bioreactor to maximize the production is also necessary.





# References

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# Acknowledgements

- I wish to acknowledge the Institute for Agricultural Research, Ahmadu Bello University for her financial support through out the course of this study
- My profound gratitude goes to my supervisory team and programme leaders for their contribution and support

# Acknowledgements

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