

Chlorophyll Status in Leaves of Coconut Palms (*Cocos nucifera* L.) Showing General Yellowing

Aparna K.* and Sreekala G. S.

College of Agriculture, Vellayani, Thiruvananthapuram-695522, Kerala Agricultural University

*Corresponding Author E-mail: aparnakumaran5900@gmail.com

Received: 7.11.2018 | Revised: 14.12.2018 | Accepted: 23.12.2018

ABSTRACT

The field experiment were carried out to evaluate the soil nutritional status of coconut palms (*Cocos nucifera* L.) showing general yellowing in Thiruvananthapuram district of Kerala during 2016 and 2017. Coconut palms showing general yellowing was identified based on visual symptom and leaf samples were collected from the coconut palms showing general yellowing and healthy palms. Chlorophyll a, chlorophyll b and total chlorophyll content of leaves showing yellowing were analysed before and after the application of fertilisers. In present the study, palms showing general yellowing recorded a significant reduction in the chlorophyll a, chlorophyll b and total chlorophyll content when compared with healthy palms. Chlorophyll a and total chlorophyll contents of palms showing general yellowing before and after the application of nutrients were found to be significantly different each other.

Key words: Coconut palms, General yellowing, Healthy palms, Chlorophyll

INTRODUCTION

The coconut palm is referred to as 'Kalpavriksha' - the 'tree of heaven' as each and every part of the palm is useful to mankind in one way or other. It provides food, drink, fuel and timber. India is the largest producer of coconut in the world (21665.00 million nuts), followed by Indonesia (16354.00 million nuts) and Philippines (14696.00 million nuts)¹. The four southern states viz., Kerala, Tamil Nadu, Karnataka and Andhra Pradesh are the major coconut producing states in India accounting for more than 90 per cent of area and production. Compared to other states Kerala occupies first position in area (770.62 ha) and

production (7429.39 million nuts) with a low productivity (9641 nuts ha⁻¹) compared to many other states¹. Coconut was the main source of income for majority of households in Kerala and a household without a coconut tree was rare to find in the past. Majority of the coconut farmers are small and marginal with old and senile trees predominantly with high incidence of pest and diseases and poor management².

According to Kalarani *et al.*³, yield potential of coconut varieties depends on several constraints like water stress, lack of nutrition, hormonal imbalance, pest, diseases etc.

Cite this article: Aparna, K. and Sreekala, G.S., Chlorophyll Status in Leaves of Coconut Palms (*Cocos nucifera* L.) Showing General Yellowing, *Int. J. Pure App. Biosci.* 6(6): 1254-1257 (2018). doi: <http://dx.doi.org/10.18782/2320-7051.7269>

Chlorophyll is the pigment that gives plant their characteristic green colour; it plays a unique role in the physiology, productivity and economy of green plants⁴. Quantity of chlorophyll per unit area is an indication of photosynthetic capacity and productivity of a plant. Therefore, the amount of chlorophyll in the leaf tissues may be influenced by nutrient availability and environmental stresses⁵. Reduction in the chlorophyll content leads to water stress condition in plants⁶.

In the recent XXXII zonal workshop of Regional Agricultural Research Station (Southern Zone), Vellayani, the problems identified from the Thiruvananthapuram district included general yellowing symptoms in coconut palms, which advanced from lower whorl to top with considerable reduction in nut yield. However scientists could not attribute a proper reason for the same. The exact reason for this is unknown. Hence a study was proposed with the objective to evaluate nutritional status of soil of coconut palms showing general yellowing and to compare it with the healthy palms.

MATERIAL AND METHODS

Study was conducted in selected coconut palms of Thiruvallam panchayat of Thiruvananthapuram district during March 2016 to March 2017.

A list of coconut farmers having area more than one acre of coconut was collected from the Krishibhavan of Thiruvallam panchayat. A field visit was conducted in the selected farmer's field to identify coconut palms of variety West Coast Tall showing general yellowing which advance from lower whorl to upper whorl based on visual

symptoms on leaves. Five fields were identified for under taking the experiment. Three coconut palms showing general yellowing from each field were identified and marked. Five healthy palms from the same fields were selected as control.

Chlorophyll content of the selected coconut palms were observed before and after the application of fertilizers. Chlorophyll content of leaf samples from the selected coconut palms was estimated following procedure of Arnon⁷. The data generated from the field experiment were analyzed statistically using standard procedures⁸.

RESULTS AND DISCUSSION

In the present study, palms showing general yellowing recorded a significant reduction in the chlorophyll a, chlorophyll b and total chlorophyll content when compared with healthy palms. Chlorophyll a and chlorophyll b content was 1.28 mg g⁻¹ and 0.90 mg g⁻¹ in healthy palms compared to coconut palms showing general yellowing 0.37 mg g⁻¹ and 0.21 mg g⁻¹ respectively. The total chlorophyll content recorded was 0.58 mg g⁻¹ in coconut palms showing general yellowing while it was 2.18 mg g⁻¹ in healthy palms (Table 1). Chlorophyll a and total chlorophyll contents of palms showing general yellowing before and after the application of fertilisers were found to be significantly different each other. The chlorophyll a (0.394 mg g⁻¹), chlorophyll b (0.226 mg g⁻¹) and total chlorophyll (0.610 mg g⁻¹) content after the application of fertilisers were increased compared to 0.376, 0.210 and 0.586 mg g⁻¹ of chlorophyll a, b and total chlorophyll.

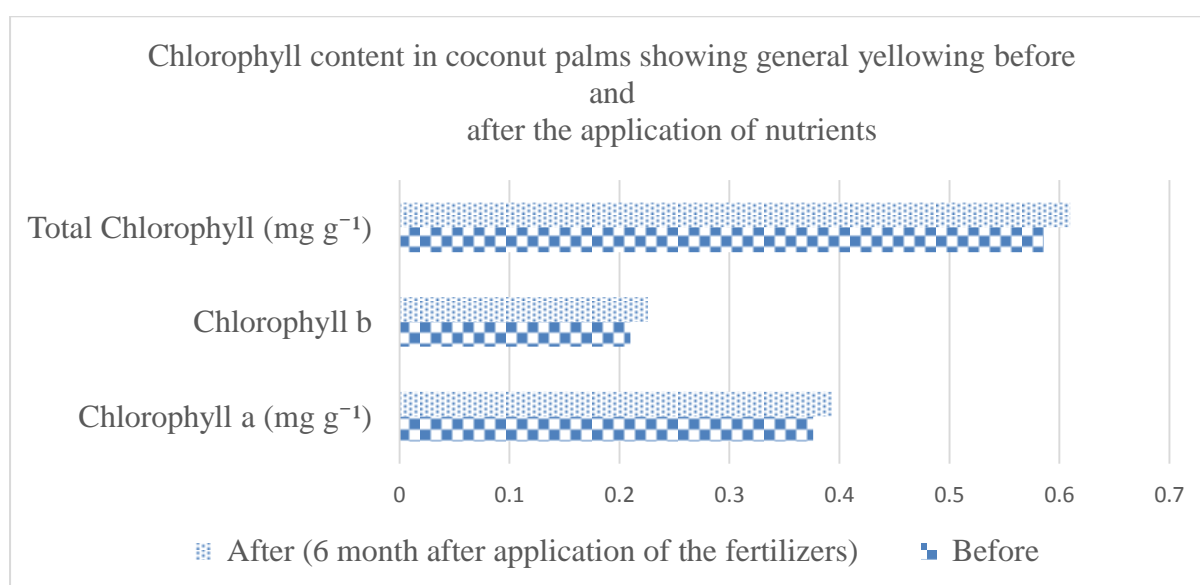
Table 1. Chlorophyll content in selected coconut palms

Treatments	Chlorophyll a (mg g ⁻¹)	Chlorophyll b (mg g ⁻¹)	Total Chlorophyll (mg g ⁻¹)	Mean
Coconut showing general yellowing (Y)	0.376	0.210	0.586	0.40
Healthy palms (H)	1.280	0.900	2.180	1.40
t stat	15.132*	10.121*	24.894*	18.931*
t table (0.05)	2.101	2.101	2.101	2.101

Table 2. Chlorophyll content in coconut palms showing general yellowing before and after the application of nutrients

Treatments	Chlorophyll a (mg g ⁻¹)	Chlorophyll b (mg g ⁻¹)	Total Chlorophyll (mg g ⁻¹)
Before	0.376	0.210	0.586
After (6 month after application of the fertilizers)	0.394	0.226	0.610
t stat	3.2010*	1.9517	2.7221*
t table (0.05)	2.145	2.145	2.145

Graph No: 1 Chlorophyll content in coconut palms showing general yellowing before and after the application of nutrients

**CONCLUSION**

The plant leaf sample analysis revealed a significant increase in chlorophyll a content and total chlorophyll content was noticed in coconut palms showing general yellowing after the application of fertilisers.

REFERENCES

1. C.D.B., [Coconut Development Board]. CDB Statistics 2015-2016 [on-line]. Available: <http://www.coconutboard.gov.in/stat.html> [25 June.2017]. (2016).
2. C.D.B., [Coconut Development Board] Horticulture Division [on-line], Department Agriculture and Cooperation. Ministry of Agriculture, Govt. of India. Available in: <http://coconutboard.nic.in/stat.html>. pdf [08 May 2017]. (2004).
3. Kalarani, M.K., Raja, D., and Sivachandran, R., Effectiveness of training-cum demonstration on TNAU coconut tonic for the management of nutrient deficiencies and physiological disorders in coconut. *Indian J. Coconut* **11**: 10-17 (2009).
4. Taiz, L. and Zeiger, E., *Plant Physiology* (5th Ed.). Sinauer associates, Inc, Sunderland, United States of America, 782p. (2010).
5. Otitoju, O. and Onwurah, I.N.E., Chlorophyll contents of oil palm (*Elaeis guineensis*) leaves harvested from crude oil polluted soil: a shift in productivity

- dynamic. *Ann. Biol. Res.* **1(4)**: 20-27 (2010).
6. Anjum, S.A., Xie, X.Y., Wang, L.C., Saleem, M.F., Man, C. and Lei, W., Morphological, physiological and biochemical responses of plants to drought stress. *Afr. J. Agric. Res.* **6(9)**: 2026-2032 (2011).
7. Arnon, D.I., Copper enzymes in isolated chloroplasts and polyphenol oxidase in *Beta vulgaris*. *Plant Physiol.* **24**: 1-15 (1949).
8. Cochran, W.C. and Cox, G.M., *Experimental Designs*. John Wiley and Sons Inc. New York. (1965).