OMICS Group Conferences
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International Conference on
Agricultural & Horticultural Sciences

September 14-15, 2012 Hyderabad International Convention Centre, India

Physiological responses to source – sink imbalances in oil palm

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Oil palm (Elaeis guineensis Jacq.), a perennial monocotyledonous palm and highest oil yielding oil crop, was introduced in the country to meet its vegetable oil demand. The vegetative growth and development of oil palm constitute priority sinks for oil palm are invariable due to less plasticity. However inflorescence production is more plastic and adjustable to available resources. The developmental periods of oil palm fronds (4 years) and inflorescences (3.3 years) are quite long and hence adjustments of sexual differentiation are determined between months and years before inflorescence setting. In such case, phenological responses of the reproductive organs may even contribute to the discrepancies between the available resources and demand and as of now, there is dearth of such information in oil palm grown under irrigated conditions. This study is mainly intended to investigate physiological responses to imbalances caused due to pruning of inflorescences. The experiment was conducted at Directorate of Oil Palm Research, Pedavegi, Andhra Pradesh and consisted of two treatments viz., inflorescences pruned at 50 , 100 per cent along with control. Physiological parameters like vegetative and reproductive growth, photosynthetic rate and non-structural carbohydrates (glucose, sucrose, starch and sugars) were estimated. The non structural carbohydrates were analyzed by collecting the sample cores from stem and petiole using increment borer as per standard methods. The results indicated that the complete pruning of inflorescences increased the rate of development by increasing the number of fronds and inflorescences. Pruning of inflorescences led to a marked acceleration and de synchronization of dynamics of appearance of female inflorescences. Inflorescence pruning also caused a gradual increase in the total non structural carbohydrate concentrations in the trunk. Starch and glucose was the dominant fractions followed by sucrose and fructose. The glucose content decreased in the inflorescence pruning treatment, while starch content increased and constituted more than two thirds of the carbohydrate reserves. The sucrose and fructose contents were constant during the experimental period. To conclude, the increase in starch content in trunk constituted the most importance adjustment process and an important buffer for source-sink imbalance in oil palm. The study would help in developing phenological and growth models for oil palm under irrigated conditions.

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