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## ABSTRACT

Screenhouses utilization is rapidly expanding now days, in this investigation the effect of planting banana plants c.v. Grand Naine under screenhouses conditions and different irrigation water quantities on vegetative growth, subsequently productivity and Water Use Efficiency (WUE) were examined, some microclimate elements such as canopy temperature, humidity, wind speed and light intensity were recorded, water saving by using three different levels of irrigation was estimated, vegetative growth parameters such as pseudostem height, pseudostem circumference, leaf length, width and assimilation area were recorded. Also flowering data such as flowering percentage, time to flowering and time to harvest were recorded. Productivity parameters such as bunch weight, length, circumference, number of hands, number of fingers per hand and number of fingers per bunch were recorded. Since we use micropropagated banana plants, somaclonal variation which directly affect the productivity was detected and identified at the morphological and molecular levels by using new molecular markers such as Sequence Related Amplified polymorphism (SRAP) and Target Region Amplified polymorphism (TRAP) to show the differences among the normal plant and its variants.

The results revealed about 40-50% reduction in wind speed, about 30% reduction in crop water use inside the screenhouses, as compared to open field which may due to the reduction of evapotranspiration and soil evaporation. Planting banana plant inside screenhouses decrease canopy maximum temperature and increase the minimum temperature. Planting banana plant cv. Grand Naine under white screenhouse conditions with 30% reduction in irrigation water gave the highest value of WUE (3.43 & 5.88 Kg/m<sup>3</sup>) in first and second season respectively. The plant screening resulted 26 somaclonal variants grouped into 8 categories, the PCR products gave 2304 amplified fragments. 1463 fragments resulted from SRAP marker and 841 fragments resulted from TRAP marker. According to SRAP Jaccard similarity analysis 'double bunching from peduncle' was more related to the normal plant. According to SRAP principal coordinate analysis most of the variants were aggregated in three clusters whereas 'pale green, black, wavy margins, double bunch from stem and vertical upward bunch' was segregated apart from the other variants. According to TRAP Jaccard similarity analysis empty peduncle' was more related to the normal plant. According to TRAP principal coordinate analysis most of the variants were aggregated in three clusters whereas 'pale green, black and vertical upward bunch' was segregated apart from the other variants which may reflect the genetic difference among normal plant and its somaclonal variants. Finally it is utmost importance to move banana orchards into screenhouses in order to minimize crop water use, pesticide usage and enhance the fruit quality.

**Key words:** Microclimate, banana, Grand Nain, irrigation, screenhouse, somaclonal variation, SRAP, TRAP.