Abstract

Light Relation in Intensive Mango Orchards †

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† Presented at the third International Tropical Agriculture Conference (TROPAG 2019), Brisbane, Australia,
    11–13 November 2019.

Abstract: The amount of light intercepted by a tree and its distribution within the canopy is critical in optimizing tree photosynthesis efficiency, carbon partitioning and productivity. Here we compare light relations in experimental high-density mango orchard systems with current commercial orchards. A baseline study of current commercial mango orchards showed a maximum light interception of approximately 67% was reached in trees aged between 26-31 years old, with canopy volume of approximately 15,187 m³/ha. Light interception did not significantly increase beyond 67% regardless of increase in canopy volume per hectare or the increase in orchard age. In these conventional orchards, maximum yields were reached approximately 16 t/ha when light interception was around 49% and as light interception increased above 49%, yields declined. In the high density orchard systems, light interception increased with canopy volume, with high density systems intercepting more available light than medium and low density orchard systems. In 5 year old high-density, espalier trained trees with approximately 5000 m³/ha canopy volume, yields reached close to 50 t/ha at 40% light interception. Trees trained as single leader or espalier had more evenly distributed light in the inner canopy compared to conventionally closed vase trained trees. in current commercial orchards, increasing the canopy volume and light interception above the maximums noted above had no benefit to increase economic returns whereas in high density mango orchards with alternate tree training, yields increases more than four times early in the orchards development. Further productivity gains are likely as the experimental high density have yet to fill their allocated space in the orchard.

Keywords: light interception; Mango; training system; intensification

Conflicts of Interest: The authors declare no conflict of interest.