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Influence of Water Availability on Fruiting Behavior and Fruit Quality of Custard Apple (*Annona Squamosa* L.)

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Abstract: *Water availability is one of the most important environmental factors influencing flowering, fruit set, yield, and fruit quality in custard apple (Annona squamosa L.). Efficient water management is particularly critical in semi-arid and tropical regions, where irregular rainfall and prolonged drought adversely affect crop productivity. The present study evaluated the effect of different water regimes on fruiting characteristics and fruit quality attributes of custard apple under field conditions. Observations were recorded on fruit set, fruit retention, fruit size, fruit weight, pulp weight, seed number, total soluble solids (TSS), titratable acidity, and overall yield. The results indicated that optimum water availability during flowering, fruit set, and fruit development significantly enhanced fruit retention, increased average fruit weight, improved pulp content, and produced superior fruit quality. Adequately irrigated plants recorded higher TSS, better pulp-to-seed ratio, and improved marketable yield compared with water-stressed plants. In contrast, moisture deficit during critical growth stages resulted in increased flower and fruit drop, reduced fruit size, lower pulp recovery, and deterioration of quality parameters. Excessive irrigation also negatively influenced fruit quality by reducing sweetness and increasing susceptibility to physiological disorders. These findings demonstrate that balanced irrigation management plays a crucial role in maximizing both yield and fruit quality in custard apple. Adoption of scientifically scheduled irrigation practices can improve water-use efficiency, enhance fruit quality, and ensure sustainable cultivation, particularly in water-limited environments. The study provides valuable information for growers, researchers, and horticultural planners seeking to optimize custard apple production under changing climatic conditions*

Keywords: Custard apple; Irrigation; Water stress; Fruit set; Fruit quality; Stone fruit, Total soluble solids (TSS); Sustainable horticulture