

## Influence of irrigation and intensity of light on physiological attributes of mango (*Mangifera indica L.*) Cv. Alphonso

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### Abstract:

“Influence of irrigation and intensity of light on physiological attributes of mango (*Mangifera indica L.*) Cv. Alphonso” experiment was conducted at College of Agriculture, Dapoli, the west coast Konkan region of Maharashtra. There are 8 light intensities treatments viz. 2000 pfd, 1750 pfd, 1500 pfd, 1250 pfd, 1000 pfd, 750 pfd, 500 pfd, 250 pfd (provided by Li-cor 6400 Portable photosynthesis system) while irrigated and non-irrigated plants were sub treatments. The physiological attributes considered were rate of photosynthesis, stomatal conductance, rate of transpiration and intracellular CO<sub>2</sub> concentration. It revealed that irrespective of sub treatments the light saturation point (at which rate of photosynthesis is maximum) of mango Cv. Alphonso in Konkan condition was recorded 750-1000 pfd. showing the maximum rate of photosynthesis was 10.91  $\mu$  mol CO<sub>2</sub> m<sup>-2</sup> Sec<sup>-1</sup>. Irrigated plants showed significantly maximum physiological functioning. The data showed that the rate of photosynthesis in irrigated plants (11.52  $\mu$  mol CO<sub>2</sub> m<sup>-2</sup> Sec<sup>-1</sup>) was 204.16% more than non-irrigated plants (3.63  $\mu$  mol CO<sub>2</sub> m<sup>-2</sup> Sec<sup>-1</sup>), the stomatal conductance in irrigated plants (0.1547  $\mu$  mol H<sub>2</sub>O m<sup>-2</sup> Sec<sup>-1</sup>) was 189.09 % more than non-irrigated plants (0.0510  $\mu$ mol H<sub>2</sub>O m<sup>-2</sup> Sec<sup>-1</sup>) and the rate of transpiration in irrigated plants (4.5432  $\mu$  mol H<sub>2</sub>O m<sup>-2</sup> Sec<sup>-1</sup>) was 119% more than non-irrigated plants (2.0439  $\mu$  mol H<sub>2</sub>O m<sup>-2</sup> Sec<sup>-1</sup>), where the intracellular CO<sub>2</sub> concentration in irrigated plants (245.25  $\mu$ mol CO<sub>2</sub>mol air<sup>-1</sup>) was 6.76 % less than non-irrigated plants (263.05  $\mu$ mol CO<sub>2</sub>mol air<sup>-1</sup>). It showed that the photosynthesis and other physiological activities are better in irrigated plants at 750-1000 pfd at costal conditions in Konkan.

### Introduction:

Konkan region on west coast of India is one of the biggest (0.182 million ha.) mango growing belts in India. Heavy rainfall (3500-4000 mm), Low sun light (below 250 PAR) for most of the day length during monsoon period from June to September are considered as the major environmental factors,

limiting the carbon assimilation and thus yield stagnated for 3 tons per hectare (Burondkar et al, 2012). Scarcity of irrigation during post flowering period leads to low rate of photosynthesis further resulted in low yield. The different practices such as pruning, irrigation, nutrition management, etc. have much importance for better production as well as productivity of mango.

### Material & Methods:

The experiment was held to study the effect of light intensity on mango trees (*Mangifera indica L.*) Cv. Alphonso with effect of irrigation (100 lit with four days interval for 3 weeks) and no irrigation on physiological factors at Department of Horticulture, College of Agriculture, Dapoli. Experiment was conducted in factorial randomized design (FRBD) consisting 8 light intensities viz. 2000 pfd, 1750 pfd, 1500 pfd, 1250 pfd, 1000 pfd, 750 pfd, 500 pfd, 250 pfd (provided by Li-cor 6400 Portable photosynthesis system) while irrigated and non-irrigated plants were sub treatments. Mango trees selected for study were of 30 years of age planted in same orchard having equal conditions.

### Results and Discussion:

Data indicated that irrespective of sub treatments, light saturation point at which rate of photosynthesis was highest in mango Cv. Alphonso in Konkan condition was recorded at 750-1000 pfd (10.91  $\mu$ mol CO<sub>2</sub> m<sup>-2</sup> sec<sup>-1</sup>) Irrigated plants showed significantly maximum physiological functioning.

Rate of photosynthesis in irrigated plants (11.52  $\mu$ mol CO<sub>2</sub> m<sup>-2</sup> sec<sup>-1</sup>) was 204.16% more than non-irrigated plants (3.63  $\mu$ molCO<sub>2</sub> m<sup>-2</sup> Sec<sup>-1</sup>). The stomatal conductance in irrigated plants (0.1547  $\mu$ mol H<sub>2</sub>O m<sup>-2</sup>sec<sup>-1</sup>) was 189.09 % more than non-irrigated plants (0.0510  $\mu$ mol H<sub>2</sub>O m<sup>-2</sup> sec<sup>-1</sup>). Rate of transpiration in irrigated plants (4.5432  $\mu$ mol H<sub>2</sub>O m<sup>-2</sup> Sec<sup>-1</sup>) was 119% more than non-irrigated plants (2.0439  $\mu$ mol H<sub>2</sub>O m<sup>-2</sup> Sec<sup>-1</sup>), where the intracellular CO<sub>2</sub> concentration in irrigated plants (245.25  $\mu$ mol CO<sub>2</sub>mol air<sup>-1</sup>) was 6.76 % less than non-irrigated plants (263.05  $\mu$ mol CO<sub>2</sub>mol air<sup>-1</sup>). The

rate of photosynthesis, stomatal conductance and transpiration rate was recorded maximum at LSP (light saturation point) in irrigated plants may be because of availability of moisture for physiological activities and this was attributed to De Villiers (2001), Kirk et.al (1988).

of mango cv. Alphonso in Konkan region can be improved by using irrigation. Except rainy days where light intensity was less than 750 pfd, physiological activities can be improved by applying irrigation. It will help in retention and improvement in quality and quantity of mango fruits. More research is required on impact of various irrigation levels and intervals on yield of mango under Konkan condition.

**Conclusion:**

Reduction in yield due to abiotic stresses during growth period

Light Intensity	Photosynthesis $\mu\text{ mol CO}_2\text{ m}^{-2}\text{ Sec}^{-1}$		Stomatal Conductance $\mu\text{ mol H}_2\text{O m}^{-2}\text{ Sec}^{-1}$		Transpiration $\mu\text{ mol H}_2\text{O m}^{-2}\text{ Sec}^{-1}$		Intracellular CO <sub>2</sub> concentration $\mu\text{ mol CO}_2\text{mol air}^{-1}$	
	Irrigated	Un Irrigated	Irrigated	Un Irrigated	Irrigated	Un Irrigated	Irrigated	Un Irrigated
PFD								
2000	10.1768	0.573551	0.168566	0.048796	6.061727	1.847212	300.803	349.112
1750	9.65625	1.141308	0.12471	0.043357	4.406298	1.671345	248.0394	325.7118
1500	10.1642	1.70999	0.122994	0.037838	3.993211	1.540093	233.377	285.8076
1250	10.4296	3.438246	0.136321	0.052801	4.270436	2.111	240.1457	279.804
1000	11.5291	3.633572	0.154776	0.051043	4.546254	2.043929	246.7378	264.0894
750	11.3523	3.879798	0.154437	0.050271	4.179333	1.974037	248.8778	245.2694
500	9.85802	3.156531	0.147413	0.042589	3.771021	1.68426	258.3669	241.3609
250	6.72216	2.664618	0.142004	0.038651	3.516866	1.502734	289.8259	243.0565
SE±	0.36144	0.361444	0.008351	0.008351	0.2338	0.2338	11.38242	11.38242
CD 5%	1.04377	1.04377	0.024117	0.024117	0.675163	0.675163	32.86984	32.86984

Table1: Impact of irrigation and intensity of light on physiological attributes of mango (*Mangifera indica L.*) Cv. Alphonso

