*Environmental Engineering and Management Journal* xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
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# MODULATING WATER VOLUME AND FERTIGATION LEVELS FOR ENHANCING THE PERFORMANCE OF NAGPUR MANDARIN IN ARID ENVIRONMENTAL CONDITIONS

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## Abstract

The field experiment was conducted by deploying 10 treatments in RBD with four replications covering 160 plants in all during two successive years commencing from March 2019 to February 2020 and again from March 2020 to February 2021 at the Instructional Farm, Department of Fruit Science, College of Horticulture and Forestry, Jhalawar, Rajasthan. The study comprised combinations of water volume and fertigation levels viz. Irrigation Scheduling at 100 % ETc + Fertigation 100 % RDF ($I_1F_1$), Irrigation Scheduling at 100 % ETc + Fertigation 80 % RDF ($I_1F_2$), Irrigation Scheduling at 100 % ETc + Fertigation 60 % RDF ($I_1F_3$), Irrigation Scheduling at 80 % ETc + Fertigation 100 % RDF ($I_2F_1$), Irrigation Scheduling at 80 % ETc + Fertigation 80 % RDF ($I_2F_2$), Irrigation Scheduling at 80 % ETc + Fertigation 60 % RDF ($I_2F_3$), Irrigation Scheduling at 60 % ETc + Fertigation 100 % RDF ($I_3F_1$), Irrigation Scheduling at 60 % ETc + Fertigation 80 % RDF ($I_3F_2$), Irrigation Scheduling at 60 % ETc + Fertigation 60 % RDF ($I_3F_3$) and Irrigation at 100 % ETc by surface irrigation and 100 % RDF as soil application ($I_0F_0$-Control). The research trail laid out to elucidate the conjoint effect of water volume levels and fertigation levels on the growth, variables such as leaf chlorophyll content, leaf proline content, and the soil properties of mandarin orchard. The plant growth attributes including height, volume, spread, shoots/branches, and leaf parameters like length, width, area, and perimeter were considerably ($p \leq 0.05$) impacted by the combined effect of water volumes and fertigation levels ($I_1F_1$-Irrigation Scheduling at 100 % ETc + Fertigation 100 % RDF). Soil physico-chemical characteristic parameters such as soil electriacal conductivity, pH, bulk density, partical density, porosity, organic carbon, and maximum water hoalding capacity (at 0-15cm, 15-30cm, and 30-45cm depth of soil) significantly ($p \leq 0.05$) improved due to receiving water volume at 100 per cent ETc with Fertigation 100 % RDF ($I_1F_1$). Furthermore, a substantial ($p \leq 0.05$) highest leaf chlorophyll content and lowest leaf proline content was found in treatment Irrigation Scheduling at 100 % ETc + Fertigation 100 % RDF. Overall, treatment Irrigation Scheduling at 100 % ETc + Fertigation 100 % RDF was confirmed to be most effective in ameliorating the plant growth and soil physico-chemical attributes.

*Key words:* Automation; Chlorophyll content; Evapotranspiration; Precision farming; Plant growth; Proline content; Water volume;

*Received: July, 2024; Revised final: March, 2025; Accepted: June, 2025*

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