

Rate of photosynthesis as affected by irrigation levels in potato

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SUMMARY

During both the seasons (2009-2010 and 2010-2011) the field trial was conducted on PGI Farm without changing randomization. The experiment was laid out in *Rabi* season. IRGA instrument (LI-6400XT) was used for estimation different microclimatic parameters of the crop within the height of 2 mt. At higher levels of irrigation (1.2 and 1.0 IW/CPE) two peaks of net photosynthesis were evident at 11.00 to 12.30 and 14.00 to 14.30 hr. At lower levels of irrigation the second peak was absent. Increased stomatal conductance appeared to be the reason for the first peak whereas for the second peak non-stomatal characters may be responsible. Photosynthetic rates were highest when planting was carried out during the last week of October and mulch was applied during first earthing up. The results revealed that increase in irrigation levels from 0.8 to 1.2 IW/CPE ratio, planting within 44th MW with sugarcane trash mulch @ 5 t ha⁻¹ exhibited higher values of all microclimatic parameter viz., photosynthetic rate (34.40, 35.55 μ mol CO₂ m⁻² s⁻¹). At harvest, the treatments combination I₃D₂M₁ was significantly superior, recording highest mean fresh weight of tubers plant⁻¹ (352.44 g) followed by I₃D₁M₁, I₂D₂M₁ and I₃D₂M₂ during first year. Significantly treatments combination I₃D₂M₁ recorded maximum mean fresh weight of tubers plant⁻¹ (498.96 g) followed by I₃D₂M₂, I₂D₂M₁ and I₂D₂M₂, while rests of the treatments were at par with each others during second year.

Key Words : Photosynthesis, Potato, Planting dates, Irrigation levels

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In India nearly 80 per cent of potatoes are grown in vast Indo-Gangetic plains of north India during short winter days from October to March. Uttar Pradesh, West Bengal, Bihar, Punjab, Madhya Pradesh, Gujarat, Assam, Karnataka and Uttarakhand are important potato growing states. About 25 million tones of potatoes are the requirement for consumption, seed purpose, processing industries and export. The estimated production of 24.51 million tonnes is quite less to meet the demand (Anonymous, 2011). The area under potato in Maharashtra is 18.8 thousand ha (2 % of India) with a production of 197.90 thousand MT and extremely low

productivity of 10.52 t ha⁻¹ (Anonymous, 2011). The part of North Satara and Pune districts are major potato growing areas of 80 per cent of area is under this crop in the state (Ahire, 1999). Due to increasing industrialization and job market created demand for processed and ready to eat convenience food, particularly in urban areas. A plant with adequate soil moisture transpires water profusely, keeping its leaves cooler than the surrounding air. When soil moisture is insufficient, plant is experiencing moisture stress, the leaves transpire less and become warmer. The plant leaves must remain turgid for leaf expansion, to keep stomata open for higher photosynthetic rate. In plant, leaves functions as an optical organs and spectral radiation properties are attuned to environment in which they live. The efficiency of absorption of PAR partly determines the efficiency of photosynthesis of plant. The PAR is absorbed more efficiently and centering around 400-700 nm, determines the plant development. Evapotranspiration from vegetative surface is influenced by many meteorological factors like temperature, radiation, humidity and physiological factor such as photosynthetic rate, leaf water potential and stomatal

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