



Tropentag, September 9-11, 2020, virtual conference

“Food and nutrition security and its resilience
to global crises”

Photosynthesis, Dry Matter Production and Yield Performance of Lentil Varieties under High Temperature

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Abstract

Climate is changing and air temperature is raising due to increasing concentration of CO₂ and other atmospheric greenhouse gases. The rise in atmospheric temperature causes detrimental effects on growth, yield, and quality of the crop varieties by affecting their phenology, physiology, and yield components. Lentil (*Lens esculenta* Medik.) is an important pulse crop with high protein content, has the potential capacity to combat nutritional deficiencies in developing regions and countries. It occasionally faces high temperature at its reproductive stage in February-March due to late sowing after Transplanting Aman rice harvest. Efforts can be made to increase area as well as yield of lentil crops by the use of temperature stress tolerant varieties. A pot experiment was carried out with ten high yielding lentil varieties cultivating by the farmers to assess the effects of high temperature (34°C) on photosynthesis, chlorophyll content (SPAD reading) in leaves, dry mass production, yield attributes and yield and to find out temperature stress tolerant varieties. The experiment was conducted from 21 November 2017 to 15 March 2018 at BINA, Mymensingh, Bangladesh. High temperature (34°C) at two growth stages like flower initiation stage and pod growth stage of the lentil varieties *viz.* B-2, B-3, B-4, B-5, B-6, B-7, B-8, B-9, B-10 and BARI masur-5 was imposed separately for 7 days in plant growth chamber. The experiment was laid out in a completely randomized design with three replications. The nitrate reductase activity, chlorophyll content and photosynthetic rate of leaves were determined during temperature imposed. At harvest, total dry matter, seed yield and yield related parameters were recorded. Photosynthesis, chlorophyll content in leaves, total dry matter and yield attributes were highest in control plants and decreased under high temperature. High temperature imposed either at flower initiation stage or pod growth stage had significantly negative influence on plant parameters but temperature imposed at pod growth stage had greater negative effect. Seed yield drastically reduced under high temperature in all varieties at any growth stage compared to control. The higher yield reduction was recorded in Binamasur-2 and Binamasur-3. But the yield loss under high temperature was less in two varieties *viz.* Binamasur-6 and Binamasur-8 and showed tolerance to high temperature.

Keywords: Dry matter yield, high temperature, lentil, photosynthesis