B-29: The influence of temperature and irradiance on growth and biological nitrogen fixation of *Trifolium steudneri*

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Trifolium steudneri (Schweinfurt, 1968) which originated in mountain regions of Kenya is an indigenous semi-erect annual legume. Evidence indicates that

this species performs well under varying edaphic conditions. Work in South-east Queensland both in Ethiopian high and lowlands and lowlands of Kenya have shown that African *Trifolium* spp are drought resistant, capable of withstanding tropical heat, irradiance and extreme wet conditions during summer. This variation may be attributed to greater radiation and higher soil and air temperatures in the lowlands as compared with the highlands. The aim of this experiment, was to study the influence of temperature and irradiance on growth and biological nitrogen fixation of *Trifolium steudneri.*

The experimental design was a complete randomized design consisting of 2 temperature regimes (18/13°C 26/23°C day/night), 2 light regimes (full light and 50% of full light) with 6 replicates. The study was performed in a greenhouse. Seeds of *T.steudneri* were sown in 2 l plastic pots (15 seeds/pot). After 4 weeks the plants were thinned out to 3 plants/pot. A complete nutrition solution similar to Hammer *et. al*; (1968) was given to the plants twice weekly (50 ml/pot). Plants were inoculated 4, 5 and 6 weeks after seedling.

The light in cabins was controlled by high pressure sodium vapour lamps (Sylvania 50NT 40W). A nylon net supported on an iron grid was used to reduce the incoming light by 50%. The irradiance was measured at plant height by a Licor apparatus.

Plants were harvested at 38, 50 and 57 days after seeding. At each harvest the leaf area, shoot, root and nodule dry weights were determined. Specific nitrogenase activity was estimated using the data of the acetylene reduction test.

The shoot and root dry weights were initially low for all the treatments. At second and final harvests, plants receiving full light/26°C had significantly higher shoot dry matter as compared with plants grown at full light/18°C. The shoot dry weights of treatments receiving 50% light were significantly low.

The dry weights of nodules and roots also followed the same trend as shoot dry matter yields. However, the difference between the plants grown under full light,26°C and full light, 18°C were not significant. The leaf area ratios (LAR) were significantly higher with 50% light/26°C and 50% light/18°C

plants as compared with plants receiving full light. The specific nitrogenase activity (mol $CH^{-1}g^{-1}$ nodule dry matter) was higher in plants receiving full light as compared with plants receiving 50% light (irrespective of temperature).

T.steudneri exhibited a vigorous shoot and root growth under full light and high temperature conditions.

It can be suggested that the higher leaf area ratios under low light conditions were due to the effect of shading. The increase in specific nodule activity was attributed to the increase in dry matter obtained under full light conditions. Results clearly indicate that both high temperature and irradiation are more favourable for growth of *T.steudneri*. It is concluded that *T.steudneri* is not site specific and could be grown in a wide array of climatic and soil coanditions.