

ABSTRACT

Visible light plays an important role in the survival of species in our ecosystem. Light signals control seed germination, leaf expansion and stem elongation. Visible light consists of electric and magnetic fields. Earlier studies have focused on the exposure of magnetic field for a short span on the growth of plants, this study will investigate the effect of magnetic field on the whole lifespan of spinach with emphasis on its effect on chlorophyll and elemental composition. In this study the focus was on the effect of magnetic flux density on spinach. Spinach is an important nutritional crop in Kenya, an excellent source of vitamin K, Vitamin A, manganese, folate, magnesium, iron, copper, vitamins B2, Vitamin E and calcium and a good source of dietary fiber. The specific objective was to determine the effect of magnetic flux density and exposure time on the growth of spinach and the concentration of chlorophyll, iron, sodium, zinc, magnesium, potassium and calcium in the leaves of spinach. A Completely Randomized Design (CRD) pot experiment with 13 treatments was set up in a greenhouse. The pots were sowed with four spinach seeds which were thinned to two immediately after germination, the plants were exposed to magnetic flux density generated by a current. There were two variables, intensity of magnetic flux density and exposure duration. Magnetic flux density of varying intensities of 0 mT, 0.5 mT, 1.0 mT, 1.5 mT and 2.0 mT and exposure time of 10 minutes, 30 minutes and 60 minutes. The plants were exposed to magnetic field at the specified duration daily for 60 days. The results indicated that the magnetic flux increases the concentration of chlorophyll a by up to 50%, chlorophyll b by up to 20%, the total chlorophyll content increased by 38% while the concentration of zinc, sodium, potassium, iron, magnesium and calcium rose by 97%, 26%, 74%, 78%, 20% and 98% respectively. The data was analyzed using R statistical software (R version 3.3.4), the results were subjected to ANOVA, the effects were significant, the means were separated using Tukey's HSD test at $p < 0.05$. These results showed that magnetic field can be used to enhance the growth of spinach that have high mineral concentration and that can therefore be used by groups of people that need high amounts of these elements like vegetarians, expectant women and young children.

Keywords

Spinach beet