EFFECTS OF IRON ON POTATO GROWTH

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SUMMARY

A field experiment was conducted in an iron deficient soil to investigate the effect of foliar application of Iron on the growth of potato. Results indicated that foliar application of iron significantly increased iron and chlorophyll concentrations in the leaves and also increased potato yield. No significant difference in iron concentration and potato yield was observed among various iron sources. However, there as a significant difference in chlorophyll concentrations among the various iron treatments.

MATERIALS AND METHODS

A field experiment was conducted in the experiment farm where iron chlorosis in crops was usually observed in the previous years. Soil sample was collected from the field for analysis. The pH of the soil was 8.2 and the DPTA extractable iron was 6 pmm. These data further confirmed that the field was likely to be deficient.

Randomized complete block design was employed with 4 treatments and 6 reapplications. Each plot was 30 feet long and 6 rows wide with 5 feet buffer between plots. Nitrogen, Phosphorous and Potassium were applied before planting at the rates of 90 ppm N, 75 ppm P_2O_5 and 40 ppm K_2O. The treatments were: Control, Ferrous Sulphate, Fe-EDTA and Fe-Glycinate.

Three foliar applications of the treatments were employed during the growing season. Each foliar application contained 300 ppm of iron in the solution, except for the control treatment plots, which received only water. Each plot received 1,000 mL of spray solution. The first foliar application was conducted when plants were about 12-15 inches in height, the second application 20 days after the first and the third application 20 days after the second.

The youngest mature leaves were taken from the middle two rows of each plot two weeks after the third foliar application. Potatoes were harvested by hand from the middle two rows of each plot for yields. Leaf samples were washed with 1% HCL solution and distilled water, dried in an oven at 75^0C for 24 hours and ground in a mill to pass a 20 mesh screen for chemical analysis.

RESULTS AND DISCUSSION

The average potato yields from different treatments are shown in Table 1. The application of iron, regardless of its sources, significantly increased the yield. There was no significant difference in yield among all the different iron sources. However, Fe-Gylcinate spray treatment resulted in the highest yield followed by Ferrous Sulphate and Fe-EDTA.

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Table 1.
Effects of Various Iron Treatments on Potato Yield.

Treatment	Yield* (T/ha)
Control	20.8 b
Ferrous Sulphate	25.3 a
Fe-EDTA	24.9 a
Fe-Glycinate	26.3 a

* Number in a column not followed by a common letter differ significantly at P<0.05 as determined by DMRT

As shown in Table 2., all iron treatments increased iron concentration in the leaves with no significant difference among the different treatments. The chlorophyll concentrations were also significantly increased by the application of iron. The highest chlorophyll concentration was found in plants receiving Fe-Glycinate followed by Ferrous Sulphate and Fe-EDTA. The increase in chlorophyll concentration in the leaves of plants receiving iron treatments indicates that iron is needed in the formation of chlorophyll which may in turn affect the yield of potatoes.

Table 2.
Effects of Various Iron Treatments in Iron Concentration and Chlorophyll Concentration on Potato Leaves.

Treatment	Fe* (ppm)	Chlorophyll a+b (ug/g fresh wt)
Control	86 b	31.4 b
Ferrous Sulphate	140 a	41.2 ab
Fe-EDTA	143 a	39.3 b
Fe-Glycinate	156 a	51.6 a

* Number in a column not followed by a common letter differ significantly at P<0.05 as determined by DMRT

In an iron deficient soil, application of iron solutions significantly increased the iron concentration, chlorophyll concentration and yield of potato. Although foliar application of Fe-Glycinate resulted in higher iron concentration in the leaves and better potato yield than Ferrous Sulphate and Fe-EDTA, the increases were not statistically significant. Different iron sources significantly increased the chlorophyll concentration in the leaves. Crops that received foliar application of Fe-Glycinate had higher chlorophyll concentration in the leaves than those that received either Ferrous Sulphate or Fe-EDTA. There was no significant difference in chlorophyll content between crops receiving Ferrous Sulphate and Fe-EDTA.

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