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Ameliorating Chlorosis-Inducing Soils with Rock Materials of Varying Porosity and Iron Content

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Abstract

Lime-induced chlorosis is a severe problem, affecting many crops in arid-and semiarid-zone soils. Applications of Fe chelates are expensive and only effective in the short term. The ameliorating effects of rock materials on three chlorosis-producing calcareous soils from Israel were determined in pot tests and in the field. Chlorophyll concentrations of peanut plants *(Arachis hypogaea* L.) grown in pots with additions of up to 15% (v/v) pumice or tuff-lapilli to the soils were compared with controls and Fe-ethylenediaminedihydrochloric acid (EDDHA) treatments. Additions of 100 % (v/v) tuff-lapilli were more effective than those of pumice in small-pot tests of all three soils. Positive effects persisted for a second growth period. In large-pot tests, only 15% (v/v) additions were effective in two soils. In field tests, the three soils were treated with pumice or tuff-lapilli (10 % v/v) or basalt powder (5.5% w/w). Basalt powder was the most effective in raising chlorophyll concentrations to levels similar to or greater than those obtained from Fe-EDDHA. Basalt powder was also the most effective in increasing pod and hay yields on two soils. Also, basalt appeared to have long-term effects. Only where chlorosis was not severe and where poor aeration appeared to be an additional factor were the effects of tuff-lapilli and pumice equal or even superior to those of basalt powder. On two soils with severe chlorosis, addition of porous, Fe-poor materials had no effect. Either because the soils were well aerated or because CO_2 production was low, CO_2 in the soil air was low and not a major factor determining HCO_3^- in water extracts.