unorthodox liming materialfor this purpose has been justified by some workers. Neilson *et al.*, (1991) and Yagodin (1984). Hence, Fluedust, woodash and silicate slag has been safely used as alternative sources of living material in this study for their nutrient supplying potentials as well as for economic reasons.

The results presented above confirm that all the test crops responded to the addition of liming materials used. The most probable reason for this could be the reduction in the levels of exchangeable Al^{3+} and other micronutrients that might be present in toxic concentration under acid soil condition. This consequently, enhanced root penetration and proliferation, increased microbial activities and population and eventually improve nutrient availability especially of N, P and S through organic matter decomposition. The end effect of these are: improved uptake and utilization of the essential elements, which stimulated vigorous crop growth and increased dry-matter yield. This is in line with some authors' opinion. For instance Kamprath (1970) had related the problems of acidity to the presence of Al^{3+} and Mn^{2+} at toxic concentration in soil. Janghorbani *et al*., (1975) has also observed that the availability of plant nutrients is greatly affected by the acid soil condition, He further observed the interaction between soil pH and soluble Al^{3+} on one hand andplant nutrients such as Mo, Mn, P, Ca, Mg, K, Fe, N, on the other hand. This interactions could be adverse under highly acidic conditions, which may lead to soilinfertility.

Liming enhanced dry-matter yield significantly to a point (pH 5.5) for lfe brown cowpea and blackeyed bean, beyond whichJhe.re was a reduction indry-natter yield. This reduction in dry-matter yield at soil pH 6.5 could be due to drastic reduction of some essential micronutrient elements. Black (1975) showed a reduction in solubility of all micronutrients except Mo thus resulting in a potential deficiency of Zn, Cu, Fe, Mn and B when soil pH was greater than 5.5. Increased concentrations of certain major nutrients also results from liming to high pH values. All these could have caused nutrient imbalance and hence yield reduction. Abangwe *et al.*, (1978) opined that liming tropical soils to pH values close to neutrality as practiced in temperate countries has been found not only to be uneconomical but could lead to yield depression. The relatively low dry-matter yield in the control treatment could he due to suspected Al^{3+} and Mn^{2+} toxicity, deficiencies of Ca, Mg, P and other adverse effects under acid soil condition.

There was a significant difference in dry- matter yield among crop species. Blackeyed beans for instance, produced the highest dry- matter yield of all the test legumes irrespective of the type liming materials added (Table 1b). The mean dry- matter yield of lfe brown cowpea (1.61g/pot) was 56% of that blackeyed bean (2.88g/pot). This difference was probably due to varying physiological demand for nutrients and their utilization among the three species. Their respective specie adaptation and response to acidity and liming could also have been different. In all however, blackeyed bean maintained the highest dry – matter yield for all treatments considered thus probably confirming its superiority as a locally adapted bean specie in this part of the World.The type of liming materials used significantly affected the dry – matter yield of crops even through with no consistent trend. This confirms the preferential specie response to the respective liming materials used.

Nutrients uptake was significantly influenced by the addition of liming materials irrespective of the sources. Also rate of application of the liming materials significantly affected uptake of N by the legumes but not beyond the rate that brought the soil pH to 5.5 units (Table 2a, b and c). As the rate of added liming material increased, the pH of the treated acid soil increased thus creating a conducive environment for microbial activities and population. The decomposition of organic matter and subsequent mineralization enhanced the release of nutrients especially N, P and S into solution thus making these elements available for crop uptake. Lack of difference in the uptake of N among the sources of liming materials may be due to the fact that no external addition of N was made nor was this element contained in any of the any of the liming materials added. The probable sources of N being taken up and utilized in this study were from those fixed by the legumes and through organic matter decomposition which was enhanced by liming the acid soil.

Plant tissue concentration of Mn which was significantly affected when soil was treated with the different liming materials. Concentration of Mn in the plant tissue tissue in the control treatment exceeded the threshold limit at which Mn toxicity occurred in most crop specie except for cowpea and soybean (Abangwu *et al*., 1978). Corresponding values in this study were 4.77, 4.80 and 4.80 cmolkg $^{-1}$ for lfe brown cowpea,blackeyed bean and soybean respectively. Although a concentration of 1.90 cmolkg^{-1} Mn in pea top was found to be toxic (White, 1970) and concentration of Mn greater than 1.70 cmolkg^{-1} was considered toxic to many plants (Jones, 1972). In this study however, the lowest level of plant tissue Mn contents after liming was 0.70 cmolkg^{-1} where wood ash was used. Although Juo and Uzu (1977) observed that Mn deficiency was limiting to the growth of maize in two acid Ultisols limed to soil pH of 7.1 units, it has been observed limiting to lfe brown cowpea, blackeyed bean and soybean in this study.

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Conclusion

In conclusion, the waste used as liming materials in this study significantly increased the dry-matter yield of the three indicator legumes. Crop response to the added liming materials was due to the reduction in the levels of exchangeable Al and other micronutrients which might be in toxic concentration under acid Soil conditions.

Improved nutrient availability was enhanced through organic matter decomposition following the addition of the waste as liming materials. Crop uptake ofnitrogen was significantly increased by the addition of the liming material and rates ofapplication.

There was no difference among the legumes in the uptake of N. Rates of added liming materials significantly increased uptake of P. More P was taken from woodash, though not significantly so, than other liming materials. Also uptake of K and Ca but not Mg were significantly increased, by the addition of the liming materials. These increases in nutrients uptake was not beyond the rate of timing material addition that brought the soil pH to 5.5.

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