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EFFECT OF MAGNESIUM AND CALCIUM LIME SOURCES ON SNAP BEAN PRODUCTION

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Magnesium deficiency in snap beans has been associated with high levels of potassium in soils. In Tennessee, high levels of K fertilization have generally reduced yields of snap beans. Magnesium deficiency has been observed on tomatoes, apples, grapes, and various field crops. Liming soils low in pH with a calcitic limestone has often eliminated Mg deficiency symptoms of tomatoes in following years, but in some instances may aggravate Mg deficiency instead. Zinc deficiency has been observed on corn and snap beans when pH was over 6.2 and climatic factors were less than favorable for optimum root expansion and plant growth.

A test was established in 1980 to evaluate varied ratios of Mg and Ca in the lime source upon yield and quality of vegetable crops. The soil is a Lily silt loam which is naturally acid (pH 4.9) and low in plant nutrients. Lime sources were MgO and $Ca(OH)_2$. Amounts calculated to raise the pH to 6.0 were added at a rate of 3.6 ton/acre $CaCO_3$ equivalent in ratios of 0, 33, 66, and 100% Mg. Calcium was the remaining portion of the lime source. Tomatoes performed well when both Mg and Ca were part of the lime ratio in 1980 and 1981 trials (1). Problems arose when either Mg or Ca were not supplied.

At the end of the 1981 season, the soil chemical conditions were evaluated and snap beans became the test crop. The pH levels were much lower than expected from prior lime application. The MgO was found to have a lower neutralizing effect than $Ca(OH)_2$ because of particle size. New lime additions were calculated and plots were limed to $\geq$ pH 6.5 in April of 1982. For the ratios of 0, 33, 66, and 100% Mg, rates of 1.85 tons $Ca(OH)_2$, 1.11 tons $Ca(OH)_2$ plus 1.25 tons MgO, 0.18 tons $Ca(OH)_2$ plus 2.50 tons MgO, and 3.75 tons MgO per acre were added to plots which changed the mole % Mg to 0, 65, 96, and 100 for the original ratios of 0, 33, 66, and 100% Mg, respectively. Foliar applications of Zn (2 lb./A) were compared to no Zn in split plot experimental design where Zn disodium EDTA was the Zn source.

The snap bean results (Table 1) show that as the mole ratio of Mg increased in the lime source, the snap bean yield decreased probably as a result of induced Ca deficiency. In the 100% Mg plots, many plants died in the seedling stage. The MgO levels required to raise the pH to the optimum level resulted in higher Mg levels than those found in standard applications of dolomitic limestone.

Lime applied in 1982 resulted in values of soil pH which ranged from 6.4 to 6.7 for the various MgO - $Ca(OH)_2$ ratios. Zinc had little effect on yield in 1982 but caused a significant (.05 level) yield reduction in 1983. Perhaps this was due to slight leaf injury from the Zn in 1983 when the growing season was very dry and hot and the plots received no irrigation.

Table 1. Effect of Magnesium Lime mole ratio on snap bean yield and soil pH.

Lime Ratio (mole % Mg)	Yield - tons/A. 1982	1983	Soil pH 1983
100	0.2 c[z]	0.3 d	6.4
96	1.8 b	0.9 c	6.6
65	2.4 a	1.6 b	6.7
0	2.6 a	2.0 a	6.7

[z] Mean separation within columns by Duncan's multiple range tests, 5% level.

Reference

1. Mullins, C. and J. Wolt. 1983. Effects of Calcium and Magnesium Lime Sources on Yield, Fruit Quality, and Elemental Uptake of Tomato. J. Amer. Soc. Hort. Sci. 108(5): 845-850.

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SNAP BEAN HERBICIDE TRIALS

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Several new herbicides have become available in recent years for testing on snap beans. Trials were conducted in 1983 to evaluate some of these new herbicides. Treatments were applied by standard procedure in a replicated test. The crop was planted on June 2 and was harvested on July 29. The cultivar was BBL-GV2.

The herbicides, acifluarfen (Blazer) and AC 252214 (Scepter) injured the snap bean plants and reduced yields. These two herbicides do not appear safe for snap beans. However, weed control was excellent.

The post emergence grass herbicides fluazifop-butyl (Fusalide), sethoxydim (Poast), SC 1084, CGA 82725 and DPX Y-6202 gave excellent grass control. These chemicals were combined with bentazon (Basagran) which gave excellent broadleaf weed control. Only DPX Y-6202 caused any visible crop injury and it was in the form of a slight marginal chlorsis of the leaves.

Metolachor (Dual), EPTC (Eptam), and pendimethalin (Prowl) continued to give excellent grass control and fair to good broadleaf weed control. Broadleaf weed control was greatly improved when propionamide (Devrinol) was combined with EPTC.