AMMONIUM HYDROXIDE VERSUS CALCIUM NITRATE FOR COTTON SEEDLINGS

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Recently, Tiedjens used ammonium sulfate, ammonium hydroxide, and calcium nitrate as sources of nitrogen in sand cultures to grow cotton from the seedling stage to opening of the bolls. He stated, "At no time was there any indication of injury to the plants, even though there was a perceptible odor of ammonia coming from the ammonia cultures. . . . . . If there is any superiority between the two forms of nitrogen, it is in favor of the ammonia cultures." For the above statements to be significant it is necessary to know the composition of the nutrient solution used. Tiedjens stated that the nutrient solutions used for cotton were identical with solutions A, F, and I given on page 12 of New Jersey Agricultural Experiment Station Bulletin 526. Each of these solutions contained approximately 600 p.p.m. of PO₄ as KH₂PO₄. They were, therefore, highly buffered and the cultures to which ammonium hydroxide was added contained, in all probability, ammonium salts instead of ammonium hydroxide.

It is not surprising that cotton plants grew well in a nutrient solution as concentrated as that used by Tiedjens. However, it should be surprising to find that plants tolerated large amounts of ammonium hydroxide in solutions dilute enough to approximate the concentration of a normal soil solution. Probably no soil solution contains as much phosphate as the nutrient solution used by Tiedjens. No mention was made of the probable effect of ammonium hydroxide on plants if they had been placed in a medium with a salt concentration which corresponds somewhat to that of the soil solution.

In order to elucidate this question an investigation in which cotton seedlings were used was conducted to study the following points: (1) The efficiency of different amounts of ammonium hydroxide and calcium nitrate in dilute nutrient solutions, and (2) the efficiency of ammonium hydroxide and calcium nitrate in nutrient solutions with various concentrations of other salts.

Cotton seedlings which germinated in sand were grown in duplicate cultures for 10 days in 2-quart vessels of nutrient solution. The solutions were changed daily. The composition of the nutrient solution, except the nitrogen content, was as follows: PO₄, 12 p.p.m.; K, 3.6 p.p.m.; Ca, 3.5 to 112 p.p.m.; Mg, 2.3 p.p.m.; and SO₄, 9.1 p.p.m.

The sources of nitrogen and nitrogen contents are indicated in Fig. 1. With the exception of the nitrogen content, this solution was approximately 1/50 as concentrated as Tiedjens' solution A, and it

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2Soil Chemist.
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