

**A BIOCHEMICAL STUDY OF NITROGEN IN
CERTAIN LEGUMES; THESIS SUBMITTED IN
PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE OF DOCTOR OF PHILOSOPHY
IN AGRONOMY IN THE GRADUATE SCHOOL
OF THE UNIVERSITY OF ILLINOIS, 1912, PP.
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ALBERT LEMUEL WHITING

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IN CERTAIN LEGUMES

BY

ALBERT LEMUEL WHITING
B. S. Massachusetts Agricultural College, 1908
M. S. Rhode Island State College, 1910

THESIS

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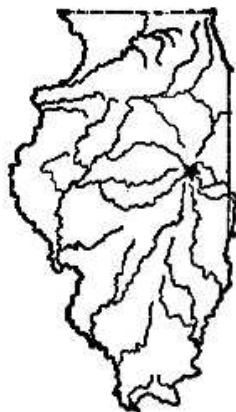
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UNIVERSITY OF ILLINOIS
Agricultural Experiment Station

BULLETIN No. 179

A BIOCHEMICAL STUDY OF NITROGEN IN
CERTAIN LEGUMES

By ALBERT L. WHITING



URBANA, ILLINOIS, MARCH, 1915

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A BIOCHEMICAL STUDY OF NITROGEN IN CERTAIN LEGUMES¹

BY ALBERT L. WHITING, ASSOCIATE IN SOIL BIOLOGY

INTRODUCTION

The investigations considered in this publication bear on the biochemical nature of the element nitrogen, especially as concerns its fixation and assimilation thru the symbiotic relationship of *Bacillus radicicola* and certain members of the botanical family known as Leguminosae.

The sources of the element nitrogen available for agricultural purposes are numerous. Of these the atmosphere is by far the most important and most extensive. Above each acre of the earth's surface there are about 69 million pounds of atmospheric nitrogen, and science has shown that by thoroly scientific systems of management this nitrogen may be appropriated for soil improvement at a minimum expense. By growing legumes, atmospheric nitrogen may be obtained at a low cost, often at no net cost, for most agricultural leguminous crops are worth growing for feed or seed alone. In commercial fertilizing materials, nitrogen costs from fifteen to twenty cents per pound, an amount from two to five times greater than that expended for any of the other essential elements of plant food. It is of passing interest to note how greatly disproportionate the cost values of these elements are to the relative supplies, when the nitrogen in the air is considered.

The United States spends annually, abroad, over 32 million dollars in the purchase of combined nitrogen for use in various operations, agricultural and otherwise.² Of this amount 16½ million dollars are expended for the purchase of sodium nitrate, which is the

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²Norton: Special Agent Series, Dept. of Commerce and Labor, Bur. of Manfr., No. 52, 9-11.