THE AGROBIOLOGIC TEST FOR NORMALITY IN FERTILIZER
EXPERIMENTS AND VARIETY COMPARISONS:
I. VARIETIES1

O. W. WILLCOX2

IN PREVIOUS contributions to this Journal, the writer has
subjected a number of published field experiments with fertilizers
to agrobiologic analysis. These experiments included cases where the
yield data conformed to the Mitscherlich law of normal crop increase
as expressed in the normal yield equation \( y = A(1-e^{-0.301x}) \), and
other cases where the yield curves were more or less distorted by
adverse conditions of plant nutrition. The general intent of these
contributions has been to explain the use of the standard yield dia-
gram and the yield-depression diagram and how field experimenters
might employ these diagrams to diagnose certain complex situations,
i. e., to distinguish normal from abnormal cases. One result of these
studies has somewhat perturbed the writer: yield depression due to
unbalanced fertilization and other more or less obscure soil conditions
is greatly prevalent in all regions, and with all crops. Existence of soil
conditions which result in depreciation of normal yields is greatly
restricting the normal interaction between crops and fertilizers and
is denying to farmers the full benefit of their land and labor. It would
therefore appear to be of first importance that agronomists should be
able to recognize and to measure these depressive influences as a first
step toward their correction or removal.

To make the necessary distinction between normality and abnor-
mality the agronomist, in his capacity of field experimenter, will need
to have a full understanding of what the normal condition really is.
Knowing the characteristics of normality, the intrusion of abnormali-
ty will be more immediately and more certainly detected. With this
in mind the choice of subject for the present paper has fallen upon a
recently published field experiment that presents an ideal case of
normality.

This ideal case, showing all the characteristics of normality, is
found in a report by Tolman (1) on the production of sugar beet
seed in southern Utah. Part of this experiment was referred to in-
cidentally in a previous paper (2). For present purposes it will now
be given a more extended treatment. Included in this work was a
variety \( \times \) nitrogen fertilization test. The field data are reproduced in
Table 1 and, after conversion of pounds of ammonium sulfate into
equivalent baules of nitrogen, are plotted on the standard yield
diagram in Fig. 1. This diagram consists of a series of normal yield
curves derived from the Mitscherlich-Baule yield equation in which \( A \)
is the maximum yield that can be obtained on a given field by in-
definitely increasing the amount of the plant nutrient \( x \), the latter
being expressed in Baule units (baules). The \( A \) values of the standard
curves are given running numbers at the top and along the right-

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1Published March, 1946
2Consulting Agrobiologist, Ridgewood, N. J.
3Figures in parenthesis refer refer to “Literature Cited”, p. 224.