NOTE
INTERPRETATION OF OLSEN AND SHAW'S FIELD TESTS BY THE
MITSCHERLICH-BAULE THEOREM AND THE UNIVERSAL
YIELD DIAGRAM

The recent work of Olsen and Shaw\(^1\) on six Ohio soils contains evidence that tends to confirm the currently accepted Mitscherlich \(c\) value (0.33) for the specific effect factor of the growth factor potash. Their figure for this effect factor, 0.34, is the mean of experimental results (pot tests) ranging between 0.26 and 0.49.

They also made a 3-year field experiment on the six soils from which the laboratory soil samples were taken. Their paper, however, contains no discussion of the results of these field experiments in the light of the Mitscherlich-Baule theorem. This omission is regrettable, for two reasons. In the first place, their field experiments are an even better confirmation of the Mitscherlich \(c\) value for potash than their pot tests. In the second place, these field tests clearly illustrate possible uses of the Mitscherlich-Baule theorem as an agronomic tool.

In Fig. 1 seven of Olsen and Shaw's field experiments are graphed on the universal yield diagram. In six of these tests the fit of the field results on the theoretical curves is seen to be fairly good. (The one apparent exception will be discussed farther on.) These fits offer a substantial confirmation of the potash factor 0.33 and the derived value of 82 pounds, acre basis, for the Baule unit of potash. (By definition,\(^2\) 1 Baule unit of a growth factor is that amount of it that will produce one-half (50%) of the total yield that might be produced by extended application of the growth factor).

The universal yield diagram here shown consists\(^3\) of a series of Mitscherlich curves, numbered 6 to 17, which have been calculated for different values of \(A\) (6.0, 6.5, 7.0, 7.5, 8.0, etc.), using the Mitscherlich-Baule universal yield equation \(\log (A - y) = \log A - 0.301x\). In this equation 0.301 is the Mitscherlich-Baule constant value of \(c\) which is applicable to any growth factor \(x\), when \(x\) is expressed in Baule units.

For evaluating a field test by the Mitscherlich-Baule theorem with the object of determining the amount of potash in the soil, it is necessary that yields be expressed in units of dry vegetable substance, and the amount of potash employed in Baule units. Olsen and Shaw report their yields as bushels of corn and pounds of stover. Converting bushels to pounds and adding the result to the weight of stover, we

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\(^2\) Willcox, O. W. A B C of Agrobiology (page 79.)


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