ECONOMIC analysis of yield response to fertilizer rests on the physical input-output relationship—the additional yield resulting from application of each of a series of increments of a plant nutrient. Each increment of application is a "marginal" one, but the intensive margin per acre in economic terms is the one at which the added return just equals the added cost. Marginal returns are higher but net returns per acre are lower, at lower rates.

There are many facets to economic analysis because "most profitable" use of fertilizer is not a static concept even under a condition where the physical relationship between use of more fertilizer and crop yields is constant. When restricted to the crop in question, analysis of profitable levels of fertilizer use is a matter of estimating either the most profitable rate per acre, or of finding the rate for highest return on the total outlay needed to grow the crop. The former represents the "maximum" economic rate—that for most profit with respect to fertilizer applied on a specified acreage. The latter may be regarded as the "minimum" economic rate—that for most profit on a specified amount of capital used to grow the crop, or the rate for minimum unit cost. Determination of this rate involves knowledge of the other costs.

The concept of profitable use of fertilizer takes on added dimensions when it is a question of dividing a total budget among many different items throughout not only a cropping system, but the farming system. Then the problem is to allocating budget so that the return per dollar item of expenditure is the same. However, this is restricted to consideration of the crop.

PROCEDURE

An economic analysis of fertility experiments with Coastal and common bermudagrasses with crimson clover and (2) Coastal and common bermudagrasses without crimson clover on Cecil sandy loam soil, class II land, at Watkinsville, Georgia. The analysis is based on 3-year average means of the period 1955-57.

The experiment with Coastal bermudagrass and crimson clover included a 4 X 4 X 4 complete factorial with rates per acre of 0, 100, 200, and 400 pounds of N; 0, 21.75, 43.5 and 87.0 pounds of P; and 0, 41.3, 82.6 and 165.2 pounds of K. There were 3 replications. Reported yields for the 2 years 1955 and 1956 have been published (1).

The experiment comparing Coastal and common bermudagrasses both with and without crimson clover included 10 fertility levels and 4 replications. Reported yields have been published (2).

The Yield Function Used

The fertilizer-yield relationship was established using the form of the exponential yield equation developed by W. J. Spillman (6). In simplest terms the equation is:

\[ Y = M(1 - R^x) \]

in which Y represents the crop yield, x, the quantity of fertilizer applied, R, the ratio each increment in yield

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1 Contribution from the Farm Production Economics Division, Economic Research Service, and the Southern Branch, Soil and Water Conservation Research Division, Agricultural Research Service, in cooperation with the Georgia Agricultural Experiment Station. Received Sept. 3, 1963.
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