ELSEWHERE in this issue of AGRONOMY JOURNAL is a series of three papers by Black, Kempthorne and White entitled, Willcox's Agrobiology, I. Theory of the nitrogen constant 318; II. Applications of the constant 318; and III. The inverse yield nitrogen law.

These three papers and the following replies relate to quantitative agrobiology, a new branch of study that for some years has been taking form as a specific discipline within the general science of plants. The subject matter of quantitative agrobiology, in distinction from descriptive ecology and descriptive plant physiology, comprises the general and specific quantitative relations between plants and the outer factors of their growth and yield. It may be said that quantitative agrobiology bears to these descriptive branches of plant science the same relation as quantitative analysis bears to qualitative analysis in chemistry. In organizing this discipline, quantitative agrobiologists have taken cognizance of certain previously little known principles or natural laws of the plant world, and therefrom have arrived at certain conclusions.

In brief, the basis from which the quantitative agrobiologists proceed may be summarized as follows: It is commonly known that all rooted and green-leaved plants require the support of a limited group of chemical and physical agencies in order that they may grow and yield vegetable substance. These agencies are called growth factors and include temperature, light, water, carbon dioxide (from the air) and a small number of chemical substances in the soil such as nitrogen, phosphorus, lime, sulfur, magnesium, manganese and a few others. It is also commonly known that the quantity of plant growth will be proportional to the quantities of these growth factors available to the plants.

If the environment is well supplied with these growth factors, growth will be exuberant, and the yield of vegetable substance large; in the contrary case, growth will be poor and the yield small. Operations in quantitative agrobiology are directed toward ascertaining the quantities of vegetable substance that result from a given combination of growth factors, e.g., the amount of yield that follows application of a given amount of a certain fertilizer under given environmental conditions on a unit area of soil.

It is furthermore commonly known that the growth and yield of all kinds of plants are subject to the law of diminishing returns, which is here more correctly described as diminishing increments of yield in agriculture. Every farmer knows that application of a small amount of fertilizer will somewhat improve the yield of a “poor” soil, and that more fertilizer may induce more yield. But it is very well known that this improvement does not continue indefinitely; there always comes a point when more fertilizer, or water, or other growth factor ceases to stimulate further plant growth. In other words, it is clearly impossible to produce an unlimited amount of vegetable substance on a unit area of land in one cycle of plant life.

Because the law of diminishing increments of yield thereby imposes an inexorable limit on the yielding abilities of any conceivable soil, the quantitative agrobiologist is primarily concerned...