fixed by thousands of scientific experiments, that plant food is not merely manure, or fertilizer, or fertilizer chemicals even, but the nitrogen, potash, and phosphoric acid contained in these substances. This is the first idea to fix thoroughly in the mind, and a great deal has been gained when so much is accomplished. Next should be considered the feeding habits of plants, and these are shown largely by the chemical analysis of the whole plant substance of any crop, grain or forage, including in every case the roots, stubble and straw-all such parts as are commonly considered useless as having no sale value. It is well to look into these refuse portions of crops still more closely. While straw, roots and stubble have little crop value in the market, they take up their proportionate amount of the plant food needed for the crop; but, without these comparatively useless proportions the valuable grain or forage as the case may be, cannot be realized. Hence, the plant food required for a certain crop must always include an allowance for the elements contained in the comparatively useless stubble, roots and straw.

The feeding habits of the chief grain crops are shown roughly by the following table, giving the actual plant food required for crops as indicated :

	Bu. per acre	Nitrogen	Potash	Phos. Acid
Wheat	35	60 lbs.	35 lbs.	25 lbs.
Rye	30	52 ''	47 "	27 "
Barley	40	47 "	39 "	22 "
Oats	60	56 **	65 ''	23 "

It is imperative, in order to realize the yields as above, that the crops should have in available form the quantities of nitrogen, potash and phosphoric acid given in the table. It is also well known that crops cannot sweep a soil clean of food, and that all plant food elements must be present in excess of the actual requirement of the crop. Knowing this, the farmer can easily balance his plant food to fit the crop.

Unfortunately, there is a tendency among farmers to use incomplete fertilizers (fertilizers not containing all three of the essential elements of plant food), and to these we must say that the laws of plant growth are inflexible; no one element of plant food can replace another. If any two are present in ample quantities, or even in excess, and one element deficient, the crop is limited by the deficient element, the excess of the other two elements goes largely to waste. In this connection, farmers will do well to scan the composition of the fertilizers offered by dealers, to see if they are not practically incomplete in the sense that one or more elements are present only in very small precentages.

Where incomplete fertilizers are used to grow a legume (plants of the clover type), the procedure is rational, as the object is to favor a heavy growth of the legume, which type of plant not only takes up atmospheric nitrogen for its own uses, but also stores up large quantities in roots and stubble which may be used as plant food for succeeding In this case, potash and phosphates crops. must be used liberally, as the nitrogen cannot be assimilated unless certain quantities of potash and phosphates are present to accompany same in the vegetable substance of the crop. It must be kept in mind, however, that fertilizers for this purpose may be deficient in nitrogen only.

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