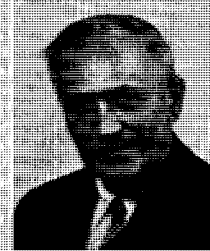


# THE OBSERVATION POST

Philip H. Groggins



## Bank Balances and Crop Fertilization

**M**OST OF US ARE BOTHERED when the bills for Yuletide purchases come in. Later we are annoyed when the bank makes a *service charge* because of the number of checks drawn. In banking, consideration must be given not only to the deposits but also to the withdrawals. To avoid a service charge it is necessary to keep a healthy bank balance or else there's a penalty.

Crop fertilization is a form of banking. To avoid penalties in the form of low crop yields it is necessary to maintain a relatively high level of nutrients in the soil bank. The amount and kind of fertilizers applied need to be related to the withdrawals made by specific crops. Efficient farming necessitates not only careful consideration of the amount of fertilizer used, but also when and how it is applied. The dietary habits of the crop must also be known and nurtured.

A review of crop requirements for fertilizers is now timely. Stemming from NPA activities, there has been an enormous expansion in the facilities for producing fertilizer materials. At the same time we are confronted with the

fact that our farmers are overproducing. Steps are being taken by the Administration to curtail output of certain crops (corn, wheat, and cotton) that are now in surplus. In light of this situation it is interesting to speculate on what the future holds for the fertilizer industry.

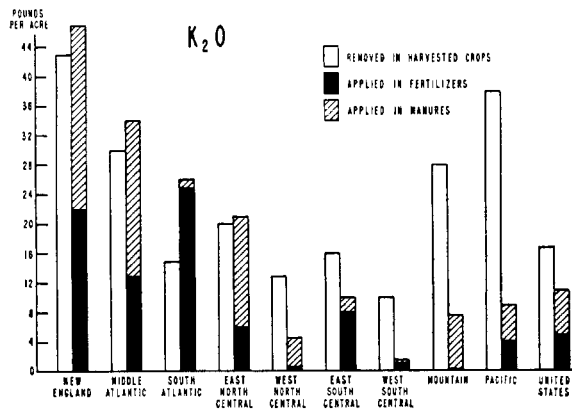
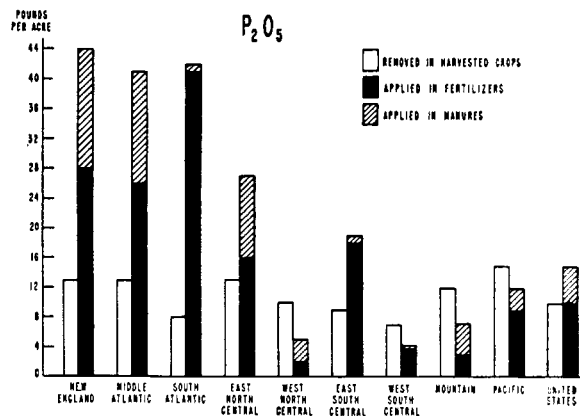
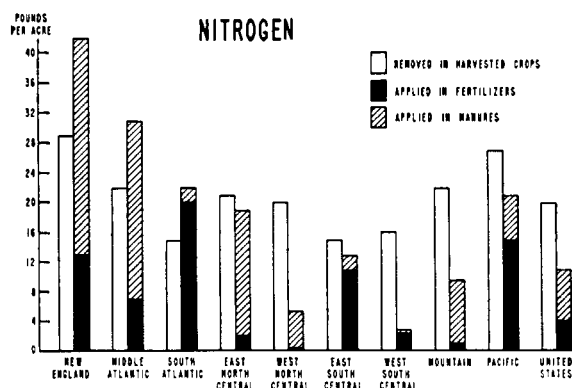
In 1951, A. L. Mehring and R. Q. Parks made a study to determine "Are We Replacing Soil Nutrients Removed with Crops?" Their findings are presented in the three accompanying charts. These show that on a nationwide basis more nitrogen and potash was being removed in harvested crops than was applied.

### High Phosphate Application

Largely because of government soil conservation programs and the knowledge that part of the applied  $P_2O_5$  becomes fixed in the soil the amount of phosphate fertilizer applied was greater than the depletion. The states west of the Mississippi have in general been overdrawing on their soil nutrient account.

It is particularly noteworthy that the

eastern states have found it prudent and profitable to maintain relatively high nutrition levels in their cropped lands. If we assume that these relationships between plant food applications and removals are reasonably satisfactory



Crop	Yield Per Acre	Pounds Plant Food Removed		
		N	P <sub>2</sub> O	K <sub>2</sub> O
Corn grain	100 bu.	95	36	18
	3 tons stover	60	20	80
		155	56	98
Cotton lint, seed	750 lb.	19	18	14
	750 lb. leaves, stalk	14	7	36
		36	25	50
Oats grain	50 bu.	35	15	10
	1.25 tons straw	15	5	35
		50	20	45
Soybeans grain	25 bu.	110	35	40
	1.25 tons straw	15	5	20
		125	40	60
Tobacco leaves	1500 lb.	55	10	80
		25	10	35
		80	20	115

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for efficient crop production, it is clear that deposits need to be from 10 to 50% greater than actual crop withdrawals. It is also clear that several additional millions of tons of plant foods are needed annually in the western states to achieve a comparable soil bank balance. It is recognized that many changes in farming practices have occurred since the survey was made. Both fertilizer applications and withdrawals have been increased. Furthermore, mechanization of farm practices has created larger markets for commercial fertilizers, to compensate for diminution of manures.

In a recent study (Table I) made by the National Canners Association, there is reported the amount of plant foods removed by canning and field crops.

It is of interest to examine the data pertaining to a few major crops to ascertain whether any light can be shed regarding future fertilizer requirements.

With the object of doing some crystal gazing, it would be interesting to assume that plant food replacements for the above crops equaled the withdrawals. The nutrient requirements would then be substantially as shown in Table II. This assumption is not strictly accurate for it does not take into account the return of part of the straw, stalks, etc. It assumes high yields for total acreage. It does not take into consideration the nutrient levels in the soil or the benefits of crop rotation. On the other hand, it does not allow for leaching and other losses which occur.

**Table II**

Crop	Millions of Acres	Thousands of Tons of Plant Foods Removed by Crops		
		N	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O
Corn	80	6,200	2,240	3,920
Cotton	20	360	250	500
Oats	40	1,000	400	900
Soybeans	15	937	300	450
Tobacco	1.6	64	16	92
TOTAL 5 crops		8,561	3,206	5,862

The above figures for nitrogen and potash appear astronomic. Current usage is about 2.2 and 1.9 million tons, respectively. If domestic agriculture applied nearly the amount of fertilizers removed we would be confronted with giant size crop surpluses. Perhaps it would be reasonable to view these figures as estimated requirements for 1975, at which time our population will be around 200 million and our soil banks will have been appreciably depleted.

*With this issue, Dr. Groggins takes leave of the "Observation Post." Guest authors will write the column in the future.*

## ASSOCIATIONS FORUM

### Cereal Chemists Announce Program for Denver Meeting

The American Association of Cereal Chemists has announced the program for its 39th annual meeting which is to be held in Denver May 23 to 27. Titles and authors of scientific papers are listed below. Among the special symposia are "Industrial Uses of Cereal Grains" and "Varietal Wheat Differences."

The meeting is to open on Monday morning with a general session, at which the presidential address will be delivered by R. A. Barackman of Victor Chemical Works. Also scheduled to address the general session are H. W. Clutter of the National Association of Wheat Growers and C. H. Bailey, dean emeritus of the Institute of Agriculture at the University of Minnesota. Mr. Clutter's subject will be "Research and the Wheat Grower." "The Changing Dimensions of Our Responsibilities" is the title of Dr. Bailey's talk.

Other high lights of the meeting will be the presentation of the Thomas Burr Osborne Medal to R. M. Sandstedt of the University of Nebraska (see page 351) at a banquet on Wednesday evening. The medal address will be delivered on Thursday morning. Technical sessions will be interrupted on Tuesday afternoon for committee meetings.

#### Monday Afternoon, May 24

##### Baking Chemistry and Technology

Chairman: REUBEN WAITMAN

HOWARD W. LINCOLN, B. M. DIRKS, and C. G. HARREL. Equipment and Method for Rapid Determination of Moisture in Doughs and Similar Plastic Materials.

H. M. R. HINTZER and H. DE MIRANDA. Investigations on the Baking Quality of Diploid and Tetraploid Rye.

N. N. HELLMAN, BARBARA FAIRCHILD, and F. R. SENTI. The Bread Staling Problem. Molecular Organization of Starch upon Aging Concentrated Starch Gels at Various Moisture Levels.

C. J. DEMPSTER, I. HLYNHA, and J. A. ANDERSON. Influence of Temperature on Structural Relaxation in Bromated and Unbromated Dough.

MERLE SHOEGREN and J. A. SHELLENBERGER. Construction and Use of Micro Baking Equipment.

J. C. BAKER, H. K. PARKER, and K. L. FORTMANN. A Machine for the Continuous Manufacture of Bread Dough.

J. C. BAKER, H. K. PARKER, and K. L. FORTMANN. Properties of Ingredients Used in the Continuous Production of Bread Dough.

#### Tuesday Morning, May 25

##### Methods of Feed Quality Control

Chairman: LOREN V. BURNS

ELMER MODEER and WYLIE HAMILTON. The Determination of Molasses in Mixed Feeds.

MAXWELL L. COOLEY. Progress in Feed Control.

S. F. BROCKINGTON. Survey of Sampling Techniques in the Feed Industry.

##### Cereal Chemistry and Technology I

Chairman: WILBUR S. CLAUS

S. A. WATSON, Yoshiro Hirata, and C. B. WILLIAMS. A Study of the Lactic Acid Fermentation in Commercial Corn Steeping.

ANNE PETERSON, VERA SCHLEGEL, L. S. CUENDET, and W. F. GEDDES. The Effect of Varying Oxygen and Carbon Dioxide Tensions upon the Respiratory Rate, Viability, Mold Count, and Chemical Composition of Wheat.

T. A. OXLEY. Underground Storage of Grain.

R. M. SANDSTEDT, JAMES FLEMING, and J. D. ALLRED. Motion Photomicrographs of the Enzymic Digestion of Wheat, Rye, and Barley Starch Granules.

#### Wednesday Morning, May 25

##### Enzymes

Chairman: LUTHER LYON

W. BUSHUK, G. N. IRVINE, and J. A. ANDERSON. Further Studies on Wheat Catalase.

C. W. OFELT, A. K. SMITH, and JAMES M. MILLS. Effect of Soy Flours on Amylograms.

C. W. OFELT, A. K. SMITH, and JAMES M. MILLS. Proteases of the Soybean.

#### Wednesday Afternoon

##### Industrial Uses of Cereal Grains Symposium

Chairman: GEORGE T. PECKHAM, JR.

GEORGE T. PECKHAM, JR. Introduction to the Symposium.

MAX GOLDFRANK and J. W. EVANS. The Use of Corn Starch in the Paper Industry.

MARVIN L. HUCKABEE. The Use of Corn Starch in the Textile Industry.

J. M. NEWTON. Interesting Little-Known Industrial Uses of Corn Derivatives.

JORDAN V. BAUER. The Use of Cereal Products in Adhesives.

FRANK E. HORAN. Wheat Products for Industrial Uses.