BE YOUR OWN SOYBEAN DOCTOR—AFTER SOIL TEST!

1—Getting Phosphate Boost
2—Using Right Placement
3—Liming As Needed
4—Preventing Potash Hunger
5—Inoculating For Insurance

March-April 1962

20 Cents

Better Crops

WITH PLANT FOOD

Better Crops
WITH PLANT FOOD

The Whole Truth—Not Selected Truth
$1.00 for 6 Issues, 20¢ Per Copy

Santford Martin, Editor
Selma Bushman, Assistant Editor
Barbara Martin, Circulation

Published bimonthly by
The American Potash Institute Inc.
1102 16th Street, N.W.
Washington 6, D. C.

Washington Staff:
H. B. Mann, President
J. W. Turrentine, President Emeritus
J. D. Romaine, Vice Pres. and Secretary
E. D. Dixon, Asst. Treasurer
S. W. Martin, Publications
Mrs. H. N. Hudgins, Librarian

Vol. XLVI Washington, D. C. No. 2

CONTENTS

ON THE COVER

. . . you can be your own soybean doctor, after a soil test, by following some basic fertilization steps: (1) Give your beans adequate boost with phosphate . . . to jump off like the left row, not stragglers like the right row. (2) Place your fertilizer by the safe, efficient band method, 2" to side, 2" below seed. (3) Don't forget your lime . . . such neglect can cause poor crop. (4) Learn what potash hunger looks like and prevent it from happening by adequate usage. (5) Inoculation is good insurance, shown by this contrast . . . left not inoculated, right inoculated. This issue of Better Crops presents several featurettes on soybean progress—as the fastest growing industry, growing quality beans for seed, the search for a hybrid soybean, examples of fertility balance boosting yields, the problems of loss at harvest, and the effect of light on the plant's growth.

FOR FOLKS INTERESTED IN PROFITS!

SOMETHING to interest everyone could well be the theme for America's First National Grassland Field Days and Conference, sponsored by the American Grassland Council and the Pennsylvania Grassland Council, now being planned for Hershey, Pennsylvania on August 15, 16, 17.

The Field Days are being prepared to appeal to all farmers interested in learning how to make greater profits through grassland practices. Drawing thousands of forage-interested farmers, business representatives, scientists, and specialists to Hershey will be the following attractions:

1 **Exhibits**—featuring both educational and commercial displays, including the latest machinery, equipment, and agricultural supplies serving modern forage farming.

2 **Field Demonstrations**—featuring 35 acres of forage plots that carry the viewer from the seedbed to feeding out . . . a complete package of modern methods demonstrated on the farms of the Hershey Estates . . . providing good opportunity to witness new equipment under actual farm conditions.

3 **North American Hay Show**—featuring competitive entries from North America and Canada in the first show of this type held on a continental basis.

4 **Plowing Contest**—featuring the traditional Pennsylvania State Plowing Contest, always interestingly competitive.

5 **Scientific Reports**—featuring two days of indoor discussions on the latest research results reported by international leaders in forage and grassland science.

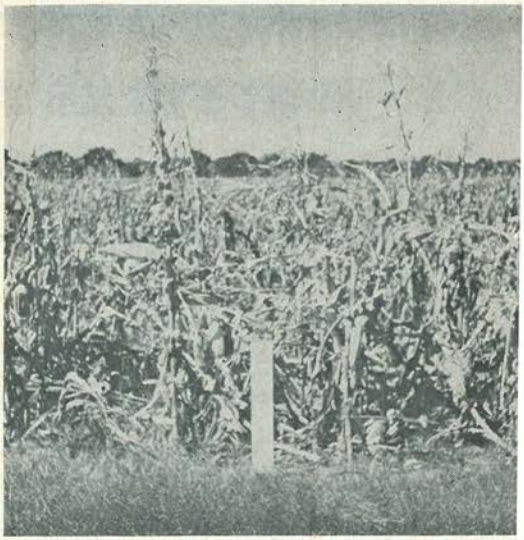
6 **Special Stadium Events**—featuring an address by a national figure, as well as the annual Pennsylvania State Police Rodeo, a traditional attraction.

7 **Land & Air Trips**—featuring guided tours to the various points of interest via bus and the overall panorama via helicopter.

If you desire detailed information for making your plans to attend, write: C. M. Wolgemuth, 173-177 West Chocolate Ave., Hershey, Penna., or J. E. Baylor, Room 316, Tyson Bldg., University Park, Penna.

What Happens?

WHEN CORN AND SOYBEANS NEED POTASH



Without Potash . . .

Corn lodging has been a problem—and yields disappointing.

By Verlin H. Peterson

CORN and soybean producers in Southeast Kansas should determine the limiting factors in their crop production.

Soil fertility is a major problem in this area. Most soils are acid in reaction, low in organic matter and available phosphorus, while the exchangeable potassium content is variable.

Potash will increase soybean yields on many of the soils in Southeastern Kansas. *But farmers fail to recognize deficiency symptoms and refer to the potash starved plants as having a blight.*

Corn responds to potash applications when legume rotations have been used over a period of years, because legumes rapidly deplete the soil of its potassium supply.

Inadequate usage of nitrogen is one of the most limiting factors in corn production. Nitrogen fertilizer will increase yields even in dry cycles. During periods of favorable moisture, 40 to 50-bushel per acre responses are possible.

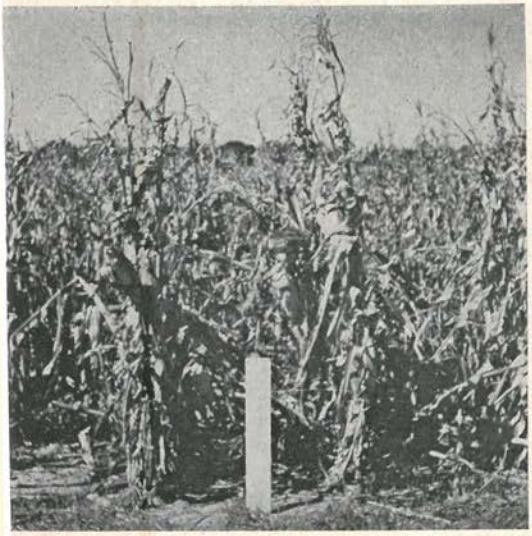
Sound soil fertility programs are based on the use of soil tests. In addition, successful fertilizer usage depends on soil type and cropping history.

Fertilizer alone will not produce high yields. Good management must be employed if fertilization is to become profitable. For example, 100 bushels per acre of corn can never be produced with 5000 plants per acre.

Soybeans Need Potash

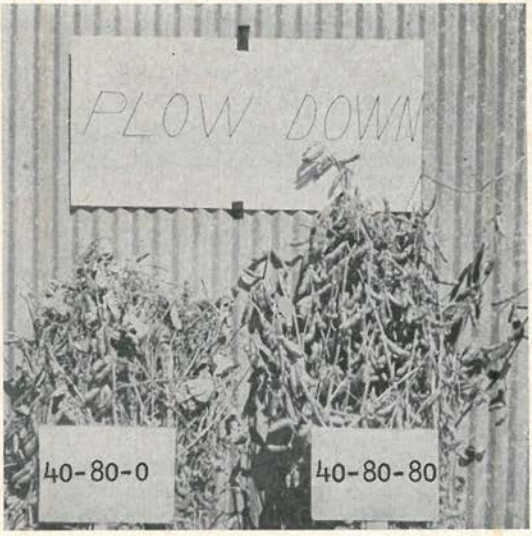
Farmers in the important soybean producing counties of Cherokee and Crawford should be alerted to how inadequate potassium will limit their soybean production. A large number of fields showing potash deficiency is not uncommon in this area.

Soybeans at the Columbus Experiment Field have shown substantial responses to potash in the past decade (Table 1). Outstanding results were obtained during the excellent crop years of 1958-1961. With high production, this trend can be expected to continue.



With Potash . . .

Corn lodging has been reduced—and yields increased.



And on Soybeans . . .

Potash has increased yields, improved pod and seed development—on low-K soil.

Kansas State University

TABLE 1. YIELD INCREASES OF CORN AND SOYBEANS FROM POTASH, COLUMBUS, KANSAS EXPERIMENT FIELD.

	Bu/A	
	Corn	Soybeans
1931–40	1.9	0.3
1941–50	2.8	1.4
1951–60	8.8	3.5
1958–61	22.3	6.7
1961	37.5	8.1

Soybeans at Columbus are grown in a rotation system which rapidly depletes the soil of its potassium supply. The crop sequence consists of two years of alfalfa followed by corn, soybeans, and two years of wheat.

Interesting facts have been established from this research project. Over the past 31 years soybeans have averaged less response to the various fertility treatments than any other crop in the rotation. But when examining 5-year averages, we found that as the experiment progressed yield response increased for treatments which included potash (Table 2).

TABLE 2. YIELD OF SOYBEANS, 1958–1961, COLUMBUS, KANSAS EXPERIMENT FIELD.

	Bu/A
No treatment	28.9
Lime	31.2
Lime, superphosphate	33.7
Lime, superphosphate, potash	40.4

This evidence suggests that a farmer should seriously consider improving the fertility level of his soil as a means of increasing soybean yields. To do this, *he must use adequate fertilizer with each crop in a good rotation system.*

Field tests, also, in Cherokee County have proved that potash will increase soybean yields 6 to 8 bushels per acre on low potassium soils (Table 3). A summary of 1961 soil

test results for the county indicated that 61 percent of the soils tested contained less than 80 pounds of exchangeable potassium per acre.

TABLE 3. YIELD INCREASE OF SOYBEANS FROM POTASH, CHEROKEE COUNTY, KANSAS, 1961.

Method	Bu/A
Plow down	7.8
Broadcast	6.2
Row	7.7

Potash applications are not necessarily reflected by increased plant height. Yield responses in tests were attributed primarily to better pod and seed development.

Potash fertilizer may be applied on soybeans by a number of satisfactory methods (Table 3). But with row applications, extreme care must be taken to separate seed from fertilizer in order to avoid germination damage.

Soybean seed quality is vitally affected by potassium supply. Wrinkled and off-colored seed was produced on many farms in 1961. An application of potash fertilizer would have corrected much of the problem.

For High Corn Yields

One hundred bushel per acre corn is possible in Southeast Kansas. To reach this goal, farmers must use the best hybrid, employ timely planting, control weeds, have a high plant population, and fertilize properly.

Poor stands are holding down corn yields. Farmers should strive for 13,000 to 16,000 plants per acre instead of half this or less. Failure to follow high plant populations with other complimentary practices such as adequate fertilizer usage will result in disappointment.

Soil insecticides must be emphasized for good stands. Properly applied, they will control soil insects such as wireworms and rootworms.

Keeping fertilizer and seed separation is necessary. Because of higher analysis and rates of starter fertilizers used today, "split-boot" equipment increases the danger of germination damage. Sideband placement types should be used.

High operating speeds at planting cause many poor stands. A good even drop of seed cannot be achieved without slowing down the equipment.

Average corn yields have increased 25 bushels per acre with good management at Columbus Experiment Field. All factors just mentioned have been employed in recent years.

High Fertility A *Must*

A combination of all fertility practices is generally necessary for top corn production in Southeast Kansas. In legume rotations, potash is essential (Table 4).

TABLE 4. YIELD OF CORN, COLUMBUS, KANSAS EXPERIMENT FIELD, 1958–1961.

	Bu/A
No treatment	59.9
Lime	76.6
Lime, superphosphate	78.3
Lime, superphosphate, potash	100.6

Yield increases from potash on corn at the Columbus Experiment Field have been impressive in the past decade. Striking results were obtained from 1958-1961 (Table 1).

Potash has been valuable as a starter fertilizer at Columbus. Corn so treated grows rapidly, root growth is promoted, sturdy stalks develop, and leaves are broad and healthy.

Corn lodging has, also, been minimized on plots treated with potash. Under these conditions very little waste would occur if mechanical harvesting were employed.

The successful performance of any major plant food element hinges on the adequate supply of all other nutrients. For example, a potash response on corn cannot be expected if nitrogen is limiting.

Corn growers in Southeast Kansas should increase their nitrogen application rates. Many fields of extremely nitrogen deficient corn exist

each season. Leaves may be fired up to a height of 3 to 4 feet.

Apprehension of adequate nitrogen usage exists among many farmers because of the drouth factor. But evidence from the Columbus Experiment Field proved that during the dry years of 1953-1957 corn yields were not reduced by nitrogen fertilizer (Table 5). Yield increases were rewarding from 1958-1961 due to abundant moisture.

TABLE 5. YIELD INCREASE OF CORN FROM NITROGEN, COLUMBUS KANSAS EXPERIMENT FIELD.

	Bu/A
1953–57	8.6
1958–61	26.2

In Conclusion

1 Potash is frequently needed on soybeans. Special consideration should be given to potash usage on early plantings and on fields where soybeans are planted two to three years in succession.

2 Potash will increase corn yields, depending on the type of cropping history. Responses are most likely following legumes.

3 Fertilizer applications should be made on the basis that every year will be a good year moisture-wise. Fertilizing for the average year does not produce top yields.

THE END

QUALITY BEANS FOR SEED

FARMERS can grow better quality soybeans for seed if they give attention to date of planting and time and methods of harvest, according to Detroy Green, instructor in field crops at the University of Missouri.

Field studies by Green indicate late planted soybeans produce highest quality seed beans. Also, the late planted beans have a higher percent of field emergence.

Seed from soybeans planted late—on June 10 or later at Columbia—had the highest field germination when planted the next spring. Green points out that soybeans planted late mature after the hot, dry summer weather and produce seed with higher field emergence.

Delaying harvesting after the soybeans are mature also decreases seed quality. Green says soybeans should be harvested when they reach a moisture content of about 12 to 14 percent. After soybeans reach this dryness, even a slight rain will sharply reduce the field germination of beans saved for planting.

Delaying harvesting until the beans reached 10 percent moisture or below reduced the number of "whole live seed" by as much as 15 percent. "Whole live seed" was reduced by 35 percent if the beans were rained on after reaching 10 percent moisture content.

"Whole live seed" takes into account the number of unbroken beans and field emergence of the beans.

Operating the combine cylinder at high speed also cut speed quality, Green says. Slowing the cylinder speed from 900 to 500 r.p.m. increased the "whole live seed' by 18 percent.

Green points out that proper harvesting methods can preserve but cannot improve quality of soybeans in the field.

Soybeans can be planted as late as June 15 in Central Missouri without much drop in yields, Green says. Farmers producing soybeans for seed might want to delay planting of those beans so they would mature after hot summer weather.

These results were obtained in two years of research at the University of Missouri.

Missouri News

GEORGE D. SCARSETH is dead—from a heart attack suffered at his home in Lafayette, Indiana.

The name of Dr. Scarseth is well known to the scientists of American soils and to many farmers who put that science to work. It is remembered for two things:

1 His unusual ability to define sound farming in a way that any man could understand and identify with his own experiences.

2 His refusal to separate his philosophy of living from his scientific quests.

A good example of the first characteristic—the clarity of his pen—is a Scarseth article the American Potash Institute recently published (one of his last reports) on "Some Basic Principles of Corn Fertilization." Simply written but thoroughly inclusive of the subject he was pursuing, Dr. Scarseth set down some ABC's of successful corn fertilization—why nitrogen, why phosphate, why potash, and what to do with them.

A good example of his second characteristic—a philosophy of life mingled with scientific advice—is a talk Dr. Scarseth made not long ago to the annual banquet of the Western Farmers Association. His theme was how to be a short-cutter: Not a lazy farmer—but a smart farmer who becomes a short-cutter by omitting some useless work. In other words, a more efficient farmer who can adjust to new ways. Dr. Scarseth likened this efficiency to the smartness of a fox—and the hunt (the men, the hounds, the chase) to life itself.

He explained that you had to give the hounds a profit motive—let them catch the fox once in awhile or they won't hunt.

For competition he said, "The dogs like to go hunting together but when it comes to catching the fox, the hound

HIS "BARK" WAS HIS BOND

hopes 'tonight I might catch him on a turn nearer to me.' "

For results he said, "The short-cutter found it smarter to cut across the ravine and to intercept the trail where it was hotter. He was silent when seeking (doing research), while the other dogs bragged on the long, rocky trail, and voted to stay in the old rut. When the short-cutter discovered the new hot trail, he published his Dog Bulletin with a knowing bark. The pack heard him and knew his bark was his bond—highly reliable. The pack changed their way by abandoning the old trail to hurry forward to the enterprise of catching the fox. One or two dogs lingered to bark on the old trail, because it was the way they had done things before. Since no one paid them any attention and they never caught a fox, they eventually gave up the fox hunt and became rabbit hunters."

He then urged his listeners not to be rabbit hunters but "to know the facts and adjust to do things the easiest way . . . realizing that where nobody learns a better way than that of the group, nobody does a better job than before."

Such language—and thought—were characteristic of Dr. Scarseth.

Born on a Wisconsin farm, he graduated from the University of Wisconsin in 1924. From that day until the afternoon of March 20th this year, George Scarseth went out to see the world—and saw it!

1 As a graduate student at Ohio State, receiving his Ph.D. in 1935.

2 As a specialist testing dairy cattle and conducting soil surveys in Wisconsin.

3 As a soil chemistry worker on the Connecticut Agricultural Experiment Station staff.

4 As a soil chemist in Central America for the United Fruit Company.

5 As a teacher and research specialist at Auburn University.

6 As chairman of the Agronomy Department at Purdue University.

7 As a collaborator with the Soil Conservation Service, as well as consultant to a company engaged in foreign commerce.

8 As a tropical agronomist with the office of Foreign Relations.

9 As Director of the American Farm Research Association, the post he held at the time of his death, and as Agronomic Consultant to the University of Alaska.

Whether advising folks in the steaming shadows of a Honduras jungle or on the frozen slopes of Alaska, George Scarseth knew the soils of this earth. He has now returned to them, leaving a legacy of clear and simple suggestions on how best to use them as long as man has them to use.

He will be missed on the agricultural scene of America.

THE END

FERTILIZER AND LIME EXPRESS...

By W. K. Griffith
Washington, D. C.

WHAT is the future of fertilizer usage in the Northeast? Big increases? Decline? Or status quo? Some say the area will do well to hold its own. Others are more optimistic. No one speaks with complete certainty, of course, but a careful look at the situation may provide an educated guess.

On one side of the ledger, farmers are faced with increased production costs—as land, labor, and machinery costs are continually rising.

Agricultural acreage is decreasing. Since 1951, the 13 Northeast states have watched urbanization, industrialization, highways, and parks eat away about 10.8% of its cropland acreage—from 21.9 to 19.5 million acres. In addition, future government programs could play a role in fertilizer consumption.

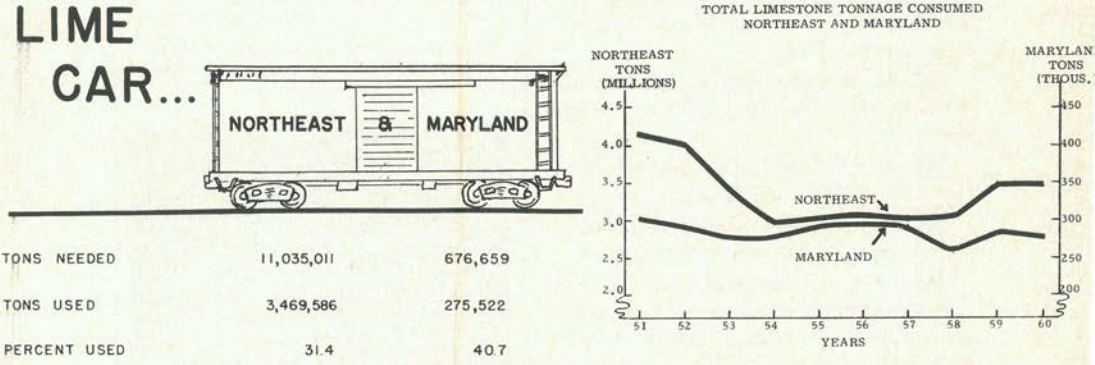
On the other side of the ledger, higher costs and greater competition make it more important today than ever before that farmers produce efficiently. High yields per acre through the use of the latest cropping practices and increased fertilization help meet this need.

Fertilizer is a bargain on today's market. Plant food has increased only 10 to 11% in price since 1940, while feed costs have climbed 100%; machinery, 116%; and wages, over 300%.

Scientific research results, showing the benefit of fertilization, now flow to the farmer in more abundant, more palatable form than ever before—through every media from educational programs and publications to progressive dealers and industry representatives.

A look at the above factors and the direction that past trends point help to determine where we now stand and may be going in Northeast fertilizer consumption. Such a look can be like a trip on a train. Let's call it "The Fertilizer and Lime Express." We board it at Farmer Practice, Maryland, and make the trip to Recommendation, Northeast USA.

Along the way we see three major scenes (or factors) involving fertilizer



LIME: Running 7½ million tons short for the region, 400,000 tons for Maryland. Showing familiar U-shaped decline and rise for region, more consistent usage for Maryland.

usage in the Northeast: (1) The great gap between tonnage used and tonnage needed, (2) The tremendous fertilizer potential on forage crops, (3) The traditional lag in farmer adoption of college recommendations—all from a train carrying much less than half a cargo.

ALL ABOARD!

. . . For Special Northeast report delivered before Maryland's Annual Lime and Fertilizer Conferences

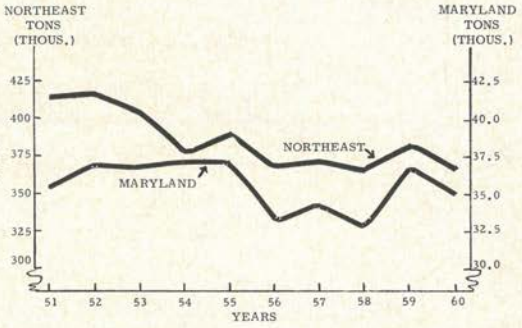
Lime Trend (10 years): It has moved from over 4 million tons in 1951 down to just above 3 million tons in 1954 and back up some by 1958, showing the familiar U-curve in the Northeast. Maryland usage was more steady. Though the trend is up again, we have a long way to go to meet our basic needs.

Phosphate Usage: A car less than half-full. Though its capacity is 1.1 million tons in the Northeast, we are using less than 270,000 tons P_2O_5—*only 23% the amount needed.* Maryland usage is some better, 47.9% of the P needed or 29,000 tons out of the 60,000 tons recommended.

PHOSPHATE CAR.....

TONS REQUIRED	1,137,411	60,663
TONS USED	267,832	29,031
PERCENT USED	23.5	47.9

TOTAL PHOSPHATE TONNAGE CONSUMED
NORTHEAST AND MARYLAND



PHOSPHATE: Running 870,000 tons short for the region, 31,000 tons short for Maryland. Showing general decline even in face of 75% of 1958 soil samples testing low to medium P_2O_5.

Total Tonnage—and Trends

Lime Usage: A car less than one-third loaded. It is the lead car on this train, because lime is first in any successful fertilizer program. Though its capacity is 11 million tons in the Northeast, we are using less than 3½ million tons limestone—*only 31.4% of the amount needed.* Maryland farmers are doing a little better, using 40.7% of the amount needed or 275,000 out of the 676,000 tons recommended.

Phosphate Trend (10 years): It has shown a general decline in the Northeast, though Maryland has remained fairly constant, except for the decrease between 1956 and '58. Such decline puzzles many people since 75% of the soils tested by the 13 Northeast states in 1958 showed medium to low in P—varying by states, of course, with Maryland showing 58% and both Pennsylvania and New York showing over 85% medium to low in P.

Potash Usage: A car less than one-fifth full for the region. Though its capacity is 1,171,124 tons in the Northeast, we are using 229,622 tons K_2O—*only 19.6% of the amount needed.* In Maryland the story is slightly better, with 26,549 tons used out of 72,103 tons needed—but still only 36.8% of the amount needed, even after 69% of the soils tested in 1958 showed medium to low in K.

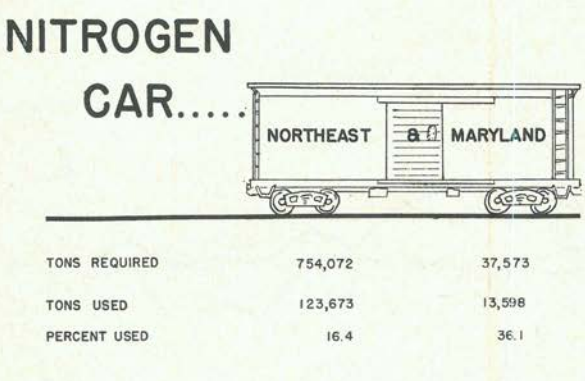
Potash Trend (10 years): It has shown a gradual increase in usage—a 100,000-ton growth for the Northeast, an 11,000-ton growth for Maryland. Yearly changes in both the region and Maryland run an interesting parallel.

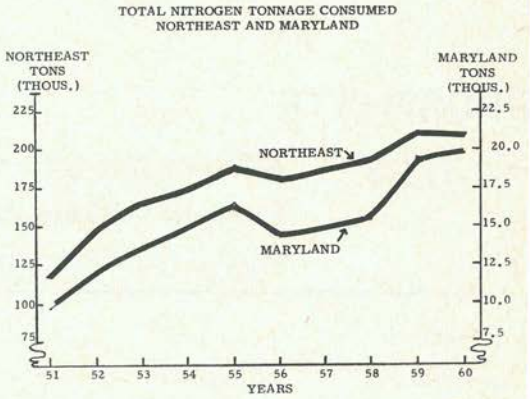
Forage Crops Potential

Out of the 40 million agricultural acres in the Northeast, pasture and hay land covers 75% of this area (30,768,450 acres), while other crops cover 25% of the area (9,406,135 acres).

In Maryland the situation is somewhat similar. Out of 2.4 million agricultural acres, 59.7% (1,500,000 acres) is in pasture and hay, 40.3% (1,000,000 acres) in other crops.

The great fertilizer potential in forages stands out when we contrast the fertilization of row crops with forage crops. For example:





NITROGEN: Running 630,000 tons short for the region, 24,000 tons short for Maryland. Showing a steady upward trend—about a 90,000-ton growth—but still short of the need.

Nitrogen Usage: Another car less than one-fifth full for the region. Though its capacity is 754,072 tons in the Northeast, we are using 123,673 tons N—*only 16.4% of the amount needed.* In Maryland the story is slightly better, with 13,598 tons used out of the 37,575 tons needed—but still only 36.1% of the amount needed.

Nitrogen Trend (10 years): It has shown a general upward trend in usage—a 90,000-ton growth for the Northeast, a 10,000-ton growth for Maryland. As with potash, no leveling off point is indicated.

1 In the Northeast, we are using some fertilizer on 83.7% (nearly 8 million acres) of our row crops, small grains, vegetables, tobacco, etc. In contrast, we are using fertilizer on only 12% (3.7 million acres) of our forage crops. These 3.7 million forage acres receiving fertilizer represent less than half the row crop acres receiving fertilizer, although forage crops cover *three times the land that row crops do.*

2 In Maryland, the picture is some better. By 1958 nearly 90% of its row crops were receiving fertilizer and

50% of its forage crops. But, again in a single state, it was the same old story of forages exceeding other crops in acreage but falling far below them in fertilization.

Recommendation Followers Lag

Not only are we not fertilizing all our land, but that which is fertilized is far below recommended rates. In fact, most farmers traditionally lag behind college recommendations. This is especially true on forages.

For example, in 1958 the Northeast applied only 4.8, 9.2, and 7.6% of the NPK recommended for forages—and for other crops, only 40.4, 58.1, 51.7% of the recommended NPK.

Again, Maryland did better, applying 43.9, 39.1, 22.5% of the NPK recommended for forages and 32.4, 58.2, and 58.5% on other crops.

These figures certainly show what a slumbering giant forages are on the fertilizer potential scene.

Farmers who manage and utilize them properly have proved how forages are basic to the agricultural economy of the Northeast—an area where soil, topography, and climate all suit forages; where a sound livestock industry depends on the low-cost, high quality feed that forages insure; where densely populated sections provide excellent markets for livestock products, especially milk.

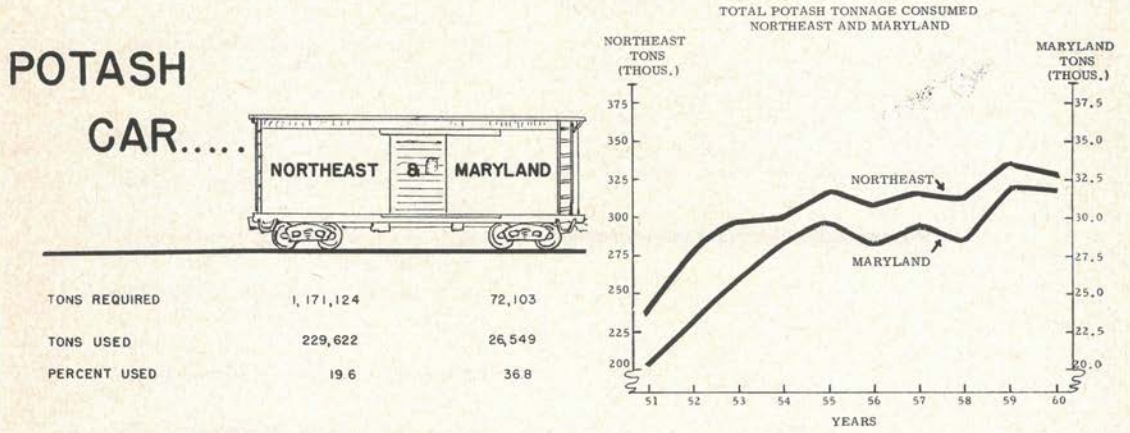
Although forages are an important factor, we still have a long way to go on some of our other crops.

On wheat, tobacco, and vegetables we are doing a pretty good job—but on corn we are using only 25% of the nitrogen, 45% of the phosphate, and 39% of the potash recommended. Soybeans are no better off, receiving only 22% of the phosphate and potash recommended.

Look at it in terms of tons and you quickly see that if corn and soybeans had been fertilized according to recommendations in 1958, it would have meant the usage of about *100,000 more tons of each nutrient.*

Using the same analogy for forages, fertilizer usage would have increased at the almost unbelievable figures of 475,000 tons N, 750,000 tons P, and 800,000 tons K.

In the final analysis, progress depends on the farmer. And although he traditionally lags behind a few years in adopting college recommendations, these recommendations are constantly



POTASH: Running 940,000 tons short for the region, 45,500 tons short for Maryland. Showing gradual 10-year increase—about a 100,000-ton growth—with interesting parallel between region and Maryland.

changing. Two Maryland examples are tobacco and alfalfa. In just 10 years tobacco recommendations have gone from 40 to 60 lbs. N, 80 to 120 lbs. phosphate, 160 to 240 lbs. potash. On alfalfa, phosphate recommendations have increased 10 lbs. and potash has gone up 100 lbs.

Such recommendations should certainly continue to increase, as college scientists develop new varieties, break old response barriers, uncover new usage methods, etc.

This fact, coupled with the vast potential in forage fertilization, seems to point in one direction: A steady upward trend for our Northeast Fertilizer and Lime Express.

THE END

This outlook is based on data secured from the following sources: (1) Facts and Figures for the Northeast (a report prepared by representatives from the 13 Northeast Land Grant Colleges for the Northeast office of the American Potash Institute), (2) Agriculture Statistics, (3) Fertilizer Consumption Reports.

SLUMBERING GIANT

Corn and cotton, barley and wheat,
Headaches each one I needn't repeat.
Acreage controls and plenty in store,
But farmers must live, so they plant more.

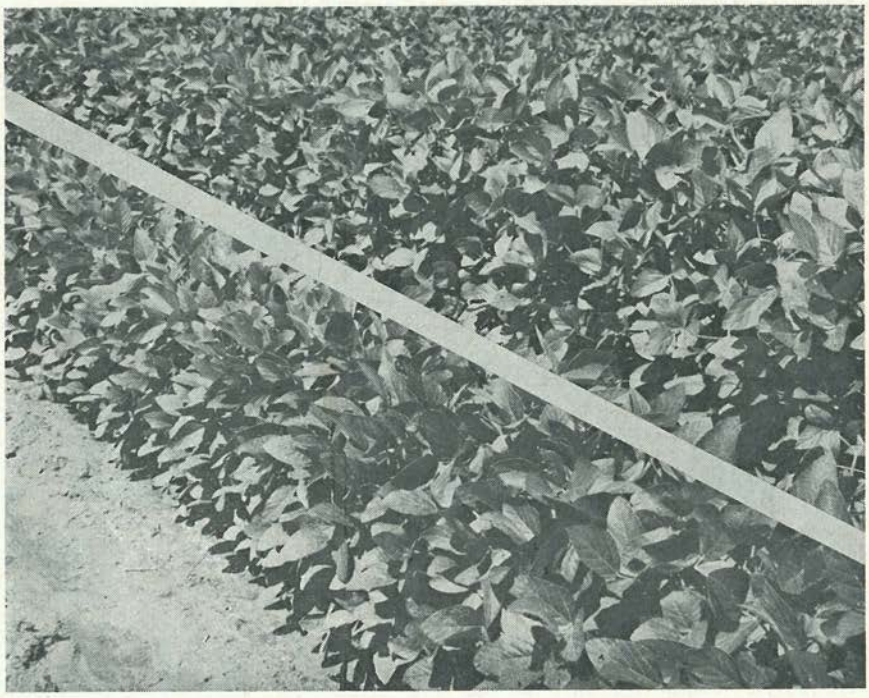
But among our midst awaiting its call,
There's a slumbering giant for one and for all.
From barn doors everywhere, it can be seen,
With abeyant productivity, these blotches of green.

Abused, neglected, and wrapped in tradition,
Biding its time for a moment of decision.
What force is needed, what movement of soul,
For forage to occupy its equipollent role?

The key to awakening, research has revealed,
There's no greater potential in the agriculture field.
A quantity of quality is what we must make,
With fertilization and management being at stake.

Testing the merits of forage, a problem arises,
An animal factor is what this comprises.
But from seeding to harvest and on to the mow,
It's utilization then profits for those who know how.

—William K. Griffith



Typical height comparison of how fertilizer affects soybeans—front row received no fertilizer and back rows received 40 lbs. of phosphate and potash.
(Picture courtesy Arkansas Farmer)

BALANCE BOOSTS YIELDS

. . . reports Arkansas Assistant County Agent Jerry M. Smith

APPLICATION of balanced fertilizer on soybeans has resulted in increased yields and profits for many Craighead County, Arkansas, farmers.

Result demonstrations conducted on farms of medium to low fertility soils show that farmers can expect an increase in yield of 4 to 18 bushels per acre. The 1961 estimated selling price of soybeans was $2.20 per bushel, which meant an increase in gross income of $8.80 to $39.60 per acre.

Consider the results obtained by these three Craighead County farmers.

Clarence Tolbert, manager of the Ralph Sloan farm in the Oak Grove community, received $3 for each one dollar invested in fertilizer. Tolbert applied 0-40-40 to one five-acre plot with no fertilizer being applied to an adjoining five acres.

Hill soybeans were planted May 22. The fertilized area produced 29 bushels per acre compared to 21 bushels for the unfertilized area. The soybean crop was stored and is expected to be marketed later for $2.40 per bushel or $19.20 for the eight-bushel increase. Fertilizer cost per acre was $5.88, which left a profit of $13.32 per acre.

An application of 160 pounds of 0-24-24 on the Harold Housley farm of the Otwell community produced 22½ bushels per acre compared to 18 bushels per acre on an unfertilized area. Fertilizer cost was $5.12 per acre. The value of the additional soybeans at $2.20 per bushel was $9.90 per acre.

Lee soybeans which received 150 pounds of 0-24-24 banded under the row before planting produced 30 bushels per acre on the D. B. Woodard farm in the Bono community. This was 18 bushels more than was produced on an adjoining unfertilized field, for a $39.60 gross return per acre from fertilizer.

All of these farmers have had their soil tested. The tests show their soils to be low or very low in both phosphate and potash. On soils testing medium to high in phosphate and potash no increase in yield could be expected. The response received by farmers in the county depends mostly on the natural fertility level along with other management practices.

These farmers are only examples of many Craighead County farmers who have discovered soil testing shows the need for soybean fertilization.

Arkansas Farmer

HOW FERTILITY LEVEL AND BALANCE CAN INFLUENCE FIELD CORN PRODUCTION

By J. T. Murdock, P. J. Sytangel, and R. E. Doersch

CORN on soils containing inadequate quantities of available plant nutrients generally responds to fertilizer application. But when only one nutrient element is used, disregarding the availability of others, detrimental effects may occur. In fact, lack of response or even yield decreases are often reported from inadequate or poorly planned fertilization programs.

To study problems associated with fertility balance, a field experiment employing 54 different broadcast and row fertilizer treatments was begun in 1959. Here we shall report results from 14 broadcast treatments.

The experiment was conducted on a Waupun silt loam, a Brunizem soil of major significance in Wisconsin corn production and similar to some of the major corn-producing soils of the midwestern states.

The surface soil was low to medium in available phosphorus and potassium and the experimental area had an average pH of 6.1. The broadcast fertilizer applications were plowed down and a 110-day relative maturity hybrid (W-573) was wheel-track planted to establish a population of approximately 18,000 plants per acre.

The area also received a pre-emergence application of Simazine and one cultivation as a weed control measure. Since the field had not been in corn for several years, no insecticide was used at planting time.

Too frequently, corn fertilization results are evaluated solely on the basis of yield and nutrient uptake values without considering its influence on other characteristics of the plant. Such influence may be very important to the farmer. For example:

1 Treatments that hasten the maturity of ear corn may be very helpful in areas where there is danger of an early frost.

2 Treatments which reduce stalk lodging minimize losses in mechanical harvest operations.

Balance Influences Maturity

Many farmers believe that fertilizer applications, especially nitrogen (N) delays the maturity of their corn crop. Since the average growing season in most areas of Wisconsin has fewer than 140 consecutive frost-free days,

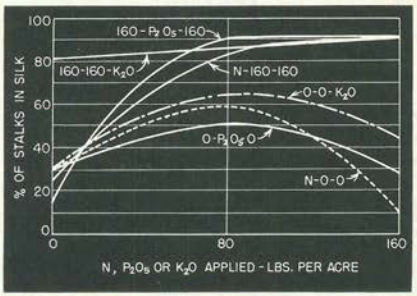
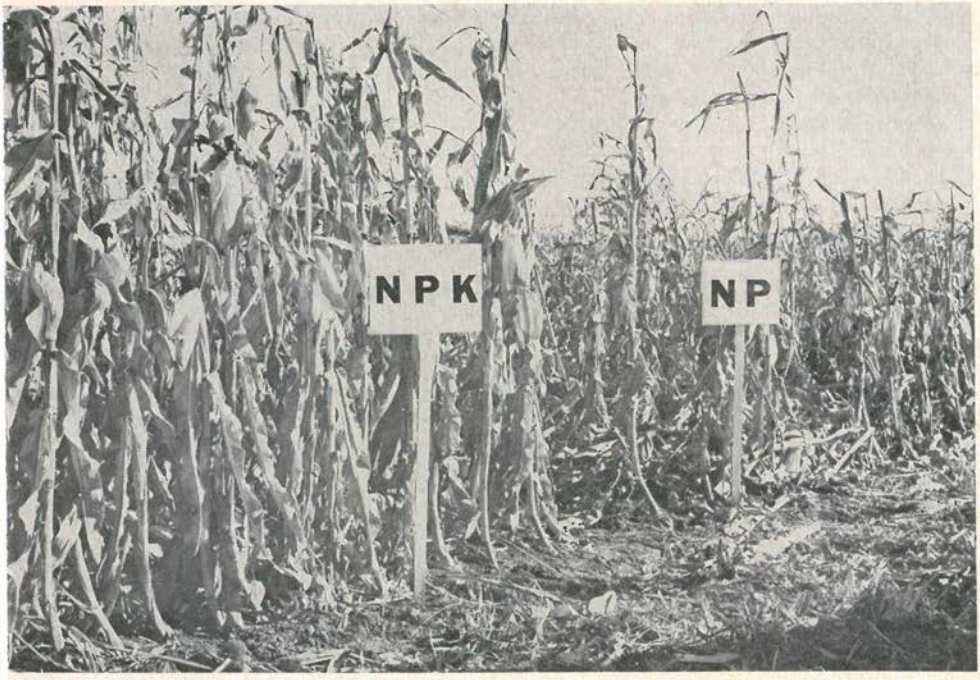


Figure 1—The influence of level and balance of fertilization on the percent of stalks in silk on August 5.



***Left:* 97.8 Bu./A** ***Right:* 85.6 Bu./A**

Soils Department, University of Wisconsin

such concern is understandable. To study the effect of fertilization on maturity, field observations were made on August 5th to determine the percentage of stalks in silk (Figure 1).

When adequate quantities of other nutrients were applied, increasing rates of N or P increased the percentage of stalks in silk. Increasing rates of K with adequate levels of N and P had little effect on the percentage of stalks in silk. However, earlier observations indicated that K application did hasten maturity slightly.

When either of the three major nutrients were applied alone, the percentage of stalks in silk increased slightly from the first increment of N, P, or K. But the second increment of each nutrient caused a decrease in the percentage of stalks in silk. N applied alone resulted in the greatest delay in silking time (approximately two weeks). Later observations showed that this delay in maturity carried through to harvest.

Except in these unbalanced fertility situations, there is no evidence that increasing levels of fertilization delay maturity. In fact, the earliest maturing plants generally produced the higher yields and *exhibited greater nutrient uptake.*

Balance Influences Stalk Breakage

Stalk breakage frequently causes heavy losses in corn production. Any one of many factors may cause it:

Disease, insects, wind, and excessively high plant populations. And low levels of available K have been associated with stalk breakage.

How various fertility treatments affected stalk lodging was observed 40 days after the relative maturity date of the corn. The observations are plotted in Figure 2.

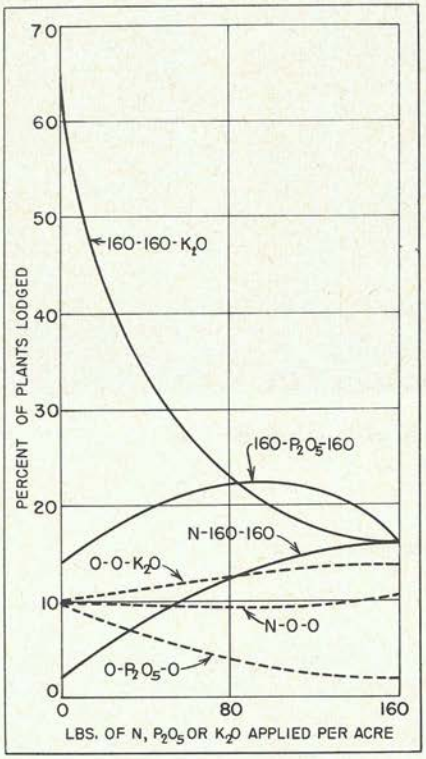


Figure 2—The influence of level and balance of fertilization on the incidence of stalk breakage.

Increasing rates of K greatly reduced the percentage of lodged stalks *when applied with adequate quantities of other nutrients.* Any relationship between stalk breakage and increased ear weight can be discounted because the ear weights were lowest on the treatments that lodged worst. Also, maturity was not involved because this series of treatments had little influence on maturity (Figure 1). But we should point out that a mature ear may occur on a relatively "green" stalk or conversely the stalk may become dry or "dead" before the ear matures. The latter relationship apparently occurred in the above treatment.

Moisture content of the stalks on the badly lodged plots was 15% lower at the relative maturity date than that on plots receiving the complete treatment, while the moisture content of the ears from the two plots was the same.

Microscopic observations of microtome sections of stalks from these plots indicated that there was little visible difference in internal mechanical tissue but that the pith at the first and second internodes of plants on the badly lodged plots was almost completely disintegrated.

We also noted that the plants on plots receiving low levels of K had a poorly developed brace root system. Stalk rot caused these roots to break down quite early in the season.

Increasing applications of N or P with adequate levels of the other nutrients resulted in a slight increase in lodging. This may be partly due to increased ear weight (especially in case of N) or possibly the influence of these treatments on maturity. Treatments that hasten maturity may increase the possibility of early lodging because the stalk loses its elasticity as senescence occurs.

Individual applications of N, P, or K had considerably less effect on stalk lodging than they had on maturity. The fact that little lodging occurred on these plots was generally related to low yields or late maturity.

Balance Influences Corn Yield

Many producers, who have increased their fertilizer usage to boost corn yields, have gotten poor results because they didn't follow recommended fertilization practices. This

study shows some further influence of various fertilizer combinations on corn yields (Figure 3). We found:

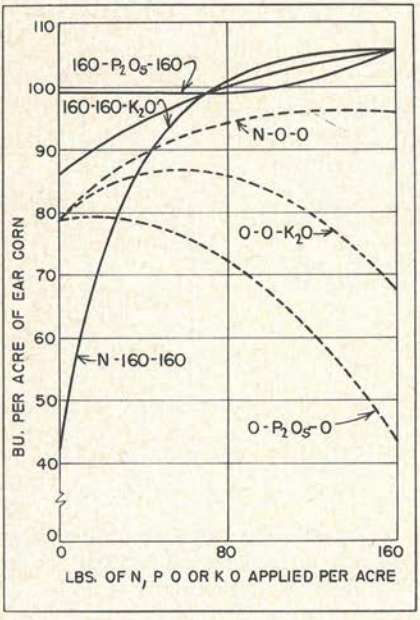


Figure 3—The influence of level and balance of fertilization on ear corn yields (15% moisture).

Excellent response obtained to either N or K when the other two major nutrients were supplied in adequate quantities.

Only a slight yield response was obtained to applications of P even though there was a marked vegetative response to this treatment early in the season. Analysis of soil samples taken at vertical increments to a depth of 45 inches revealed a region of relatively high available soil P beginning at a depth of 25 inches. The time of root penetration to this soil depth correlated well with the stage of growth beyond which the P treatment failed to show appreciable response.

The first increment of N or K applied alone substantially increased yield and the second increment of applied N brought about an additional yield increase. However, the second increment of applied K decreased the yield considerably below that of the check treatment.

When P was applied alone, increasing rates resulted in decreased yields. In this instance, the highest rate of P decreased the yield to approximately 50% of the check treatment. Plants from these treatments showed extreme N deficiency much earlier than those from the check treatment, and this was accompanied by a drastic yield reduction.

Balance Influences Nutrient Uptake

Total nutrient uptake by a crop indicates the ability of plants to secure the necessary nutrients for plant growth. Since nutrient uptake is a function of nutrient concentration within the plant, it reflects partly the nutritional status of the plant. Nutrient uptake is also a function of yield. Thus, the deficiency of one nutrient may result in reduced yields that will influence the total uptake of all nutrients. Figures 4, 5, and 6 show the effect of fertilization on nutrient uptake by the whole plant at maturity.

1 Nitrogen Uptake—Substantial increases in N uptake were brought about by increasing rates of N, P or K, *provided adequate quantities of the other two nutrients were also supplied* (Figure 4). As expected from the yield responses, N applications were most effective in this respect. When either of the three major nutrients were applied individually, both rates of N application and the first increment of applied K resulted in slight increases in N uptake. On the other hand, the second increment of applied K and increasing rates of P brought about decreases in N uptake. The parallel between these nutrient uptake curves and the yield response curves (Figure 3) points out the close relationship between N uptake and yield.

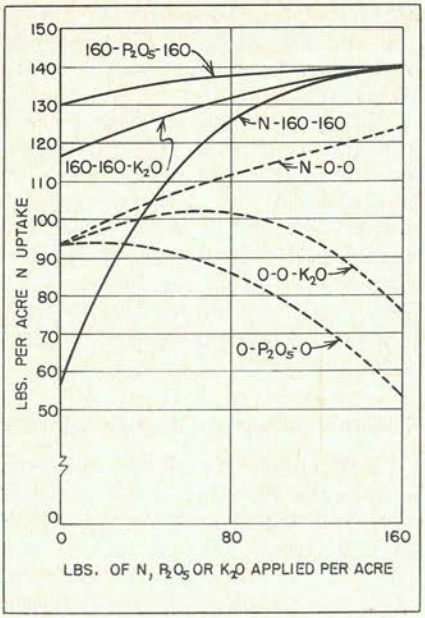


Figure 4—The influence of level and balance of fertilization on total nitrogen uptake at maturity.

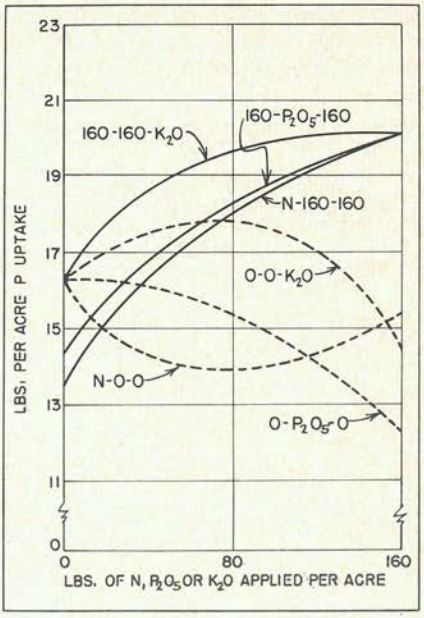


Figure 5—The influence of level and balance of fertilization on total phosphorus uptake at maturity.

2 Phosphate Uptake—Increasing rates of N, P or K fertilization resulted in sizeable increases in P uptake when adequate quantities of the other two nutrients were also supplied (Figure 5). When increasing increments of K or P were applied individually, the shapes of the P uptake curves were similar to those of the comparable yield response curves (Figure 3). However, when increasing increments of N were applied, the shape of the uptake and the yield curves differed considerably. Although the N alone resulted in a sizeable yield increase, it brought about a substantial decrease in P uptake. This may be due to the fact that when high N rate was applied alone it severely curtailed P uptake early in the season. Although this P deficiency resulted in shorter plants and reduced stover weight, the subsoil apparently provided some of the P needed for grain production.

3 Potash Uptake—Substantial increases in K uptake were brought by increasing rates of either applied N or K when adequate quantities of the other two major nutrients were supplied (Figure 6). The K uptake curve rises more sharply with increasing levels of K than the yield response curve for these same treatments (Figure 3). When other nutrients were applied in adequate quantities, increasing rates of applied P had little effect on K uptake. The first increment of K applied alone resulted in a substantial increase in K uptake even though it resulted in only a slight increase in ear corn yield (Figure 6). The decrease in K uptake as a result of the second increment of applied K parallels the yield response curve for the comparable treatments. When increasing increments of N were applied alone, only a slight increase in K up-

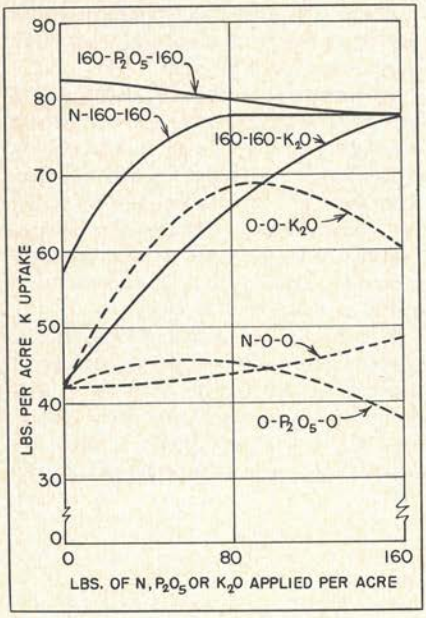


Figure 6—The influence of level and balance of fertilization on total potassium uptake at maturity.

take was evident. Treatments receiving only P showed a slight increase and then a decrease in K uptake with increasing rates. Since the yield response curve for these same treatments (Figure 3) indicated drastic yield reductions, it is evident that the *extreme N deficiency brought about by P application resulted in inefficient utilization of K for this particular yield level.*

Summary

The level and balance of fertility had substantial effects on *maturity, stalk breakage, yield,* and *nutrient uptake* of corn plants. However, the specific ratio of nutrients had little effect on any of these characteristics *unless one or more of the major nutrients was in short supply.*

On the other hand, it should be pointed out that the level at which an individual nutrient became limiting often depended on the level of other nutrients. We reached these conclusions:

1 The relative maturity of corn was hastened by applications of either N or P and to a lesser degree by K, provided the other two major nutrients were adequate level.

2 Either of the three major nutrients applied individually (especially N) delayed maturity of the corn plants.

3 The percentage of lodged stalks was slightly increased by N or P applications, but was decreased by K applications when the other two major nutrients were adequate.

4 Increasing rates of the individual major nutrients applied alone had little direct effect on amount of lodged plants.

5 Substantial yield responses to either N or K and slight yield responses to P were obtained when adequate quantities of the other two major nutrients were also supplied.

6 When any of the three major nutrients were applied individually, yield responses were obtained to applied N and to the first increment of K. However, either level of applied P or the second increment of K applied alone resulted in severe N deficiency and reduced yields.

7 Increases in both N and P uptake resulted from either N, P or K applications, provided adequate quantities of the other two major nutrients were also supplied. Increasing rates of N or K application also resulted in increased K uptake while increasing rates of P had little effect on K uptake.

8 When either N, P or K were applied individually, N uptake curves closely paralleled yield response curves for comparable fertility treatments and P uptake was generally decreased. When K was applied alone, substantial increases in K uptake were obtained but individual applications of N or P had little effect on K uptake.

THE END

FASTEST GROWING INDUSTRY

. . . the soybean

By Peter Edson
Newspaper Enterprise Assn.

THE LOWLY soybean, an unknown commodity to most city slickers, is becoming the glamour crop of U. S. agriculture. It is also a subject of interest to big business as well as to government planners intent on saving the world.

Production of soybeans in this country has shown a larger annual average growth since the end of World War II than any other industry. This is the finding of National Industrial Conference Board of New York. It comes as a surprise to practically everyone and it is important.

The average annual growth rate for all U. S. industry since 1948 is 2.6 per cent. The soybean industry nearly tripled that with a growth rate of 7.6 per cent.

Right behind it are the aluminum industry with 7.5 per cent, life insurance in force 6.7 per cent, synthetic fibers 6.3 per cent, natural gas and electric energy production 5.6 per cent.

Soybeans are now America's fourth largest cash crop behind corn, wheat and cotton, just ahead of tobacco. The United States now produces nearly 60 per cent of the world soybean supply and furnishes nearly 74 per cent of all soybean exports. It is a billion-dollar crop, with every indication of growth.

There is a long range potential that soybeans might revolutionize American agriculture for the better.

As new uses and expanded markets are developed, an increase in soybean acreage and a decrease in corn, wheat and cotton acreage would reduce surpluses of the last three. This could cut government billion-dollar price support, storage and surplus disposal subsidies, saving the taxpayers hundreds of millions of dollars.

There is no government program to make these shifts in American farm production. But the importance of soybeans is recognized. Last year Secretary of Agriculture Orville L. Freeman raised the soybean support price from $1.85 to $2.30 a bushel. This may have helped increase U. S. production by 88 million bushels.

Economist Louis H. Bean has recently completed two big soybean studies for Department of Agriculture, Joint Congressional Economic Committee and Food for Peace agency. They have an important impact for all U. S. foreign aid recipients and U. N. programs in the developing countries.

World population is expected to increase from three billion today to four billion in the early 1970s.

Statistician Bean therefore calculates that in the present decade there will be a world shortage of calories equal

U.S. Industries And How They Grew

Following is a list of the industries included in the National Industrial Conference Board study, ranked by annual average rates of growth (1948-1958) on a percentage basis:

Bituminous coal production	0.3	Sulphur production	2.1
Corn production	0.3	Gross physical output	2.6
Wheat production	0.4	Phosphate rock sold or used	2.7
Potato production	0.4	Petroleum, crude, consumption	3.4
Lead consumption	0.4	Cigarette consumption	3.5
Butter, margarine production	0.6	Paper, paperboard consumption	4.1
Portland cement production	0.8	Rubber consumption	4.7
Cotton consumption	1.0	Motor-fuel demand	5.0
Railway ton-miles	1.0	Margarine production	5.3
Pig iron production	1.1	Electric energy production	5.6
Tangible capital input	1.3	Natural gas production	5.6
Energy fuel production	1.3	Asphalt production	6.0
Steel ingot	1.6	Fiber (man-made) consumption	6.3
Roller iron and steel production	1.6	Life insurance in force	6.7
Copper consumption	1.8	Aluminum production	7.5
Motor vehicle registrations	2.0	Soybean production	7.6

to over a billion bushels of wheat, a shortage of animal proteins in terms of about two million tons of dry milk, and of fats in terms of three million tons of vegetable oils.

"Soybeans as a protein source outrank in volume all the other oil seeds," writes Bean. "For the same protein efficiency, 100 pounds of wheat flour can be replaced by 40 pounds of wheat flour and 5 pounds of soy flour with a reduction in protein costs of over 50 per cent.

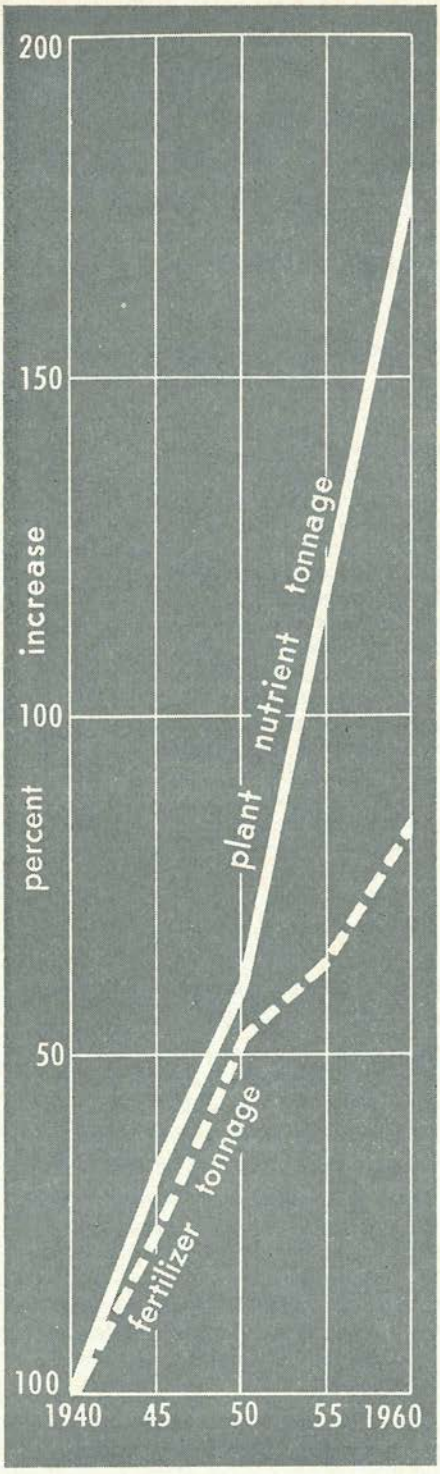
"As a result of technological advances not generally known, beverages for child feeding, nutritionally the equivalent of cow's milk, can now be made from cottonseed flour, particularly soybean flour, and a completely adequate protein supply can be obtained from vegetables."

That sums up the soybean potential about as succinctly as it can be stated. The problem, of course, is to educate more consumers on the use of soybean products, but this is being worked on.

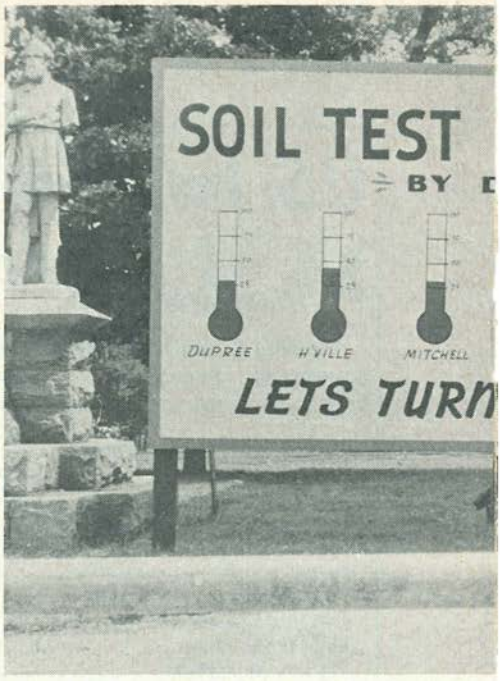
There is a Soybean Council with headquarters in Waterloo, Iowa, promoting new uses. General Mills and other food processors have soy products on the market. Department of Agriculture's research laboratories in Peru, Ill., have developed a number of new soy foods.

The most recent is a soybean gel that can be served hot as a liquid soup, or chilled for a whipped or molded salad or jellied soup.

Waterloo Daily Courier



The trend toward higher analysis fertilizers began around 1950—shown by this comparison.



From signs on courthouse squares to sc stores, Georgia is teaching—*and selling*—the

BLUEPRINTS FOR ACTIO

By P. J. Bergeaux
Extension Agronomist
Soils and Fertilizer

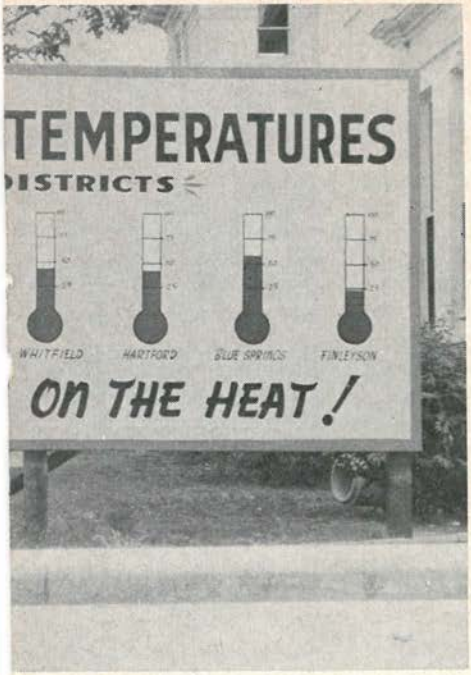
J. R. Jo
Extensio
Dep

DRASTIC changes have occurred in fertilizer and plant nutrient usage over the past two decades. Georgia is a good example.

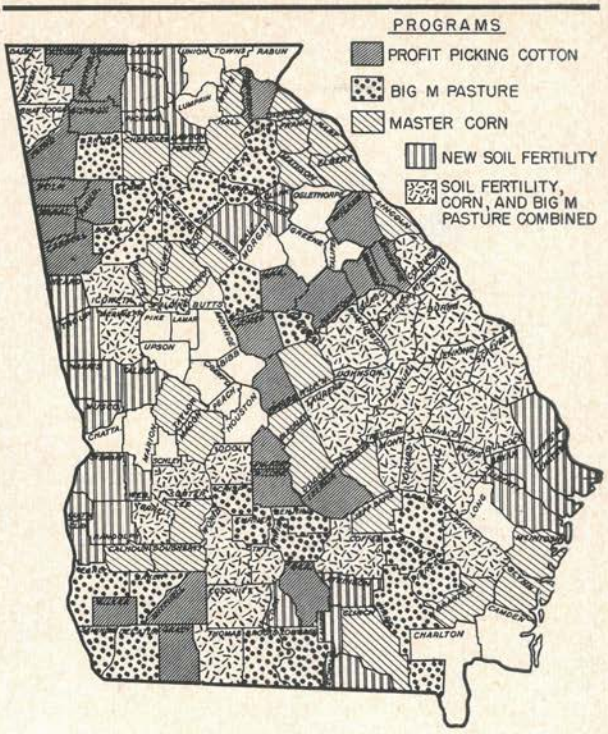
From 1940 to 1960, fertilizer tonnage in this state increased 79% (from 783,000 to 1,401,414 tons), while plant nutrient content increased 181% (from 139,764 to 392,-293 tons).

The major surge in fertilizer *tonnage* occurred in the first decade (1940-50), while the major surge in plant nutrient *content* occurred in the second decade (1950-60). For example:

1 In the first decade, while fertilizer tonnage was increasing 52%, the nutrient content of that fertilizer was increasing 58%. That was the decade of low-potash fertilizers such as 4-8-6, 3-9-6, etc.



il sample pickup stations at crossroads value of soil testing.



A responsive people is clearly reflected in the map above which shows how Georgia has responded to a continuing, expanding effort that proceeds on a county-by-county basis: From the Soil Fertility Program the first year into a Master Corn Program, a Big M Pasture Program, and a Profit Cotton Picking Program the succeeding years.

N IN SOIL FERTILITY

hnson, Head
n Agronomy
artment

University
of
Georgia

2 In the second decade, while fertilizer tonnage was increasing 27%, the nutrient content of that fertilizer was increasing 123%. That was the decade of 4-12-12 and beginning emphasis on 5-10-15 and 0-10-20, etc.

Why?

Why did consumption of such fertilizers as 4-8-6 and 4-8-8 decrease from 567,200 tons in 1950 to 26,000 tons in 1960 and such a fertilizer as 5-10-15 increase from 0 tons in 1955 to 213,000 tons in 1960?

Why did consumption of ammonium nitrate increase from 12,000 tons in 1950 to 95,000 tons in 1960—and anhydrous ammonia and nitrogen solutions from 12,000 tons to 66,000 tons in the same period?

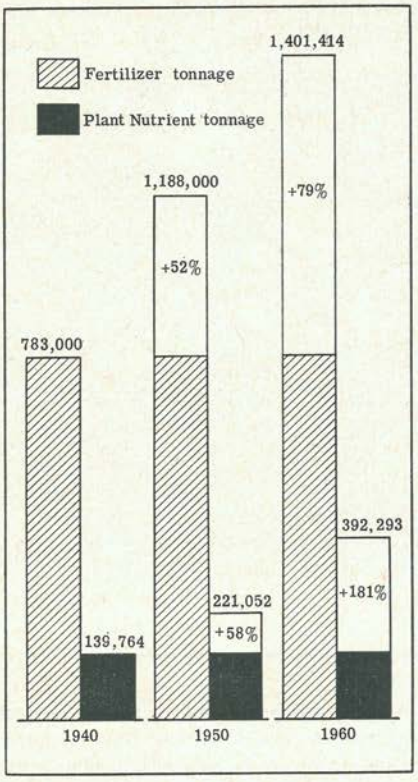
We of Georgia do not claim to have developed the perfect plan for increasing the

. . . AND WHAT CAN HAPPEN!

TABLE 1—ORIGINAL SOIL FERTILITY COUNTIES

County	Gross Income From Crops and Livestock 1957	1960
Colquitt	$14,132,100	$20,000,000
Thomas*	14,771,202*	19,847,121
Tift	7,013,345	9,188,936
Coffee	14,600,000	20,254,200
Laurens	6,728,315	10,312,554
TOTALS	$57,244,962	$79,602,811
		57,244,962
INCREASE		$22,357,849

*1958, since 1957 figures not available.



Compare the fertilizer and plant nutrient increase—1940 to 1960.

people's understanding of soil fertility as an important factor in their economic development. But we do believe the pattern shown in the charts accompanying this report cannot be separated from the educational work our Extension Service performs among the people—especially the Intensified Soil Fertility Program launched five years ago.

In early 1957, the College of Agriculture Extension Service released some figures showing that Georgia farmers—and the whole economy dependent on their barometer—were losing approximately $200 million annually above fertilizer costs by not following fertilizer and lime recommendations and other approved cultural practices on the major crops grown.

Something had to be done, our leadership concluded. But our Extension agronomy staff is small. The state of Georgia is large. We early decided that any action would have to begin with a few agronomists working in a selected group of counties—working intensively with the county agents and all the agricultural advisors and people they could stimulate to join the team.

Out of that decision grew Georgia's Intensified Soil Fertility Program that has moved from 6 counties into 25 into 54 into 109—and by the end of this year into 134 counties. After completing the Soil Fertility Program, each county follows up with a Big M Pasture Program, then a Master Corn Program, and the fourth year a Profit Picking Cotton Program.

Different phases of this program have been reported in many places by many people. But nowhere, to our knowledge, has it been blueprinted for detailed study by other areas interested in boosting their farm economy. For that reason, *Better Crops* magazine has granted here adequate space for us to blueprint our experiences.

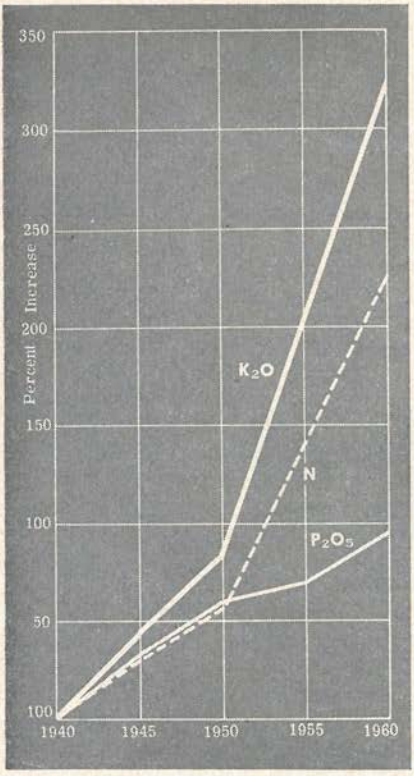
BLUEPRINT 1

. . . proving the need.

It all began in six Georgia counties—Colquitt, Coffee, Tift, Thomas, Worth, and Laurens—in 1957.

At the time our Extension Service announced the $200 million loss, we had many state-wide proofs to give the people. For example, official estimates showed:

1 Georgia soils are low in natural fertility—at the time, 58% testing low in potash, 50% low in phosphate, and 30% below pH 5.5.



Percentage increases of nitrogen, phosphorus, and potassium—by 5-year intervals.

2 The gap between lime and fertilizer actually used and the amount needed was wide enough for anyone to see—only 1,058,544 tons mixed fertilizer used in 1956, while 1,878,000 tons were needed . . . only 300,000 to 400,000 tons lime used, while 2 million tons were needed . . . only 44,000 tons actual nitrogen used, while 222,000 tons were needed.

3 Many farmers were using low analysis fertilizers of the wrong ratios.

4 They were applying far too little fertilizer per acre.

5 And they were getting yields far below their potential—such as 73% less corn per acre than their potential indicated, 78% less soybeans, 35% less peanuts, 41% less lint cotton, 13% less tobacco, and 78% less hay.

We also had the economic values of fertilizer to give the people. Although many farmers know it, they don't stop to think what a real bargain fertilizer is. For example:

1 Its cost (based on plant nutrients) has increased only 10% since 1940, while feed costs have increased 100%, farm machinery 116%, and farm wages 346%.

2 The way to buy fertilizer is to figure cost *per pound of plant nutrient*.

3 Returns from money spent on fertilizer often reach 100 to 300%, compared to the 3 to 6% returns from investments in major corporations.

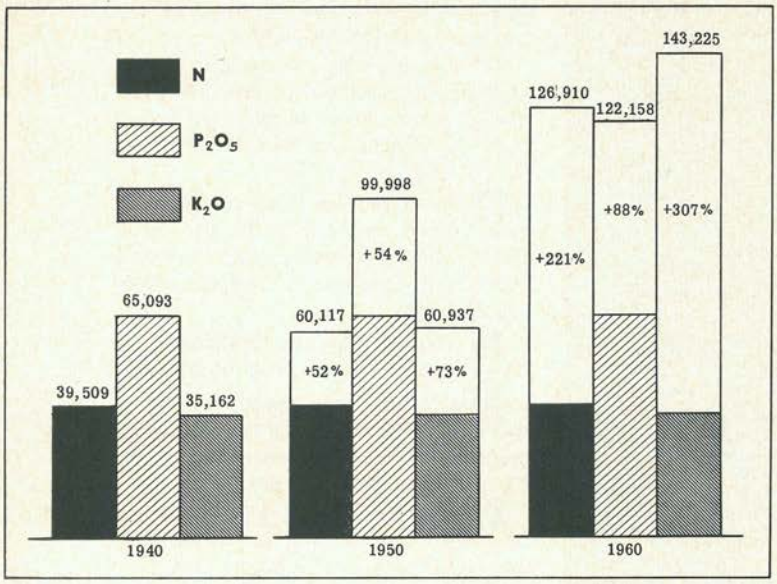
4 The increases from proper usage help get profitable production from less land—reducing land, labor, and equipment costs or what the economists call *unit* (per acre) *costs*.

BLUEPRINT 2

. . . organizing the leadership.

After our Extension Service Administration had approved the idea and the soil fertility research workers had agreed to help with soil testing and research information, the Georgia Plant Food Educational Society assigned six agronomic authorities from industry to work with us. This team—from Extension: Harold Gurley, Ralph Wehunt, and the authors; from Industry: Frank Boyd, David Howe, J. C. Morcock, E. M. Parker, Fielding Reed, Irving Wofford—went into the 6-county area to explain the idea to the local workers.

It was all voluntary. The county agents and their assistants listened, thought it over, and agreed to attend



Increased Use of Nitrogen Phosphorus And Potassium 1940-1960 In Georgia

a training session that gave details: On soil testing, liming, mixed fertilizers, and nitrogen usage, combined with other agronomic practices.

They learned that the job was threefold: (1) To help farmers relate proper soil fertility to their production and ultimate profits; (2) To help the fertilizer industry relate sound educational programs to their business potential; (3) To help local business leaders relate proper soil management to their county's economic future.

They learned that the need must be brought home. This is done by summarizing the fertilizer and lime requirements of each county. Such summaries are based on soil characteristics furnished by SCS, on long-time soil test results, on fertilizer consumption data, on fertilizer and lime research findings, on cropping systems, and other factors. It requires facts from specialists on horticultural problems, on entomology, irrigation, and farm management, *because fertilizer must be used with other good practices to be profitable.*

They learned that teamwork is the *only* key—that Soil Conservation Workers, Vo-Ag Teachers, Home Demonstration Agents, FHA, PCA, and other workers must join the county agents in organizing County Program Development Committees and guiding County Soil Fertility Work Groups. These leading farmers, bankers, merchants, newspaper and radio editors, fertilizer and seed dealers, supply house people, etc., in turn, sell their communities.

BLUEPRINT 3

. . . developing the information.

We learned that the people must have meaningful information to work with. It must be factual. It must be related to *their* soils, *their* crops, *their* county. It must be their proof.

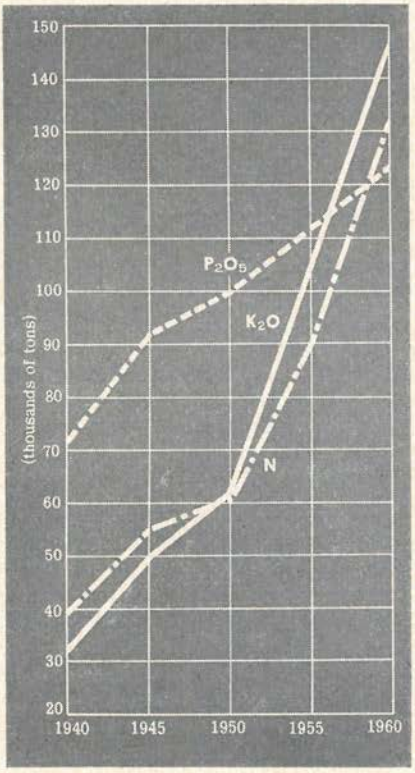
The vehicles for carrying it can run the gamut. It can be spread through slide sets, press releases, radio-TV scripts and interviews, folders, talks

before club meetings, public school chapel programs, bumber stickers, public exhibits, customer letters, billboards, soil-collecting contests, telephone brigades, church pulpits, postcards—even a homemade sign draped over a cow's back at a public auction.

The county agents should be supplied with a master series of slides, soil tubes, and circulars on soil testing, lime, and mixed fertilizer and nitrogen.

The media may differ but the message is the same strong theme repeated over and over. CONTRAST! Contrasting lime *needs* with current lime *usage,* NPK *needs* with NPK *usage,* ratio *needs* with ratio *usage.* Contrasting *current* yields with *potential* yields, *current* net income with *potential* net income.

Results of local winners in the Bale and Half Cotton Club, in the 1,000 Bushel Corn Club, in the Ton Per Acre Peanut Club, in the Big M Pasture Program, in 4-H Club Contests are all bases for good information—as well as carefully planned demonstrations on selected farms and on one total farm per county.



Increase in plant nutrient tonnage—1940-1960 in Georgia.

BLUEPRINT 4

. . . stimulating the action.

We have learned that many segments of county life can promote the county's soil resources. The action must come through the people. A brief look at some of our past experiences will give an idea of what can be suggested and accomplished:

1 Both in-town civic club members and rural community leaders can serve as soil test agents, operating soil sample collection stations, supplying bags and information sheets, stimulating 100% soil test communities where all active farmers of a given community collect samples.

2 These same civic clubs can sponsor a Farmer Fertility Day Program to which each member invites a farm friend to hear an official leader explain the Intensified Program.

3 Home Demonstration Councils can form telephone brigades to stimulate more soil sampling, invite professional agronomists to talk to their clubs, help with 4-H exhibits—and even sponsor Soil Fertility Teas.

4 School teachers can present chapel programs on the theme, while ministers designate a Soil Fertility Sunday, mentioning the program from their pulpits, on their radio talks, and in their church bulletins.

5 Fertilizer manufacturers and

dealers can talk the program with their customers, print reminder-slogans on their letters and invoices, and help sponsor such events as a Soil Fertility Hoedown Square Dance or a Saturday afternoon Fertilecade, floats, bands, and all.

6 Vo-Ag teachers can guide their students with special exhibits and fertility demonstrations based on soil tests, while 4-H Clubs prepare store window displays (sponsored by Chambers of Commerce) and build contests around the soil fertility theme. Both groups can aid in surveying farmers for soil sampling progress.

7 Telephone and utility companies can enclose fertility leaflets in their regular monthly bills, and rural mail carriers can "talk the program" along their route. In our 6-county campaign, nearly 50,000 postcards on soil testing, lime, mixed fertilizers, and nitrogen, as well as 12,000 special nitrogen letters, reached the farmers through such carriers.

8 The ASC office can encourage farmers to take soil samples on all fertilizer cost-share programs, while FHA can base production loans on soil tests.

9 Land-wise SCS specialists can explain how to use the soil map in soil testing programs, as well as prepare articles and interviews on the soil characteristics of their counties.

10 Bankers can mail fertility leaflets to their farm customers and place soil test information sheets and bags on their counters. In some cases, banks have bought radio time at county-wide basketball games to remind farmers to collect their soil samples. These same banks can sponsor meetings on fertilizer economics and personally urge farmers seeking fertilizer loans to follow official recommendations.

Such activity can become contagious. In our case, some counties declared Soil Fertility Weeks, with the local press featuring city and county officials signing the Declaration and the local radio outlet running special announcements.

Specific examples stand out:

Some radio stations went all out. One sponsored five 15-minute programs and nine one-minute spots per day for 8 days, featuring Extension and locally prepared materials and such slogans as "Soil Fertility Gives Growability," even during disc jockey shows. Another featured a Soil Fertility Day, a 12-hour production directed and announced entirely by farm men and women, except for commercials. Still another featured soil fertility for a whole week. Aided by fertilizer firms, hardware dealers, bankers, jewelry merchants, etc., such programs are now annual affairs.

One of our major radio efforts was a special tape, "You and Your Soil," featuring farm leaders, fertilizer dealers, bankers, agronomists, and radio editors explaining the Intensified idea. In the six counties, nearly 400 tapes on various soil fertility subjects were used on radio, featuring about 150 farm and business leaders interviewed by official workers—all in addition to live programs by the county agents' offices.

Many local newspapers produced special soil fertility editions. Supported by many business, farm, and civic groups, these editions ranged from 8 to 20 pages, featuring success stories and special articles from the Extension Service editors working closely with county agents, agronomists, and local editors.

Prominently displayed were endorsement letters from the Governor, the U. S. Senators, the Dean of Agriculture, the Extension Service Director, the State Agricultural Commissioner, the State Farm Bureau, etc.

In addition to downtown window displays, some counties erected large signs on their courthouse squares exclaiming, "Now is the time to take a soil sample!" or "Soil test temperatures by districts . . . let's turn on the heat!" A quick glance told the average citizen

where his community stood in the contest.

It may be corny, but at one livestock sale, a cow was run through the auction block carrying a sign to remind farmers of their soil sampling opportunities. No media should be overlooked.

Of course, a most important action was the farm tours attracting people to see firsthand the many fertility demonstrations on major crops, to see high fertility farms contrasting sharply with neighboring farms.

These tours and the results they featured were covered fully in the press and on radio, because they constituted the basic proof.

BLUEPRINT 5

. . . recording tangible results.

As anyone in farming knows, overnight changes seldom occur. Results are gradual. But we have conducted this Intensified Program long enough now to report some tangible results.

In the six pilot counties, this happened in one year:

1 Soil samples increased over 500%—from 2,200 to about 14,014 samples—under very adverse weather conditions.

2 Total consumption of all mixed fertilizers and materials increased 10.1%—actual plant nutrients 17.5%—as farmers purchased $1,238,000 more fertilizer the first year of the program than the year before.

3 By using 32 to 58% less low-analysis non-recommended fertilizers, farmers saved an estimated $84,000.

4 The greatest increase in high-analysis, recommended fertilizers was with 5-10-15 which surged up 585%—from 3,027 to 19,937 tons in one year—in fact, 92% more in the Intensified Counties during the Program than in the whole state the year before.

5 Much progress was made toward right ratios: Low phosphate-high potash fertilizers increasing from 3.3% of total plant food used in 1957 to 16.6% in 1958, even phosphate-potash decreasing from 90% to 80% of the total, and high phosphate-low potash decreasing from 6.6% to 3.6%.

6 Average nutrient content of mixed fertilizers increased—from 25% plant nutrients to 26.4% the first year—most of it from potash increases.

7 Farmers used about 3,040 tons more actual nitrogen: Ammonium nitrate up 46.5% (from 9,132 tons to 13,381 tons), anhydrous ammonia up to 191.5%, and liquid nitrogen up 9.4%.

8 Lime usage increased three to five times, suppliers reported.

9 And corn yield increased 121% (from 18 bu. to a 39.8 bu. average), while cotton yield rose 56% (from 296 lbs. lint to a 462 lbs. lint average).

But the big question is this: What has happened to the income of these six pilot counties? The figures in table 1 speak for themselves.

By the time the program had expanded into many more counties, we were able to get some clear answers to the two basic questions: (1) Will farmers follow the lime and fertilizer recommendations they receive from soil tests? (2) If so, what happens to their yields and income? From 23 counties, 414 farmers told us this:

1 69% of all crops were limed according to soil test recommendations—with more farmers following recommendations on pastures (81%) and peanuts (77%) than any other crops.

2 Farmers following *lime* recommendations increased their returns over those not following recommendations by the following averages: 5% more peanuts (115 lbs. worth $6.65 per acre *after lime and harvest costs*) and 11% more cotton (61 lbs. lint

worth $13.82 per acre). Corn showed a 3 bu. increase worth around 15 cents.

3 60% of all crops were fertilized according to soil test recommendations or at higher rates.

4 Farmers following *fertilizer* recommendations increased their returns over those using less than recommended by the following averages: 23% more corn (14 more bu. worth $7.85 per acre *after fertilizer and harvest costs*), 28% more cotton (103 lbs. lint worth $24.16 per acre), 7% more peanuts (133 lbs. worth $9.27 per acre), 81% more oats (26 bu. worth $11.74 per acre), and 64% more hay from permanent pastures (1.31 tons worth $15.74 per acre).

Other management factors—such as insect and weed control, etc.—must be credited. But two facts stand out: (1) *Farmers who followed soil test fertilizer recommendations averaged higher per acre yields than the state average for all of the major crops grown in Georgia,* (2) *A convincing 98% said soil testing was valuable to their farm operation.*

Conclusion Via Experience

If anyone finds these blueprints useful enough to adapt to another area, we would conclude with this suggestion:

No one person, no one group alone can turn the tide toward greater efficiency in farming and greater profits per acre of work. It takes teamwork to get action—the farmer accepting and *using* the official recommendations, *all* the county agricultural workers applying their respective skills to the cause, the dealer stocking and selling the ratio-grades called for by soil tests, and the townspeople identifying their own future with the farmer's economic potentials.

THE END

WATCH YOUR EMPHASIS

Georgia has learned many lessons through its Intensified Soil Fertility Program. The most important one, perhaps, is the need to organize your emphasis. They have found the following schedule effective:

1 *Soil Test Emphasis:* Using all media to stimulate taking of soil samples, setting up pick-up stations in key spots, training leaders and 4-H Clubs in how to take soil samples.

2 *Lime Emphasis:* Begin soon after soil testing phase to allow sufficient time for results of soil analysis to be in farmers' hands.

3 *Mixed Fertilizer Emphasis:* Begin after completion of lime phase, time depending on county conditions, but methods same as soil test and lime emphasis.

4 *Nitrogen Emphasis:* Begin after completion of mixed fertilizer phases and approximately one month before time for sidedressing.

5 *Other Cultural Practices:* Seeding, spacing, etc. to be emphasized at appropriate time.

6 *Result Demonstrations:* As many as four per county on lime, mixed fertilizer, and nitrogen following soil test recommendations and weed control . . . assisted by all Extension Agronomists under leadership of Department Head . . . sponsored locally if possible. Results featured through all possible media.

One lady to another: "My husband would never chase after another woman. He's too fine—too loyal—too decent—too old . . ."

"A fine time to come in," stormed a wife to her spouse as he stumbled in at 4 a.m. "I want an explanation and I want the truth."

"Make up your mind, dear—you can't have both."

I try to look out for those characters who want me to put my shoulder to the wheel. Generally it's their wheel, and what they want is a free ride.

Women are as transparent as cellophane and as hard to remove once you get wrapped up in them.

Employer: "Do you and your wife have a joint checking account?"

Employee: "No sir. This is my second wife."

Production would skyrocket if every man worked as hard as he tells his wife he does.

A member of the President's Cabinet was fretting over the time-consuming committees which had been created to advise him on policy. Annoyed by the collective gab-fest at a recent meeting, he exploded: "If Columbus had had an advisory committee, he would probably still be at the dock."

About the smallest package there is, is a man all wrapped up in himself.

Teacher asked the pupils to list the nine greatest Americans and all but Johnny submitted their lists.

Teacher: "Have you finished yet, Johnny?"

Johnny: "Not yet. I can't decide on the catcher."

A woman walked up to a little boy she caught smoking. "Does your mother know you smoke?" she asked.

"Lady," he countered, "does your husband know you stop and talk to strange men on the street?"

Minister: Do you, Evelyn—please let me finish. Do you, Evelyn, take this—let me finish, Evelyn—.

Second Place?

People worried about the United States falling behind Russia might be reminded that in order to "catch up" we'd have to rip up 14 of every 15 miles of our paved highways, junk 19 out of every 20 cars and trucks, tear down seven of every ten houses and rip out 19 of every 20 telephones.

SCALE FOR ESTIMATING HELMINTHOSPORIUM TURCICUM LEAF BLIGHT

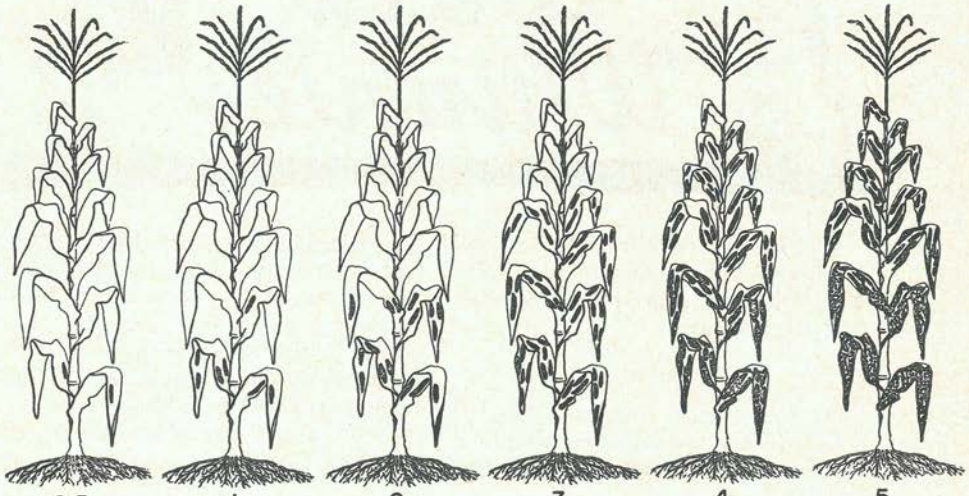


Figure 1

By A. L. Hooker

Department of Pathology

ALTHOUGH the relationship of soil fertility to corn diseases has not been extensively investigated, several workers have reported data on soil fertility and stalk rot.

Additional information is available in relation to the leaf blight, bacterial wilt, smut, and ear rot diseases.

Stalk Rot

Most workers have concluded that the incidence of stalk rot generally increases with fertility level. This was demonstrated in the famed Morrow Plots on the University of Illinois campus in 1961. In the continuous corn plots with 16,000 plants per acre and high fertility, 77.7% of the plants were rotted. Similar plots with low fertility had 28.5% rotted plants.

Frequently stalk rot is more severe when potassium is low in relation to nitrogen. Data showing this (Table 1) were obtained on the Agronomy Soil Experiment Field, Clayton, Illinois in 1951 (Ill. Bull. 658).

TABLE 1. EFFECT OF FERTILIZER APPLICATIONS ON CORN STALK ROT FERTILIZER APPLICATION EQUIVALENTS.

N	P_2O_5	K_2O	Corn Stalk Rot
lbs.	lbs.	lbs.	%
0	0	0	16
80	0	0	40
0	80	0	21
0	0	80	17
80	80	0	49
0	80	80	13
80	80	80	17

Similar data have been reported from tests conducted in Iowa, New York, Ohio, and Pennsylvania. In some cases these relationships are more pronounced with a stalk rot resistent than with a susceptible hybrid, since a susceptible hybrid may be completely killed. *Thus disease resistance and balanced fertility are both important.* In certain soils and seasons the effects of potassium in reducing stalk rot are not as pronounced as those shown in the experiments cited.

Work conducted in New York (Agronomy Journal 50:426-429. 1958) has shown that increasing the rate of KCl decreased stalk rot incidence while increasing rates of K_2SO_4 KPO_3 had little or no effect on stalk rot. These workers found a negative correlation between the percentage of plants with stalk rot and the percentage of chloride in the ear leaf. The Illinois work and presumably that of all other workers reporting the effects of potassium on stalk rot used KCl as the K_2O source. Thus the effect of KCl on stalk rot may not be from the potassium but from the chlorine.

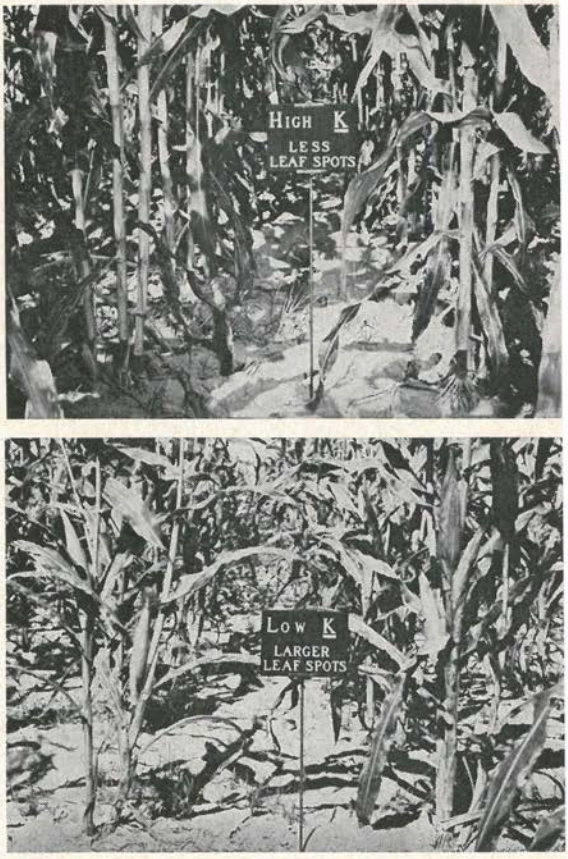


Figure 2—When northern corn leaf blight is severe, the low-K plots on Southern Illinois experimental fields usually show greatest damage. On potash-treated plots lesions will be fewer and smaller, as shown here. (H. L. Garrard pictures)

ROLE OF FERTILIZER ON CORN DISEASES

University
Of Illinois

Leaf Blight

Obvious differences in Northern corn leaf blight infection caused by *Helminthosporium turcicum* were observed in the Agronomy Soil Experiment Field, Brownstown, Illinois in 1961. Notes were taken on September 5 and again on September 21 by different sets of workers.

Plots were classified according to the scale shown in Figure 1.

Leaf blight was slightly more

TABLE 2. EFFECT OF FERTILIZER APPLICATIONS ON CORN LEAF BLIGHT.*

Pounds of K_2O per acre	Lime with Pounds of N per acre			Lime and Rock Phosphate with Pounds of N per acre			Lime and Superphosphate with Pounds of N per acre		
	0	40	80	0	40	80	0	40	80
0	4.2	3.2	4.0	4.2	4.5	4.2	4.8	4.8	4.2
25	1.8	1.8	2.8	1.2	2.2	2.8	3.2	3.0	2.8
50	1.5	2.0	2.0	1.0	2.5	2.2	1.5	3.2	2.2

*0 = no infection, 5.0 = lesions on all leaves—see Figure 1.

severe as levels of nitrogen and phosphorus increased. Major differences, however, were observed in plots receiving different levels of KCl—*over twice as much leaf blight developed in the absence of potassium than in the presence of potassium.* This is indicated in Table 2 which shows the average leaf blight scores for the two dates. Similar effects were observed at the Toledo Soil Expt. Field (Figure 2).

Other Diseases

A number of workers have observed that the proportion of smutted corn is usually greater on more fertile than on less fertile soil. High nitrogen may increase smut since susceptibility is associated with tender, succulent vigorously growing corn tissues.

In the greenhouse, bacterial wilt was most severe under low levels of potassium and high levels of nitrogen.

Ear rots at times are more severe in very fertile soils and those high in organic matter. In Illinois, the addition of phosphate fertilizer reduced Fusarium ear rot, but had little effect on Diplodia or Gibberella ear rot (Ill. Bull. 639).

THE END

DON'T DUMP YOUR BEANS

NO SOYBEAN grower would willingly dump three bushels of harvested beans on the ground after combining.

Yet, says S. H. Phillips, UK Cooperative Extension Service specialist, that amount would be left in every field if the national average loss was shared equally by growers.

The Iowa Ag Experiment Station ran tests showing that four beans on each square foot of ground represent a loss of a bushel an acre.

Principal causes of harvest loss are shattering of plants, and dropped stalks and pods left below the cutter bar. In fact, losses increased 1.4 bushels for each inch the cutter bar was raised above proper cutting level.

Some points to remember in harvest: Combine when moisture content of beans is less than 14 percent; check reel speed and height, ground travel speed, cutter bar height and sharpness, pickup by guards or special attachments for lodged plants, cylinder speed and clearance, and material flow over rack and shoe.

Also: Use a weed seed cleaner to prevent re-seeding fields with weeds and to keep out foreign matter; use a straw shredder to permit easier seed bed preparation for the next crop; and make adjustments to combines after checking combine losses during actual operation.

Kentucky News

TURN THE LIGHTS DOWN

YOU HAVE to turn the lights down low to get the most soybeans.

I'm not saying that this popular little legume gets its courting habits from people. But I've just seen some evidence that will make you wonder.

Down Hartsville way there's a big lighted sign in a soybean field. All the beans have completed their growth cycle and are now awaiting the combine—all, that is except the beans under the lighted sign. They're just sitting there as if to say:

"If you don't turn those lights off—no beans."

Sure enough, there are no beans on the vines under the sign. They haven't even begun to bloom. Yet, away from the sign, the vines are loaded with mature fruit.

This is a practical demonstration of one of the laws of nature which plant scientists call photoperiodism. It means simply duration of light, or day period, as it affects plants.

And the effect is terrific. The world knew little of this subject until W. W. Garner and H. A. Allard, researchers with the United States Department of Agriculture, published their findings on the subject about 1920.

They showed that plants can be divided into two classes, long day plants which flower when exposed to long hours of daylight, and short day plants which flower only when the hours of daylight are short.

The short day plants include the soybean—one of the most sensitive to the day period. Others under this group are tobacco, runner bean, millet, sorghum, dahlia, and chrysanthemum. Flowering of these plants is inhibited by increasing the day period—even with such artificial devices as the electric light.

If your chrysanthemums aren't blooming, perhaps the failure is caused by a nearby street light. Dr. W. R. Paden, retired Clemson agronomist, called my attention to just such a situation at Clemson.

Farmers who were disappointed with soybean yields this year might check up on their varieties and planting dates. These are all important because of the day period.

Soybean varieties bloom at different day periods. One may bloom when the daylight hours number thirteen. Another may bloom when the daylight hours are twelve. And when that period comes, the variety will bloom and mature seed—even if the plant is only six inches tall!

Farmers want to seed soybeans early enough for the plant to grow to sufficient size before blooming—but not so early that it will bloom in the spring.

Consult with your county agent about soybean varieties.

L. C. Hamilton, Clemson News

UP YOUR SOYBEAN YIELDS

SOYBEAN yields will increase when the beans are planted in narrower rows, indicate tests conducted at the Illinois Ag. Expt. Station.

Results from 352 plots showed a yield advantage of 15% for 24-inch rows over 40-inch ones. Thus, an average of 25 bushels for a 40-inch row can be increased almost four more bushels by planting 24-inch rows. With a 40-bushel yield, about six more bushels could be added.

The best seeding rate suggested is about 75 pounds per acre for 24-inch rows. Although growing soybeans successfully in narrower rows will require some changes in machinery, harvesting the beans presents no problems, say the researchers.

Business Farming

IN PLACE OF LAND

Fertilizer will be the most effective substitute . . .

FERTILIZER will apparently be this country's most effective substitute for the land that is going under concrete, says Dr. George L. Mehren, director of the University of California's Giannini Foundation of Agricultural Economics.

On shrinking acreage, U. S. farmers will be expected to meet a 35 per cent greater market for foods and fibers by 1975, Mehren recently reported. He said today's fertilizer practices in California, where use of fertilizer has increased 10 times as fast as in the rest of the country, may give a fairly clear picture of the future.

"In California," said Mehren, "about 2.2 million acres—about half of the fertilized land in the state—are used for the high-value crops of cotton, fruits, vegetables, sugar beets, and potatoes.

"These high-value crops use only about half the fertilized land, yet they use 70 per cent of the nitrogen, 47 per cent of the phosphate, and two-thirds of the potash used in the state.

"The high-value crops in California use less than 3 per cent of American farm land, but they use about 10 per cent of American agricultural fertilizer."

The U. C. economist added that 10 California counties use two-thirds of the farm fertilizer, and one-third of it is used in three counties—Imperial, Kern, and Fresno—where high-value crop production is concentrated.

Dr. Mehren pointed out that the most impressive part of U. S. growth from its "hoe and axe" agricultural economy of 1860 has come with the emerging age of chemistry in American agricultural industries. Research indicates that fertilizer use has been a major factor in the output increases

and cost decreases, he said, and it will be possible in the future to increase output by increasing fertilizer inputs and using still less acreage.

"All data indicate that the estimated net contribution to income from one dollar of fertilizer in 1954, on the average for all areas of the United States," he said, "was $2.93 for all crops, $3.40 for intertilled crops, and $1.96 for close-growing crops.

"It is quite clear that for most major commodities, the application of fertilizer has been highly profitable. It may also be noted that a ton of nutrients has added as much output as 10.7 acres of land without fertilizer. Thus there is an immense income potential from additional fertilizer and there is equal potential for expansion of output, retirement of land, and perhaps emergence of surpluses in some commodities."

Dr. Mehren remarked that agricultural industries in the United States have been the basic original source of capital upon which industrialization of the rest of the economy has been built.

. . . Californian says

The apparent shrinkage in the farm industries, he added, is only apparent.

"Almost 40 per cent of American economic activity reflects work in the food and agricultural industries," he said. "The apparent shrinkage in one sense represents transfer of functions once performed on farms and by families to commercial industries.

"The difficulties of commodity surpluses and in the transfer of people to other industries mask the excellent over-all adjustment made by agriculture. They seem also to mask the great debt that is owed to these industries by the people of the nation."

University of California News

STILL SEARCHING

TO DATE University of Illinois agronomists have been foiled in their attempts to develop a hybrid soybean. They are still searching for a male-sterile soybean.

Because of possible yield reductions, plant breeders do not wish to develop a variety that is even partly sterile. But at the same time agronomists may use certain types of male sterility to develop commercial hybrid soybeans.

Two sources of breeding material studied at the University of Illinois have produced disappointing results so far, agronomist H. H. Hadley reported here today. All the sterile plants produced were as vigorous and tall as normal plants, but they were also highly female sterile. They apparently have no value in developing commercial hybrid soybeans.

Most of the sterile plants had only small, fleshy pods with no seed. Occasionally a sterile plant produced one or more pods but had only one seed per pod. Such seeds resulted in two types of plants. One was highly sterile with more than the normal number of chromosomes; the other was usually fertile and had the normal number of chromosomes.

Apparently the two steriles in the Illinois study were mutations. While they have no immediate practical value in breeding programs, they may be of considerable value to soybean geneticists.

The occurrence of such steriles in a farmer's field should cause no significant depression in yield. Steriles occur very infrequently and contribute few if any offspring to future generations, Hadley said.

Illinois News

Old . . .

HABITS

. . . and new

By T. S. Buie, Columbia, South Carolina

"IS IT optimism or ignorance that leads a man to plant cotton on land like that year after year when he knows, barring a miracle, he hasn't a chance of making a good crop?"

That is the question I asked a fellow experiment station worker more than four decades ago as we drove in a Model-T Ford past a field of "bumblebee" cotton which averaged no more than two or three bolls per plant.

"It is neither," said my older companion drawing upon a lifetime of service to farmers. "It is habit. Every spring he plants cotton because he doesn't know what else to do!"

Actions—The Result of Habit

Many farmers, like other men, act from habit. They follow a given course because it is easier than attempting something new. Some folks call it "staying in a rut."

With modern agricultural advances, many farm practices of former years have been changed, new methods and ways of doing things introduced.

The most significant recent change in Southern agricultural habits has been the shift from cotton to other crops and livestock. Only a quarter-century ago, both plantation owner and one-horse share-cropper looked to cotton for money.

That is no longer true. For example, in South Carolina the annual value of the tobacco crop exceeds cotton . . . as many or more acres are planted to soybeans as to cotton . . . the value of livestock products sold each year exceeds $100 million dollars.

And the same trends apply to nearby states.

Old Habits Discarded

Let's look at some of the other habits that have been discarded by up-to-date Southern farmers. Burning woods is a good example. In my childhood it was common sight every spring to see the smoke of woods' fires by day and its red glare by night. Today, forest management is a practiced science.

A generation ago, farmers bought

their fertilizer largely by habit, relying on color and smell rather than the analysis on the bag.

Today they don't just buy a ton or so of the cheapest formula available for use on all crops. They take soil samples in each field, have them analyzed, and modify the application accordingly.

Rarely now does one see a couple of sagging barbed wires attached to a row of leaning posts enclosing a worn-out field called a pasture. The development and introduction of new grasses and legumes—Coastal Bermuda, Bahia, and fescue along with the adapted clovers and lespedezas—have broken this habit. Sleek, well-bred cattle now feed on lush pastures the year round.

The habit of depending on cow-peas for hay and soil improvement has also been broken. Cow-peas did make good "strong" hay when by chance there was a rain-free period long enough for the cut vines to cure and be hauled to the barn. Now the surplus spring pasture growth is converted into grass silage or hay. This, along with that from special hay fields, has freed most farmers from the dilemma faced each fall when they "hoped they had enough feed to get through the winter."

In numerous ways farmers have moved from a "minimum" to a "maximum" basis. Not how few pounds of fertilizer can be used to make a crop or how small a quantity of grain and hay it will take to grow an animal to maturity but how *much* fertilizer or feed can be used to advantage.

Better Care of the Land

The pattern of straight rows, running up and down hill, has given way to a contour system where the rows of cotton, corn, tobacco, and soybeans curve and wind around each hillside. Another bad habit replaced by a good one! And an increasing number of the "draws" in cultivated fields are now sodded to grass. Thus washes and gullies, which so often carried surplus water down hill, are eliminated.

One might continue almost indefinitely to list the changed habits of the Southern farmer: Tractors for teams, herbicides for hoes, hybrid corn for farm-selected seed, well-bred cattle for scrubs.

Other Habits Need Changing

But let's not forget some undesirable habits still persisting.

For one thing, many farmers still plow entire fields by starting at the edges and moving inward. On rolling land, this means that some furrows are plowed up and down hill. Perhaps such plowing at all is a habit that needs to be broken with direct planting of row crops in a lister furrow without the space between rows being disturbed.

Incorporating crop residues into the soil is another practice that needs expanding. Equipped with modern machinery, some farmers are now turning under the residue from former crops instead of burning it. Some are plowing sod land for row crops. Good habits that should be expanded to reach all.

And let's not forget row arrangement. If modern multirow equipment is to be used on terraced and contoured fields, the terraces must be parallel or equidistant so there are no short or point rows to plague and delay the operator of the tractor-cultivator.

As the cost of farming increases, each field and pasture should be treated according to the individual characteristics of its soil. This means using adapted varieties, proper cultural methods, the right kind and amount of fertilizer, and doing everything modern research demands.

THE END

A LOOK AT SCS

THE MICHIGAN STATE University Cooperative Extension Service and the Michigan–U. S. Soil Conservation Service are headed for a common goal: Determining the best use for every acre of Michigan's 37,000,000 acres of land, and of seeing each acre properly treated according to its needs.

When that goal is reached, the State's most valuable natural resource will be "conserved." Soil conservation will be complete.

They Work Together

State and SCS soil scientists work together all the way down the line. First, they conduct a soil survey. This is like taking an inventory of our soil resources.

Every successful businessman does this annually, so he knows what resources and facilities are at his disposal. The soil scientist and the farmer must know, in detail, the kinds of soil involved before they can determine together the best plan of management.

In Michigan, the survey is directed by E. P. Whiteside of M.S.U.'s Soil Science Department and Clarence Engberg of the U. S. Soil Conservation Service. Clarence received his undergraduate training in North Dakota and did graduate work in Michigan where he has spent most of his professional years. He is officially a member of the Soil Science Department, enjoying all the privileges of a full-time University employee, except that of receiving a pay check, a nice arrangement so far as M.S.U. is concerned.

Dr. Whiteside is Professor of Soil Science at Michigan State University. His university training was in Illinois where he assisted with their soil survey program before coming to Michigan.

Soil Conservation Districts

The State Soil Conservation Committee is now helping to establish a Soil Conservation District in Monroe County. If Monroe County farmers vote in favor of the District, it will be the 80th such organization in the State. The U. S. Soil Conservation Service will establish an office in the county and hire one or more men to serve those farmers who decide to be "cooperators." The service will be free.

Soil surveyors will first prepare a detailed soil map of each farm. This will be the inventory. The "capability" of each field will be recorded and the farmer will be advised as to how he may overcome the production "hazards" inherent in the soil. The practices to be followed in overcoming the hazards are those worked out at the University. This is where the experiment station and cooperative extension personnel enter the picture.

Extension specialists are also members of the Soil Science Department. They evaluate and summarize the results obtained by soils research workers who are experimenting to determine the best uses for each of our valuable acres.

The specialist then goes out to peddle the information to Michigan farmers. He has two groups of individuals to help him in his teaching efforts. They are the members of the county cooperative extension staff and those

of the U. S. Soil Conservation Service in the Districts.

Farmers Reap the Benefits

All farmers should be district cooperators. Likewise each farmer in the district should be acquainted with and take advantage of the services available through the Cooperative Extension Service.

The SCS men prepare the soil map and drainage plan, lay out contours and terraces, and give advice on the best land use to prevent excessive soil loss, either from wind or water. I personally am a cooperator in the Clinton Soil Conservation District and have profited greatly thereby. Two open county drains originally crossed a corner of my farm. Two bridges were necessary to reach all the land. Lloyd Campbell, District farm planner, pointed out how it might be possible to relocate one drain and save building a new bridge when the old one had washed out.

Lloyd's survey showed the new location to be feasible, so we obtained approval of the drain commissioner, hired a contractor, and relocated the drain. There is still some cleaning up to do but everyone seems happy with the change.

The County Agricultural Agent directs a well planned and efficient soil sampling and testing service. He makes lime and fertilizer recommendations based on the soil tests and the particular soil types involved. He depends on the SCS soil scientists for soil type identification, although district cooperators have this information on their basic farm plans readily accessible to both farm planner and county agents.

Fertilizers and lime are essential to a good soil conservation plan. Unless yields are high, residues and stable manures will be in short supply, soil organic matter levels will drop, and soil loss will increase. Failure to feed the crops properly may spell doom to even the best conservation plan. Careful attention to the results of soil tests makes nutrient control possible.

. . . by a prominent Michigan State University scientist . . . Dr. R. L. Cook . . . head of the Department of Soils Science.

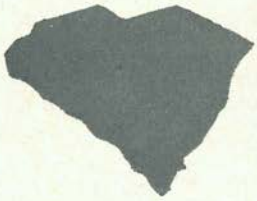
I have watched the Soil Conservation Districts since the first one was organized in the state. Their programs are entirely geared to education and service. Farmers are still "signing up."

Why have some delayed so long? This question is hard to answer. All farmers should have signed long ago. If we continue to work together—Farm Planners, Soil Scientists (research and extension), and County Agents—the selling job will become easier. Time will tell.

But this we know: the practices we perform to grow our top yields do the best job in conserving and building our soils.

THE END

SOUTH CAROLINA LOOKS AT



By Hugh A. Woodle

Clemson College

After returning from a specially conducted tour of California, a South Carolina agronomist recorded these impressions.

WHAT has California got that we don't have?

Well, we went out there for a "Look-See"!

We saw what they are doing, we asked questions, we got answers. Yes, this group of South Carolina bankers and agricultural leaders, headed by Governor Fritz Hollings and Dr. Edwards, President of Clemson College, really asked questions and evaluated the answers.

Conclusions? Yes!

Briefly, when we landed back at home base in Columbia, these appeared to be the general impressions of the group:

1 *Water!* We never before realized the importance of water, and we never before appreciated our ample annual rainfall which we have always taken for granted.

2 *People!* We never saw so many busy people, so many cars, so much activity. We soon found out that Texas does not have the biggest and best of many things.

3 *Crops!* All kinds of crops! Cotton, potatoes, vegetables, fruit, nuts —you name it.

4 *Quality!* They just won't harvest or ship anything unless the quality is tops.

5 *Taxes!* They have to produce high yields of quality crops. We appreciated our relatively low property taxes more than ever before.

6 *Land!* Good land, yes, but high-priced land that is only desert if the water is not available.

7 *Labor!* How can they pay farm labor such high wages? We agreed—their labor earns every cent they are paid. One of our group exclaimed, "Just look at them! They move at a trot."

8 *Marketing!* Rigid quality control and fully mechanized processing. We learned some lessons here.

9 *Livestock!* Never had we seen so many cattle on such few acres. They bring the feed to the cattle. We are beginning to do some of this.

10 *Financing!* It takes a "pile" of money to finance such intensive operations. Our banker friends emphasized that there is no shortage of funds to finance similar operations here in South Carolina.

One of the California farmers, who is a Japanese, was asked the ques-

tion, "How do you do it?" His answer was, "We produce more for less, and make it better." This answer gave us plenty to think about.

But you should study their agricultural laws (it's the law that only one variety of cotton can be planted), agricultural marketing orders, marketing programs, and marketing agreements. They are determined that California farm produce must be the very best.

Californians advertise! Look in almost any of our magazines. You will see those beautiful pictures of California farm produce that make your mouth water. People associate California with "Quality." There's a lesson here.

Everyone remembers the old story of the farmer who left his small farm and spent his lifetime searching all over the world for diamonds, how he finally returned home when he was old and penniless, for he had found no diamonds. Then, just before he died, he discovered that his own small farm was covered with "acres of diamonds."

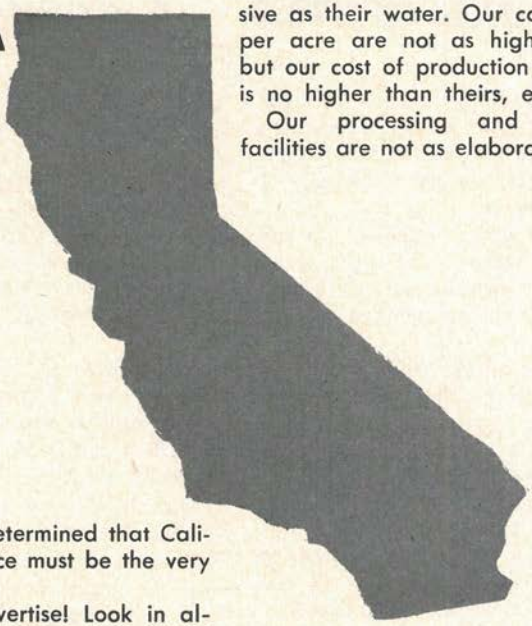
Perhaps this trip to California will go a long way in convincing South Carolina bankers, statesmen, agricultural leaders, and farmers that we can find the greatest opportunities and riches right here at home.

Our South Carolina soils are responsive soils. With our climate, our water, our markets, and our people we can compete successfully with California or any other area.

We must use more commercial fertilizers than they use in California, but our fertilizers are not as expensive as their water. Our cotton yields per acre are not as high as theirs, but our cost of production per pound is no higher than theirs, either.

Our processing and marketing facilities are not as elaborate as those in California, but we intend to improve our marketing program. Already, we feel that our fresh peach packing sheds are more modern than those in California.

CALIFORNIA



What about Coastal Bermuda in California?

Yes, they *can* grow Coastal in California, but we didn't say much about it on our trip. Why? Those Californians are already competing so successfully, and Coastal holds such great promise for increasing farm income, perhaps we just want to be first in at least one thing.

There are exciting new frontiers ahead for Coastal. Dehydration, pel-

leting, new feeding methods, new uses—these and other possibilities of Coastal promise to bring a bright new day to South Carolina farmers.

So South Carolinians looked at California!

Many thanks to our Wagonmaster, Henry Simons, and his associates of the Wachovia Bank and Trust Company. We saw and we learned many things that should help us. But not a single one of us would consider moving to California. We appreciate South Carolina more than ever, for we have a wealth of opportunities right here at home.

THE END

TRAINING CENTER — A BUSY PLACE

IT is Back-to-School each time technicians of the Soil Conservation Service attend sessions at the Athens Training Center on the University of Georgia Campus.

A typical group includes 15 soil conservation aides, with from 2 to 25 years' field experience, and one recently employed engineering draftsman.

The trainee groups come from Alabama, Arkansas, Florida, Georgia, North Carolina, and Tennessee. The training session is one of the regular subprofessional study courses conducted at Athens, and this year extended from April 3 to April 21.

The Athens Center is located in Barrow Hall on the campus of the University of Georgia. Established in 1954 by the Soil Conservation Service, the Center is designed to meet part of the group training needs of the nine Southeastern States and the Caribbean Area. In addition to the training session described here, nine others are scheduled in a typical year.

The sessions will vary from a five-week course to one as short as one week and two days—and in subject matter from advanced engineering to management training. More than 1,300 Soil Conservation Service employees have attended one or more courses at Athens.

One such training session, as all such sessions, was designed to give each participant a broad program-picture of the Service, especially as it concerns him and his assigned duties. The latest techniques in soil and water conservation, as well as the basic principles involved, were explained and demonstrated for each segment of the course. Principles of working with others—a trademark of SCS—were emphasized throughout the session.

Instructors included specialists from the Soil Conservation Service, Agricultural Research Service (Watkinsville Field Station), and the University of Georgia.

The course was conducted under the direction of the resident staff, including Jackson Bennett, Supervisor with 25 years' SCS experience and Warren B. Turkett, Assistant Supervisor with more than 20 years' experience.

A typical reaction came from Will J. Peacock of Blountstown, Florida, "The training I got at the Athens Training Center prepared me to be of greater help to the farm owners and operators I work with in the Chipola River Soil Conservation District. I only wish it had happened to me 15 years ago."

Steve Drone wrote from McMinnville, Tennessee, "I found the training session well worthwhile. Many of the things learned there will help me back here in my work unit."

THE END

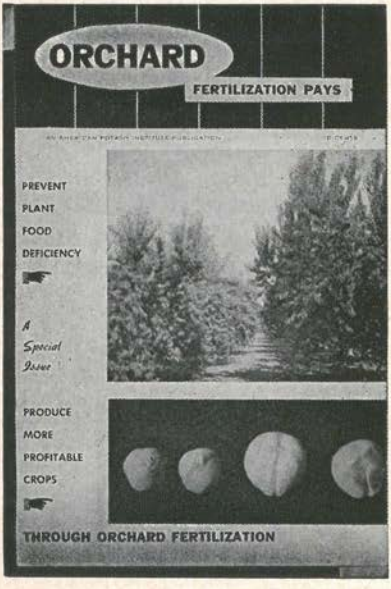
FREE REPRINTS

ON SOILS AND CROPS AS LONG AS SUPPLIES LAST

	Serial Number	Number Desired
Balanced Nutrition Improves Winter Wheat Root Survival	J-3-53	
White Birch Helps Restore Potash-deficient Forest Soils	MM-12-53	
Potash Pays on Forage in New England	BB-6-54	
Shortages of Potash Limit Grape Yields	I-2-55	
Soybean Production in the Southern States	L-3-55	
Residual Fertility Insures Alfalfa After Drouth	BB-8-55	
Fertilizing Alfalfa in Kentucky	X-12-56	
Growing Azaleas and Camellias	N-5-57	
Soil Tests Spotlight Turf Needs	P-8-57	
Key to Long Life Ladino	BB-11-57	
Development of Potassium Use and Future Possibilities	II-12-58	
Principles for Roadside Fertilization	A-1-59	
Growing Alfalfa Successfully	B-5-60	
Potassium in Row Fertilizer for Corn	A-3-61	
Tailor-Made Recommendations	C-3-61	
Check Your Plant Food Deficit	D-3-61	

Name_____ City_____

Address_____ State_____



ORCHARD HANDBOOK

(Or Individual Reprints On Rear Coupon)

10¢ per copy
$10 per 100

Up to 10 Copies Free Official Advisors and Fertilizer Firms

Name_____

Position_____

Address_____

For quantities above stated free policy: $_____ attached
Bill me $_____

Department B.C American Potash Institute 1102 16th St., N.W. Washington 6, D.C

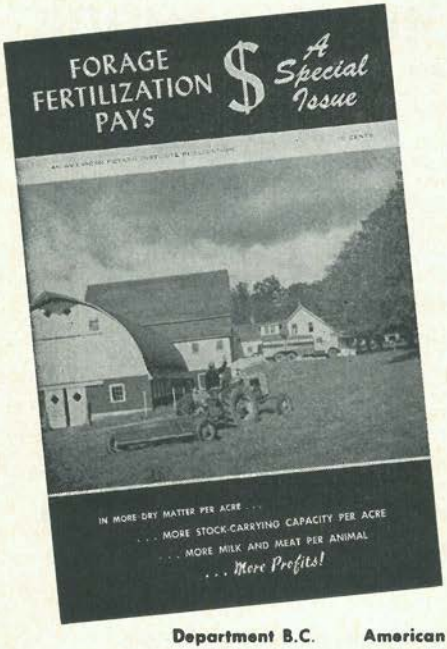
FREE REPRINTS

ON SOILS AND CROPS AS LONG AS SUPPLIES LAST

	Serial Number	Number Desired
Turf Grasses Need Lime & Fertilizer	H-10-61	
Johnsongrass—A Real Haymaker	I-10-61	
Basic Principles of Corn Fertilization	J-10-61	
Apple Nutrition Can Be Multiple Challenge	K-10-61	
Peach Nutrition, A High Demand	L-10-61	
Why Citrus Needs Nutrition	N-10-61	
More Lime and Fertilizer Needed	O-10-61	
Why Pecans Demand Liberal Fertilization	Q-10-61	
Get Top Cherry Production	R-10-61	
Applying Fertilizers To Orchards	S-10-61	
Why Not Excellent Papers?	T-10-61	
50 Bushels of Corn Per Hour	U-12-61	
You Can Predict Fertilizer Needs With Soil Tests	V-6-61	

Name_____ City_____

Address_____ State_____



A NEW HANDBOOK FOR TEACHING ADVISORY USE, AND SALES SERVICE

10¢ per copy
$10 per 100

Up to 10 Copies Free Official Advisors and Fertilizer Firms

Name_____

Position_____

Address_____

For quantities above stated free policy:

$_____ attached

Bill me $_____

Department B.C. American Potash Institute 1102 16th St., N.W. Washington 6, D.C.

ORDER SLIDE SETS

THIS EASY WAY

- **Potassium Hunger Signs ($2.20) 22 Slides and Script**

Shows typical potash hunger signs in field crops, vegetables, fruits, forage crops, and some ornamentals. Such common potash hunger signs as poor growth, leaf scorch, poor root development, weak and lodged plants, poor seed and fruit quality. Can supplement local slides.

AMERICAN POTASH INSTITUTE (DEPT. BC)
1102 16TH STREET, N.W.
WASHINGTON 6, D.C.

PLEASE SEND ME YOUR SLIDE SET "POTASSIUM HUNGER SIGNS" FOR SHOWING ON THE DATE INDICATED BELOW.

FOR LOAN: TEN DAYS

FOR PURCHASE: $_____ ENCLOSED

DATE_____ ALTERNATE_____

NAME_____

ADDRESS_____

_____

- **Soil Fertility and Soybeans ($4.20) 42 Slides and Script**

Assembled in cooperation with the National Soybean Crop Improvement Council. Covers nutrition, including liming, direct fertilization, rotational fertilization, and placement, as well as other factors in production. Tells a rather complete story—and can readily supplement local slides.

AMERICAN POTASH INSTITUTE (DEPT. BC)
1102 16TH STREET, N.W.
WASHINGTON 6, D.C.

PLEASE SEND ME YOUR SLIDE SET "SOIL FERTILITY AND SOYBEANS" FOR SHOWING ON THE DATE INDICATED BELOW.

FOR LOAN: TEN DAYS

FOR PURCHASE: $_____ ENCLOSED

DATE_____ ALTERNATE_____

NAME_____

ADDRESS_____

_____

- **Successful Alfalfa ($4.00) 40 Slides and Script**

Shows the value and use of alfalfa in modern farming. Gives 10 steps in successful production, including liming, fertilization, and management. While it tells a rather complete story, it is designed so you can use it to supplement local slides.

AMERICAN POTASH INSTITUTE (DEPT. BC)
1102 16TH STREET, N.W.
WASHINGTON 6, D.C.

PLEASE SEND ME YOUR SLIDE SET "SUCCESSFUL ALFALFA" FOR SHOWING ON THE DATE INDICATED BELOW.

FOR LOAN: TEN DAYS

FOR PURCHASE: $_____ ENCLOSED

DATE_____ ALTERNATE_____

NAME_____

ADDRESS_____

_____

- **Safe, Efficient Fertilizer Placement ($4.00) 40 Slides and Script**

Illustrates proper placement methods on *row crops, forages,* and *small grain*—and what happens when fertilizer is wrongly placed. Shows how band placement pays, how band seeding improves legume and grass stands. With sharp color and vivid illustrations for classroom showings, meetings, short courses, etc. Can supplement local slides.

AMERICAN POTASH INSTITUTE (DEPT. BC)
1102 16TH STREET, N.W.
WASHINGTON 6, D.C.

PLASE SEND ME YOU SLIDE SET "FERTILIZER PLACEMENT" FOR SHOWING ON THE DATE INDICATED BELOW.

FOR LOAN: TEN DAYS

FOR PURCHASE: $_____ ENCLOSED

DATE_____ ALTERNATE_____

NAME_____

ADDRESS_____

_____

BROWSER'S EYEVIEW . . .