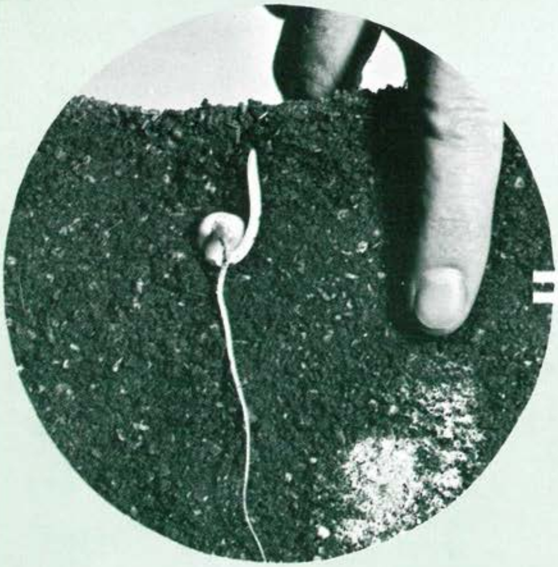
Better Crops

WITH PLANT FOOD

WINTER 1965-66 25 CENTS




BAND IN ROW for FAST START


BROADCAST for CONSTANT SUPPLY

CONTENTS

Better Crops WITH PLANT FOOD

The Whole Truth—Not Selected Truth

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THE COVER

IF THE Potash Institute's newly revised slide set on Fertilizer Application for Top-Profit Yields could be summed up in two points, these steps might do it.

The idea of **BAND + BROADCAST = FAST START + CONSTANT SUPPLY** was born from the modern grower's demand for higher and higher yields.

Fertilizer placement has evolved from a handful around a cornhill to a truckful across a cornfield. And not without pain: (1) sometimes uneven stands from fertilizer **too close** to the seed, (2) sometimes stubby, chaffy ears and costly lodging from **hidden** hunger during the heaviest growing period.

Today's top grower pushes all practices to the limit on EACH ACRE—including fertilization! Why? To get highest profit PER ACRE OF WORK—not highest return per dollar spent!

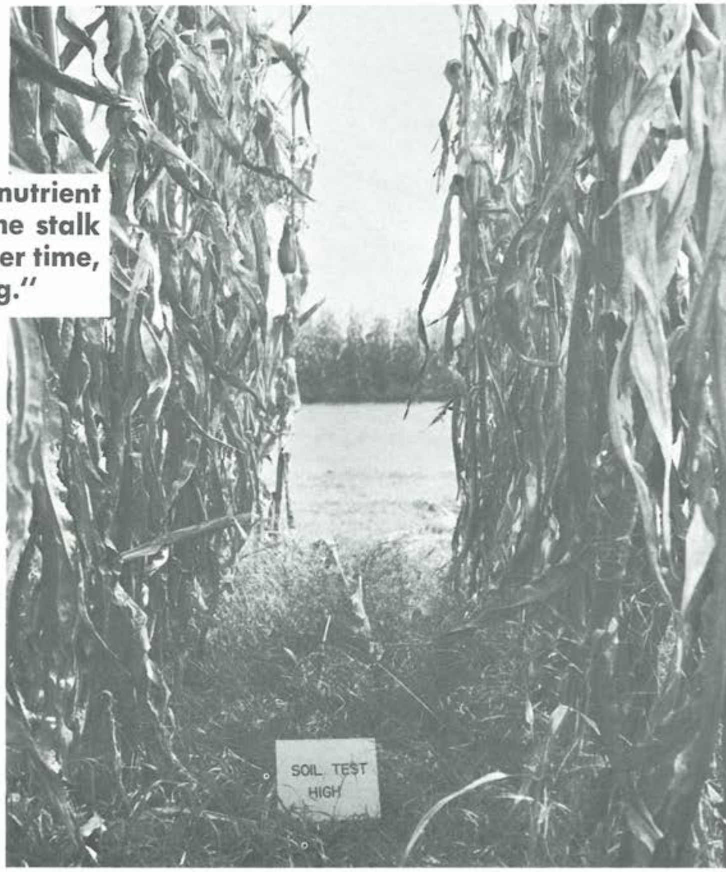
He's after maximum returns on his TOTAL investment. He must get it to stay in business.

Today's improved varieties and hybrids demand greater fertilization for top-yield performance.

That is why the top grower watches his fertilizer placement carefully. He fertilizes not only to REPLACE the nutrients high-yield crops remove, but to BUILD UP his soil for future production. And he does it without injuring his seedling or wasting his plant food.

Turn to page 24 for the highlights from this new color slide set.

". . . adequate nutrient supplies keep the stalk active for a longer time, reducing lodging."



HIGH POTASSIUM

. . . meant less than 5% lodged and 146 bu/A. yield, machine or hand harvest.

Grow STRONG-STALK

By W. L. Parks,

CORN PRODUCTION practices have changed so rapidly in recent years that adequate corn stalk structure for supporting high yields has become a problem. And mechanized harvest makes it even more important to produce strong, sturdy stalks for the high yields.

Increasing plant populations without adjusting row widths has contributed to the lodging problem, because closer stalks in the rows tend to produce a smaller, more spindly stalk. Reducing distance between rows has helped control this problem but has not cured it.

POTASH REDUCES DEAD STALKS

L. M. Josephson has reported an important correlation between the **amount and rate of stalk aging and potash.** Treatments with low available potash had more dead stalks at harvest and consequently more lodging than well supplied

"... once the stalk dies, rot organisms enter to weaken it and lead to increased lodging."

LOW POTASSIUM

... meant 80% lodged and 64 bu./A hand harvest, only 12 bu./A machine harvest.

Corn with Potash

University of Tennessee

potash treatments. In many cases, adequate potash reduced the amount of dead stalks at harvest by 60 percent.

Adequate potash levels have lowered stalk lodging in experiments on a Hartsells loam soil. The relationship between lodging and available potassium levels is shown in the chart. Soil test K and fertilizer K were almost additive as they influenced corn yields on this soil.

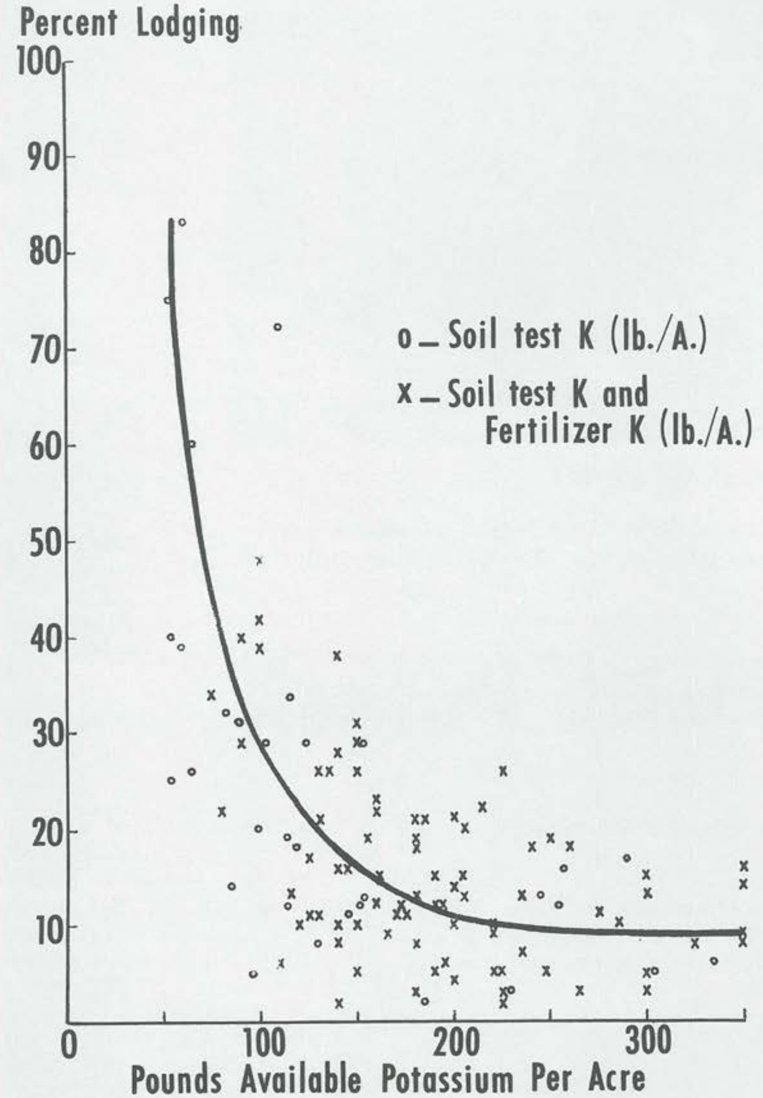
When the available potassium dropped below 180 lbs. per acre, stalk lodging increased and became acute when the available potassium level fell below 100 lbs. per acre.

The pictures tell the story! The low-potassium plot had 80% lodged stalks and yielded only 64 bu./A with hand harvest. The high-potassium plot had less than 5% lodged stalks and yielded 146 bu./A. Both plots received 150 lbs. N, 80 lbs.

P_2O_5 and 20 lbs. zinc sulfate per acre. The hybrid was Dixie 29 at 15,000 plants per acre.

It is easy to see how impossible it is to harvest badly lodged corn mechanically. **Corn yields are measured by the amount that leaves the field in the wagon and in mechanized harvest—lodged stalks contribute little or nothing to the corn that goes to the crib!**

These data are in line with the findings of other stations that show **high potassium levels producing**



ADEQUATE POTASSIUM LEVELS can reduce the percent of lodging, as shown here.

stronger stalks when adequate amounts of other nutrients are present.

Providing adequate nutrient supplies also keeps the stalk green and active for a longer period of time, reducing lodging. Once the stalk dies, secondary rot organisms enter to weaken the stalk and lead to increased lodging.

GENETICS VS NUTRITION

Recent experiments conducted on Hartsells soil indicate that the corn hybrid may genetically produce a poor root system or weak stalk. For example, one experimental hybrid had the capacity to produce high yields but developed a very poor root system. Even at a high available potassium level, this hybrid lodged 100 percent. This characteristic was present in one of the parent inbreds and was transmitted to the hybrid.

Adequate nutrition does produce stronger stalks for supporting higher corn yields—BUT when the corn hybrid has a genetic tendency toward lodging, adequate nutrition cannot overcome this genetic deficiency. **The End**

AND GENETIC WEAKNESS can increase lodging tendency, even under high K levels.

Tomorrow's Grower Will

Not GAMBLE with "HIDDEN HUNGER"

FERTILIZER PRACTICES of the future will focus on this question: **"Do crops have hidden hunger?"** Many present recommendations take crops out of the deficiency symptom stage but leave them in the hidden hunger zone!

Let's consider some of the fertilization possibilities between now and 1975. This affects all of us and we must be making plans.

WITH WHOM WILL WE WORK?

The grower will have a higher and higher capital investment, with many having investments of $150-$200,000! The number of total farms is decreasing and the acreage per farm is increasing rapidly. Illinois projections illustrate the trend:

	1959	About 1975
Total farms..........	154,652	100,000
Acres per farm......	196	300
No. of farms with gross income over $20,000...........	23,044	49,000
% of total farms.....	15%	49%
% of total gross sales..............	48%	87%

H. G. Halcrow, Univ. of Illinois

Even with $20,000 gross income farms increasing—49% of the total—the actual number of such farms per county would not be large. This is mentioned because industry and extension could actually give personal attention to these growers.

YIELD GOALS WILL INCREASE RAPIDLY

The first step in a commercial farming operation is **sustained top profit yields of crops.** Once these yields are obtained, the grower can sell the crop directly or market it through livestock.

A top profit yield is the point at which the last dollar spent for an input will return just a dollar. This gives top profits per acre. Purdue data for N on corn given below help show this point. Somewhere between 120 and 140 lbs. N would be best.

A LOOK AT FERTILIZER PRACTICES FOR TOMORROW'S AGRICULTURE

BY WERNER L. NELSON
WEST LAFAYETTE
INDIANA

Returns for added nitrogen fertilizer

Nitrogen added per acre per year	Net return per additional dollar invested
1st 20 pounds	$7.25
2nd 20 pounds	5.75
3rd 20 pounds	5.00
4th 20 pounds	3.87
5th 20 pounds	2.38
6th 20 pounds	**1.63**
7th 20 pounds	**.88**
8th 20 pounds	.50
9th 20 pounds	.12
10th 20 pounds	—.62

J. W. Pendleton, of the University of Illinois, predicts that average yield in Illinois may reach 100 bushels per acre before 1970. By 1975 it could reach 110-125 bushels.

The time is important! Improved hybrids, pest control and management all operate together. Timeliness is a very important point! Two examples might be given:

(1) At high yield levels, fall plowing of reasonably level dark soils may increase yields of continuous corn 10 to 15 bushels in some years over spring plowing. Plowing when the soil is not wet, freezing and thawing effects on physical conditions, and setting the stage for early planting all contribute. Soil type and slope are keys.

(2) Early planting may increase yields 20 to 30 bushels over late planting. Many states have shown this. Data from S. A. Barber show the point (two year average):

April 17-20	**136 bu./A.**
April 25-26	**148 "**
May 7-9	**163 "**
May 21-22	**132 "**
June 3-4	**120 "**

Advantages of early planting include cooler temperatures, longer days early in the life of the plant, and avoidance of late summer drouths. So, fall plowing and early planting may increase potential 20 or more bushels per acre—at no extra cost!

Plant spacing is important! Changes in plant spacing will increase potential. Data by W. L. Colville in Nebraska are significant. Incidentally, will the 0.5 lb. ear be fact or fiction?

Within row—between row spacings*	Plants per hill	Handweeded, 1961-62 ave. Yield	Wt. per ear
in.		bu/A.	lbs.
20	1	175	0.75
30	3	161	0.65
40	4	126	0.67

*** Population 15,680; 20,910; and 15,680 respectively.**

High yields are not new. The yields quoted in 1866 in Table 1 are humbling.

Table 1. High yields—Quoted in Indian Corn by Edward Enfield, D. Appleton and Co., New York—1866

	Bu./A.
Illinois, Madison Co.	170
Kentucky, Bourbon Co.	160 *
New Jersey	Almost 200
Ohio	165 **
Iowa, Marion Co.	178
Iowa, Marion Co.	95 (half acre)
South Carolina	200+

* Rows two feet asunder and stalks 12 inches apart in row.

** Three quarter pound ears.

By 1975, growers planting corn in 38 to 40 inch rows will be regarded as strictly non-progressive. Machinery is available to handle close rows now. This, combined with more efficient weed killers, will make close rows possible. Experimental work on plant spacing in the year past was limited in some instances by cultivation practices, inadequate nutrition or other problems.

The above examples are given because management for 150-200 bushels but fertility for 100-150 may leave 50 Hidden Hunger bushels!

REMOVE LOW FERTILITY!

With yield potentials increasing rapidly, soil fertility must be optimum. Fertility is an easy-to-control factor. In his ASA presidential address of 1957, A. G. Norman said: **"An ideal nutritional environment indeed may be one in which all nutrient elements are available to the point of slight luxury consumption at all times."**

For 150 bushels of corn rather than 100, Purdue says add an extra 100 lbs. N, 20 lbs. P_2O_5 and 40 lbs. K_2O. Michigan and some other states suggest an additional 20 lbs. N, 12 lbs. P_2O_5 and 12 lbs. K_2O for each 10 bushels expected over the average recommendation!

Fertility insures for future yields. We all know the residual effects of N, P and K. The Iowa State Soil Testing Service uses the guide shown in Table 2 to evaluate carryover of last year's fertilizer and give it proper credit in the current program.

Residual effects of N vary greatly with rate, soil texture, and rainfall. For example, Indiana prairie soil plots received the same N in 1960 and 1961. Figure 1 shows the 1962 yields from five rates of N across these plots. The residual effect of 1960-and 1961 applied N amounts to about ⅓ bushel of corn per pound of N where none was applied in 1962. At the same time, where no N was applied in 1960 or 1961, the first 50 lbs. applied in 1962 equaled about the residual effect from 150 lbs. N applied the previous two years.

FERTILITY STRETCHES WATER

Water is lost from a soil in two ways:

(1) From the soil surface by evaporation (usually about 50%).

(2) Through the plant by transpiration.

With a more complete plant cover, less water evaporates from the soil and more goes through the

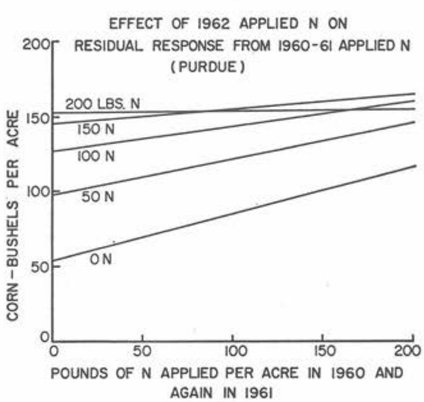


FIGURE 1

Table. 2 Estimated average CARRYOVER credit for fertilizer and manure nutrients.*

Nitrogen (N)		Phosphorus (P)		Potassium (K)		
Applied last year **	Carry-over	Applied last year **	Carry-over	Applied last year ** K	Carryover: Only grain Removed	Carryover: Whole plant Removed
lbs./A.	lbs./A.	lbs./A.	lbs./A.	lbs./A.	lbs./A.	lbs./A.
40	4	18	7	33	13	0
60	10	26	13	50	23	3
80	20	35	21	66	35	10
100	33	44	29	83	49	20
120	48	53	37	100	63	32
140	60	—	—	—	—	—
160	72	—	—	—	—	—

*** Credit is based on normal rainfall and crop response the previous year.**

**** Pounds/A. applied last year includes the carryover from the previous year, plus fertilizer or manure nutrients applied last year. (Iowa Farm Science, August 1963.)**

plant. **Fertilizer and adequate stands help to provide more plant cover rapidly and to get more benefit from the water.**

In Nebraska, N on dryland increased corn yields 42 bushels and increased water use efficiency 44%! 150 lbs. of N on irrigated corn in Colorado gave a 56-bushel increase in yields! Also, the valuable water produced 7.4 bushels per inch instead of 4.9 bushels.

	No N	150 lbs. N
Yield of corn—bu./A.	91 bu.	147 bu.
Bu. per inch of water	4.9 bu.	7.4 bu.

Potassium-deficient plants use more water per bushel of grain produced. One explanation is that the plants are more wilted and the openings through which the water is lost (the stomata) are open more fully in K-deficient plants. In a sense, potassium helps to "turn the faucet off." Potassium is essential in the guard cells surrounding the stomata and it helps control the rate of transpiration.

Growers in the past have worried about having enough moisture to get the most out of the fertilizer. In the future they will worry about having enough fertilizer to get the most out of the moisture.

Deeper plowing increases effective root growth. But this increases the need for P, K and lime in some instances because of nutrient dilution and lower nutrition often found 3 inches below the plowlayer.

DIAGNOSTIC APPROACH ESSENTIAL

Many crops of tomorrow will be in the Hidden Hunger zone. With no symptoms to guide us, we must turn to more diagnostic chemistry to determine needs:

(1) Soil tests to predict needs.

(2) Plant tests to pick up errors in nutrient applications.

This puts plant tests in the role of an investigator—a key role!

Plants must capture sunshine. Basically the job of the plant is to capture light energy and use it in photosynthesis. In this process, certain elements are essential for plant growth.

$$6\,CO_2 + 6H_2O \xrightarrow[\text{chlorophyll}]{\text{light}} C_6H_{12}O_6 + 6O_2$$

Certain unavoidable losses of

energy occur with temperature changes. **But there are avoidable losses due to insufficient and ineffective leaf surface.**

Thickness and distribution of plants are basic. Chlorotic leaves or hidden hunger may limit effectiveness of leaf surface. For example, the leaves on a P-deficient plant are not functioning to full capacity. Iowa workers stress fertilization practices in determining leaf area per plant and preventing premature death of leaves. **A corn ear ripening on a green plant is ideal.**

How will soil tests be used. In a sense, top growers have graduated from soil test recommendations, although they still get soil tests. In the past, soil tests were used as an educational tool. But growers who will operate in the next 10 years know about fertilizer. They just want to know how much to apply. Soil tests then become part of a profit-guaranteeing service.

Growing evidence indicates that **soil tests should be taken under the growing crop or in the fall about harvest.** The crop draws down the nutrient supply and more meaningful results can be secured at that time.

A big advance in soil testing was the development of a slurry method to test undried soils at Iowa State University. Tests for N, P or K on the undried soils are more meaningful than tests on dried soils, results show. How rapidly will other labs adopt this procedure?

Plant tests let plants speak. There are two kinds—tissue tests on the growing plant and detailed analyses of plant samples in the laboratory.

Tissue tests have the advantage of getting some answers before leaving the field. If the results seem out of line, they can be rechecked immediately. If the main problem is not NPK, other aspects can be checked. Tissue test kits are available from a number of sources: Lee Lab, 1412 Russell Blvd., Columbia, Missouri: Urbana Laboratories, Urbana, Illinois; Denham Laboratory, R.R. #1, Wilmer, Alabama.

Spectrographic plant analysis in the laboratory (for major, secondary, micronutrients) is becoming more popular. The Ohio Agricultural Experiment Station now operates a spectrographic service for farmer samples. Twelve elements are reported, including **manganese, boron, copper, and zinc.**

RESEARCH DEMANDED

The big problem is to stay well ahead of the demand for information. Also, the diagnostician must have confidence in the tests.

Calibrations. A major problem is that soil and plant tests have been calibrated at **low yields.** Outmoded practices may keep yields at a level of little value to the grower interested in top-profit yields. Most field fertility studies conducted before 1960 are out of date. Unfortunately, some more recent studies were out of date when conducted.

One Midwest researcher says, "If I don't get at least 150 bushels of corn per acre, I think I have had a crop failure. These high yields can be made, must be made, and **must be increased to help the grower meet competition.**

The increasing yields in a 12-year rotation-fertility experiment in Indiana are interesting. (S. A. Barber):

	1st four years	2nd four years	3rd four years
Corn (bu.).......	103	131	156
Soybeans (bu.)..	37	44	50
Wheat (bu.).....	48	46	58
Hay (tons).......	4.5	4.1	4.8

What is a sure level? It is enough nutrients to insure against seasonal variations in need. We can never guarantee the planting season won't be too cool or wet or dry. So, it is necessary to raise the nutrient content of the plant to a "sure level."

Many responses of corn occur at **high** soil test levels. This is particularly true for P and K. Starter effects and environmental conditions are responsible.

Fertility needs of silage corn. How many readers know about fertilizer trials on silage corn? What about effects of continuous silage on soil chemical, biological, and physical condition? A higher and higher percentage of the corn is utilized for silage.

Michigan reports the following facts based on 15,755 lbs. of dry matter per acre above ground. Grain made up 6731 lbs.

	Removal		
	N lbs./A.	P lbs./A.	K lbs./A.
Corn for grain...	**121**	**23**	**23**
Corn for silage..	**196**	**30**	**173**

COMMUNICATING WITH THE FARMER

He'll listen to profits! Goals like 50 more bushels of corn, 10 more bushels of soybeans, two more tons of alfalfa will attract the commercial grower's attention. Can we net him $20 more income per acre on 250 acres—$5,000!

Complete service programs. Industry is more and more interested in having a one-stop Farm Service Center. One company is planning 100-200 service centers in the Midwest.

Industry-farm contacts greatly exceed extension-farm contacts, and industry influences many grower decisions. Extension specialists and/or industry conduct diagnostic clinics for people who contact the grower. We can expect industry to work more and more at being diagnosticians. The educational agencies have a real opportunity and responsibility to give industry the facts. University of California studies indicate this might well be the major effort of extension.

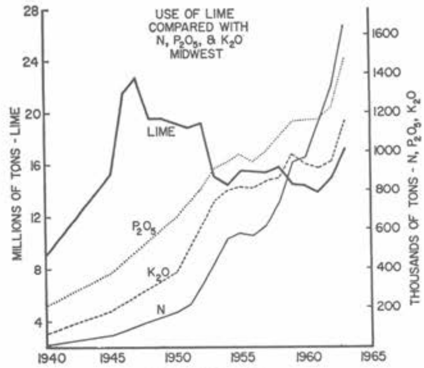


FIGURE 2

WHAT ARE THE TRENDS?

NPK lime usage. Midwest usage trends (Figure 2) show the climb. Nitrogen industry predicts a 10 to 12% annual increase the next 10 years. P and K usage could well double in this time. The downward lime trend, started in 1948, is being reversed and could move up to the previous all-time high.

Bulk blending grows. The number of plants mixing dry fertilizer materials is increasing rapidly. (Table 3) Cost per pound of nutrient is lowered for the farmer.

Availability of fertilizer materials well adapted to blending has been a great stimulus. Diammonium phosphate is playing an important part along with muriate of potash.

Bulk blending will be increasingly important in fertilizer distribution.

Bulk spreading saves grower. Bulk application gets on the giant amounts needed while decreasing labor for the farmer. The proportion and amount should increase rapidly. Research shows how important it is to have the soil built to optimum fertility level to plow depth. This reduces the need for large amounts of nutrients in the row at planting.

Table 3. Number of blending plants is increasing in the Midwest

	1962	1963	1964
Ohio	28	45	55
Indiana	50	108	150
Illinois	152	215	248
Michigan	8	20	25
Wisconsin	14	18	32
Minnesota	62	67	90
Iowa	150	258	318
Missouri	118	139	177
North Dakota	8	11	11
South Dakota	8	13	17
Nebraska *	18	40	60
Kansas	5	6	30
Kentucky	12	25	37
Total	633	965	1,250

1962 figures presented by Myron Keim at TVA Southern Bulk Blending Conference January 1963. 1963 and 1964 figures obtained from college and control officials in the spring.

*** Includes liquid mixed fertilizer plants in 1963 in Nebraska.**

Bulk spreading fits earlier planting habits because growers can reduce time spent on practices that might slow them down. Broadcast lime, P and K can be applied any time the truck can get on the field.

Two ways with micronutrients: (1) Add a shotgun mixture as an insurance measure—the practice with premium grade fertilizers. (2) Add amounts of the specific micronutrient as needed—as with B for alfalfa, Zn for corn, Mn for soybeans, etc. As diagnostic techniques improve, the second approach will be employed to a greater extent.

The big problem will be to keep adjusting fertilization programs upward **to meet the needs and goals of the grower.** This will demand care with:

(1) Right balance among the nutrients applied—as with P-Zn, Fe-Mn, N-K, and Mg-Ca-K.

(2) Constant reservoir to supply nutrients not now being applied but being depleted.

The End

International Potash Institute Awards Young Researchers

The International Potash Institute (Berne) is sponsoring a second competition for young research workers in which prizes will be awarded for papers on the chemical, biological or physiological role of potassium in the soil, in the vegetable realm or in the animal organism, including the field of human nutrition.

A sum of *4000 Swiss Francs* (i.e. about US$1000) will be awarded as prizes.

Only researchers who have not passed *the age of forty* on completion of their papers are participating.

Both published and unpublished papers are entered provided that they were *completed in 1964 or 1965.*

The papers are written in, or translated into, one of the four official languages of the Institute viz. English, German, French or Spanish. A very lengthy study in another language is acceptable if accompanied by a summary in one of the four above-mentioned languages sufficiently detailed to enable the paper as a whole to be assessed on its merits. The papers are submitted to the Institute neatly typed in five copies.

February 28, 1966 is the deadline for papers to reach the International Potassium Institute, 30 Zieglerstrasse, Berne (Switzerland).

The entries are being examined by a committee of three members of the Scientific Council of the International Potassium Institute.

Entrants will be notified of the results of the competition by September 30, 1966 at the latest.

California Corn RESPONDS to APPLIED POTASH

SILAGE CORN grown on Hanford loam in Stanislaus County, California, this past summer showed response to nitrogen and potash, according to the California Fertilizer Association. **Increased yield of about 10% was credited to the potash applied.** Farm Adviser J. L. Meyer has issued this report:

"Last summer Earl Olson and I ran a rather detailed experiment with the use of nitrogen phosphate and potash on silage corn.

"We were running the trial on a Hanford sandy loam, a rather sandy soil. We observed an increase in production of about 10 per cent with the use of potash. In observing, we also noticed a definite iron response in the color of the plants. We have been expecting some of our very light soils to **show field crop responses to potash because, of course, we have observed it in our tree crops for several years.**

"We also observed that on the sandy soils, 100 pounds of actual nitrogen on corn is not enough. Two years ago we tried nitrogen rate trials on fields of corn on very sandy soils and found 175 pounds of actual nitrogen was the economic application.

"We are not recommending that people go out and try a test plot with potassium, but **we are looking for test plot areas for rate trials of nitrogen and observations for potassium trials.**

"We would like to find four to five locations in the County this spring for experimental fertilization on corn silage. We would like to demonstrate the economic level of fertilization."

The Fertilizer Association recommends the local fertilizer supplier and the county Farm Advisor as good sources of information concerning the plant food requirements of all crops grown in the area which they serve. **The End**

COST PER UNIT GOES DOWN AS YIELD GOES UP

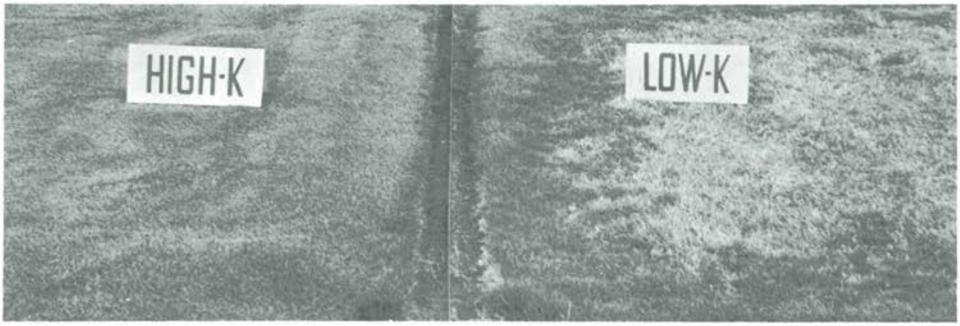
INFORMATION FROM BLOSSER, Ohio State University, indicates how the cost per bushel or ton of production decreases as yields go up (below). Even when the cost per bushel increases slightly, maximum economic yields and profits may be increasing.

CORN		SOYBEANS		WHEAT		HAY	
Yield Bu/A.	Cost of Production $/Bu.	Yield Bu/A.	Cost of Production $/Bu.	Yield Bu/A.	Cost of Production $/Bu.	Yield Tons/A.	Cost of Production $/Ton
50	1.00	20	2.03	20	1.89	1.0	30
65	.87	25	1.74	25	1.67	2.0	20
80	.79	30	1.54	30	1.52	3.0	17
95	.73	35	1.39	35	1.41	4.0	15
110	.69	40	1.28	40	1.33	5.0	14
125	.67	45	1.20	45	1.28	—	—

Range in profit per bushel or ton (Based on Midwest prices)

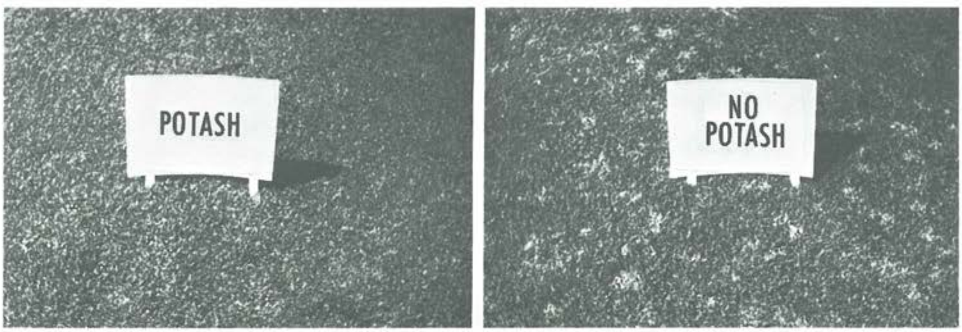
$.02 to $.35 $.55 to $1.38 —$.49 to $.12 —$7.50 to $8.50

Even greater profits than these can be achieved. Drive the profit per bushel or ton upward by increasing yields.



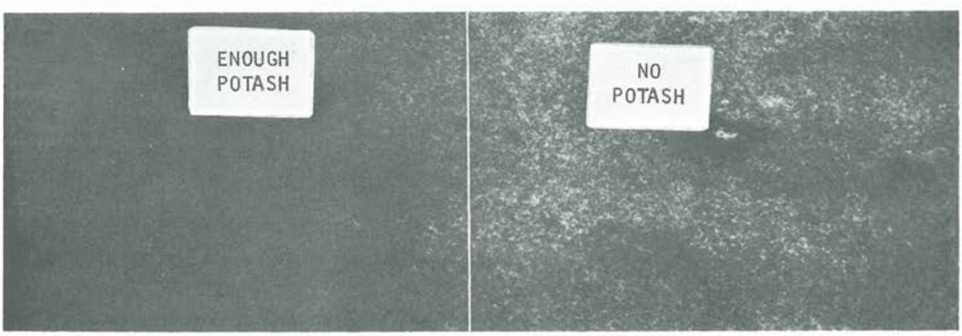
POTASSIUM HELPS YOUR LAWN SURVIVE WINTER RIGORS

(Picture from Auburn University Experiment Station)



POTASSIUM HELPS YOUR LAWN RESIST MANY DISEASES

(Picture from Florida Agricultural Experiment Station)



POTASSIUM HELPS GIVE YOUR LAWN VIGOR AND COLOR

(Picture from Rhode Island University Agronomy Department)

Put KUALITY In Your Lawn

WITH SCIENCE CONFIRMING new values of potassium (K) on turfs, many experts now suggest it should equal at least two-thirds the amount of nitrogen in your lawn fertilizer.

WHY? Because. . . .

POTASSIUM-RICH GRASS is more winter-hardy—due greatly to potassium's role in building carbohydrate (sugar) reserves in the cell sap and roots.

POTASSIUM-RICH GRASS withstands hot weather better—due greatly to potassium's role in slowing down plant respiration (breathing rate) and reducing water loss.

POTASSIUM-RICH GRASS is tougher, the leaves less likely to wilt and more able to take heavy traffic.

POTASSIUM-RICH GRASS is less subject to diseases—especially where frequent turf clipping can weaken grass and increase susceptibility to disease.

This is the theme of a new folder, a full-color picture story on the role of potassium (K) in building and keeping a top-quality lawn.

The 8-panel fact sheet calls the lawnmaker's attention to the "Neglected Nutrient"—that "third number" on the fertilizer bag.

It points out the importance of nitrogen, the first nutrient (number) on the bag, especially for rich, green growth . . . and the importance of phosphorus, the second nutrient on the bag, especially when establishing a lawn.

But it reminds the lawnmaker that nitrogen-rich growth comes thick and soft—and WITHOUT ENOUGH POTASSIUM, science says your lawn can suffer more severe disease attack, more summer and winter damage.

It cites soil test surveys showing between 50 and 90% of the lawn and turf soils testing low-to-medium (inadequate) in potassium.

It reminds the lawnmaker to replace the nutrients removed in his grass clippings . . . and cites the amount of nitrogen, phosphate, and potash removed with two different grasses.

In addition to plant food needs, it gives a quick check-off list on grass selection, liming, weed-insect caution, mowing and watering. **ORDER BELOW**

Clip and mail to:

American Potash Institute, 1102 16th N. W., Washington, D. C. 20036

	Free Sample Copy	Additional Copies 2¢ each Quantity	Payment
Please send me KUALITY LAWN FOLDER	______	______	$______

Name ______________________ Address ______________________

City ______________ Zip Code ________ State ______________

Organization ______________________________________

Bu. 290/A.	Tons 40/A.
CORN GRAIN	CORN SILAGE

How HIGH Are TOP

YESTERDAY'S TOP YIELDS are today's average. Even the 85-bushel corn **averaged** by Illinois in 1963 does not measure up to the 92-bushel corn indicated for 1965 on more than 9½ million acres—or to the 94 bushels predicted for nearly 5 million acres in Indiana.

To get a 92 to 94-bushel average on 14 million acres, many farmers produce well over 100 bushels an acre on sizeable fields and some go to 200 bushels.

Clyde Hight of Moweaqua, Illinois averaged 202 bushels of No. 2 corn per acre on 388 acres. How did he do it?

. . . Selected high performance hybrids.

. . . Planted early. Started April 20 and finished May 11.

. . . Drilled in 20-inch rows.

. . . Used 27,000 to 29,600 plants per acre.

. . . Applied 185 pounds per acre of N, 140 pounds of P_2O_5 and 200 pounds K_2O.

. . . Controlled weeds.

. . . Controlled insects.

Tons
16.2/A.

ALFALFA
HAY

ABOUT TOP YIELDS . . .

1 The Corn Belt leads in **corn grain** yields, while the Northeast offers strong competition in **corn silage** yields. And no region clearly leads **alfalfa** yields, except some irrigated cases in the West.

2 Top farmers often get greater **corn grain** yields than experiment stations. This gap is less striking with **corn silage.** And with **alfalfa,** experiment stations seem well ahead of farmers in most states.

Yields

Some key findings condensed from a national survey by **R. E. Wagner and W. K. Griffith** in close cooperation with land-grant university agronomists and extension specialists in 21 states. This survey can be secured in two forms: as a direct reprint of this condensation or as a complete mimeographed report. For the condensation, write TOP YIELD REPRINT. For the full report, write TOP YIELD MIMEO REPORT. At American Potash Institute, 1102 16th Street N.W., Washington, D. C. 20036.

Like it or not, farmers and regions are in stiff competition for high yields—not to win contests, alone, but to make money! High yield farming lowers unit production costs. In fact, many conditions demand at least 60 to 70 bushels an acre just to break even—and those bushels above the break-even point are the real money makers.

The survey revealed interesting facts about top yields, best feed producers, fertility needs, and other vital practices:

3 Average **corn grain** yields have shot up in the past 10 years—BUT TOP YIELDS are still 3 to 5 times greater than most average yields.

4 Average **corn silage** yields have increased in recent years—BUT TOP YIELDS are still 2 to 3 times higher than average yields.

5 Average **alfalfa** yields have risen surprisingly little in 20 years—AND TOP YIELDS usually run 3 to 4 times higher.

TABLE 1. Top corn grain yields and average state yields

State	Top Yields[1] Farmer Contest	Farmer Non-Contest	Expt. Sta. or Extension	Average State Yields, bu./A 1944	1954	1964
1. Missouri bu./A	290	—	177	34	23	51
TDN lbs./A	12,992		7,930			
2. Tennessee bu./A	264	—	180	22	19	48
TDN lbs./A	11,827		8,064			
3. Indiana bu./A	254	170	190	40	55	72
TDN lbs./A	11,379	7,616	8,512			
4. Illinois bu./A	251	202	217	45	50	78
TDN lbs./A	11,245	9,050	9,722			
5. West Virginia bu./A	—	225	186	28	47	49
TDN lbs./A		10,080	8,333			

[1] Yields corrected to 85 percent dry matter wherever the needed information to do so was available. Used 80 percent TDN in these calculations.

ABOUT FEED QUALITY . . .

1 The highest **corn silage** yields produced more TDN (total digestible nutrients) than **corn grain** or even **alfalfa hay**—except for one farmer contest field of irrigated **alfalfa** in California.

2 **Highest TDN** from **corn silage** was 16,000 lbs./A in New Jersey compared to 12,992 lbs. recorded for **corn grain** in Missouri.

3 **Lowest TDN** from **corn silage** yields was 8,000 lbs./A compared to a low 4,800 lbs. from **alfalfa** and 4,023 lbs. from **corn grain.**

4 13,000 lbs. or better TDN/A were reported from 13 **corn silage** yields, from two **alfalfa** hay yields, and from no **corn grain** yields—though Missouri came close with 12,992 lbs./A.

5 Top **corn silage** yield produced **23% more feed nutrients** than the highest **corn grain** yield—a significant advantage for the livestock or dairy farmer growing his own feed.

TABLE 2. Top corn silage yields and average state yields

State	Top Yields[1] Farmer Contest	Farmer Non-Contest	Extp. Sta. or Extension	Average State Yields, T/A 1949	1954	1964
1. New Jersey tons/A	40	30	35	8	8	10
TDN lbs./A	16,000	12,000	14,000			
2. California tons/A	—	39	—	—	—	16
TDN lbs./A		15,600				
3. Kentucky tons/A	—	37	35	9	8	13
TDN lbs./A		14,800	14,000			
4. Massachusetts tons/A	—	28	36	9	9	12
TDN lbs./A		10,800	14,400			
5. West Virginia tons/A	—	35	30	10	11	11
TDN lbs./A		14,000	12,000			

[1] Yields corrected to 30 percent dry matter wherever the needed information to do so was available. Used 20 percent TDN in these calculations.

TABLE 3. Top alfalfa hay yields and average state yields

State	Top Yields[1]			Average State Yields, T/A		
	Farmer Contest	Farmer Non-Contest	Expt. Sta. or Extension	1944	1954	1964
1. California tons/A........	16.2	—	12.0	4.5	4.8	5.3
TDN lbs./A...........	19,440		14,400			
2. New York tons/A.........	—	—	9.9	2.0	2.2	2.1
TDN lbs./A...........			11,880			
3. Illinois tons/A...........	—	8.4	9.4	2.2	2.3	2.6
TDN lbs./A...........		10,080	11,280			
4. Indiana tons/A...........	—	7.0	8.5	1.7	2.0	2.3
TDN lbs./A...........		8,400	10,200			
5. Mísissippi tons/A........	—	—	8.5	2.2	1.6	2.3
TDN lbs./A...........			10,200			

[1] Yields corrected to 88 percent dry matter wherever the needed information to do so was made available. Used 60 percent TDN in these calculations.

6 **Alfalfa** produces top protein—not shown by the survey. For example 200-bushel **corn grain** and 25-ton **corn silage** will match the **feed nutrients** but only **half the protein** in 8 tons of **alfalfa** hay. It takes 400 bushels of **corn grain** and about 50 tons of **silage** to get the protein available in this amount of **alfalfa** hay!

ABOUT FERTILITY NEEDS . . .

1—Reported usage varies widely—Nitrogen: from 70 lbs./A in Ohio to 485 lbs. in North Carolina; Phosphate: from 30 lbs. in Maryland to 674 lbs. in Missouri; Potash: from 0 in California to 813 lbs. in Indiana. These sharp contrasts are partly due to soil differences and previous treatment. Also, more than enough fertilizer is often used to assure it does not become a limiting factor.

2—Average rates fall far short of high-yield needs—with some top state recommendations even inadequate.

3—**Corn silage** demands more fertilizer than **corn grain** because the whole plant is removed—with experiment stations reporting up to 250 lbs. N, 200 lbs. P_2O_5, and 470 lbs. K_2O to get top yields.

4—Top **alfalfa** yields received a wide range of fertilization—P_2O_5:

TABLE 4. Amount of fertilizer (lbs./A) applied to top yields of corn grain

State	Farmer Contest[1]	Farmer Non-Contest[1]	Expt. Sta. or Extension[1]
	N P_2O_5 K_2O	N P_2O_5 K_2O	N P_2O_5 K_2O
1. Missouri............................	305-674-666	— — —	— — —
2. Tennessee..........................	— — —	— — —	— — —
3. Indiana.............................	395-310-813	120- 80-100	178-266-205[2]
4. Illinois..............................	298-109- 76	185-140-200	250- 75- 75
5. West Virginia......................	— — —	— — —	90-120- 60

[1] Includes manure applied, based on 10 lbs. N, 5 lbs. P_2O_5, and 10 lbs. K_2O per ton of manure at 50 percent availability.

[2] During past 5 years 1,426 lbs. N, 1,166 lbs. P_2O_5, and 2,066 lbs. K_2O were applied per acre. Soil tests in 1964 showed pH 6.0, 1,000 lbs. P_2O_5 and 288 lbs. K_2O.

TABLE 5. Amount of fertilizer (lbs./A) applied to top yields of corn silage[1]

State	Farmer Contest	Farmer Non-Contest	Expt. Sta. or Extension
	N P_2O_5 K_2O	N P_2O_5 K_2O	N P_2O_5 K_2O
1. New Jersey	200-200-200	175-100-150	100-155-470
2. California	— — —	300-100- 0	— — —
3. Kentucky	— — —	180-120-120	— — —
4. Massachusetts	— — —	240-145-230	250-145-290
5. West Virginia	— — —	— — —	100-100-100

[1] Includes manure applied, based on 10 lbs. N, 5 lbs. P_2O_5, and 10 lbs. K_2O, per ton of manure at 50 percent availability.

from 50 lbs./A in Maine to 240 lbs. in Massachusetts; K_2O: from 60 lbs./A in Ohio to 420 lbs. in Kentucky.

5—Illinois applied 460 lbs./A of K_2O to **alfalfa** in fall, 1964, to replace the potash removed by the 9.4 tons yield.

ABOUT OTHER PRACTICES . . .

1—Row width varied from 20 to 42 inches, for **corn grain,** with most plant populations totaling 20,000 per acre or above.

2—Modern technology has apparently made it possible to produce top yields with corn following corn as if a legume preceded the corn crop.

3—Most **corn silage** grew in 36-inch rows, the survey showed, with most areas recording 24,000 to 26,000 plants per acre.

4—High alfalfa yields were recorded most frequently from DuPuits and other Flamande types with shorter life but more vigor and production potential than some varieties.

5—Fertility was listed most frequently as the main factor limiting corn and alfalfa yields, followed by moisture, soil, variety, insects, too few plants in wide rows, lime need, too late planting, and weeds.

ALL OF WHICH RAISES 3 QUESTIONS . . .

1 Do we need to emphasize **HIGH YIELD** corn research to insure more useful facts for leading farmers?

2 Do we need to promote the value of **LATEST PRODUCTION PRACTICES** for alfalfa and other forages—plus more HIGH YIELD research?

3 Do we need stronger **ECONOMIC GUIDANCE** for high-yield agriculture in a day of high costs and investment risks? **The End**

TABLE 6. Amount of fertilizer (lbs./A) applied to top yields of alfalfa hay

State	Farmer Contest	Farmer Non-Contest	Expt. Sta. or Extension
	N P_2O_5 K_2O	N P_2O_5 K_2O	N P_2O_5 K_2O
1. California	204-204- 84	— — —	— — —
2. New York	— — —	— — —	— — —
3. Illinois	— — —	0-120-150	
4. Indiana	— — —	— — —	119-216-288
5. Mississippi	— — —	— — —	0-120-240

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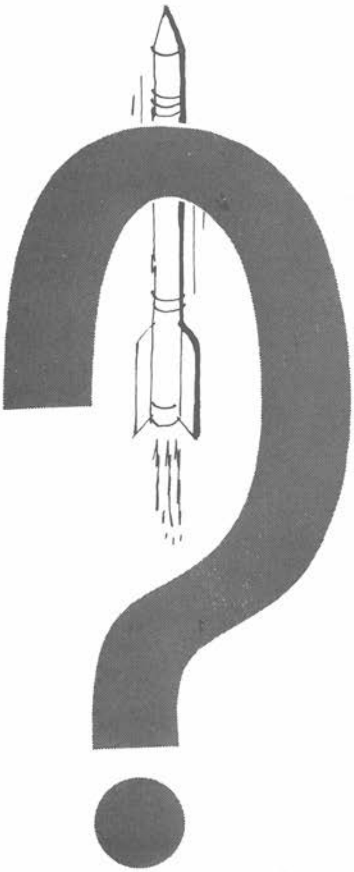


FROM HERE

By A. L. Lang
University of Illinois

WHERE DO WE GO from here? During the last decade, the Corn Belt has witnessed four great phenomena:

Inconceivable acceptance by land operators of new technology, varieties, culture, chemicals and automation.

Herculean expansion in the production of corn's most needed nutrient (nitrogen), with accompanying price reduction.

Increased production of other necessary nutrients without paralleling other input price increases.

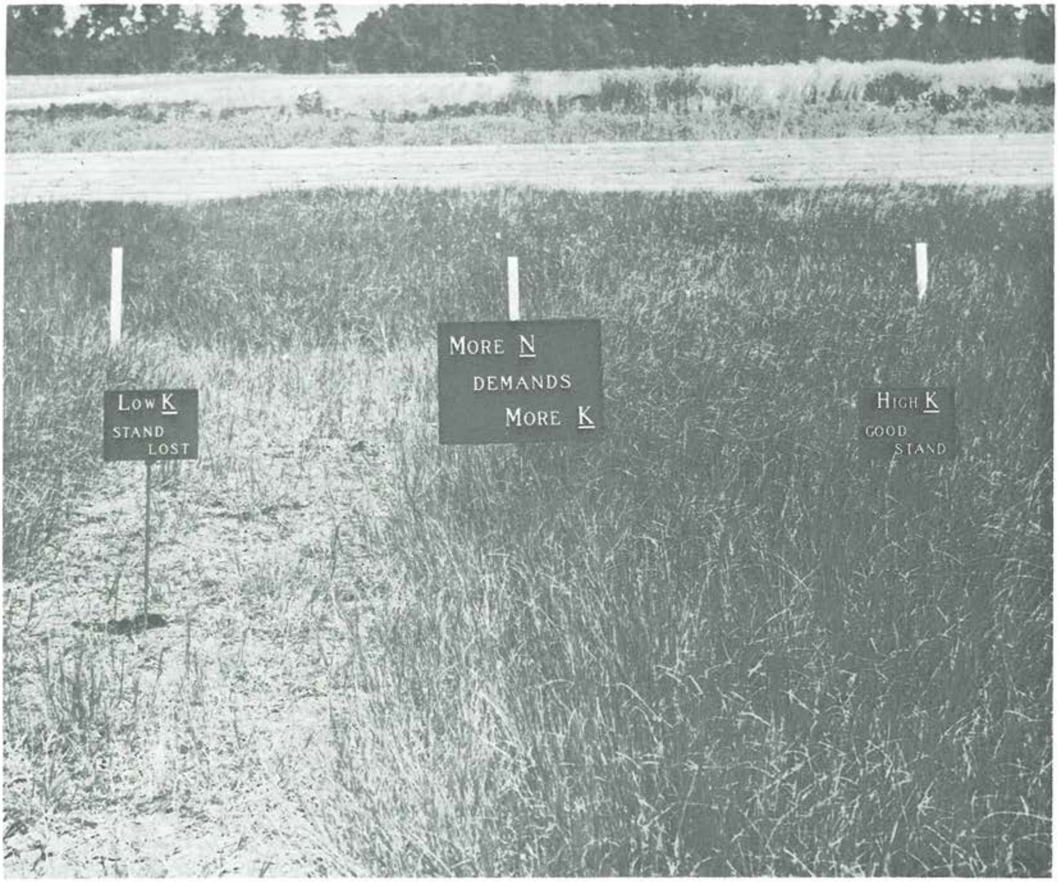
Nature's help with the longest period of almost ideal corn growing weather in the history of our records. Also technology has made weather somewhat less a factor than in the past.

All this has contributed to the almost 45 degree straight line increase in crop yields, especially corn.

So—where do we go from here? We haven't seen anything yet! This is just the beginning of a fabulous expansion in agricultural production. Momentum sparked by the Corn Belt will spread rapidly and widely throughout the world. Food can and will be produced abundantly for exploding populations even in now nearly starving countries.

In 1952, we predicted the corn belt folks would be talking about 200 bushels of corn. In 1965, the corn belt is bursting at the seams with 200 bushels per acre and more! How have they done it? **More nutrients, better varieties, higher popu-**

Turn to Page 45



IN FOCUS

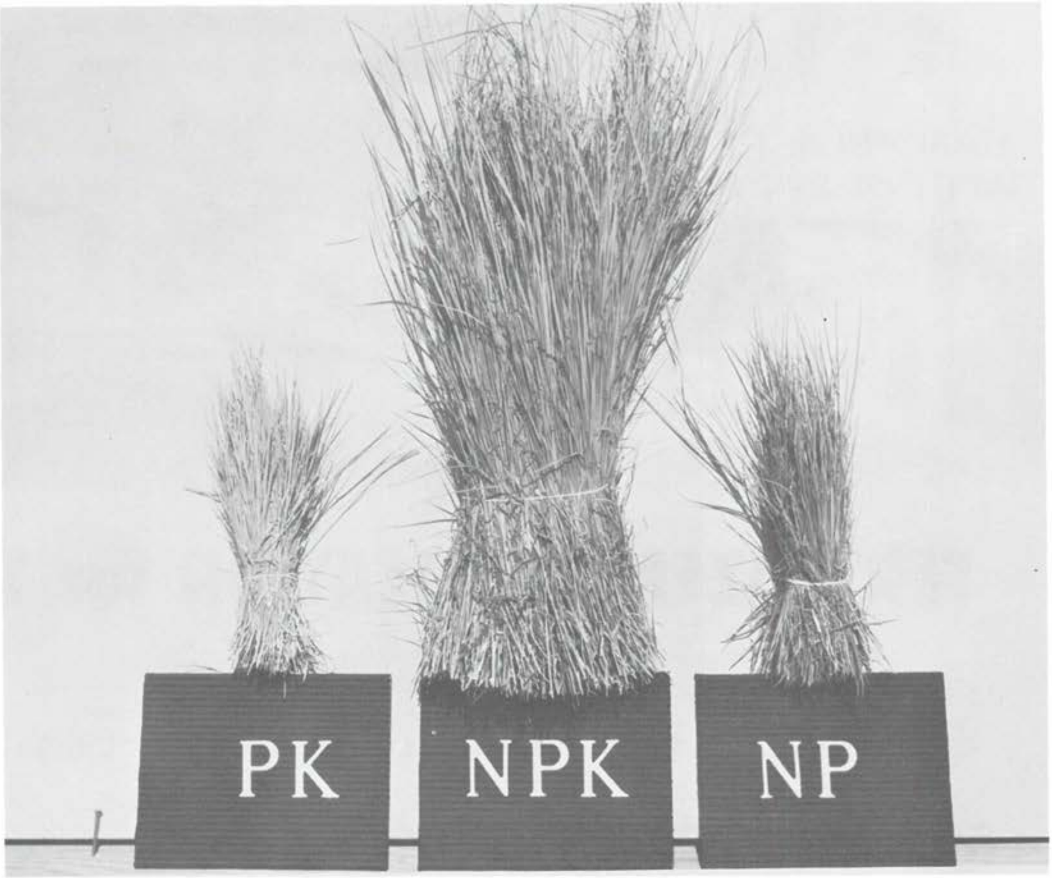
Picturing facts about so-called nutrient balance in multiple-deficiency soil is not always easy.

Experiments must be laid out right to give right answers—like the excellent experimental work conducted by the Alabama Experiment Station near Breton, Alabama, pictured here.

The response of Coastal Bermudagrass to potassium under high nitrogen conditions is shown above. If you saw only the field picture (above), you might draw wrong conclusions.

This experiment tells the story of COMBINED effects of nitrogen and potassium—illustrated in the second photo (right page) with comparative clippings from three plots.

If one had applied ONLY nitrogen or ONLY potassium on



with Garrard Ag Photos

the soil, without the NK COMBINATION as a comparison, then neither N nor K would have shown benefit.

If only PK vs. NPK or NP vs. NPK plots had been compared WITHOUT the third plot, wrong conclusions might have been drawn—and the **needed** nutrient not found.

Meaningful experiments are a big investment to official agriculture and a big dividend to the farmer who puts the results into practice. Equally important is the interpretation of the results. The grower deserves the full story—science demands it.

Herbert L. Garrard
Garrard Ag Photos
10 Heather Lane
Route 3, Noblesville, Ind.

FERTILIZER APPLICATION for TO

HIGHLIGHTS FROM NEW (revised) SLIDE SET & SCRIPT

Top growers apply fertilizer for TOP PROFIT yields. To do this, they take steps to remove soil fertility as a limiting factor.

Modern crop yields exhaust soil nutrients rapidly. These yields contain high amounts of NPK. Is your soil READY for high yields?

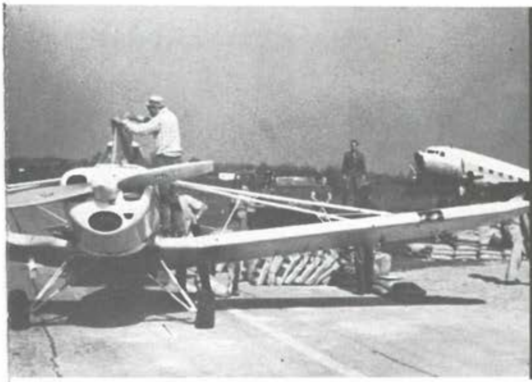
Seek highest profit PER ACRE. . . . *not* highest return per dollar spent. Top growers push all practices to the limit on EACH ACRE to insure maximum returns on their TOTAL investment.

Consider the soil a self-feeder—a CHEMICAL self-feeder much like the mechanical self-feeders livestock folks maintain for their stock. A soil contains many sources of fertility: native fertility, crop residues, residual fertility, and fertilizer applied yearly. Top growers insure FULL FERTILITY throughout the plow layer from crop PLANTING to MATURITY.

Fertilize not only to REPLACE the NPK the yields remove but also to BUILD UP the soil for future production. Amounts depend on the soil. On medium or low test soils, heavier fertilization applications pay off.

The trend is toward MORE plus HIGHER . . . more fertilizer of higher analysis. This demands more attention to fertilizer placement.

The comple with 48 slide lessons in f can be ord loan or pur page 48.



P PROFIT YIELDS

Use right placement for three reasons:

. . . to put nutrients in ACTIVE root zone.

. . . to AVOID INJURY to seedlings. Keep fertilizer-free soil between seed and fertilizer band to prevent soluble N, P, K, B, or other salts from harming seed. Small amounts of high P fertilizer can go with the seed of some crops.

. . . to INSURE EFFICIENT USE of nutrients from start to maturity. Nutrients are located where they will intercept new roots of the young plant AND are amply supplied throughout the plow layer to meet heavy growth demand later in the season.

CORRECTIVE FERTILIZATION is a buildup process—like raising your bank account to a strong working level. It may include heavy broadcast and plow-down of limestone, P, and K—and sometimes micronutrients. Consider this a capital investment.

MAINTENANCE FERTILIZATION is a replacement process—like keeping your bank account balanced with the withdrawals. It replaces nutrients lost by crop removal, fixation, soil and water movement. It may include reliming and annual additions of N, P, K, S, Mg, and micronutrients.

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Use soil tests to detect acid, low P and low K soils. Such soils should be retested 2 or 3 years AFTER CORRECTIVE APPLICATIONS. One application might not do the job because of inadequate amounts, inadequate soil mixing, fixation, or crop removals. A new soil test might indicate another CORRECTIVE application.

Top growers now plow deeper and deeper . . . using more lime, more P and K. Deep plowing helps loosen plowpans, enlarges root zones. *But remember:* a 12″ furrow slice contains 80% MORE SOIL to correct than the traditional 6⅔″. The extra soil may be more acid or lower in PK than the plow furrow. Many soil test recommendations are based on the 6⅔″ slice. So, push the soil sampling probe as deep as you will plow the ground and *list plowing depth* on the soil test sheet.

Lime keeps your soil factory working full-time. On mineral soils, hold pH at 6.5-7.0 to get specific benefits:

- Increases efficiency of P, both broadcast applications and native soil P, and reduces fixation.
- Heavy rates of N are needed on corn. But many forms of N are acid forming and may need 2 to 5 lbs. of lime to correct acidity from each pound of N.

Liming can decrease availability of Zn, Mn, Fe, and B. IF micronutrient hunger occurs with pH of 6.5-7.0, it may *not* be too much lime but NOT ENOUGH OF SOMETHING ELSE. Don't guess . . . test!

Proper placement depends on the crop. Most row crops and small grains do best with fertilizer to the side and slightly below seed level or young plant. Small-seeded legumes and grasses do best with part of the fertilizer directly under the row as in band-seeding. The fertilizer should be where it can intercept the new young roots.

N, P, and K move differently in soil. N moves most, P practically none, K very little. Nitrates dissolve and move up and down in soil solution according to water movement. Ammoniacal N moves very little until it is converted to nitrate. K may move readily in very sandy soils.

Wrongly placed fertilizer does most damage under limited moisture. Fertilizer can dissolve under limited moisture BUT the solution is far too concentrated . . . limiting germination, injuring seedlings. On the other hand, improperly placed fertilizer causes little damage under high water supply . . . because heavy rains after planting disperse the salts. *Remember:* when large amounts of fertilizer salts dissolve in the soil solution and bathe the germinating seed or young seedling, the plant cannot get water—literally drying out as in an oven.

Broadcast to meet row crop needs on low-PK soils. It gets large amounts on safely, quickly, economically.

Plowdown fertilizer . . . to get nutrients into moist, active root zones. MOISTURE IS VITAL TO NUTRIENT UPTAKE. Roots grow to less than 3% of the nutrients in the soil. As plant roots absorb water, more water flows to the root carrying N, Ca, Mg, etc. But P and K diffuse very slowly through water films, never moving over ¼″. Plowing down may put your fertilizer in moist soil for a greater part of the growing season. Disking does not put fertilizer deep enough!

Band placement about 2″ to the side and below the seed works well with row crops such as corn. It prevents soluble salts from damaging seed in dry years . . . enables feeder roots to reach nutrients soon after seed germination. This method is good for soybeans, which are very sensitive to soluble salts.

Band placement is important for cotton on low fertility soils. But don't put it too close. High rates only 2″ to the side and 2″ below may be too close on sandy soils. Broadcast applications are usually needed to get top profit yields.

Band-seed small-seeded legumes and grasses . . . to enable seedling tap roots to reach the plant food quickly for a fast start. Band part of the fertilizer about 1½ to 2″ deep and drop seed directly over the band. Many companies offer such equipment.

Broadcast to replace high nutrient removal by forages. Even roots and other plant parts near or on the soil surface can absorb nutrients. This grower topdresses 0-10-30+B right after harvesting alfalfa-grass.

Improve small grain stands, speed up emergence with side band: 1″ to side, 2″ below. It may pay to broadcast part of the fertilizer. Under low moisture conditions, too much nutrients down the spout with the seed may injure stand and growth.

Fertilize by air when ground machinery won't do . . . on rough pasture lands, sugar cane, forests, rice, cereals in spring, etc.

Compact with press wheels after seeding . . . to give seeds shallow cover and contact with moist soil . . . to get better germination and stands.

Place ammonia at least 6″ to 8″ deep . . . to make more certain the clay and organic matter will hold it.

Broadcast nitrogen solutions without pressure or liquid complete fertilizers directly on the surface . . . . Placement rules for solid fertilizers apply to liquid complete fertilizers at planting. And always release nitrogen solutions with pressure *under the soil surface*.

Residual (CARRYOVER) fertility is basic to fertilizer economics. A top grower seeking top profit yields will apply more fertilizer. This builds greater carryover effect, meaning part of his fertilizer investment will come back in following crops. This is the principle behind corrective or BUILDUP applications.

Carryover N increased corn yields on a black prairie soil in Indiana. High N rates for 2 years increased yields the 3rd year with no N. Even so, the 150 lbs. of N the THIRD YEAR gave profitable returns. Rate, soil, rainfall, and yields affect such carryover. A big factor limiting non-legumes is N supply. Use MORE N this year if it means more return NEXT YEAR.

Large K applications can also increase next year's yields. Up to 250 lbs. K_2O per acre in ONE YEAR increased soybean yields for TWO YEARS on this low-K Iowa soil. But don't expect carryover with heavy K-using crops, such as alfalfa and corn silage—UNLESS you apply very high rates.

Have the MODERN concept of fertilizer use! Plow down large CORRECTIVE APPLICATIONS to build up low fertility soils. Plow down and/or band MAINTENANCE APPLICATIONS to replace losses.

ORDER COMPLETE SCRIPT & 48 COLOR SLIDES ON PAGE 48

P-K IN DANDELIONS OUT

From "Post-Harvest Treatment with 2,4-D for Control of Dandelions in Orchards," by W. C. Stiles and K. R. Goff in **Maine Farm Research.**

While seeking how effectively post-harvest applications of 2,4-D reduce dandelion populations in orchards, Maine scientists also found phosphorus and potassium apparently making grass sod vigorous enough to reduce dandelion populations up to 38% more than the nitrogen-alone plot.

HIGH POPULATIONS of dandelions in orchards represent a serious problem in nearly all sections of the state. Many orchardists feel that bees brought in to pollinate the apple flowers are attracted to dandelion flowers and are therefore not as effective as desired.

Another serious problem is damage to spraying equipment caused by dandelion seeds clogging radiators. In an effort to overcome these problems, a post-harvest application of 2,4-D (amine form) was made in 1964 in a mature orchard at Highmoor Farm, Maine. The material was applied at the rate of 1 lb. (actual) 2,4-D per acre, using a low-pressure boom sprayer.

Results of the 2,4-D treatment were evaluated by counting open dandelion flowers at the time of full-bloom on McIntosh the spring of

PRODUCE TWICE THE PROTEIN WITH ALFALFA

CORN GRAIN	COMPARABLE		CRUDE PROTEIN/A	
Yield Level	Alfalfa Yields	TDN	Corn	Alfalfa
bu/A	T/A	lbs/A	lbs/A	lbs/A
80	3.00	3600	448	900
100	3.75	4500	560	1125
125	4.70	5600	700	1410
150	5.60	6700	840	1680
200	7.50	9000	1120	2250

Corn—80% TDN and 10% crude protein
Alfalfa—60% TDN and 15% crude protein

Minnesota

WIT

Table 1. Effect of 2,4-D on Dandelion, Highmoor Farm, 1965.

	Fertilizer Plots			
	Nitrogen	Nitrogen plus potassium	Nitrogen plus phosphorus plus potassium	Average
	Av. No. dandelion flowers per 4-tree plot			
Non-treated	2,688	1,844	1,652	2,061
2,4-D (1 lb/A)	98	32	73	68

1965. To eliminate influence of different fertility levels, comparable fertilizer treatment plots were used as test areas. These plots are composed of four trees each, with a 40 x 40 foot spacing between trees. Results are summarized in Table 1.

Further evaluations of the effectiveness of 2,4-D and of possible fertilizer influences on dandelions are anticipated. But results from this trial demonstrate that a major reduction in dandelion populations can be obtained with a post-harvest application of 2,4-D.

Two points of interest are apparent in these data:

1—The 2,4-D afforded approximately 95 to 98% control of dandelions regardless of fertilizer treatments in the test areas.

2—There were 31 to 38% fewer dandelion flowers present on non-treated plots which received potassium and phosphorus plus potassium, respectively, compared to the plots which received only nitrogen.

The reason for the latter difference (from P-K fertilization) was not determined in this test, but may be related to a more vigorous grass sod on plots that received the potassium and phosphorus.

Since apple trees are classified as being intermediate in susceptibility to 2,4-D, precautions should be taken to avoid spraying the trunks or limbs. Further, only low-volatile forms of 2,4-D, such as the acid, sodium salt or amine forms, should be used. **The End**

EARLY CUTTING HELPS INSURE QUALITY

Composition of Alfalfa-Grass Mixtures Harvested at Different Dates

ALFALFA

Cutting Date	Stage of Growth	TDN	Crude Fiber	Protein
		%	%	%
June 2	Prebud	71	24	20
June 15	Late bud-1/10 bl.	62	30	17
June 24	1/2 bloom	59	33	14
July 2	Full bloom	56	35	13

Minnesota data

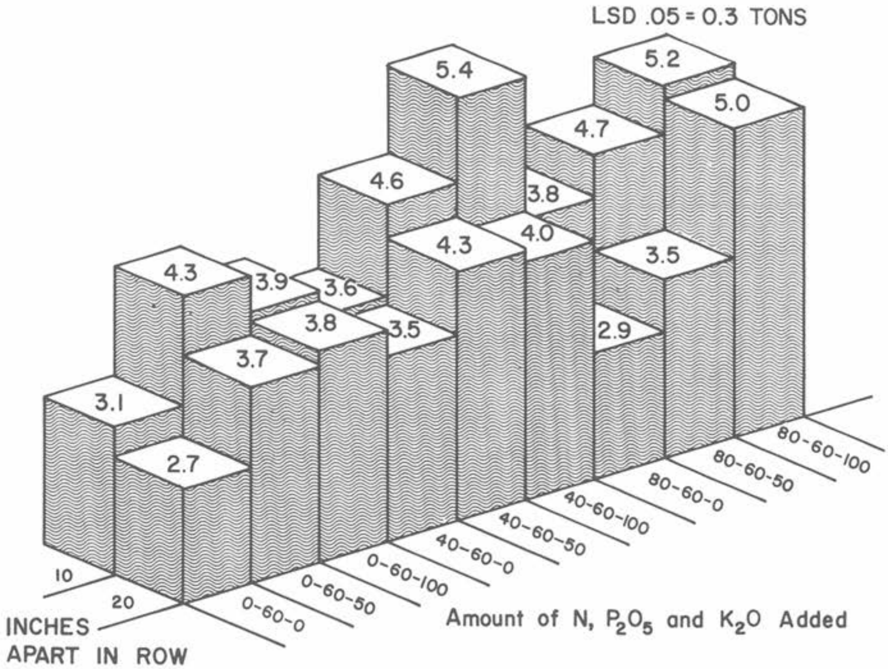
POTASSIUM HUNGER shows up as bronzing condition of pepper leaves, followed by necrosis and leaf drop.

N-K TEAMWORK PEPS UP SWEET PEPPER YIELDS

(From "Fertility Level and Plant Spacing Influence Yield of Ripe, Sweet Pepper," by G. M. Campbell and H. D. Swingle in **Tennessee Farm and Home Science**)

GOOD YIELDS of ripe sweet pepper can be produced on well-drained, fertile upland soils. However, facts regarding mineral element requirements and optimum plant population are relatively limited—especially requirements for nitrogen and potassium.

Mineral deficiencies often limit yields of high-quality ripe pepper for growers and processors. Recent investigations were conducted in sand culture and under field conditions at Tennessee's Main Experiment Station to gain more information concerning the mineral element



DIFFERENT N AND K LEVELS and plants spacings affect the marketable yield (tons per acre) of ripe sweet pepper.

requirements for this crop, and to study the influence of spacing on yield and quality.

SAND CULTURE STUDIES

The effects of low and high levels of calcium, magnesium, and potassium were studied in the greenhouse by using sand culture techniques.

Low levels of any one of the three elements reduced fruit fresh weight and percentage of ash. **Plants receiving a low level of potassium were markedly smaller and contained a lower level of ash. Symptoms of potassium deficiency were apparent on the foliage of these plants before they reached the flowering stage.**

The highest nitrogen percentage was found in plants and fruits receiving high calcium and magnesium levels. N levels were generally much lower in plants and fruits receiving high potassium levels.

Plants and fruits produced with low potassium levels contained the highest phosphorus percentage.

Increase in the level of any one of the three elements in the nutrient solution increased that element in the plant and fruit tissue.

Thirty-five percent of the fruits receiving low calcium levels were affected by blossom-end rot.

FIELD STUDIES

The response of sweet pepper to different nitrogen and potassium levels at normal and closer than normal spacing was studied during 1964. Sequatchie soils low in potassium and medium in phosphorus with a pH of 6.2 were selected for the study.

Two plant spacing distances and three levels each of nitrogen and potassium were incorporated into a factorial field plot design containing 4 replications.

Nitrogen (ammonium nitrate) was applied at rates of 0, 40, and 80 pounds of N per acre; phosphorus (20% superphosphate) at the rate of 60 pounds P_2O_5; and potassium (muriate of potash) at rates of 0, 50, and 100 pounds of K_2O per acre.

All materials were broadcast and incorporated into the soil previous to planting. Georgia grown plants of the Yolo Wonder variety were set in rows 3½ feet apart. Marketable yields are shown for the first four harvests in the chart.

NARROW ROWS PAY

Marketable yield was significantly increased by spacing plants 10 inches apart rather than 20 inches when the overall effects of N and K levels were considered. When plants were spaced 10 inches apart in the row, maximum and virtually identical yields were produced on plots that received 40 and 80 pounds of N combined with 100 pounds of K_2O. When plants were spaced 20 inches apart in the row, 80 pounds of N and 100 of K_2O was the most effective treatment.

The combined effects of N and K in this study indicate that both elements should be supplied at a relatively high level when peppers are grown on soils low in potassium. **Although yields were significantly increased by closer than normal spacing, further investigations should be pursued before considering any change in presently recommended practice.**

The End

Black Leaf on Low-K Grapes

In the Prosser, Washington area, leaf and petiole samples collected in mid-September show a close relationship between low potassium and black leaf on Concord grapes:

	Blades		Petioles	
Normal Vineyard	K	MG	K	MG
Normal Vines	0.7	0.30	3.50	0.31
Affected Vineyard				
Slight Black Leaf	.62	.35	1.25	0.57
Severe Black Leaf	.28	.48	.28	1.11

The black leaf at the Sloulin vineyard near Prosser was corrected with high rates of potassium sulphate per acre (840 lbs. K) placed 4″ deep in the irrigation rill. Leaf K showed an increase the year following potassium application, but it was two years before the black leaf condition was corrected.

The experiment was conducted by Dr. C. G. Woodbridge, WSU, Pullman, and Dr. W. J. Clore, Irrigation Experiment Station, Prosser, Washington.

A PROFIT-MAKING advantage of narrow rows is the quicker shading between rows, to cut down on weeds and save soil moisture.

Narrow Rows NET Grower $33/A!

California Farmer Reports

NO ONE has done much with the spacing between corn rows since the day some brave soul put a tape measure across the rear of a horse and decided it would require 40 inches to get that end of the beast down the row.

Several machinery manufacturers have discovered they are no longer tied to the horse's backside and now make machinery available for rows as narrow as 30 inches and in some cases even 20.

Corn growers in California are interested in the new concept that claims a 15 to 20 per cent yield increase. One grower trying the new 30-inch concept is Warren Bogle of Clarksburg.

As is always the case there is a catch and it could be a major one. The switch requires retooling from the ground up including planting, cultivation and harvesting equipment. If your planting and cultivation equipment is on a tool bar it may be adaptable, but a harvester with the appropriate head is essential.

Bogle found himself in a spot where he increased his corn acreage from 325 acres last year to 513 this year (1965). At the same time, his equipment was at the replacement stage. He felt the decision had to be made to go narrow row this year or forget it until equipment replacement was again necessary.

He talked to his banker and he is now a narrow row producer. How does a grower get back his rather sizable investment? Most of it must come from increased yield but there are other savings:

On wide rows, Bogle irrigated every 12 days. Close spacing has saved one irrigation by requiring water every 16-18 days. Also the quicker shading between the rows cuts down on weeds.

Narrowing the rows allows the use of a 4-row harvester rather than a 2-row for a considerable saving in time.

Bogle has jumped his plant population from 22,000-23,000 up to 28,000-29,000. Not every variety is suited for these heavy plant populations. Some varieties will allow the closer rows but must be opened up in row. **Any grower considering narrow row will do well to know what he is doing variety-wise before going off the deep end. The wrong variety could prove a disaster.**

Also increased plant populations mean **increased attention to fertilizer needs.** Bogle uses 275 pounds of N, 49½ pounds of P_2O_5 and 162 pounds of K_2O at an increase of $14 per acre over previous fertilizer costs. Seed costs are also increased $3 per acre.

In 1962 and '63 Bogle produced four tons per acre. In '64 his production was 3.8 tons per acre. On the close rows in 1965, five of eight varieties made 5 tons or better. On a small break-the-barrier plot one variety went 6¼ tons. **One ton increase is worth $50. With increased costs of $17 he ended up with a $33 per acre net from close spacings.**

APPLY FERTILIZER

FOR PROFITS!

SEE PAGE 24

209-Bu. Wheat!

Don't Bother To Check Your Glasses . . . You Read It Right.

GAINES, Washington's record-breaking wheat variety, topped all past achievements in 1965 with a 209-bushel **PER ACRE** yield.

Dr. B. R. Bertramson, chairman of Washington State University's department of agronomy, said the new worldwide record for wheat yields was set by a Kittitas county farmer, Wally Huppert.

Huppert farms 225 acres of irrigated land in the Denmark-Badger Pocket area of Kittitas County. He produced the 209-bushel yield on a 2.2 acre field measured by the Agricultural Stabilization and Conservation Service.

Total yield from the field, delivered to and weighed by the Western Farmers Association, was 27,600 pounds for the 2.2-acre field.

"And that," County Agent Phil Bloom reported to Dr. Bertramson, "is 209 bushels per acre according to my figures."

Bloom also reported that "Huppert wasn't trying to break any records. He's just a good farmer."

HOW HE DID IT

This is Bloom's account of Huppert's farming operations:

1—He raised 30.3 acres of wheat this year, all Gaines, averaging 136 bushels per acre. But one 6-acre field of 2nd-year wheat ground yielded only 96 bushels per acre. That reduced the overall yield.

2—The 2.2-acre field producing the top 209 bushel yield produced sweet corn in 1964 fertilized with 120 pounds of available nitrogen. Following the corn harvest, Huppert plowed down the residue, and fertilized the field with 135 pounds of nitrogen, 65 of phosphorus, and 65 of potash per acre. The fertilizer was applied in dry form and worked into the soil.

3—Huppert seeded Gaines wheat at the rate of 78 pounds per acre, heavier than usual because of the late planting date—October 27.

4—During the growing season, he irrigated by rill on a 10 to 14-day schedule. The wheat was harvested in mid-August. It was windrowed, then threshed from windrows.

Huppert also raised approximately 15 acres of barley, 80 acres of alfalfa, and 100 acres of sweet corn.

A REAL LEADER

Huppert's farming ability is shown by his yield on these other crops:

BARLEY: 2.8 tons/A—nearly 2 tons above state average!

SWEET CORN: 7 to 8 tons, with one field over 10 tons—nearly 2 tons above state average!

ALFALFA: 5.5 tons/A from two cuttings, with third cutting pastured—more than 2.5 tons above state average!

Until Gaines wheat was released, Huppert raised spring wheat averaging 70 to 80 bushels per acre.

Washington News

A QUICK LOOK AT SOIL TESTING

The general rules one can apply to plant nutrients are not satisfactory for all forages and all soils. Unfortunately both forage crops and soils are too variable for much standardization. Wise and economic use of time and fertilizer, however, has some guiding principles as a basis.

1. **No soil is inexhaustible for most nutrients**

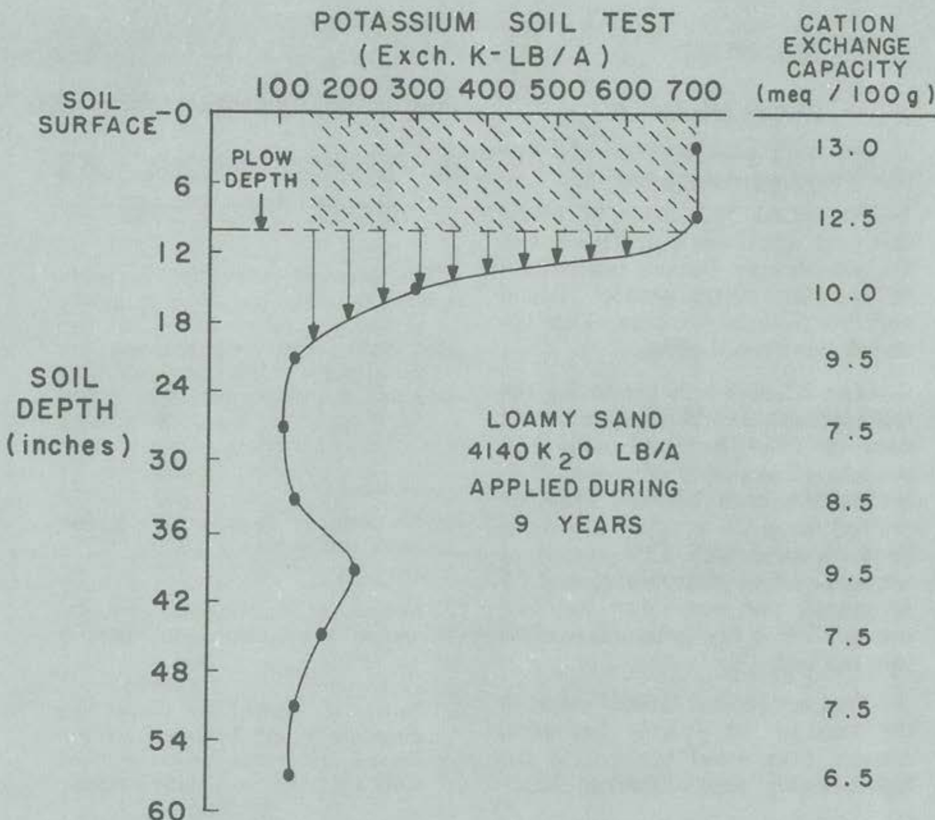
2. **Better management can increase production and quality**

3. **Nutrient problems can be masked by or induced by excesses of some nutrients as well as from soil deficiencies**

4. **Nitrogen is always needed on grasses regardless of soil or type of grass.**

The cost of producing forages are a reality. These costs make up a big share of the total in any livestock program. Hence today's forage fertility program must go beyond those guiding principles. Soil testing moves those guiding principles to the field and adjusts them for the best economic advantage. Adjustments in soil pH with lime applications may provide quality and yield returns for years to come. Increases in phosphate may have immediate returns. Perhaps a decrease in phosphate and an increase in potassium is necessary. Perhaps boron has been neglected on legumes. No one can afford to fertilize and lime with a set of guiding principles. It will require a soil test and a hard look toward the cost of forage production.

R. A. Wiese, Wisconsin



How Much Does APPLIED

By C. J. Overdahl
University of Minnesota

Sandy soils usually demand large amounts of potassium (K) for high crop yields.

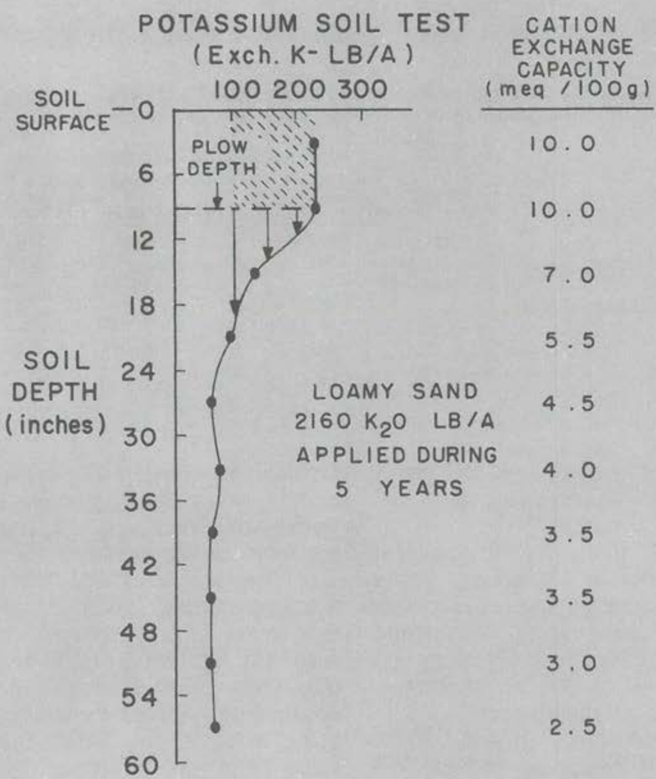
What happens to the downward movement of K? With high application rates, K could move out of the root zone. But if little movement occurs, where is the plowed down or topdressed potassium after a few years?

Let's look at some important results:

K TREATMENT ON IRRIGATED, LOAMY SAND

On loamy sand soils used for growing potatoes under intensive irrigation (where rainfall averages about 30 inches per year and 10

For a review of published work on K movement, write for the following reprint, "Movement of Applied Potassium in Soils." American Potash Institute, 402 Northwestern Ave., West Lafayette, Indiana.



POTASSIUM Move?

And R. D. Munson
American Potash Institute

to 12 inches of irrigation are applied annually), potassium soil tests were made on samples taken in 6-inch increments to a 5-foot depth from two fields in 1965. The potash rates below had been applied yearly for the number of years indicated.

Field 1 had 460 lbs. K_2O per acre applied annually or over 4000 lbs. K_2O per acre (to convert K_2O to K, multiply by .83). Likewise, field 2 received annual applications of 430 lbs. K_2O per acre or a total of over 2100 lbs. per acre.

These fields were plowed 9 to 10 inches deep each year after the broadcast application which explains the K levels in the 6 to 12-inch depth in Figures 1 and 2. Early

	Field 1 (9 Years)	Field 2 (5 Years)
Broadcast:........................	500#/A 0-0-60	400#/A 0-0-60
Row:..............................	1000#/A 8-16-16	1200#/A 8-16-16

Table 1. Pounds of exchangeable K one and/or two Years after application of 180 or 1000 pounds of K_2O per acre on a sandy loam soil

Soil Sample Depth	Potassium Soil Test Level—Exch. K		
	180# K_2O/A	1000 K_2O/A	
	After 2 years	After 1 year	After 2 years
Inches	lb./A.	lb./A.	lb./A.
0-1	70	600+	600+
1-2	—	600+	—
2-3	40	410	400
3-4	—	180	—
4-5	30	90	240
5-6	—	70	—
6-7	40	70	70

potatoes are grown and the yields range from 300 to 400 cwt. per acre.

In field 1, there is little apparent movement below 18 inches and in field 2 there is only slight movement below 18 inches. Virgin, unfertilized soil in this area usually tests no more than 40 to 80 lbs. exchangeable K even at the surface.

Phosphorus tests showed slight evidence of increase below 12 inches, but this could be from predistribution through roots rather than movement.

Since these data are on very coarse-textured soils under intense irrigation, even at high rates there would seem little danger of potassium moving out of the root zone with around 30 inches of rainfall.

USING 1 OR 2-INCH INCREMENT SAMPLES TO CHECK K MOVEMENT

Soil tests at 1 or 2-inch depths have helped locate faulty lime or fertilizer placement. Topdressed fertilizers are on the immediate surface during the year applied. Sampling by inch increments detects downward movement. Table 1 shows K tests on samples taken one and/or two years after topdressing alfalfa with 180 and over 1000 lbs. K_2O per acre. Note how the 180 lb. application affected the soil test very little, though the crop indicated some response. Even the 1,000-lb. rate showed no change in K level of the 6-7 inch layer.

Though Table 2 shows slight downward movement by K when surface-applied, the bulk of K is in the top two inches. In one sample (sampled in inch increments), 75 percent of the K was in the top inch. Since these soils dry rapidly at the surface, it appears that disked-in and topdressed placed fertilizer would be disadvantageous without irrigation and the K would be relatively unavailable.

Table 2. Effect of Disked-in At Seeding (240 lb. K_2O/A) and Topdressed (120 lb. K_2O/A) Potash Treatments on K Soil Test Levels on Sandy Loam Soils

Soil Sample Depth	Potassium Soil Test Level—Exch. K							
	Wadena Co.		Ottertail Co.		Morrison Co.		Hubbard Co.	
	No K	+ K	No K	+ K	No K	+ K	No K	+ K
Inches	lb./A.		lb./A.		lb./A.		lb./A.	
0-2	70	230	90	330	60	180	70	210
2-4	50	90	60	120	30	90	60	60
4-6	40	90	50	90	40	40	60	60
0-6 Average	53	137	63	180	43	103	63	110

Soil Sample Depth Inches	K Tests No K lb./A.	K Tests 200# K_2O/A lb./A.	Soil pH No Lime	Soil pH 10 Tons Lime
0-2	240	330	6.1	6.2
2-4	220	230	5.9	6.6
4-6	210	300	5.9	6.6
6-8	200	330	5.8	6.4
8-10	190	290	5.8	6.2
10-12	160	190	5.8	5.8

By contrast, two deep diskings plus deep plowing distributes fertilizer and lime rather uniformly to the plow depth. Potassium tests one year after an 800 lb. treatment of 4-12-12 or nearly 200 lbs. K_2O per acre plowed 10 inches deep are compared (above) to no treatment.

SUMMARY & IMPLICATIONS

(1) Where high K rates have been plowed down over a number of years on coarse-textured soils, little K movement has occurred below 18 inches even under irrigation. With finer-textured soils, movement would be less. So, it appears that K losses from leaching would be neglible. This study was made with about 30 inches of rainfall.

(2) Disked-in or topdressed K on sandy soils moves very little (2 inches) unless extremely high rates are applied. So, potassium not plowed down may be relatively unavailable to crops during dry periods reducing the benefit.

The End

The Case for 150-Bushel Corn

Top hybrids, thick stands, plenty of fertilizer — keys to high corn profits

Joe Hinkle, Cass County, Indiana pushed for top yield with new hybrid at 26,000 plants per acre teamed with extra fertilizer. This 13-acre field of a new special cross, Funk's G-4582, yielded 158.6 bushels per acre in dry 1964.

Joe Hinkle used to figure it was a real good feat to roll out 70-to 80-bushel corn yields. But that was back in 1950.

Today, Hinkle is one of a growing number of corn farmers who believe 150 bushels per acre is a mark they should shoot for every [illegible] revolution [illegible] performing [illegible] under [illegible] planting and respond to [illegible] lizer. The afterburner—putting thrust in this movement—is an urgent quest for higher profits.

How's Joe Hinkle doing? In 1963, his Cass County, Indiana, cornfields kicked out average yields of 141 bushels per acre. During the past five years, and counting two seasons which clobbered his area with hot, dry weather and high winds, he has averaged 138 bushels to the acre—*on his total corn acreage.*

His per-acre costs average out at \$73.75. Seed, fertilizer, weed and insect killers run \$33.75; taxes and land investment, \$[illegible] [illegible] machinery depr[illegible] [illegible] labor [illegible] \$10.

Hinkle sells as much corn as he can on the early corn market. He delivered some last fall at \$1.21 per bushel. Even at \$1 per bushel this leaves \$62.25 profit per acre.

Hinkle feeds out 1,200 head of feeder pigs and 50 to 100 head of cattle a year. He figures he makes \$1.40 a bushel when he markets corn through cattle and hogs.

But we've left out the "middle" of Joe Hinkle's story. His case for 150-bushel corn is one of constantly improving his corn-growing practices. "You have to keep improving—moving ahead—or in a fe[illegible] you're [illegible] average," [illegible] Hinkle [illegible] I was pl[illegible] at [illegible] a lit[illegible] harvest stan[illegible] stalks p[illegible] over [illegible] ing 100 pounds of 12-12-12 starter. Top yields in those years were 80 bushels."

Hinkle started to side-dress in

He Made It!

Joe Hinkle our farmer who thought he could average 150 bushels finds he's making it — and then some.

------From NATION'S AGRICULTURE------

Last February we wrote, "Joe Hinkle used to figure it was a real good feat to roll out 70-to 80-bushel corn yields. But that was 1950.

"Today, Hinkle is one of a growing number of corn farmers who believe 150 bushels per acre is a mark they should shoot for every year."

By mid-September, Hinkle had combined his first field, planted to a hybrid extremely early for this area but which had been literally flattened by tornadic force winds. This early high-powered hybrid averaged *146 bushels* of No. 2 corn.

By the end of the month, Hinkle had another very early Single Cross in the bin. It was also adjusted to No. 2 at 15.5 percent moisture and went over the scales at *158 bushels per acre!*

Just before we went to press, Hinkle took a tally on his weight tickets at a nearby elevator. He had combine-harvested an average of 154 bushels per acre on 180 acres – with 320 acres yet to go. One of his full-season hybrids averaged 163 bushels of No. 2 corn per acre from 40 acres!

From the moment corn harvest commenced, hundreds of top corn farmers, like Joe Hinkle, knew the '65 crop would be a whopper.

Field-wide yields started rolling in early – 145 bushels . . . 151 . . . 175 . . . 183 . . . 200. . . there's even one–234 bushel average.

Hinkle explains it this way: "You've gotta' shoot for an above-average year . . . and *not* leave anything to chance."

Here are some of the things Joe *didn't leave to chance* in 1965:

Deep plowing – he plowed a good 9 inches deep; plowed some of his 510 corn acres in fall, but the bulk of it in early spring.

High fertility – he has been on a high fertilization plan for a dozen years, bulk spreads nitrogen and potash and plows it down. He uses 300 lbs. of 11-18-37 liquid starter and side-dresses the balance of his nitrogen after planting, for a total of 188 lbs. of N, 54 lbs. of P_2O_5 and 120 lbs. of K_2O per acre. Soil PH is kept at 6.5.

Hybrids – Joe Hinkle plants the hybrids with the highest yield potential he can find. In 1965 he used six hybrids. He planted two 4-way hybrids, early maturing for his north central Indiana location – Funk's G-15A and G-17A. He planted three medium-maturing varieties–Funks G-4350, single cross; G-4390, a special cross; and G-38, a 4-way hybrid. His full-season selection was a special cross, G-4582.

Plant Population – Hinkle aims for a harvest stand of 22,000 on most of his corn land. This means planting 10 to 15 percent thicker than 22,000. He's also checking the upper limits of plant population.

Minimum Tillage – He uses only a field cultivator ahead of the planter – a 4-row minimum tillage outfit that puts down starter, insect killers and band-sprays for weeds.

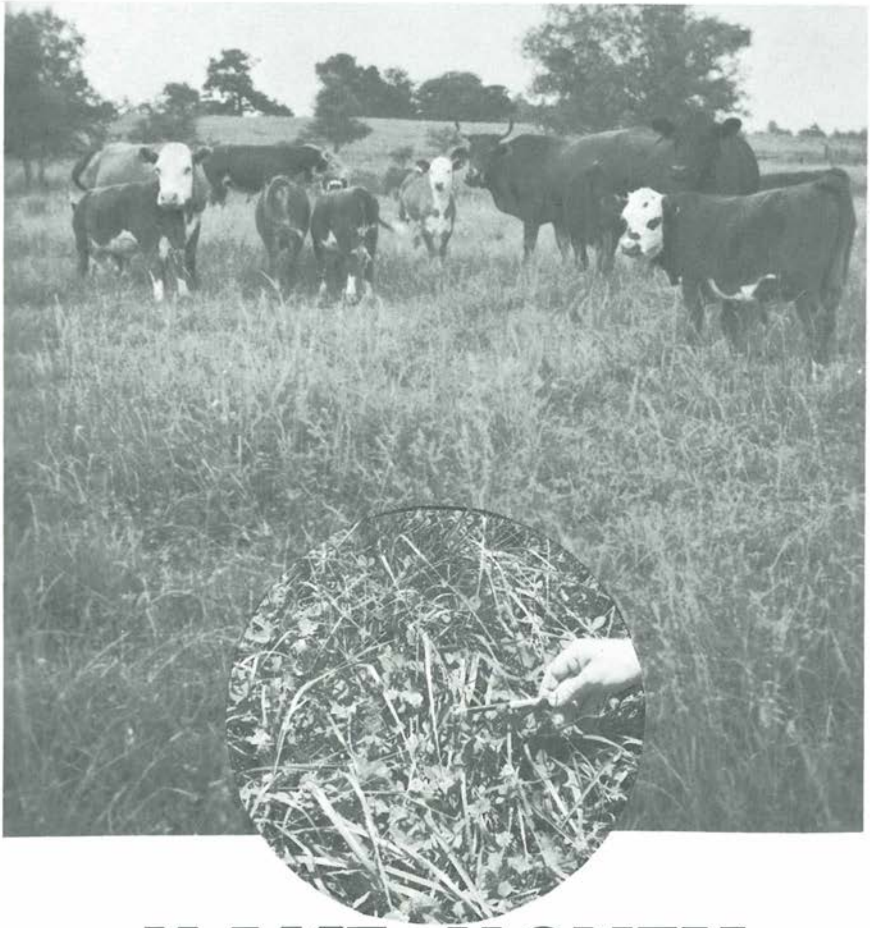
Early Planting – "Start the last week of April," says Joe. "Wind up no later than May 10."

Weed Control – 1 lb. of Atrazine per acre is band-sprayed over the row; with just one cultivation.

Insect Control – 5 lbs. of 20 percent Aldrin are applied in the row to clobber soil insects.

Early Harvest – Hinkle likes to get some of his corn harvested early to take advantage of peak prices *before* the big seasonal rush. He has a new, big capacity 4-row combine and a batch dryer which enables him to get started harvesting when corn is 28 to 30 percent moisture.

Timeliness – This is vital. Hinkle keeps all his corn growing equipment in tip-top shape. "When I'm ready to go, I want to roll!" he says. Hinkle's system for top yields ticks like a fine watch. Maybe he has a "Case for 200-Bushel corn not 150 bushel!"



MAKE MONEY with Clover-Grass Pastures

CLOVER-GRASS PASTURES help East Texas cattlemen increase profits by providing **a longer grazing season and higher quality forage at less cost than grass pastures.**

Management practices for a grass pasture are much simpler than for a clover-grass pasture, **but clover-grass pastures increase the calf crop, produce higher daily gains and higher weaning weights of calves.** Protein, phosphorus, and calcium—the "building blocks" for growing calves—are usually higher in clover than in grass.

WATCH "FIRST TABLE" EATERS

Fertilization practices for growing a legume are much different than for growing grasses. Clovers in East Texas grow in autumn, winter, and spring. Phosphorus and potash are applied in autumn to stimulate the weak root system of clover.

Grasses "eat at the first table" for phosphorus and potash, and clover disappears from East Texas pastures if these nutrients are deficient! Since East Texas soils **are characteristically low in lime and available phos-**

phorus and potash, ample lime, P and K must be used to stimulate clover seedlings for rapid establishment and growth. Fertilizing East Texas pastures with nitrogen high rates in spring and early summer stimulates extensive root systems of popular Common and Coastal bermudagrasses, causing clovers to disappear within a few years.

WHITE CLOVER PROVES BEST

Louisiana S-1 white clover and ryegrass are growing more popular as winter pasture. White clover "fixes" up to 200 lbs. nitrogen annually, growing longer and more uniformly through the winter season than the old favorite Crimson clover. Yet, many producers receive increased animal performance through higher levels of fertilization and management even with Crimson.

With only 120 lbs. each of P_2O_5 and K_2O applied in autumn, many East Texas cattlemen stock approximately one cow with calf per acre.

By

J. Neal Pratt

James I. Mallett

Texas A&M University

High quality hay, made during summer from excess forage grown in the pasture, is fed to cattle during the fall and winter while clover and ryegrass are being established. These fertilization rates encourage rapid clover establishment in autumn and growth during late spring and early summer. And much white clover lives through the drouthy summer when adequately nourished.

DEMANDS GOOD MANAGEMENT

Intensive management is essential for maintaining clovers and obtaining livestock profits. White clover is difficult to establish in thick turfs of bermudagrass. Pastures are grazed closely or harvested for hay in the early fall to permit fertilization for clover establishment. Nitrogen is withheld from clover pastures in late summer and early fall to avoid stimulating grass growth during clover establishment period. Pastures are rotated to permit hay production from rank grass that retards clover growth. Making hay from the pasture uses up excess high-quality forage and permits uniform regrowth of the pasture.

FIXED COSTS

In most East Texas counties, the average farm runs about 250 to 300 acres. On this size farm, the same system of equipment, buildings, and fences is needed, whether the stocking rate is **six acres per cow or one acre per cow.** But the investment per cow can range from $1186 to $367 per cow, due to land and improvement costs spread over more cattle. See Table 1. Likewise, total depreciation, interest, repair, maintenance and taxes change very little, but decrease drastically per cow unit.

WHAT IT COSTS & PAYS

Each stocking rate included in Table 1 represents a different forage and livestock system.

One Cow Per 6 Acres:

Little or no weed control.
No fertilizer.
Long winter feeding period requiring both protein supplement and purchased hay.
Cash costs about $45 per cow yearly.

One Cow Per 4 Acres:

About $10 fertilizer costs per cow applied yearly to hay meadows to get winter hay and extend graz-

TABLE I. INVESTMENT AND FIXED COSTS, 300 ACRE EAST TEXAS COW-CALF BEEF FARM

Item	1 Cow/6a.	1 Cow/4a.	1 Cow/2a.	1 Cow/1a.
Land Cost	$30,000	$30,000	$30,000	$30,000
Improvements	9,900	9,900	9,900	9,900
Machinery and Equipment	9,240	9,240	9,240	9,240
Livestock	10,175	15,262	30,525	61,050
Total Investment	59,315	64,402	79,665	110,190
Investment per cow	1,186	859	531	367
Annual Fixed Costs *	5,200	5,925	7,050	9,000
Annual Fixed Costs per cow	104	79	47	30

* Includes depreciation, interest, repair and maintenance and taxes.

ing season that reduces winter feeding period.

Cash costs about $40 per cow yearly.

One Cow Per 2 Acres:

Involves 2 acres of **crimson clover and bermuda** grass per cow.

Fertilized with 250 lbs. of 0-20-20 fertilizer per acre at $15 per cow cost yearly.

Adequate weed control and rotation grazing helps this system give good summer grazing and hay production PLUS some winter grazing to reduce winter feeding demands.

One Cow Per Acre:

Demands high quality plants and high fertilizer levels teamed with the best livestock management.

White clover and bermuda grass fertilized with 500 lbs. 0-20-20 at $15 per cow or per acre cost yearly.

Rotation grazing to give hay production, improved animal health, and parasite control.

A few East Texas cattlemen are approaching the one cow per acre production level, while many are progressing in this direction. This is the road to top-profit yields of feed for beef, as shown in Table 2.

Competition from the companion-crop (as ryegrass) during establishment can determine success or

TABLE 2. INCOME, OPERATING COSTS & PROFIT, 300-ACRE COW-CALF BEEF FARM

	1 Cow/6a.	1 Cow/4a.	1 Cow/2a.	1 Cow/1a.
No. of cows	50	75	150	300
Income/cow *	$100	$100	$100	$100
Cash operating costs/cow	45	40	40	40
Income above cash costs/cow	55	60	60	60
Total income above cash costs **	2,750	4,500	9,000	18,000
Fixed cost/cow	104	79	47	30
Income above total costs/cow	(−49)	(−19)	13	30
Total income to labor and mgt.	(−7,350)	(−2,850)	1,950	9,000

* Income per cow should actually increase in favor of the higher stocking rate since improved livestock nutrition usually improves calf crop percentage and weaning weights.

** Most beef producers have cash income above cash costs, but less efficient producers receive a very low income for their labor and little or no return on their investment. The two lower stocking rates lacked $7,350 and $2,850 respectively covering depreciation and interest at 6% on their investment.

failure of a stand. If the cool-season grass begins to dominate the clover, graze or clip the stand. This helps the clover become established.

Pastures should be divided for rotation. This is basic to successful white clover in East Texas. Clipping excessive forage removes the unpalatible growth, helps prevent "spot grazing," and permits the entire pasture to regrow to uniform age and height.

White clover-grass pastures are growing more popular in East Texas for making money through beef cattle. Adequate lime, phosphorus, potash and management are doing the trick. **The End.**

From Page 21

lations. Insect, disease, weed control and less tillage, meaning no root damage by man, insects, diseases and weeds—resulting in more efficient use of air, water and nutrients.

But enough of the crystal ball. What do we see factually in the corn belt and especially in Illinois for the next period ahead?

Nitrogen production and acceptance tripled, other chemicals in proportion. Corn yields now hovering around the 100 bushel level as a common average (and doubled by top growers) will be doubled in the next 20 years. Other crops and other technologies will likewise develop and be accepted in ever mounting sequence.

What does this mean in Illinois alone **with 10,000,000 acres of corn?** Let's be conservative and predict **acceptance in Illinois by 1975 of 800,000 tons of N, 500,000 tons of P_2O_5 and 500,000 tons of K_2O.**

Usage July 1, 1963 to June 30, 1964 was 363,000, 276,000, and 227,000 tons of N, P_2O_5 and K_2O respectively (USDA). **This means a doubling of plant nutrient use by 1975 in Illinois. Let's spread this thinking over the agricultural lands of the world!** **The End**

With fertilizer, wheat, and atrazine . . .

"Fly-on" farming spreads its wings

Harold Johnson reports in **The Farmer**

THOSE NEW "fly-on" farming practices we've been telling you about came through last year with flying colors. You'll see them used on an even bigger scale this year, along with even newer developments.

APPLYING ATRAZINE BY AIR: "Looks awfully good to me," reports Hiram Drache, Clay, County, Minn., college professor, cattle feeder and corn grower.

A year ago last spring he hired Ralph Mathews, Barnesville, Minn., to aerial spray 40 acres of corn. "I'd just finished planting it and didn't think I'd find time to do any cultivating. Ralph flew on four pounds per acre of atrazine 80W per acre, along with two gallons of water per acre. Spraying was delayed until two weeks after the corn was planted. Then I waited another two weeks for rain. **Things looked pretty gloomy, but not for long," Mr. Drache reports. He got perfect weed control—without a single cultivation.**

The same field was planted to corn again last spring. Not sure to what extent he could count on carryover of the chemical, he played it safe by having two pounds per acre of atrazine flown on. Weed control again was "perfect." With six pounds of chemical applied the past two years, he will depend on carryover alone to control weeds next year in the third consecutive crop of corn.

On land rated at 40 bushels per acre by the ASCS, he averaged 91.6 bushels of corn last year (15.5% moisture basis). He ensiled the entire crop this year, but estimates it would have yielded about 88 bushels, had he harvested it for grain. He has completely eliminated cultivating and, based on a trial he ran this past year, believes he also can eliminate plowing for continuous corn. He plans to spring disk stalk residue, then follow right behind with the planter. **He fertilizes heavily (100-70-50 pounds of actual N, P and K per acre, plus 10 tons of manure, on this year's crop) and uses a high plant population (19,400 plants per acre—harvest count—in 36-inch rows).**

"FLY-ON" PASTURE FERTILIZATION: Walter Schock, Peavey Company Dealer Service manager, and Al Pietsch, of the Pietsch Flying Service, teamed up to offer this new service in the Minot, N. Dak., area last spring. The project was offered on a "break-even" basis and had a lot of takers. **"It opened a lot of eyes to the big potential in pasture fertilization," says Mr. Schock, who adds that "we had terrific interest again (last) fall."**

SEEDING SMALL GRAIN BY AIR: In Cavalier County, N. Dak., Robert Wells and Walter Platskow have air-seeded mudded-in fields which were too wet to work with conventional equipment for the past three years. "We'd hoped this past year to do more testing of aerial seeding as a regular practice, comparing it with drill seeding. **But, with the wet situation we had last spring, what we seeded by air was on an emergency basis. It was either this or nothing on most of the custom acreage we seeded by air,"** Mr. Wells told THE FARMER. "Yields were erratic, depending mainly on whether or not it was possible to get in with ground equipment after seeding to scratch in the seed. **All told, we think wheat seeded by air turned in a good performance—good enough so we're ready to try it on a bigger scale (this) year."**

Mr. Wells plans to follow this four-step "fly-on" program on his own farm (this) year: Step 1. Fly durum wheat on stubble-mulched, previous cropping, at the rate of 1.5 bushels per acre; Step 2. Fly on fertilizer; Step 3: Inter-seed sweetclover by air after the grain is up; Step 4: Aerially spray the grain for weed control. **The End**

Airplane and the "reload" setup which Mr. Wells uses to seed small grain.

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A Few Whinnies

A society for Absent Minded Professors was actually organized in 1942—they forgot to meet in 1944. And disbanded.

Mountaineers are noted for their longevity.

A newspaperman from an eastern city was traveling through a backwoods area when he saw a wrinkled, bent, old man rocking on his porch. Thinking that perhaps there might be a good story here, he stopped to talk with the old man.

"Sir, I'd like to know your secret for long life?" he said.

"Well," replied the old man, "I drink a gallon of whiskey and smoke 25 cigars each day, and go dancing every night," replied the old man.

"Remarkable," said the reporter, "and exactly how old are you?"

The reply was: "Twenty-seven years old."

A little old lady was going through customs at San Francisco. An inspector asked her what was inside a bottle in her valise.

"Holy water," she replied in a thick Irish brogue.

The inspector uncorked the bottle and took a swig. "For Pete's sake," he exclaimed, "This is Irish Whiskey."

"Saints be praised!" exclaimed the old lady. "It's a miracle."

A man went to the doctor to see if there was a cure for snoring. The doctor asked, "Does it bother your wife?" To which the man replied, "No, it just embarrasses her, it's the rest of the congregation it disturbs."

The shoe salesman was stunned when the shapely gal he had been waiting on slapped his face and tore out of the store.

"What the blazes happened," roared the boss.

"I don't know," replied the puzzled clerk. "All I said to her was 'these shoes will make street-walking a pleasure'."

If the politicians keep on "improving" living conditions in this country it is going to reach the point that great men won't be able to find a humble beginning.

The teen-age boys on the corner enjoyed offering little Tommy a choice of a nickel or dime, and he inevitably chose the larger coin—the nickel. He usually went to the corner store and spent it on candy.

"You're not that dumb," the storekeeper said one day. "You know the smaller coin is worth more than the bigger one."

"Course I do," Tommy replied, "But the first time I take the smaller one I'd be killing a good thing."

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