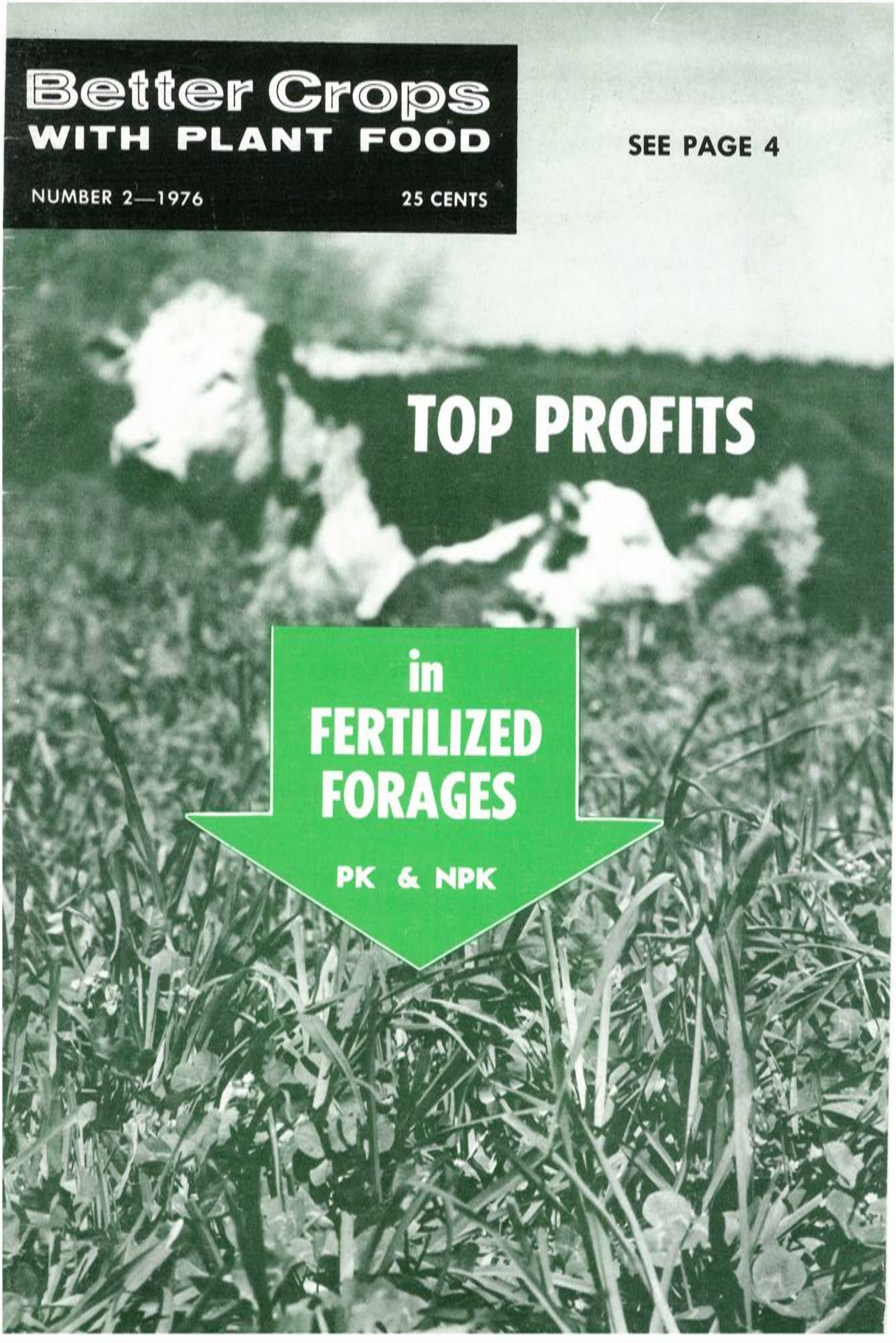
Better Crops WITH PLANT FOOD

NUMBER 2—1976 25 CENTS

SEE PAGE 4



TOP PROFITS

in FERTILIZED FORAGES

PK & NPK

Better Crops
WITH PLANT FOOD

Published Quarterly by
Potash Institute
1649 Tullie Circle, N.E.
Atlanta, Georgia 30329

Santford Martin, Editor
Selma Bushman, Assistant Editor

VOL. LX 2/76

$1.00 per year, 25¢ Per Copy

Controlled circulation postage paid at Washington, D.C.

CONTENTS

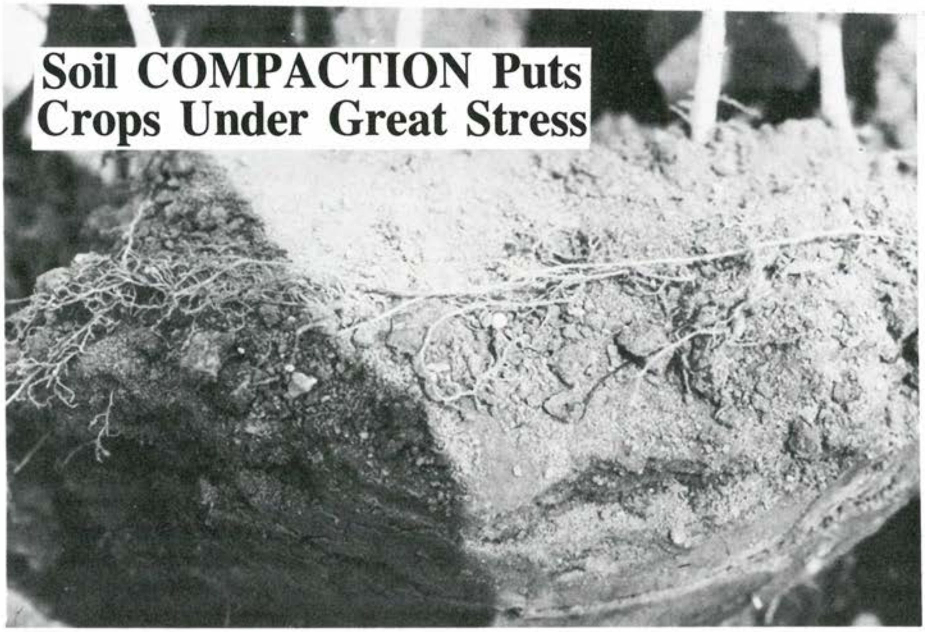


FIGURE 1. Bean roots were restricted to the surface soil in this soil worked too wet. Note the fine structure of the surface soil and the plating condition in the subsoil (Michigan State University).

Werner L. Nelson
West Lafayette, Indiana

FARMERS AND RESEARCHERS recognize soil compaction is becoming a serious crop production problem.

Soil compaction requires more power to pull tillage tools. It slows drainage thus delaying planting. It restricts root growth, causing plants to suffer from drouth stress sooner. The roots cannot explore the soil to make full use of the nutrients.

Soil compaction causes less oxygen in the soil, and oxygen is vital in nutrient uptake and translocation. And it reduces yields and profit.

Basically there are two kinds of man-made compaction:

1—Pressure exerted by heavier and heavier tractors, particularly when soils are worked too wet.

2—Plow sole caused by plowing at same depth and by implements such as the disc. Discs are often used to help pack roadways preparatory to paving.

In addition, heavy rainfall may puddle and compact the surface of some soils.

COMPACTION HINDERS ROOT GROWTH. With compaction the size of the soil pores decreases and roots can't enter soil pores smaller than their tip diameter without doing extra work. Instead of growing 2 inches a day

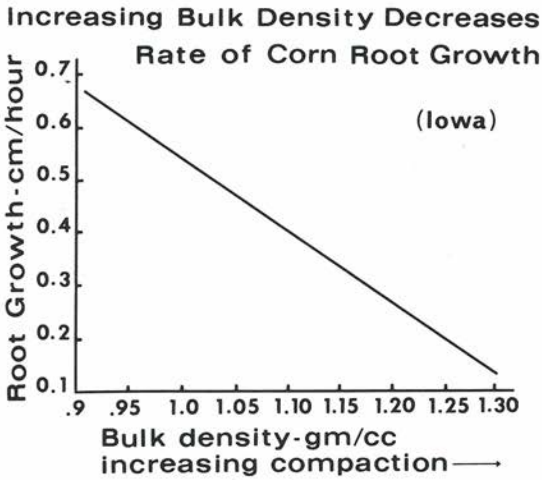


Figure 2. Increasing bulk density decreases growth rate of primary and secondary seedling corn roots. Seedlings grown for one week on Colo clay (Iowa State University) *SSSA Proc.* 26: 319-322.

roots may grow only ⅛ inch. **See Figures 1 and 2.**

COMPACTION REDUCES WATER UPTAKE. One point is clear. If most of the roots are limited to the upper one foot of soil rather than 3-6 feet, the plant has less soil volume from which to absorb water. The plant will then be more susceptible to drouth. Also, with low aeration, the water permeability of roots decreases.

The USDA National Tillage Laboratory has shown that crop stress increases as soil compaction increases.

Such conditions can cause stomata or pores on the under side of the leaf to close much of the time, drastically reducing CO_2 intake for photosynthesis and water vapor movement. The plant soon suffers from lack of sugars.

COMPACTION RESTRICTS NUTRIENT UPTAKE. The plant not only has less volume of soil to explore

TURN TO PAGE 12

TOP PROFITS in FERTILIZED FORAGES PK & NPK

FEW INVESTMENTS pay better returns than fertilizer on forage crops.

Forage crops can equal or surpass returns from "cash" crops, if we give them equal management.

Why? Because forages give dairy and beef producers high quality feed at less cost than grain feed. Because fertilizer puts yield muscle into those poorer fields usually assigned to pastures and other forages.

Economically, dollar returns do not break even on many soils without adequate and balanced fertility. Extra yields from fertilizer contain extra dollars. This booklet documents many cases.

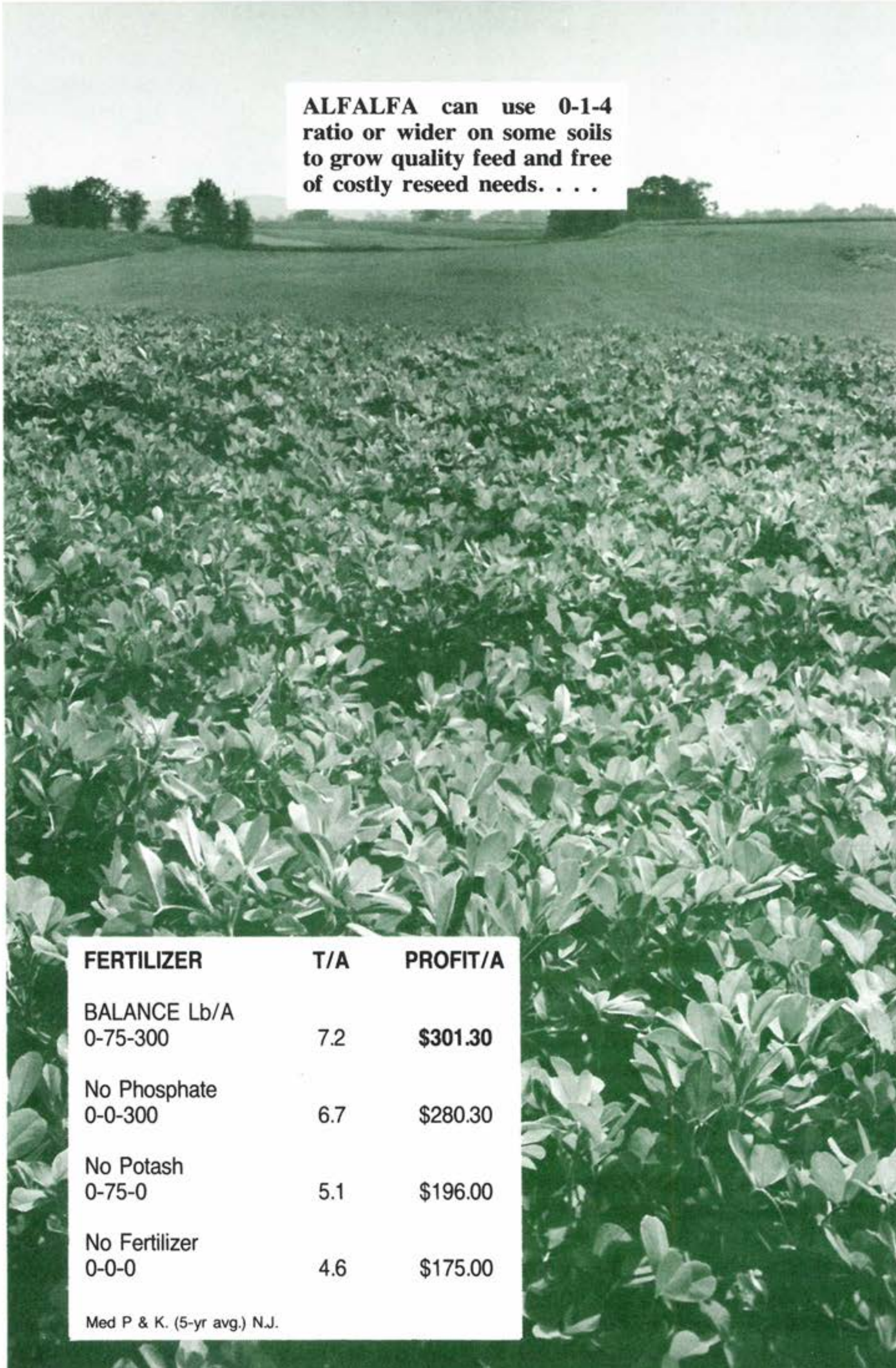
The table on page 10 shows how total production costs were calculated to get these returns from official trials in different parts of the nation.

ALFALFA. . . .

Its cash crop potential comes from HIGH yields. Fertilizer helps build stronger stands. More cuttings. Better variety potential. Fuller lime results.

A 7-ton yield obviously uses energy (sun, fuel, labor, land, all inputs) more efficiently than 4 tons. Fertilizer PLUS lime is the key, because alfalfa demands 6.8-7.0 pH.

The profit of $301.30/A shows that high yielding alfalfa, 7.2T is a valuable crop—especially at high yield levels. The return in the fertilizer investment was 183%.



ALFALFA can use 0-1-4 ratio or wider on some soils to grow quality feed and free of costly reseed needs. . . .

FERTILIZER	T/A	PROFIT/A
BALANCE Lb/A 0-75-300	7.2	**$301.30**
No Phosphate 0-0-300	6.7	$280.30
No Potash 0-75-0	5.1	$196.00
No Fertilizer 0-0-0	4.6	$175.00

Med P & K. (5-yr avg.) N.J.

The biggest factor holding back this alfalfa was phosphorus on a silt loam low in P and medium in K. But, again, it took the balanced PK team to get top profit or 99% return from fertilizer.

FERTILIZER	T/A	PROFIT/A
BALANCE Lb/A 0-76-224	4.8	**$144.80**
No Potash 0-76-0	4.4	$139.76
No Fertilizer 0-0-0	3.6	$100.00
No Phosphate 0-0-224	3.8	$ 92.44

Low P, Med K. (4-yr avg) Ill. Fertilizer expressed as N, P_2O_5 & K_2O in this article.

Without potash, this Tennessee alfalfa ran into the red. It took PK to get top profit or 155% return in fertilizer investment.

FERTILIZER	T/A	PROFIT/A
BALANCE Lb/A 0-120-200	4.3	**$93.70**
No Phosphate 0-0-200	3.3	$47.50
No Fertilizer 0-0-0	2.3	$ 2.50
No Potash 0-120-0	2.4	$ 8.00

Med to High P. Low to Med K. (4-yr avg.) Tenn.

Order this article as Forage Booklet Folder Size On Page 24

CORN SILAGE. . . .

Anyone looking for the most total digestible nutrients (TDN) among forages can find it in corn silage.

Around 13 million acres of corn and sorghum silage are harvested and the acreage is increasing.

This crop is a real nutrient grabber. A 32-ton corn silage crop will remove approximately 240 lb N, 100 lb P_2O_5 , and 300 lb K_2O. The NPK team must be kept in balance for top dollar returns and top quality.

The NPK team, in right balance, also increases the quality of the silage. For example, Wisconsin doubled the percent of protein with *adequate N,* tripled the carotene (Vitamin A) content with *adequate K.*

Adequate N is a must to get greatest returns from K—and adequate K assures best returns from N. With the higher rate of N, profit was increased to $331/A with 470 lb K_2O (below).

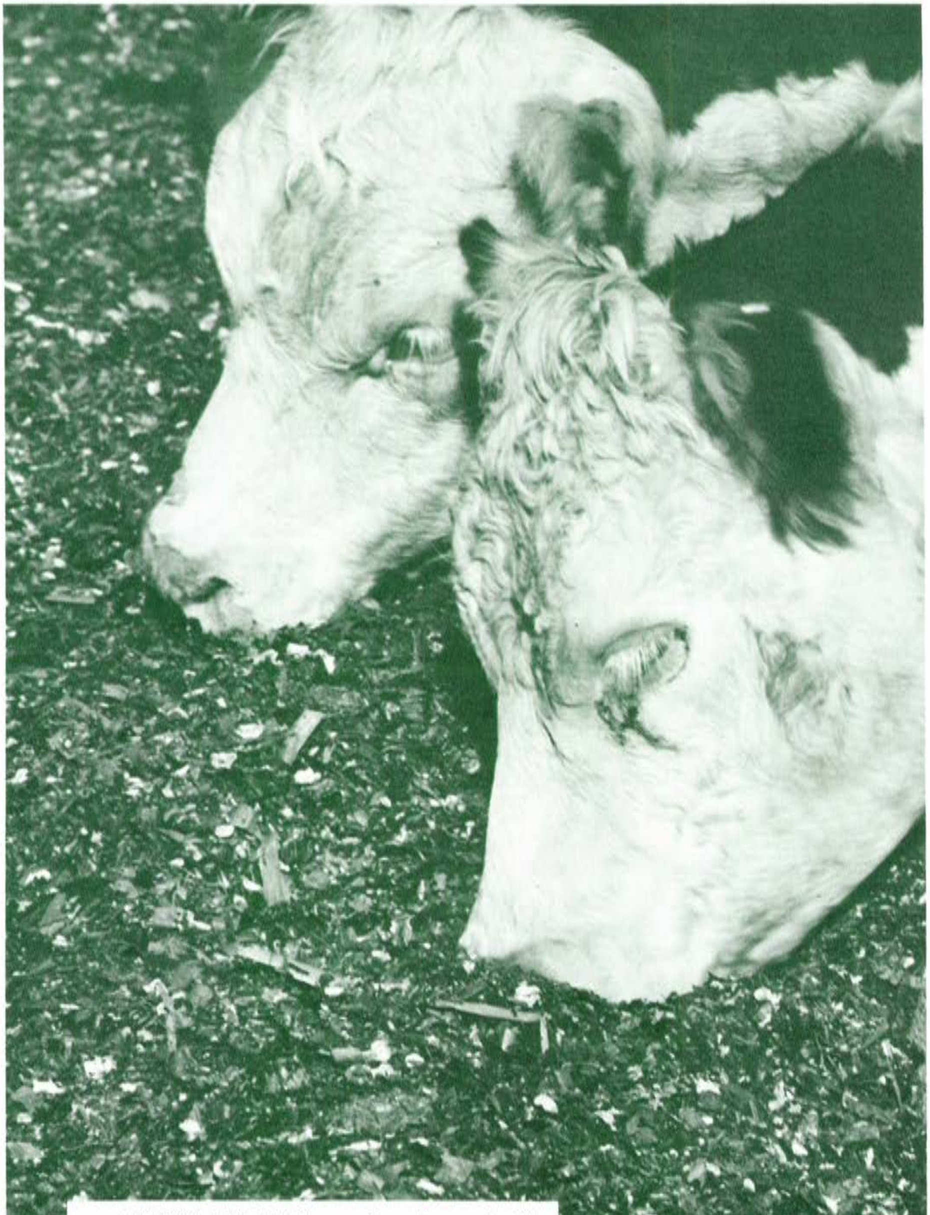
WITH 50 LBS OF NITROGEN (N)

FERTILIZER	T/A	PROFIT/A
470 Potash 50-130-470	27.1	**$254.50**
290 Potash 50-130-290	27.3	$273.70
No Potash 50-130-0	23.3	$239.80

WITH 100 LBS OF NITROGEN (N)

FERTILIZER	T/A	PROFIT/A
470 Potash 100-130-470	32.8	**$331.00**
290 Potash 100-130-290	30.8	$318.20
No Potash 100-130-0	25.6	$266.30

Low P & K. N.J.



CORN SILAGE needs adequate N to get greatest returns from K. Adequate K assures best returns from N. With the higher rate of N, profit was increased to $331/A with 470 lb K_2O.

BERMUDAGRASS. . . .

Improved Bermudagrasses demand high nitrogen rates to produce those 7 to 10-ton yields. PLUS large amounts of potash with the N—because a 10-ton yield removes about 500 lb N, 140 lb P_2O_5, and 420 lb K_2O.

On this Coastal Bermudagrass, EXTRA potash (288 lb K_2O) with 200 lb N gave little increase. However, with 400 lb N, extra potash was quite effective. That $220 top profit came from a 10.7-ton yield.

Low potash can cost dollars in lost stand, interrupted production, and $85/A to re-establish. Plenty of potash pays.

FERTILIZER	T/A	PROFIT/A
400-115-288	10.7	**$220.58**
400-115-192	9.7	$191.22
200-115-288	7.9	$146.18
200-115-192	7.5	$139.62

High P, Low K. (4-yr avg.) Ala.

IN PASTURES. . . .

Balanced fertility adds beef. In a 3-year grazing study on Coastal Bermudagrass, shown below, Georgia proved the value of sound pasture fertilization.

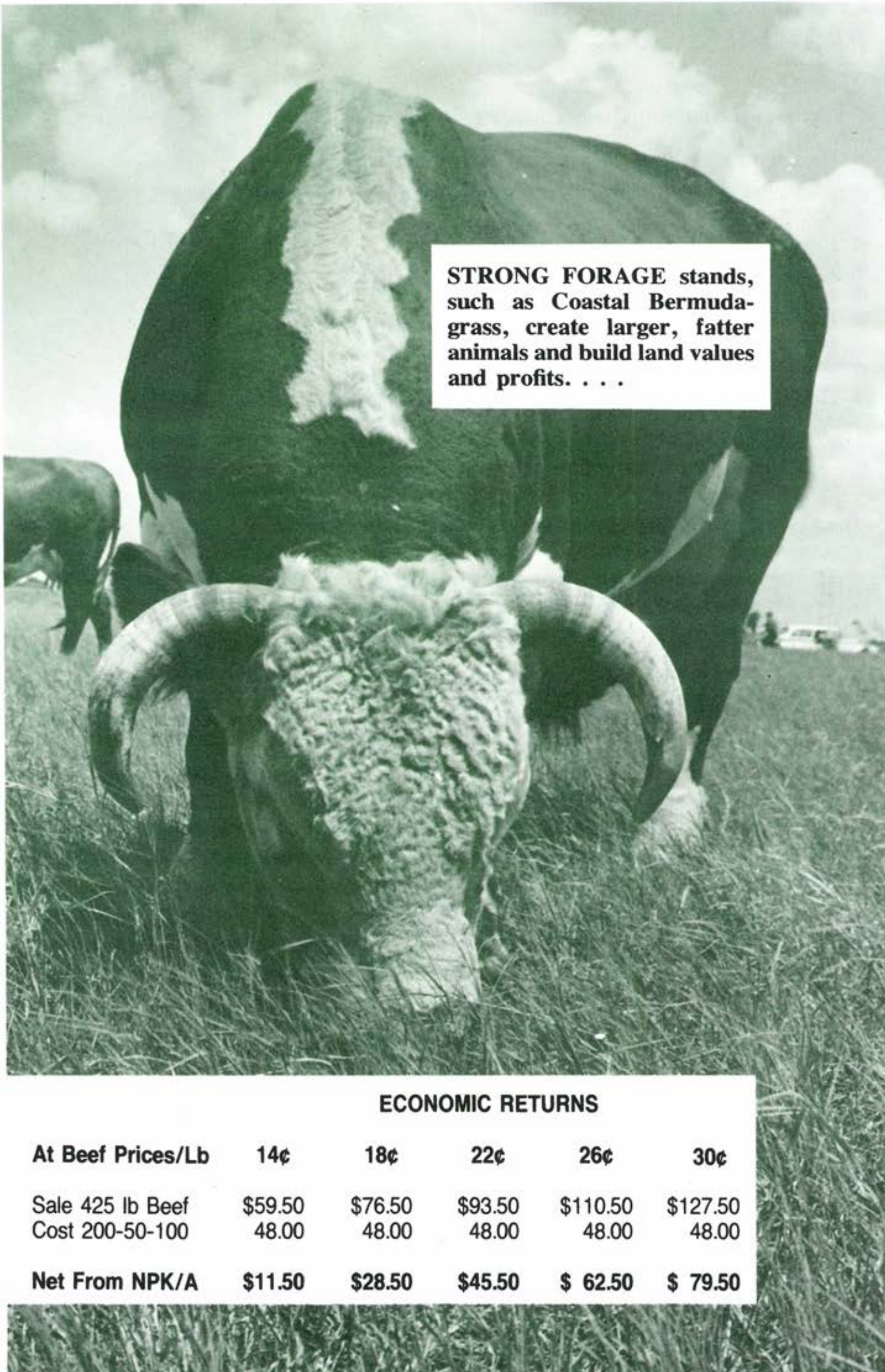
Here the fertilizer increased beef production from 259 lb to 684 lb per acre per year. At 18¢ beef, that EXTRA 425 lb of beef would bring an EXTRA $28.50 per acre—or an EXTRA $2,850 in a 100-acre operation. At 26¢ beef, an EXTRA $6,250 in a 100-acre operation.

This is real profit when you realize it takes just as much money and labor to plow, plant, spray, and fence for low yields as for high yields—and just as much land. Yes, it pays to fertilize—and then utilize what you fertilize. Unfertilized pasture becomes weedy and thin. Quality deteriorates and land values decline.

ANIMAL RETURNS

684 Lb/A With 200 N-50 P_2O_5-100 K_2O
259 Lb/A Without Fertilization

425 Lb/A More Beef From NPK



STRONG FORAGE stands, such as Coastal Bermudagrass, create larger, fatter animals and build land values and profits. . . .

ECONOMIC RETURNS

At Beef Prices/Lb	14¢	18¢	22¢	26¢	30¢
Sale 425 lb Beef	$59.50	$76.50	$93.50	$110.50	$127.50
Cost 200-50-100	48.00	48.00	48.00	48.00	48.00
Net From NPK/A	**$11.50**	**$28.50**	**$45.50**	**$ 62.50**	**$ 79.50**

LEGUMES IN GRASS PASTURES. . . .

Legumes mixed with grass make a blue chip pasture:

- **Give more even feed distribution.**
- **Don't let the pasture run short on nitrogen.**
- **Nourish the animal faster than grass does.**
- **Improve the animal's average daily gain.**
- **Bring more top quality protein to the pasture.**
- **Increase weaning weights of calves.**
- **Improve calf quality for higher market grades.**
- **Improve the cow's conception rate.**
- **Help insure against tetany.**
- **Help reduce pasture costs for each pound of beef gained.**

For example, a cool season grass mixed with alfalfa produces about the same yield as grass receiving 150-200 lb N per acre per year.

So, in addition to its noted feed quality, the alfalfa legume adds $25 to $30 worth of nitrogen—a real bonus to the beef and milk producer.

AND DON'T FORGET. . . .

- Top economic returns come from high agronomic yields. For example, 7.2 ton alfalfa netted $301/A, while 4.3 ton netted $94.00 on another soil.
- Enough right balanced PK and NPK help produce highest quantity of quality.
- These high yields of harvested forages remove large amounts of nutrients from each field.
- Well fertilized forages avoid $60 to $85/A re-establishment costs.
- "Returning manure" doesn't fill fertility needs of pastures, because pastures are usually grown on poor soils.
- Cattle gain faster and land values rise on well fertilized pastures.
- Legumes save N cost and boost cow-calf performance on a legume-grass diet.

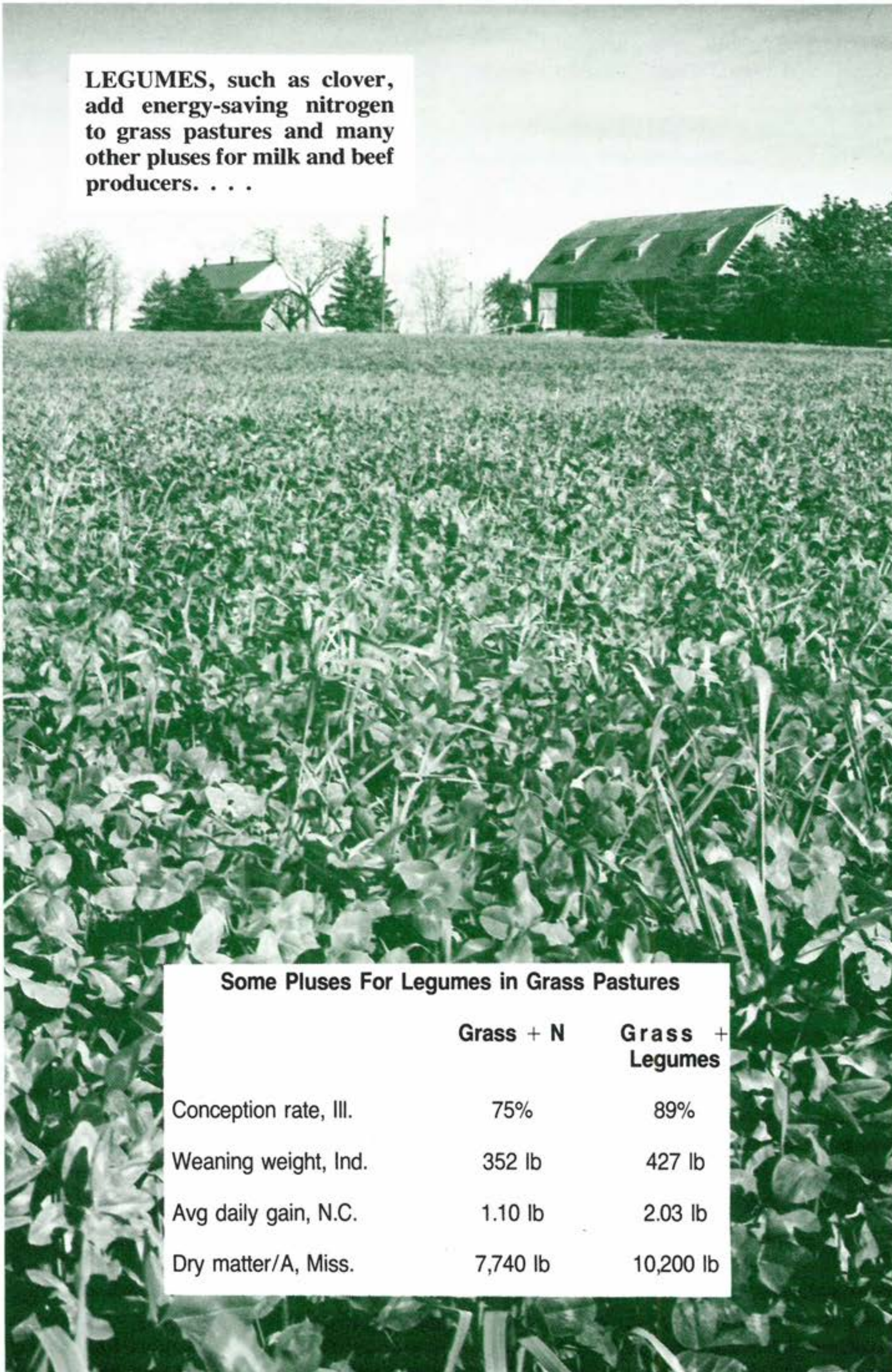
CALCULATIONS BASED ON THESE VALUES
(Substitute your own values to suit your area)

CROP	Price Ton	Prod. Cost/A Exclud. Fertil.	Harvest Per Ton
Alfalfa	$75.00	$170.00	$12.00
Corn Silage	20.00	200.00	5.00
Coastal Bermudagrass	50.00	170.00	12.00

Fertilizer cost, including application: N—16¢ lb, P_2O_5 —14¢ lb, K_2O—9¢ lb.

THIS ARTICLE, "Top Profits in Fertilized Forages," is available in reprint booklet—folder size. Order on back cover today.

LEGUMES, such as clover, add energy-saving nitrogen to grass pastures and many other pluses for milk and beef producers. . . .



Some Pluses For Legumes in Grass Pastures

	Grass + N	Grass + Legumes
Conception rate, Ill.	75%	89%
Weaning weight, Ind.	352 lb	427 lb
Avg daily gain, N.C.	1.10 lb	2.03 lb
Dry matter/A, Miss.	7,740 lb	10,200 lb

FROM PAGE 4

for nutrients, but also less ability to absorb and translocate nutrients due to less soil aeration.

When Iowa compared nutrient uptake by corn in aerated and nonaerated soils, they found poor aeration inhibits potassium uptake the most:

Uptake in an unaerated soil as % of uptake in an aerated soil:

Potassium 30%	**Calcium 90%**
Nitrogen 70%	**Phosphorus ... 130%**
Magnesium......80%	**Dry Matter 60%**

Under such conditions the plant roots lose K to the soil solution. Added K increased corn plant growth under both unaerated and aerated conditions:

	No aeration	Aeration
	gm/pot	
No K	18.9	26.0
Added K	27.1	45.5

Iowa

Compaction may affect nitrogen uptake indirectly since low aeration favors denitrification and loss of N in the gaseous form. Improved aeration improves uptake of N. A compacted soil in Ohio reduced corn growth. With starter fertilizer, corn growth and P uptake increased sharply.

In one Iowa study, severe compaction reduced yields 53% with low fertility. With fertilizer, yields were higher and compaction reduced them only 40%. The soil's resistance to plant roots or decreased ion movement caused the reductions rather than low oxygen, it was concluded. Compaction reduced NPK and Mg uptake:

	CORN YIELD—Bu/A	
Compaction	**Low Fertility**	**Fertilizer Added**
Normal	60	113
Moderate	38	84
Severe	28	67

Iowa—Agron. Journ. 54:29-34

TILLAGE AFFECTS NPK UPTAKE. In the West Central and North Central Corn Belt, tests have indicated tillage can change availability of K. On a medium-K soil, Wisconsin found the plowed, till-planted area gave 1.3% K in the corn leaf at silking and 82 bu yield. The unplowed, till-planted area gave 1.0% K content and 58 bu yield.

Purdue found reduced tillage did not affect N and P content of corn leaf, but reduced K content:

	LEAF COMPOSITION		
Tillage	**% N**	**% P**	**% K**
Conventional	2.64	0.32	2.59
Chiselled 8"	2.67	0.32	2.36
Rototill 2"	2.62	0.32	2.19
No tillage	2.70	0.32	2.17

This agrees with results on three Iowa soils. On plowed plots, the corn leaves contained 1.8% K at silking and in the subsurface tilled plots the content was 1.3% K.

Ontario got a higher % K in the corn leaf at tasseling with plowing than with no plowing (below). The high K rate increased leaf content with both tillage treatments.

K_2O APPLIED	**PLOWED**		**UNPLOWED**	
lb/A	**Bu/A**	**% K**	**Bu/A**	**% K**
0	100	1.04	68	0.78
300	108	1.90	88	1.31
600	112	2.39	94	1.99

Conestoga Loam

These effects might be partly explained by a more compact environment and reduced root growth—meaning the roots were contacting less soil. And, in Wisconsin, the soil in the unplowed, till-planted area might have been cooler—meaning less K uptake.

But, in Ohio and further East, plant nutrient uptake and corn yield in no tillage plots with adequate surface mulch has been satisfactory. Part of the explanation may be that the soil surface is kept moist and this favors nutrient absorption. Further West, drouth may enter in. **The End**

From BRUSH
To
FESCUE

W. E. McMurphy, J. F. Stritzke
B. B. Webb, and L. M. Rommann
Oklahoma State University

Very little usable forage is found in the understory of the native scrub oaks.

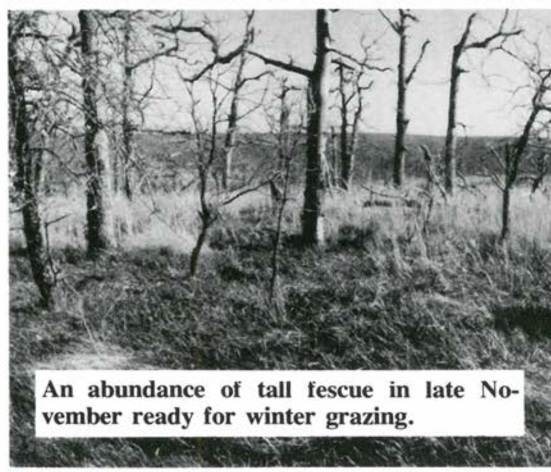
ON ABOUT 20 MILLION ACRES of rough, rocky soils in western Arkansas, southern Missouri, and eastern Oklahoma vegetation consists primarily of brush and scrub oak, with little usable forage. Spraying native grass by air on these areas has not controlled brush very well.

The major grasses released have been the less desirable, such as broomsedge. And the brush soon becomes a problem when woody species, not controlled by 2, 4, 5-T, start resprouting and growing again.

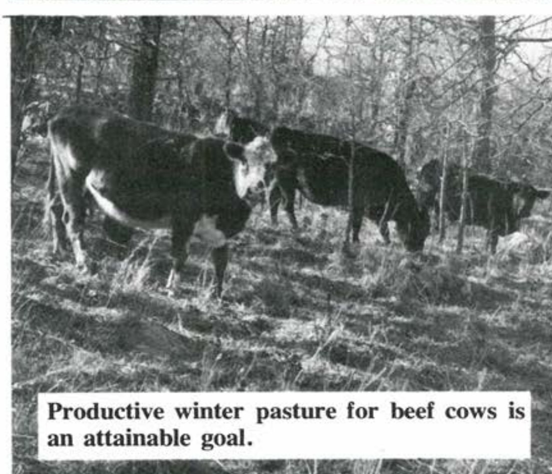
In 1969, cooperative studies were launched with the Sarkeys Research Foundation to improve forage production in eastern Oklahoma.

The study area is class VII land. This means 5-30% slopes, stony outcrops, with high water infiltration rates and low water holding capacity. It is highly erodable. Soils are low in organic matter, low in fertility, and acid. The pH ranges from 5.0 to 5.5. Rainfall averages 42 inches a year.

NUMEROUS EXPERIMENTS involving more than 200 treatments have been evaluated. Only one practice has consistently increased forage production—aerial spraying for brush control



An abundance of tall fescue in late November ready for winter grazing.



Productive winter pasture for beef cows is an attainable goal.

followed by aerial seeding of tall fescue.

The system works best on dense brush areas. Open grassland or brushy land previously sprayed provides too much competition for the tall fescue. Even under favorable conditions, two growing seasons are usually needed to achieve optimum production.

We have found the following procedure to be the most successful in achieving a good stand of tall fescue.

1—Brush is sprayed with an effective herbicide in early June, hopefully when soil moisture is adequate and brush is actively growing. It is sometimes necessary to control burn after spraying, usually in late August or September, to remove leaf litter. A dense accumulation of litter can prevent seed/soil contact and reduce effective establishment of the tall fescue. If litter is insufficient to carry a fire, there is no need to burn.

2—About 15 pounds of tall fescue seed per acre is applied by air during late September to mid-October. A starter fertilizer containing at least 40 lbs of actual N per acre has to be used on these low fertility soils. Phosphate and potash should also be applied as a starter if soil tests indicate the need.

3—An airplane landing strip on the project site helps reduce costs of aerial applications. Current application fees are $1.50/100 pounds of applied material.

4—Fertilizer spreads well over a 50-foot swath, but seed should be spread over only a 20-30 foot swath. Mixing seed and fertilizer together reduces labor and gives good results, but dealers don't like to do it because they can't clean the seed from the blenders. This creates a problem when later customers receive fertilizer contaminated with tall fescue seed.

5—Grazing during establishment year may be harmful. But in a good season, when fescue may form a dense stand 12 inches high by April, some April and May grazing is allowed. Cattle are removed by early May to permit vegetative recovery and production of seed heads.

6—Management of established tall fescue has been designed to provide winter pasture for a beef cow herd in a fall calving program. Each year in late August, 60 lbs of N per acre and phosphate-potash needs (by soil test) are applied.

Grazing is deferred until December 1 to allow forage to grow. After the first year, this fall growth has ranged from 1,500 to 2,500 lbs per acre. Fall production plus a limited amount of regrowth has provided almost enough forage for one beef cow per acre through the winter months.

7—Topdressing 45 lbs N per acre in early February adds spring growth to total five animal unit months of grazing per acre.

Cattle should be removed in late May to allow some regrowth before the summer dormant season. With good spring and summer rainfall, some additional grazing will be available in July. When this program is established, one acre can winter feed a beef cow with a suckling calf.

Dry cows may tend to get too fat. And first calving two-year-old heifers will require an energy supplement to insure good rebreeding performance, especially during late February to mid-March.

Producers respect the program. After fescue had been successfully established in 1970-71, several ranchers in the area began using the system in 1972.

The program has had no apparent adverse effect on the wildlife in the area. Quail, rabbit, and deer have increased. **The End.**

NEWS & VIEWS

Digested By Potash Institute Staff . . . From Around The Globe

THERE IS A STRONG TREND toward broadcasting fertilizer on row crops. The report on 1975 fertilizer use in Georgia shows a high percentage of fertilizer now being broadcast. County agents gave some interesting facts on placement and lime use:

	% broadcast	% drilled	% limed
Cotton	83	17	57
Corn	70	30	50
Peanuts	95	5	77
Soybeans	78	22	55

ADDITIONAL POTASSIUM MAY BE VITAL for cattle wintering on tall grass prairies. Texas researchers warn low forage consumption in winter may demand supplemental crude protein, digestible energy, phosphorus, *and potassium.* Herds fed supplemental K show higher calf survival, lose less weight, and produce heavier calves. How much K should a dairy cow's total ration contain? At least 0.8% potassium, according to new standards accepted by the National Research Council and based largely on extensive work by Kentucky dairy nutritionist Roger Hemken.

READ-IT-AND-WONDER DEPARTMENT. Lime is still neglected in the South even though research has proved over and over and over how essential lime is when the soil needs it . . . to improve fertilizer efficiency . . . to increase availability of some soil nutrients . . . to prevent toxic buildup of other nutrients. The National Limestone Institute, Inc. has released this read-it-and-wonder news:

STATE	NEED (TONS)	USED (TONS)	% OF NEED
Alabama	4,000,000	951,000	23.8
Arkansas	1,264,363	560,531	45.8
Kentucky	4,640,911	1,484,873	32.0
Louisiana	1,250,000	150,000	18.8
Mississippi	2,035,340	499,396	24.5
Oklahoma	1,797,231	115,584	15.0
Tennessee	2,625,000	700,000	26.7
Texas	2,500,000	125,000	11.0

WITH BASIC K ARITHMETIC . . . we can calculate how many bushels of corn, soybeans, wheat, or other crops are needed to pay for potash:

	60 lb K_2O/A Applied				120 lb K_2O/A Applied			
Price of 0-0-60	**\$72/ton**	**\$84**	**\$96**	**\$108**	**\$72**	**\$84**	**\$96**	**\$108**
	6¢/lb K_2O	**7¢**	**8¢**	**9¢**	**6¢**	**7¢**	**8¢**	**9¢**
CROP PRICE PER BU.	**BREAKEVEN YIELD INCREASES—BU/A**							
\$1.50	2.4	2.8	3.2	3.6	4.8	5.6	6.4	7.2
2.00	1.8	2.1	2.4	2.7	3.6	4.2	4.8	5.4
2.50	1.4	1.7	1.9	2.2	2.9	3.4	3.8	4.3
3.00	1.2	1.4	1.6	1.8	2.4	2.8	3.2	3.6
3.50	1.0	1.2	1.4	1.5	2.0	2.4	2.7	3.1
4.00	0.9	1.1	1.2	1.4	1.8	2.1	2.4	2.7
5.00	0.7	0.8	1.0	1.1	1.4	1.7	1.9	2.2
6.00	0.6	0.7	0.8	0.9	1.2	1.4	1.6	1.8

For example, with corn at \$2.50 and K_2O applied at 120 lb rate (costing 8¢/lb), only 3.8 bu would be required to pay for the potash. This difference cannot be seen in the field. **Responses are usually much greater on low and medium soils . . . even on some high K soils.**

These facts are available on a colorful postcard for easy mailing. Order on page 28.

EFFICIENT Fertilizer Use Means ENOUGH Fertilizer to give the farmer the greatest net income per acre. In some cases, it may mean more of a certain nutrient, in some cases less. But it is usually better to be a little high than low. This Purdue work shows why. With 25% MORE fertilizer than optimum, the corn's net return (or bushel buying power) declined only 1.2 bu. With 25% LESS fertilizer, the crop dropped 4.3 bu under optimum. REMEMBER: Carryover benefits from additional fertilizer make optimum recommendations wise, even when the rate exceeds optimum needs in unfavorable growth years.

Fertilizer Amount	Corn Yield	Cost of Nutrient Added in Terms of Yield bu/A	Net Return From Fertilizer	Difference From Optimum
¼ less	120.5	8.1	46.4	−4.3
Optimum	127.5	10.8	50.7	0
¼ more	129.0	13.5	49.5	−1.2
None	66.0	0		

WHEN CROP PRICES DECLINE, keep full fertility . . . because higher yields cost less per bushel to seek your share of declining dollars. When 24 bu of UNFERTILIZED soybeans needed \$5.50/bu to break even in Virginia, 44 bu of FERTILIZED beans needed only \$3.25 to break even.

STILL EXPORTING Large tonnages of potash are still leaving southern soils in harvested soybean crops . . . depleting the soils of many soybean fields. According to 1975 reports, most states returned only about 50% of the potash their soybeans removed . . . and this to only 30% of the acreage.

	1975 Fertilization		Tons K_2O		
State	Acres, %	K_2O/A lbs.	Removed	Applied	Deficit
Ark.	28	50	78,960	32,900	46,060
La.	23	57	30,576	11,930	18,646
Mo.	29	53	48,048	23,977	24,071
Tn.	53	45	31,728	22,061	9,667

FERTILIZER IS A RELATIVE DROP in the bucket of crop production costs, as these figures show for cotton and soybeans. Yet, fertilizer can have a real profit impact on yields. Cotton is fairly well fertilized but only 30% of the soybeans get any fertilizer. Fertilizer rates for both crops dropped in 1975.

Crop	Total Costs/Acre*	Fertilizer Costs/Acre	Fertilizer, % of Costs
Cotton	\$320.00	\$40.00	12.5%
Soybeans	144.00	19.00	13.2

*Progressive Farmer BEP estimates

An Investment In FERTILIZER Is An Investment In The FUTURE . . . and the best way to prove it to ourselves is to do a little calculating: (1) Start with the price of fertilizer. (2) Estimate expected yield increase from applied fertilizer. (3) Figure price received for crop. (4) Add harvesting costs generated by higher yields. (4) Then calculate returns on fertilizer.

For Example: Soybeans grown with NO fertilizer might produce 15 bushels per acre. Adding 0-60-60 might push yields up to 30 bushels per acre. Assume fertilizer cost: P_2O_5 20¢ lb, K_2O 9¢ lb. Soybeans selling for \$4.50/bu. Harvesting cost: 24¢ bu.

Without Fertilizer: 15 bu/A yield × \$4.50/bu .... **\$ 67.50 gross income.**

With Fertilizer: 30 bu/A yield × \$4.50/bu \$135.00

60 × .20 + 60 × .09 + 15× .24 .... −21.00

(P_2O_5) (K_2O) (Harvest) .... **\$114.00 gross income**

Fertilizer Return: .... \$114.00 (with fertilizer)

−67.50 (without fert.)

\$ 46.50 (net return from fertilizer)

Make your own evaluations. Expected yield responses are available for most areas. Fertilizer is a wise investment.

BIFOCALS

S.W. Martin

The concern of

NOBEL LAUREATE, George Wald of Harvard, is worried about that artificial gene M.I.T. has created down on the river.

Test tube genes don't worry me as much as bedroom genes—or whatever it is that creates more Hitlers than Schweitzers.

But don't sell the test tube genes short. Their possibilities may be unlimited. That's what created this column out of a collard dream. Collards are going to get me, yet. Some folks like smoking, some martinis or beer, but I like collards. And they like me until bedtime—then they can bring on some deadly dreams. So, what I report here is a dream—surely.

At first, it looked like a huge headline printed across murky clouds: "G. M. Cosmos Tapped Mythville Prexy. New Era For University." Then the clouds dissolved into the biggest newspaper page I ever saw, with this incredible story:

Tom Dick Harryson, Chairman of Mythville University Board of Managers, today announced the election of Dr. G. Mutation Cosmos as 10th president of the university. Through his unusual background, Dr. Cosmos is expected to bring sharp changes to the 100-year-old institution. He has already issued a silver paper on 5 planks of intention:

PLANK 1—A bone-bare minimum of vice presidents, associate deans, assistant directors, administrative assistants, executive aides, etc.

Dr. Cosmos told a statewide press conference, "We must slow this rabbit-like multiplying of administrators and managers or there won't be anyone left to manage."

While attending a funeral in the Washington, D. C. suburbs last year, Dr. Cosmos found himself standing in a church hall staring at the sign on an office door: "Minister of Administration."

He asked the reporters, "What in tarnation does that mean?" Then he added, "I suddenly had visions of the Great Carpenter for Whom that church was built strolling in with his dusty-sandaled crew of country boys and staring with me at that sign—then asking me, 'My friend, what does that mean?'

"Gentlemen, such a vision can jar you. In the future, there won't be 11 layers of administrative fat between the young instructor's $500 raise over in Psychagosis and me. I guarantee you that."

PLANK 2—A return of the teacher to the highest pedestal in the university system.

Dr. Cosmos explained, "We can create all the new computers and bug repellents our little minds can spawn but if we don't inspire young minds to think above them, the bolts and bugs will replace us.

"The great teacher is a showman, at heart, a wit, with masterful command of the language to lift kids to the skies of enthusiasm for a subject.

"Such talent should never be saddled with research 'to get ahead.' Nor should the great researcher be asked to forsake his projector of data-filled slides delivered to data-ready students in a rhetoric the most talented teacher could never duplicate.

"Gentlemen, this university will provide all undergraduates—especially eager, pliable freshmen and sophomores—with great teachers, not graduate students freeing pompous pudintry to pamper professional reputations among the brethren.

"The young are impressed or turned off in those first 18 months in college. And the young are the only tomorrow we have. So, they will get the greatest teaching we can secure for them."

That claim seemed to set off a spark in the reporters. Several voices asked together, "From where, doctor?" The strong, tall educator said that was in Plank 3.

PLANK 3—Elimination of all physical frills costing a fortune in pretentious office suites, equipment duplications, and some plant overlaps.

Dr. Cosmos said he had ordered his own office space reduced to half its present size, all expensive drapes, carpets, and furniture sold for the best dollar and replaced with goodwill equipment well refurbished. Returns from the lavish equipment will be turned into what he calls "our Teacher Trust."

The tall educator hastened to explain if he was not man enough to greet office-conscious

Stanley Scooppucker

guests from industry and government in an economical little office, then he was not man enough to run this university.

He said most of his office would be "in here" and he pointed to his coat pocket and to his chest, in the area of the heart. A short flurry of applause went through the large assembly of reporters. This seemed to move him.

Then he said, "My friends, young people are seeking a higher road. And the way to impress them is not with the size and decor of our offices, homes, vehicles, and clothes, but with the quality of our talent and character behind it.

"This is why I will place the dedicated teacher at the top of this university—without office, but with great teaching and speaking talents that move students to new heights of determination.

"Teaching is the hardest work in the world. To do it every day. Fully prepared, always ahead of those young minds in front of you. To add inspiration to all that information.

"My job is simple compared to the teacher's. My job is just another executive role. Mastering social amenities, smalltalk, the golf-bridge-cocktail syndrome, coated with a certain confidence-of-appearance human nature demands of certain leadership. With, of course, a gift for judging people, creating programs, studying alternatives, and choosing. And ALWAYS making sure a talented team is behind me to feed me good-sounding, good-looking tools.

"But, friends, that great old teacher stands alone. No one can add or subtract from his talent—from his gift to inspire and sometimes spellbind his kids. He WORKS when he does his job. I challenge any bureaucrat or administrator in the land to try one year of it every day of the school year."

PLANK 4—A declaration of independence from the publish-or-perish fetish that has sapped the energies of talented teachers in the past.

The colorful new president explained, "We're not interested in our teachers wasting fine minds scratching around rehashed data to grind out another innocuous paper for some pompous little journal suffering rhetosis. But we ARE interested in eloquently written articles of original thought and findings.

"In the long period between them, we will find more useful ways to quench the normal thirst for recognition."

A reporter asked, "What's rhetosis, doc?"

"Oh," Dr. Cosmos chuckled, "I should have defined it. Rhetosis is the fattening of the rhetoric to repeat what the tables already tell in a report."

PLANK 5—Stiff fines to control the number and length of committee meetings.

"One of the real threats to academic freedom," Dr. Cosmos explained, "is the tendency of mediocre minds to call a meeting every time their mediocrity itches—and it itches often.

"Meetings can become a disease stifling creative minds, because human nature grows wary in bunches. Have you ever seen three men talk to each other with the same ease and trust two men do? Move your more imaginative minds from a one-on-one situation to the conference table and watch.

"Most ideas, the ones that capture us, never come from committees or conference tables—any more than Handel's 'Messiah' or Einstein's 'Theory' came from a committee. Very few meetings—staff or otherwise—create a thing but expense. The time it takes to prepare for them, wade through them, and clear up after them is a waste no one dares record.

"So, it seems reasonable to set these limits: One committee per department. Two meetings per year. One hour and 5 minutes per meeting, the 5 minutes being grace period. Each violation will bring a $700 fine to the committee chairman. The fines will be placed in our Teacher Trust for those teachers too busy preparing dynamic lectures for their students to sit through meetings."

Dr. Cosmos then invited the press to visit him anytime they were free, explaining he would find a room for them since his office is so small.

As they departed, some noticed a bright but seedy little guy who had sat wordless in the shadows behind the new leader. He had been introduced as "Stanley Scooppucker from PRA" (public relations and advertising). He was stuffing papers into a briefcase, muttering to himself, "What are we coming to, what are we coming to?!"

These collard dreams are gonna get me, yet.

EVERY-Season Fertilization Starts NOW

THE SMART GROWER won't get crunched by spring rush but once or twice before he looks for a way to lick the problem. That's why he leads in yields, profits, and ideas. That's why you may see him "storing" fertilizer in his soil *THIS FALL* or *WINTER*.

He knows EVERY-season fertilization—applying fertilizer any time weather and soil permit—helps clear the way for an early start next spring. This is vital when **increased yields from early planting** may make each hour on the corn planter worth $200.

He knows EVERY-season fertilization helps him avoid many supply and demand problems of spring, caused by low inventories, rail car shortages, and other problems.

Most growers have some logical questions about fertilizing in fall or winter or whenever weather and soil permits. Both research and experience have some logical answers acquired over many years of profitable production.

1—Are fall and winter good times to put on phosphorus and potash?
Yes. Leaching is no problem, except with potassium on deep sandy soils.

2—Can P and K be spread on any surface with success?
Up to 8% slope with virtually no loss IF they are covered with heavy residue (corn stalks and small grain stubble), or left rough by chiesling, listing, or other means. Up to 4% slope IF they have light residue cover. Phosphate and potash can be safely applied on frozen ground or on light snow cover.

3—Will I have time to get it on after harvest before raw weather sets in?
Yes. Illinois harvests about 80% of its corn by November 10, more than 80% of its soybeans by October 20. With sharp timing, you might have the harvester, spreader and plowdown going on at the same time. Some do it.

4—What about my lime needs?
Lime can be put on pastures any time. On row crops, summer, fall or winter application gives it time to react before planting. MAINTAINING a good lime program is vital, especially on pastures.

5—Which is better, P-K plowed down or disced fairly close to surface?
Plow down is better. Iowa got 8 bushels more per acre from plow down than disced corn. Plow down puts the plant food deep to give crops extra feeding and cushion between rains in summer. Disced in fertilizer can get stranded near the surface in dry weather so the roots can't get to it.

6—Does deeper plowing need more fertilizer and lime?
Yes, in most cases. You are creating a greater plow layer, sometimes 50% more. This "extra soil" dilutes the nutrients you once applied to the more shallow layer. AND the newly turned soil may be (and often is) poor in nutrients. So, you should fertilize accordingly.

7—Does fall plowing help any other way than getting fertilizer to the root zone?

In many ways. It insures warmer soil quicker next spring. Frost can leave a dark sun-absorbing plowed soil *10 days ahead* of an unplowed field insulated by light-colored crop residues. It also helps reduce insect problems next spring. Fall plowed fields expose larvae to wind, snow, and ice, reducing survivors. Fall plowed fields showed about half as many western and northern corn rootworm larvae as in SPRING PLOWED SOILS IN MIDWEST tests.

8—I've heard no-till is a perfect system for EVERY-season fertilization.

It's a natural. Any time from harvest to planting—fall, winter, or early spring—you can fertilize for no-till. In most cases, you should fertilize at planting.

9—Can I reduce my soil compaction and deep ruts?

Summer, fall, and winter fertilization can help. It gets your heaviest fertilizer bulk on when soil is drier or frozen. For top yields, your soil must absorb plenty of water, take plenty of air in and out, and allow full root growth. Flotation tires help reduce rut and compaction problems in spring soils. But summer, fall, and winter spreading allows freezing and thawing over winter to help ''unpack'' the soil.

10—What about applying most of my fertilizer through the planter?

You eat up nearly 18% of your time JUST FILLING HOPPERS to get on 500 lbs per acre, still not enough nutrients for today's high yields. And TIME is MONEY. But some starter fertilizer is needed at planting under cool conditions.

11—Is my time really that important in spring?

If 30 to 40 more bushels per acre are important, it is. And that can happen. A 3 or 4-week delay in planting has cost corn growers 30 to 40 bushels per acre in some fields. With a $2 corn market, you could lose $60 to $80 per acre. Yes, time is valuable in spring. And EVERY-season fertilization gives you more time.

12—Can I use summer to start an EVERY-season program?

Yes—by trouble shooting in the growing crop. Tissue tests, plant analysis, and soil tests taken under the growing crop tell nutrient need WHEN THE CROP NEEDS IT. Also topdress and lime your forages. Broadcast fertilizer as soon as you harvest small grain. And plowdown corrective phosphate and potash before seeding winter grain and legumes.

13—What about applying P and K summer, fall, or winter in the South and East?

Safe for P on all soils. Safe for K on all but sandy soils that may leach some. Potash does not leach on heavier textured soils. In Tennessee tests, most of the K remained in the top 6 inches, even after 400 lb K_2O/A for 4 years straight.

14—Isn't spring weather better for fertilizing in the South than other areas?

Don't bet on it. Wet weather and soggy fields delay some so long they finally run the spreader on wet soils. Ruts and compacted soil can take their toll. Waiting for ideal conditions can take its toll, also—in lost planting days. The South usually has less than a week of ideal days to plant cotton. With fertilizer already spread in fall or winter, you have ALL those valuable days. If spring runs dry, just ONE DAY SAVED that planting week could mean the difference between a good and poor stand—and later profits or losses.

15—I've heard fall phosphate and potash fertilization produce lower yields than spring fertilization in the South.

Tests show otherwise. Tennessee cotton studies at different locations and on two soils showed no yield differences among fall, winter, and spring fertilization. Arkansas tests showed the same for soybeans. Mississippi cotton used fall P as well as spring P. And Louisiana found fertilizer timing no important factor in final yields of sugar cane.

16—How safe is fall nitrogen in the Midwest?

The ammonia form is all right on soils cool enough—below 50°F temperatures. But do not apply on sandy soils, of course.

17—How about applying N in the South or in the Great Plains?

There are two keys—rain and temperature. West of the 30-inch rainfall belt in the Great Plains, growers now apply ammonia N to some soils with fall-winter plowing. Wheat gets all its nitrogen in fall in some areas. When applied after December 1, little nitrogen leached from heavier textured soils in Texas tests. And Virginia found no corn yield differences from ammonia applied fall, winter, or spring on heavier textured soils. But in the lower South, with more moisture and warmer soils, fall-winter ammonia applications increased corn yields only 50 to 80% as much as planting-time applications.

18—Will fall P-K applications help my forages get through winter better?

Yes. Many tests have shown this. Plenty of phosphate and potash applied in the fall helps lower freezing point of plant cell sap, insures stronger roots, and reduces respiration and water loss. In a severe Midwest winter, 90% of the poorly fertilized alfalfa died, only 20% of the well fertilized crop. High yielding forages remove much plant food, especially potash. So, it pays to put on plenty in fall—for winter rigors and for adequate surge next season.

19—Does it help to split P and K applications on forages?

Not for phosphate. But in Louisiana tests, split K_2O applications were best for Coastal bermudagrass. When Arkansas split K_2O on fescue-common bermuda pastures so both grasses "could feed at the first table," neither grass pushed out the other. The mix remained balanced. But you have to weigh values of splitting against costs of additional labor and equipment use.

QUESTION-ANSWER ARTICLE above available in Fertilegram form—EVERY-Season Calendar opposite page available as 8½ x 11 sheet in 2 colors—Order on page 24 now.

EVERY-Season Fertilization Calendar

FALL

SEPTEMBER

Sun	Mon	Tue	Wed	Thu	Fri	Sat
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		

OCTOBER

Sun	Mon	Tue	Wed	Thu	Fri	Sat
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

NOVEMBER

Sun	Mon	Tue	Wed	Thu	Fri	Sat
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30				

- Collect soil samples.
- Broadcast NPK for winter small grain—add extra PK for double crop beans.
- Check crop nutrient removals by field.
- Plowdown PK and micronutrients for spring crops immediately after harvest.
- Topdress to winterize alfalfa.
- Treat problem spots.
- Store N in soils below 50° F.

WINTER

DECEMBER

Sun	Mon	Tue	Wed	Thu	Fri	Sat
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

JANUARY

Sun	Mon	Tue	Wed	Thu	Fri	Sat
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

FEBRUARY

Sun	Mon	Tue	Wed	Thu	Fri	Sat
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29						

- Broadcast P and K on shallow snow or frozen ground, up to 8% slopes with heavy residue cover.
- Topdress pastures and winter small grain.
- Plowdown NPK on fields missed in the fall.
- Attend crop production information meetings.
- Read new information.

SPRING

MARCH

Sun	Mon	Tue	Wed	Thu	Fri	Sat
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

APRIL

Sun	Mon	Tue	Wed	Thu	Fri	Sat
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	

MAY

Sun	Mon	Tue	Wed	Thu	Fri	Sat
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31					

- Collect soil samples.
- Broadcast preplant fertilizer.
- Drill in NPK with spring seeded small grains.
- Plant corn and beans EARLY applying sideband fertilizer.
- Bandseed alfalfa with fertilizer after plowdown.
- Topdress alfalfa with high K fertilizer after first cutting.

SUMMER

JUNE

Sun	Mon	Tue	Wed	Thu	Fri	Sat
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30			

JULY

Sun	Mon	Tue	Wed	Thu	Fri	Sat
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

AUGUST

Sun	Mon	Tue	Wed	Thu	Fri	Sat
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

- Attend or hold field days and fall-winter fertilization training meetings.
- Collect soil and plant samples as you study the crop.
- Make long range fertilizer plans for a full-feed program.
- Set up a fertilizer program for fall and winter.
- Bandseed alfalfa with fertilizer, after plow down.
- Topdress pastures.
- Fertilize soybeans in multiple cropping systems.

Anytime Is The TIME To Promote Sound Fertility

SEND US MATERIALS MARKED BELOW TO PROMOTE FERTILIZATION THIS FALL:

On Dollar Returns From Fertilization

	QUANTITY	
Return$ From Potash (16 page BOOKLET folder size)	______	15¢ ea.
NPK Road to GRAIN Profits (12-page BOOKLET folder size)	______	15¢ ea.
NPK Road to FORAGE Profits (8-page BOOKLET folder size)	______	15¢ ea.
Potash—Real Bargain For Farmers (FOLDER)	______	10¢ ea.
FEW Bushels Pay for K (K Rates—Crop Prices—Uptake Arithmetic POST-CARD)	______	5¢ ea.
Sample Kit (1 copy each publication in this section)	______	25¢/Kit

On Nutrients Taken Up By GROWING Crops

Plant Food CORN Takes Up While Growing (FOLDER)	______	10¢ ea.
ALFALFA Absorbs Much Plant Food in 4 Cuts (FOLDER)	______	10¢ ea.
Plant Food SOYBEANS Take Up At 5 Growth Stages (FOLDER)	______	10¢ ea.
SORGHUM Takes Up Much Plant Food At Different Stages (FOLDER)	______	10¢ ea.
WHEAT Takes Up Much Plant Food At 4 Growth Stages (FOLDER)	______	10¢ ea.
Five Nutrients Contained in 40 Crops (Plant Food WALLET BOOKLET)	______	15¢ ea.
Nutrients 4 Major Crops Take Up At Different Growth Stages (WALL CHART)	______	15¢ ea.
Nutrients 4 Major Crops Take Up At Different Growth Stages (PLACE MAT)	______	5¢ ea.
Plant Food Utilization—5 Nutrients in 40 Crops (16″x22″ WALL CHART)	______	15¢ ea.
Sample Kit (1 copy each publication in this section)	______	25¢/Kit

Advantages of FALL-WINTER Fertilization

EVERY-Season Fertilization (FERTILEGRAM answering 20 key questions)	______	10¢ ea.
Profitable FALL Potash Use (FERTILEGRAM answering 18 key questions)	______	10¢ ea.
HIGH-K Soils Can Need MORE K—Research Says (FOLDER)	______	10¢ ea.
Fertilize Fall Small Grain For LATER Soybeans (FERTILEGRAM 22 ques-ans)	______	10¢ ea.
Soybeans Get Hungry, TOO (WALL CHART)	______	15¢ ea.
EVERY-Season Fertility: Set Clock For Next Year's Crop (WALL CHART)	______	15¢ ea.
Year-Round Fertility Tips (Color POSTCARD)	______	5¢ ea.
Plan For Full-Feed CORN (Color POSTCARD)	______	5¢ ea.
EVERY-Season Fertilization (CALENDAR)	______	10¢ ea.
Sample Kit (1 copy each publication in this section)	______	25¢/Kit

COLOR SLIDE SETS:	10-DAY LOAN	PURCHASE
Facts Point to Fall-Winter Fertilization (37 Slides & Script)	______	______$10
Fertilizer Time Is ANYTIME Down South (35 Slides & Script)	______	______$10

Payment enclosed $______. (No shipping charges)
Bill me ______. (Add shipping charges to the invoice)
(Discount 20% on any item exceeding 5,000 copies)

Name ______________________ Address ______________________

City ______________________ State ____________ Zip ____________

Organization ____

Potash Institute 1649 Tullie Circle, N.E. Atlanta, Ga. 30329

HIGH YIELD
Key To CORN And SOYBEAN Profits

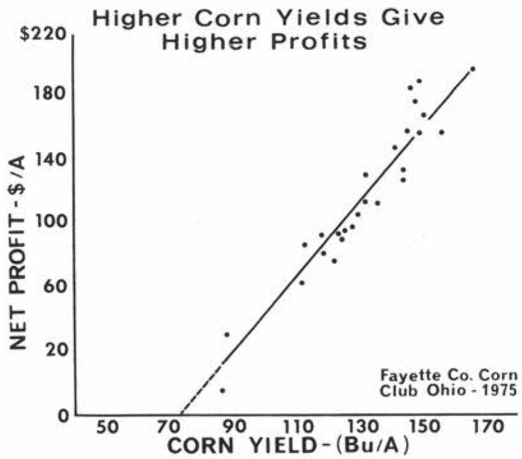


FIGURE 1

R. B. Lockman
Agrico
Washington Courthouse, Ohio

FARMERS ARE HIGHLY concerned about growing corn profitably. Since 1972, prices of inputs and grain have been changing drastically, **but not always together.** The data presented here represents what has actually happened for one group of farmers during this period of rapid change.

The Fayette County Ohio Corn Club kept accurate records of corn production for their 25 to 40 members. Remember these growers average about thirty bushels per acre **more** than the average corn grower. They are doing many of the "right" things to grow profitable corn. So, their records should help those striving to increase their corn profits.

Corn profits are largely determined by two factors: (1) Grain price. (2) Grain yield. The farmer has little control over grain prices at any one moment, but he has much control over his grain yields. So, this article considers factors the farmer can control—**the management factors that influence his yields!**

CORN PROFITS are closely associated with yield, as **Figure 1** clearly indicates. The cost of inputs do affect profit margins, but the one major factor is **YIELD!** So the farmer must first determine what he must do to get the profitable, high yields.

Such yields demand the **TOTAL PROGRAM** approach. Proper planning and timing of all operations. This includes proper hybrid selection, early planting at optimum populations, adequate weed and insect controls plus adequate fertility programs, etc.

Forgetting any one of these essential factors can reduce the benefits received from all the others and drastically affect profits.

With these factors in mind, let's look at the nutrients required by better-than-average corn yields of the Fayette County Corn Club. **Table 1** shows yield-cost-profit relationships of Club growers since 1973.

On average, the higher yield group increased yield nearly 50% with nearly the same cost per acre as the lower yield group. This 50% increase in yield boosted profit almost 100%.

This is why I say yield is a key to profits! Note how the relationship of yield and profit held true despite the highly variable cost pictures between 1973 and 1975! Good management pays in both "good" and "poor" years. This includes timeliness and spending money on the proper inputs.

FARMERS ARE CONCERNED about corn profits. Production costs are higher and grain price dropped in 1975. This has rapidly reduced profit margins. Figure 2 shows how returns took a big jump in 1973-1974. The better margins were caused mostly by better grain prices.

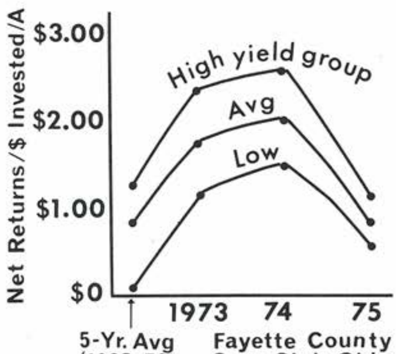


FIGURE 2

TABLE 1—CORN YIELD-COST-PROFIT STATISTICS
FAYETTE COUNTY OHIO CORN CLUB 1973-75

Item & Year	Lower Yield Group	Mid Yield Group	Higher Yield Group
Grain Yields (bu/a):			
1973	102.7	131.7	162.9
1974	103.9	127.6	146.3
1975	106.4	131.9	149.9
3-yr. Avg.	104.4	130.4	153.0
Total Production Costs ($/A):*			
1973	101.07	102.91	103.99
1974	144.00	144.00	140.00
1975	170.42	181.06	176.75
3-yr. Avg.	138.50	142.66	140.24
Net Returns ($/A):**			
1973	119.74	180.16	246.20
1974	216.00	294.00	361.00
1975	83.11	130.17	183.38
3-yr. Avg.	139.62	201.44	263.53

*Includes all current cost of seed, fertilizers used, pesticides, all harvest and tillage costs actually employed, and land-use expenses as determined by the Corn Club committee.
**Net return calculated each year = (current grain prices in fall harvest period x yield)—total production costs.

But 1975 returns have dropped back to near those of the 5-year period, 1968-1972. The 1975 growers faced higher costs and reduced grain prices but the ratio now is back to a more "normal" level. **This means their profit will depend more on good management.**

In 1973-74, even low yield growers could get good returns—but in 1975, only the high yield growers cleared over one dollar (over and above costs) for every dollar they invested in their crop. This is over 100% profit. The low yield group cleared only about 50¢.

NUTRIENT CONDITIONS associated with higher yield groups are not outstanding, but **Table 2** shows the higher yields occurred with better nutrition levels.

On average, the higher yield group

TABLE 2—CORN FERTILITY STATISTICS FAYETTE COUNTY OHIO CORN CLUB 1973-75

Item & Year	Lower Yield Group	Mid Yield Group	Higher Yield Group
3-year Avg. Yield	104 bu	130 bu	153 bu
3-year Avg. Rate of:			
N lb/A	167	160	189
P_2O_5 lb/A	86	83	81
K_20 lb/A	89	106	126
3-year Avg. Soil Test:*			
P_1 (lb/A)	67	72	96
Exchg. K (lb/A)	311	307	340
(% K Saturation)	(1.9)	(1.8)	(2.3)

*Many other tests were run, but differences among yield groups in general were not appreciable. For more detail, see Better Crops (Vol. LVIII: 26-29), No. 1-1974.

used about 10% higher N rates, about equal P_2O_5 rates, and about 40% more K_2O than the lower yield group—189-81-126 for high group vs. 167-86-89 for lower group.

Average soil test values indicate similar trends. Soils of the higher yield group tested higher in P and K. Yes, the evidence is clear—the better the yields and profits the stronger N-P-K programs.

WHAT DOES THIS TELL THE GROWER? Growing corn profitably requires adequate fertility levels. "Saving" money by not applying all the nutrients required for high-yield crops can be one of the most costly mistakes he can make.

Only balanced and adequate fertility levels can assure top yields. A sound fertility program will require soil tests to determine just how much of what nutrients will be required to reach this balanced condition. Adding more than needed is just as much of a mistake as not adding enough.

Playing too close to the margin on fertility can be costly, too, on that better-than-average corn year. The club data show that year in and year out, good soil fertility programs together with other sound management practices go hand in hand with profitable corn production.

SOYBEAN PROFITS are closely related to soybean yields. **Figure 3** shows Soybean Club records of Fayette County, Ohio, 1975.

In 1974, when cost-price ratio was more favorable for the grower, soybean profits started at about 10 bu/A yield level.

In 1975 with higher costs and lower soybean prices, the grower had to raise 28 bushel/A just to break even.

But after these threshold yields were reached, the grower's final profit was directly related to his yield.

The individual farmer cannot set the price of the grain he sells, but he CAN do much to regulate yields. When the economic squeeze gets tighter, sound programs that produce higher yields become even more important as **Figure 3** clearly shows. Therefore, the grower who wants to improve his profit picture should look first to what will increase his yields. Club records show both good soil P and good soil K levels will help reach top yields in a given year.

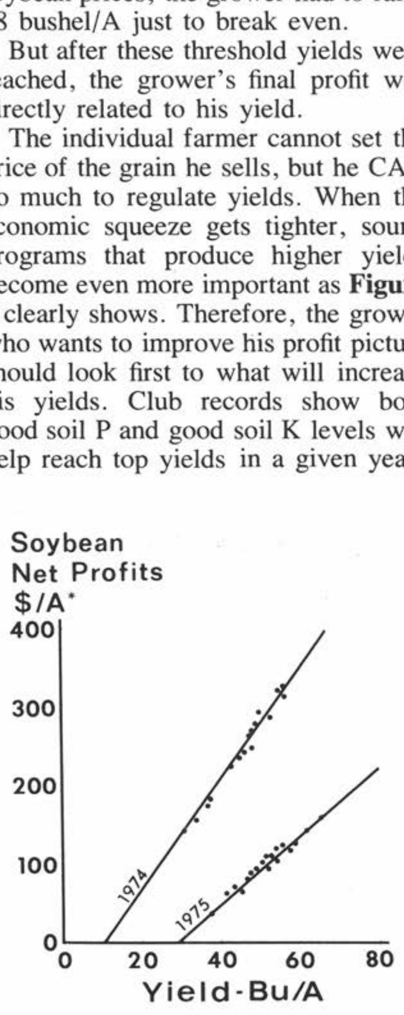


FIGURE 3

TABLE 3—STATISTICS FROM FAYETTE COUNTY (OHIO) SOYBEAN CLUB (1974-75* Data)

	Club Average			Top 6 Yields			Top Yield Group % Over Club Avg.
Avg. yield (Bu/A)	45.8	52.1	49.0	52.9	59.0	56.0	14%
Avg. $ Cost/A	$108	$131	$120	$110	$135	$122	2%
Avg. $ Net Profit/A	$250	$104	$177	$305	$132	$218	23%
$ Net/$ Investment	2.31	0.79	1.48	2.77	0.98	1.79	21%
Avg. Soil Tests:							
P_1 (lb/A)	68	56	62	76	72	74	16%
K (lb/A)	347	295	321	362	339	350	9%
pH	6.5	6.6	6.6	6.6	6.6	6.6	0

*Calculated on basis of current fertilizer and grain prices each year. There were 26 entries in 1974 and 18 entries in 1975 that were included in these statistics.

Although some pretty good yields and profits could be realized with less-than-optimum soil test values, records in **Table 1** show TOP yields and profits with **soil P_1 tests over 60 lb** and **soil K tests over 300 lb.** This happened both years. **Yes, soybeans do respond to good soil P-K tests.**

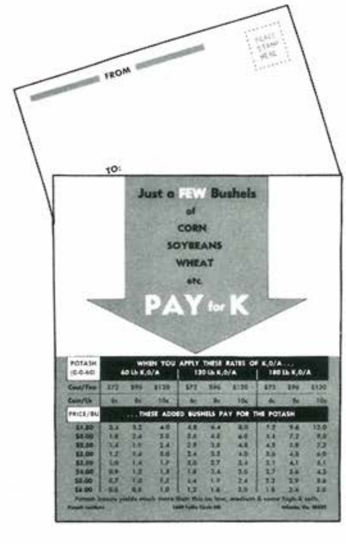
MANY CLUB FIELDS did not receive direct N-P-K fertilizers. From the limited number of fields where direct applications were used (9 of 18 in 1975), we found little correlation with yield. This observation is not new.

But it should be remembered soils were already testing in the ''good'' category, in most cases. Other research data from soils testing low P-K do show soybean responses to both row and/or broadcast N-P-K fertilizers.

Table 3 summarizes two years' records. The top yield and profit group of the club spent only 2% more average on their crops to obtain a 14% yield increase. This increased net profit 23%. But their soil tests averaged 16% higher in P and 9% higher in K.

These statistics show top management plus good soil test produced the most profitable results. Similar data appears in our corn report—but corn responds to direct fertilizer application. The data came from cooperative efforts of club members; John Gruber, Fayette Co. Ohio Extension Agent; and the personnel at the AGRICO Agronomic Service Laboratory. **THE END**

*Figure 3 calculated by current year prices of inputs and grain by the Fayette County Club committee and John Gruber, County Agent, who cooperated on the article.



Potash Helps Coastal Bermudagrass Resist Disease While Improving Yield

"The yield of Coastal forage is positively responding to potash (K_2O). And the loss of stand and severity of leafspot is sharply reduced when potash (K_2O) is included in the fertility program."

Marcus M. Eichhorn, Jr.
Louisiana State University

COASTAL BERMUDAGRASS is an excellent pasture grass that can produce high yields of quality hay when properly managed. It is a deep-rooted grass that can extract nutrients 10 feet or deeper in the soil.

Coastal is especially adapted to the soil of north Louisiana. But in recent years we have observed **Helminthosporium cynodontis** disease in Coastal pasture and meadows. Severe leafspot is followed by stand loss. Crabgrass and other undesirable species invade the bare spots.

THIS STUDY WAS ESTABLISHED on an area used for continuous hay production during the past 15 years. The fertility program removed more potash than it applied. Although the soil was not being "mined" very rapidly, annual potash removal probably ran at least 105% of the potash applied as fertilizer, possibly more.

This study shows how potash increases Coastal bermudagrass yields and helps control **Helminthosporium cynodontis** disease in this forage. The study was initiated in 1973. Yield data go through the 1975 growing season. Stand loss caused by the disease is also reported. The study is being conducted on a Shubuta gravelly fine sandy loam.

The fertility program includes:

Nitrogen—400 lbs/A/yr, applied as ammonium nitrate. Nitrogen is applied at the rate of 100 lbs/A before each of four cuttings made during each season.

Phosphate—100 lbs/A/yr, applied broadcast about April 1st. Ordinary superphosphate is the source.

Potash—Rates of 0, 100, 200 and 400 lbs/A/yr, applied broadcast as muriate of potash. Half the plots receive the annual rate about April 1st. The others receive split applications, half about April 1st, other half about June 25th.

Soil samples were taken from each of the treatment plots before the study was launched in the spring, 1973. A second set of samples was taken in spring 1975. **Table 1** shows how K_2O treatments affected soil test values.

AFTER THREE YEARS, there is some K_2O buildup where 400 lb rates are applied. At the 200 lb rate, soil K increased with single annual applications but stayed about the same with split applications. Levels dropped in all plots with O and the 100 lb K_2O rate.

Although there are insufficient data to draw specific conclusions, it appears

Table 1. Effects of varying K_2O RATES ON SOIL TEST K levels and Coastal bermudagrass in hay production, 1973-1975.

Lbs./A./Yr. K_2O applied	Lbs./A. exchangeable K Year 1973	1975	Change in soil K
0	88	62	−26
100*	77	76	− 1
200*	56	88	+32
400*	85	104	+19
100**	94	88	− 6
200**	98	96	− 2
400**	82	102	+20

*Single application.
**Split application.

that 100-200 lbs K_2O/A per year is needed to maintain soil K at the 1973 levels.

Additional data, including correlation among yields, forage quality and soil tests, are needed to determine K_2O needs more accurately. But two conclusions can be clearly drawn from the study to date:

1—The yield of Coastal forage is positively responding to potash (K_2O).

2—The loss of stand and severity of leafspot is sharply reduced when potash (K_2O) is included in the fertility program.

Table 2 shows how consistently potash has boosted yields. Yield per cutting was averaged for the three-year period. These average yields were held back by the unusually cool spring and dry summer of 1974.

For the three years, the greatest response came from a single 400 lb K_2O application. Nearly as much dry matter was produced at the 100 lb level when the applications were split between spring and summer.

Advantages of splitting K_2O applications have been shown by others. The advantages and disadvantages of single and split applications will not be discussed here, except to note that all factors (from economics to management practices) should be weighed before deciding when to apply K_2O. The fact remains that Coastal bermudagrass is responding to K_2O fertilization.

THE MOST STRIKING RESULTS are shown in Table 3 where response by treatment is broken out by year.

Response differences within treatments were three to eight times greater in 1975 than in 1973. Absolute differences reached 6000+ lbs/A.

In all cases, 1974 results were intermediate, establishing a trend toward higher and higher responses to potash with time. We can only speculate

Table 2. Effects of varying rates of K_2O on Coastal bermudagrass yield, using two application schedules for the period, 1973-1975.

Lbs./A./Yr. K_2O applied	Dry forage production-pounds per acre: Average cutting dates 5/20	6/22	7/30	9/16	Season total	Response to K_2O
0	1,747	2,567	2,392	1,658	8,364	—
100*	2,545	3,121	2,857	1,916	10,439	2,075
200*	2,607	3,243	3,057	2,112	11,019	2,655
400*	3,002	3,545	3,355	2,528	12,430	4,066
100**	2,608	3,185	3,534	2,559	11,886	3,522
200**	2,579	3,099	3,460	2,608	11,746	3,382
400**	2,631	3,264	3,526	2,590	12,011	3,647

*Single application.
**Split application.

TABLE 3. Effects of three years' hay removal on Coastal bermudagrass response to K_2O, 1973-1975.

K_2O applied (Lbs./A.)	Dry forage production-pounds per acre — Response to K_2O 1973	1974	1975	Average response
0	—	—	—	—
100*	535	1,486	4,206	2,075
200*	1,167	1,695	5,106	2,655
400*	1,830	3,119	7,249	4,066
100**	1,831	2,793	5,942	3,522
200**	899	2,495	6,751	3,382
400**	1,052	2,635	7,258	3,647

*Single application.
**Split application.

whether this trend will continue as the study goes on.

Observations of the test plots themselves suggest it will. On the plots receiving no potash (K_2O) significant stand loss is being observed. They have become progressively worse during the study. There is no reason to expect a remission of the disease on unfertilized plots.

Meanwhile, plots receiving potash (K_2O) remain healthy with strong stands. This means potash fertilization is adding vigor the Coastal needs to resist **Helminthosporium cynodontis** disease.

Table 4 shows the continuing divergence in total yields between unfertilized and fertilized plots. Weather reduced all yields in 1974. But even under moisture stress, potash fertilized plots used available moisture and nutrients to produce higher yields than unfertilized plots.

IN SUMMARY, Coastal bermudagrass performed best when adequate N, P **and K** fertility were provided—a convincing demonstration for balanced fertility.

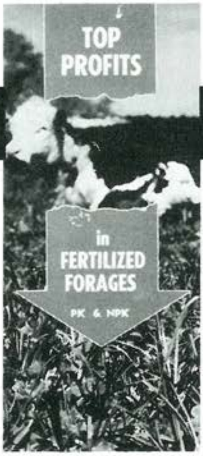
Potash boosted yields by providing increased resistance to disease and a higher tolerance to moisture stress. The End.

Table 4. Effects of varying rates of K_2O on seasonal yields of Coastal bermudagrass, using two application schedules.

Lbs./A./Yr. K_2O applied	Dry forage production-pounds per acre — Year 1973	1974	1975	Three-year average
0	10,315	7,593	7,184	8,364
100	10,850	9,079	11,390	10,439
200*	11,482	9,288	12,290	11,019
400*	12,145	10,712	14,433	12,430
100**	12,146	10,386	13,126	11,886
200**	11,214	10,088	13,935	11,746
400**	11,367	10,228	14,442	12,011

*Single application.
**Split application.

New Forage PROFITS Booklet (Folder Size)



THERE ARE TOP PROFITS in fertilized forages. Extra yields from fertilizer contain many extra dollars. But they rarely get pulled out of the production package and credited to fertilizer. This booklet documents top profits from balanced fertility on forages. Order for quick delivery below.

Send us: ________ Top Profits in Fertilized Forages
Quantity booklet, 15¢ each

Payment enclosed $________ (No shipping charge)
Bill us ______ (Add shipping to invoice)

Name ______________________ Address ______________

City ______________________ State ________ Zip ______

Organization ______________________________________

Potash Institute, 1649 Tullie Circle, N.E., Atlanta, Ga. 30329

Better Crops
WITH PLANT FOOD

Potash Institute
1649 Tullie Circle, N.E., Atlanta, Ga. 30329

Controlled circulation postage paid at Washington, D. C.