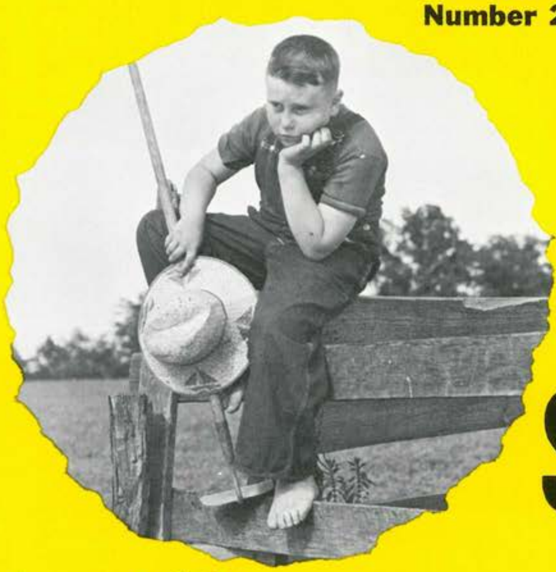
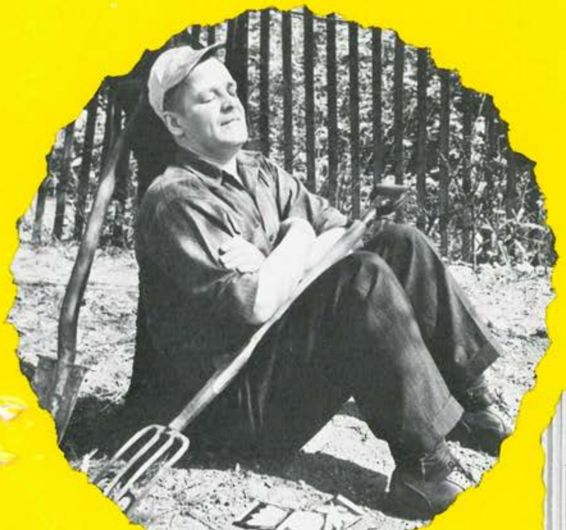
# Better Crops

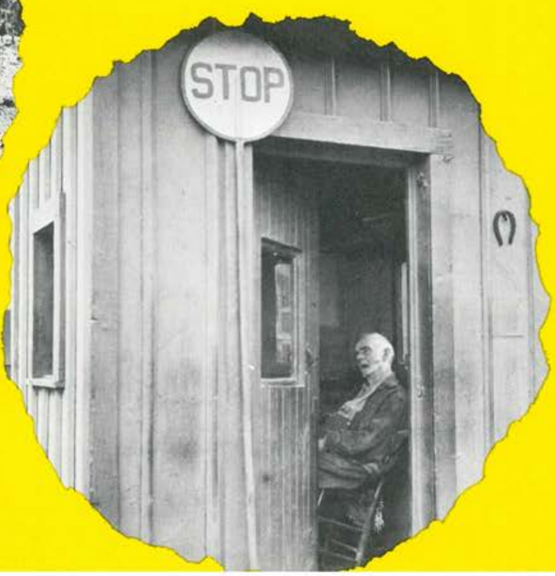
## WITH PLANT FOOD

**Number 2 — 1968** **25 Cents**

# SPRING FEVER





# Change Of Address
# NOTICE!


**AFTER JUNE 1, 1968, OUR NATIONAL HEADQUARTERS ADDRESS WILL BE:**

**AMERICAN POTASH INSTITUTE**
**1649 TULLIE CIRCLE, N.E.**
**ATLANTA, GEORGIA 30329**

**ON THE COVER** an old-fashioned disease sets in. It was once right common among all ages and all kinds of people, taking its heaviest toll in late April or May or early June. Modern science (that is, efficiency and automation) conquered the disease or made it such a luxury that few people could afford to catch it. But like most conquered diseases, it has been replaced by other things: ulcer pills, tranquilizing tablets, and blood pressure tonics. With drug costs being what they are, maybe it would pay us to contract this old-fashioned malady now and then. Maybe the whole country, the whole world should come down with it for a few days. The idea intrigues us enough to "waste" a valuable cover on it. What would happen if the whole world caught the disease at the same time and recovered from it at the same time? One fellow once said that sleep knits the raveled sleeve of care. Maybe the world . . . oh, well, too late now, for us, at least . . . here comes another deadline.

Better Crops WITH PLANT FOOD

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# Potassium REDUCES Corn Leaf DISEASE

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**WILL A BALANCED** fertility program help build healthy corn plants? A recent Iowa study suggests it will! A relationship was found between nitrogen, potassium, and a bacterial leaf disease.

**A FIELD TRIAL** was designed to study how N and K fertilization affects the growth, standability, chemical composition, and yield of corn grown under high management levels.

The soil, a Webster silty clay loam, tested low in P and low-medium in K and had a pH of about 7.0. In April 80 lbs. of P and 10 lbs. of Zn per acre were broadcast and plowed under. N and K treatments consisted of 0, 40, 80, 160, and 320 lbs. per acre in all possible combinations. Ammonium nitrate and muriate of potash (KCl) were used as the source of nutrients.

The corn was planted on May 3 in 30-inch rows, producing a final stand of about 22,000 plants per acre.

**LEAF DISEASE** appeared after a 2 to 3-week period of rainy weather in June. Rusty colored lesions developed on the lower leaves of many plants in certain treatments. Lesions started on the lower leaves and spread upward, reaching the upper half of only a small percentage of plants.

While an appreciable area of the lower leaves was affected, few of these leaves were completely destroyed. The disease was identified as bacterial leaf blight by the Plant Disease Diagnostic Clinic.

**INDIVIDUAL PLOTS** were rated for disease incidence in mid-July, guided by a scale pictured by A. L. Hooker in the March-April, 1962 issue of Better Crops.

This scale includes six categories, ranging from 0.5 to 5.0, with the number of lesions per leaf and affected leaves increasing toward the maximum of 5.0. TABLE 1 shows an average of

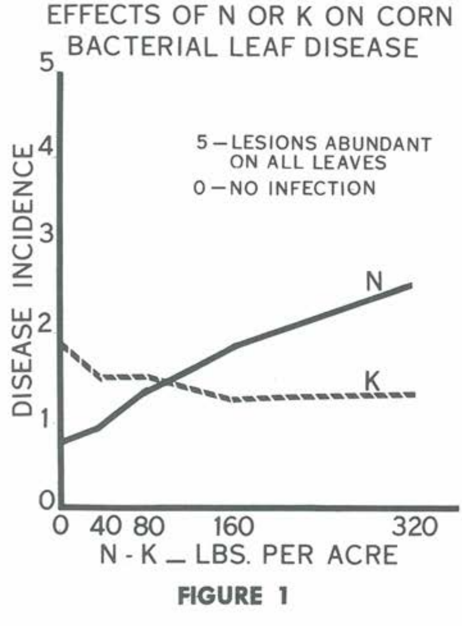
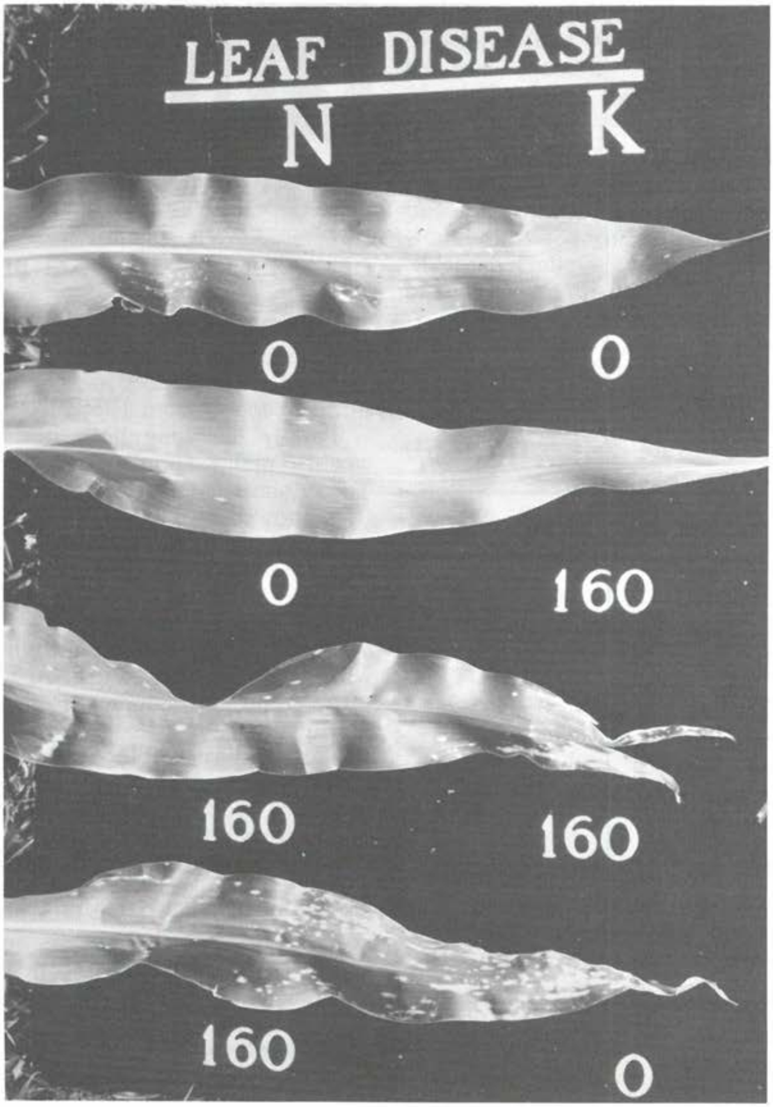



**FIGURE 1**

TABLE 1. N-K TREATMENTS AFFECT BACTERIAL LEAF DISEASE

| N Rates—lb/A | K Rates—lb/A 0 | 40 | 80 | 160 | 320 | AVG. |
|---|---|---|---|---|---|---|
| 0 | 0.92 | 0.88 | 0.79 | 0.54 | 0.71 | 0.77 |
| 40 | 1.25 | 1.08 | 1.08 | 0.71 | 0.71 | 0.97 |
| 80 | 1.88 | 1.29 | 1.33 | 1.25 | 1.33 | 1.42 |
| 160 | 2.83 | 2.58 | 1.92 | 1.75 | 1.50 | 1.92 |
| 320 | 2.75 | 2.75 | 2.42 | 2.17 | 2.42 | 2.50 |
| AVG. | 1.93 | 1.52 | 1.51 | 1.28 | 1.33 | |

FIGURE 2—POTASSIUM (K) HELPS CONTROL LEAF DISEASE



the ratings assigned by two individuals for all fertilizer treatments.

**K CUTS SEVERITY.** With increasing N rates, disease rose sharply and consistently. With K fertilization, leaf damage showed a smaller but definite decline. In fact, potash fertilization reduced disease infection above the rate that showed yield responses. FIGURE 1 shows curves representing the averages for N and K treatments.

**POTASSIUM HELPS** control leaf disease in FIGURE 2. Typical leaves from selected treatments were essentially disease-free with no N and K or with K only. But 160 lbs. N per acre without K caused rather severe leaf damage of lower leaves. This damage declined much when 160 lbs. K joined the N.

**WHAT ABOUT YIELDS?** They ranged from 110 to 170 bushels per acre, depending on fertilizer treatment. It was impossible to determine how much disease actually affected yields. The disease did not appear to spread after the visual rating was taken.

But it seems reasonable to conclude that a balanced fertility program increases the farmer's profit potential because it helps assure a healthy crop.

**THE END**



# TURKEY Turns to Fertilizer


DENNIS CRAIG — FAO REVIEW


**THE TURKISH** province of Iskeshir has grown its last opium crop, and seven other provinces are ceasing opium production from 1968.

Turkey has long been one of the world's major suppliers of the drug. Today she is one of only seven countries allowed by United Nations agreement to produce opium for medical and scientific research purposes.

But in 1967 the Department of Agriculture decided 500 hectares of good alluvial soil in Iskeshir province on which poppies have flourished for centuries could, in the national interest, be put to better use.

Fruit and vegetables are now being grown there. And many more thousands of poppy-growing hectares in other parts of the country will be changed over to food production in the next few years.

**CROP YIELDS MUST RISE.** In the past, expansion has been achieved largely through opening up new areas of arable lands. But the limit has almost been reached. In the future, greater agricultural production will come from increasing per acre yields through irrigation, intensive use of fertilizers, pesticides, and other technological measures. Fewer people on the land will produce more food, while new industry will absorb many of those who leave.

Agricultural extension officers with whom I talked throughout Turkey were agreed on one thing: **that the biggest single factor which convinced farmers of the benefits of modern methods of increasing food production during the first five-year plan was application of fertilizers.**

**WORLD FERTILIZER INDUSTRY HELPS.** Turkey's fertilizer program was launched in 1961 with the help of the Food and Agriculture Organization and its Freedom-from-Hunger Campaign. At that time, the campaign received the first of a series of annual donations—$271,000—from the world fertilizer industry to start programs in the Near East, North Africa, West Africa and Central America.

FAO experts trained Turkish Extension officers in all aspects of fertilizers, and the two sides have continued to work together to demonstrate fertilizer properties, uses, and results. In 1960 Turkey's fertilizer consumption was one of the lowest in the world, importing only 107,000 tons.

**During 1967-68, farmers will use 1.7 million tons—40 percent of it produced in Turkey—and by 1972 consumption will have risen to more than 4.5 million tons!**

Yields of cotton, groundnuts, rice and potatoes during the first five years increased by 20, 30, 30 and 35 percent respectively. The government has credited much of these increases to fertilizer, though its use is by no means widespread throughout the country.

Mehmet Demir, Mayor of Yesilbayir village, told me: **"Life has changed for me and many others in this district since we decided to use fertilizer.**

**"But at first I was a fool. My crops were poor but I didn't believe that this powder they showed us would make things grow better—and if it did they would not be of the same quality. So I wasted two years on being suspicious.**

**"Now my cotton, fruit, and vegetable crops are three to four times bigger and the quality has greatly improved."**

From being a subsistence farmer he now has money in the bank, he has added three rooms and a bathroom to his house, and he takes his produce to market in a gleaming new 10-ton truck.

Shyly, he offered round cigarettes from a plastic box. On top of the box was a carved bird which, at the touch of a spring, dipped down and presented a cigarette in its beak. Each time it did so, farmer Demir roared with pleasure.

**"It is a beautiful toy, this,"** he said. **"And you know, it's the first luxury I have ever bought myself." He waved proudly towards some plastic flowers on the sideboard. "And these I bought for my wife. Before, there was just never a kurush over for such things."**

His seven eldest children have had little education since their labor was needed on his land.

**"But the two youngest have not missed a day's schooling,"** he explained, **"and I am hoping that Osman, the youngest, who is clever at his lessons, will go to the university at Istanbul."**

County agents select suitable farmers in their areas who are willing to convert one or more small strips of land for treatment. At one demonstration, I attended on the windswept plateau settlement of Assagi Kurzfindik, one farmer solemnly took a pinch of fertilizer between his thumb and forefinger and licked it.

**"It has an unpleasant taste,"** he declared. **"Will it not give a bad taste to our crops?"**

Andre Delas, a 32-year-old FAO associate expert who speaks fluent Turkish after three years of field work, replied, **"My friends, have you ever tried tasting that other well-known fertilizer —manure?"**

Lingering doubts dissolved in laughter and the farmers walked out to the wheat fields to watch the correct quantities and mixtures being prepared, broadcast by hand and ploughed into selected strips.

At harvest, the fertilizer team returns to illustrate the difference between treated and untreated crops. A threshing machine, scales, and a blackboard are set up in the village square so that samples from test beds can be compared in identical conditions with samples from the same areas of unfertilized land.

Excitement grows as individual yields are recorded on the blackboard, with the village often taking on the atmosphere of a race track as farmers lay bets on what the final figures will reveal.

This creates a demand for fertilizers, but few Turkish farmers can afford to buy it in any quantity to try on their land.

**FERTILIZER ON CREDIT.** FAO and government field workers select a group of 200 to 700 farmers in an area, each of whom is loaned enough fertilizer to treat one or two hectares. In these pilot projects, as they are called, fertilizer use is strictly controlled by extension officers so results are, without exception, highly rewarding.

The value of the fertilizers has to be repaid after the first harvest. So high is the traditional code of honor that between 95 and 98 percent have repaid FAO's revolving fund in full. After one or two years of pilot project supervision, farmers form their own association. And on the basis of a group guarantee, they can borrow money for adequate amounts of fertilizers from the Agricultural Bank.

Through a new agreement between the Turkish government, the Bank, and FAO, pilot projects are to be extended throughout the country. The government favors this gradual approach because extension controls insure farmers are properly trained in how, when, and what quantities to apply. In the Antalya region, for example, where almost 100 percent of the farmers have been converted to fertilizers, only an estimated 30 percent use it properly.

In Kaza, nestling at the foot of the Taurus Mountains near Gazipasar, 256 farmers were harvesting their first crop of peanuts from a 330 hectare pilot plan when I called there. Although some adjustments have to be made to the quantities of fertilizers being used, the yield was up from 2,000 to 3,000 kilograms a hectare. **In terms of cash at current market prices, yields had been increased by $200 per hectare.**

Farmer Ziraat Teknisyeni, a gaunt, grizzled man who owns six hectares, kept repeating, **"It's a miracle, a miracle,"** as he compared rich clusters of king-sized, fertilized nuts with small bunches from untreated soil. **"At this rate I will be able to buy one of those TV sets in a year or two,"** he said. **"All the talk around here since this harvest started has been plans for buying new things—radios, bicycles, even automobiles."**

Fertilizer program workers had to overcome many obstacles. As their operations spread to poorer, less sophisticated parts, they will meet many more.

In the earliest days, there was some opposition from Muslim religious leaders who questioned whether it was right to fertilize with artificial materials. They have been so won over by increased prosperity among farmers who use it that a number now preach its benefits, while in many small villages with inadequate storage, fertilizer is stacked in the local mosques during wet season.

Yet the angriest man I saw in Turkey was a government officer approached by a group of farmers to arrange a new fertilizer loan. He asked them what had become of their plans for a storage shed for their fertilizers which they had pledged themselves to build out of the extra profits from fertilizer crops.

After some hesitation, they admitted that all their extra profits had gone towards building an elaborate new mosque.

**"I cannot believe that your priorities will have pleased Allah,"** the official said icily.

In windswept Konya province, where weather conditions on the high, dry plateau vary between sub-tropical and sub-Arctic, wheat yields have increased greatly.

**"Now we can rely on at least a fair crop every season, even if growing conditions are not good,"** I was told. **"Before we used fertilizers we averaged one good season in five and four poor ones."**

Insuring a high priority for agriculture in its expansion plans, Turkey is one of the best examples of a developing country building a more prosperous future for its people, in the face of spiralling population.

This is reflected in her latest wheat production figures which, between 1960 and 1965, could not keep pace with extra demand. The total deficit of 2 million tons had to be imported and paid for in scarce foreign currency. But in 1966, no imports were needed, while in the following year there was actually a small surplus. They believe this will be the future pattern.

Mr. Ekrem Gunay, Assistant Director-General of Agriculture, confidently predicts that even when Turkey's population reaches 75 million—by 1999 even allowing for a successful birth control campaign—there will not be a hunger problem.

**"But the situation can be met only if we step up yields considerably,"** he told me. **"This will mostly be achieved through intensive use of fertilizers and by growing high-yielding Mexican and American wheat varieties."**

Turkey's 60 million hectares of farmland is divided into more than 3,500,000 units. They plan to make these into bigger, economic units, fully mechanized and observing the strictest conservation measures.

**"But fertilizer is the spearhead of our agricultural development and has been accorded first priority in our next five-year plan,"** Mr. Gunay explains.

**THE END**

## WITH CORN & SORGHUM

# USE THOSE STALKS

**FRANK SCHALLER**
IOWA STATE UNIVERSITY

**RON GEORGE**
AMERICAN POTASH INSTITUTE

**COST-PRICE SQUEEZE** continues to demand more efficiency out of the farmer.

Higher yields are one answer. They spread fixed costs over more units of production, increasing profit per bushel or profit per ton. Another approach is FULL CROP USE!

**WHAT A WASTE!** Many Midwest farmers plow under more dry matter per acre EACH YEAR than cattlemen in the range country can produce in 5 years. In fact, acre for acre, we waste more harvestable dry matter in our corn and sorghum fields than we harvest from the average alfalfa field.

Climbing corn yields and flourishing feed lots in other regions add up to more competition for the Midwest

**(TURN TO PAGE 13)**

*FERTILIZER HELPS . . .*

# PRESCRIPTION PINE PLANTINGS RECLAIM ERODED LAND

**N. B. GOEBEL**
CLEMSON UNIVERSITY

**IN AGRICULTURAL RESEARCH**

**Removing** topsoil for road building or other construction activity often leaves "borrow areas" that become conspicuous examples of erosion.

Reforestation is usually considered the most effective method of reclaiming severely eroded sites, but reforestation of borrow areas is impractical without site preparation.

Site preparations have been installed in the Clemson Forest as an incidental outcome of a 2-day tree-planting conference sponsored at Clemson by the U.S. Forest Service in 1957. That conference focused special attention on prescription plantings suitable for a number of problem areas.

One of these areas was a 3-acre borrow area in the Clemson forest. Topsoil was removed from it in July 1955. Its soil considered of B horizon of Cecil sandy loam. It was affected by severe sheet erosion and broken up by gullies, 2 to 3 feet deep.

**FIGURE 1 shows how gullies formed a drainage system composed of a main channel in the middle of the field and of secondary channels draining into it.**

Some conference participants recommended treatments for this area:

- **Plant loblolly pine. Mulch with straw.**

- **Plant loblolly pine. Fertilize each tree at the rate of 70 pounds N, 35 pounds $P_2O_5$, and 35 pounds $K_2O$ per acre.**

- **Subsoil area on the contour. Allow the affected soil to settle 4 to 6 months —then plant loblolly pine.**

- **Subsoil area on the contour. Plow, disk, and smooth out the gullies, as though you were preparing a seedbed for a cover crop such as rye or oats. At seeding time apply to the bed 200 pounds of 4-12-12 fertilizer per acre and sow the selected crop at the rate of 80 pounds of seed per acre. One year later plant the area with loblolly and Virginia pine.**

In each treatment, the recommended spacing of trees is 6 by 6 feet or 6 by 8 feet.

Carrying out each prescription led to successful establishment of stands. The cost of treatments ranged from $16 to $32 per acre. The survival of trees on all areas amounts to 89 percent. The formerly bare soil of each plot is becoming covered with a layer of needles and is beginning to be occupied by weeds and low woody vegetation.

**FIGURE 2 shows how fertilization proved beneficial and was soon manifested in healthy color of needles and increased growth of the trees affected.**

It was found, however, that the application of readily available nitrogen compounds should be delayed on similar areas until 1 year after tree plant-

FIGURE 1

TWO YEARS AFTER LOSING TOPSOIL

FIGURE 2

FOUR YEARS AFTER LOBLOLLY PINE

ing. This will preclude the unnecessary stimulation of growth of vigorous weeds capable of competing for nutrients with tree seedlings during their critical period of growth.

If nitrogen has to be added to the soil at planting time, its slowly available form should be used.

On the two subsoiled plots, the growth of the root systems of pines showed conspicuous peculiarities up to 1966. Growth was confined to that portion of the soil which was loosened by cultivation. Tap root growth was arrested at the base of the furrows, and the other portion of the root systems grew more or less horizontally within the confines of the furrow.

Examination of root systems of several excavated trees in 1966 disclosed that their tap roots had begun to penetrate into portions of the soil left undisturbed during site preparation.

**THE END**

*WITH FERTILIZER*

# PUT STRENGTH in ROADSIDE TURF

**L. E. FOOTE**
MINNESOTA HIGHWAY DEPARTMENT

**Condensed from TURF GRASS TIMES**

**MANY ROADSIDE** turfs have never been fertilized. Some are located on nutrient-hungry subsoils. Others are on coarse-textured soils from which nutrients are rapidly leached. Active erosion may increase on such roadside areas or the turf may become weed infested, non-vigorous, and unattractive.

Work on a previously non-fertilized sloping roadside turf in Minnesota showed fertilizer greatly increasing total cover even two years after application.

Total cover increased up to 900 lb/acre of 12-12-12. Also, active erosion declined.

Carefully designed experiments were established in a poor, weed infested, non-attractive roadside turf that was actively eroding. The site was a deep sand cut with a 2:1 west-facing slope.

The sand had been covered with 3 inches of topsoil of a black loamy sandy nature, but much of the slope dressing material had been washed off, especially on the upper portions of the slope. And gullies had started to form.

The area had not been fertilized at the time of construction (1961). About the only desirable grass on the site was smooth bromegrass.

There were many broadleafed weeds on the site, dominated by common ragweed. Also many annual grassy weeds were present, including sandburs, foxtails, and crabgrass.

The fertilizer experiment (12-12-12 varied with rates of 0, 300, 600, and 900 lbs. per acre, and over-seeding. Total combinations of these variables resulted in eight treatments.

The plots were 15-ft. wide with 3-ft. borders. Plot length was the height of the slope which varied from 32 to 90 ft., except for replication 5 on which the plots covered the upper 60 ft. of the slope.

The first four replications were applied September 1, 1963 and the last replication September 12, 1963. The overseeding used was Kentucky bluegrass variety Park at 30 lb. per acre rate. Both seed and fertilizer were spread broadcast by hand.

Another experiment on the same site used higher fertilizer rates in September 1964, 1,200 and 1,500 lb., per acre.

**Over 1,000,000 acres of turf with the Interstate Highway System alone demand high maintenance standards.**

A complex overseeding mixture was added, with two replications being on the east-facing slope and two being on the west-facing slope.

The upper 60 ft. of the slope was used.

The turf on the east-facing slope was somewhat better than that on the west-facing slope.

**TABLE 1 shows how fertilizer was still greatly increasing total cover two years after treatment.** Total cover was increased directly as fertilizer rates increased. Erosion declined as fertilizer rates rose. Most increase from fertilizer occurred within a month after application and continued throughout the next two years.

Rather surprisingly, there was a basic overall increase in the amount of total cover.

Untreated areas had much more total cover two years later than at the start of the experiment. This was probably

**Table 1. Total turf cover percentages on different dates as affected by fertilizer rates.**

| Fertilizer Rates (Lb./Acre *) | Dates of Data Collection 10-7-63 | 9-17-64 (% Cover) | 9-10-65 | Erosion Estimates ** 5-17-65 |
|---|---|---|---|---|
| 0 | 58.8 | 62.0 | 66.4 | 3.4 |
| 300 | 77.7 | 71.8 | 74.7 | 2.5 |
| 600 | 78.5 | 80.7 | 80.0 | 2.3 |
| 900 | 86.5 | 88.4 | 88.8 | 1.7 |

* Analysis 12-12-12.
** Average of two estimators: 10 equals active erosion over complete plot, and 0 equals no active erosion.

Table 2. The percent increase of the mat and desirable turf-grass components of a roadside slope as effected by time and fertilizer rates.

| Fertilizer Rates* (Lb./Acre) | Percent Increase at Times After Application — Desirable Grasses 1 year | Desirable Grasses 2 years | Mat 1 year | Mat 2 years |
|---|---|---|---|---|
| 0 | 19 | 12 | 3 | 13 |
| 300 | 28 | 14 | 5 | 17 |
| 600 | 39 | 22 | 7 | 19 |
| 900 | 45 | 31 | 8 | 21 |

* Analysis 12-12-12.

due to better than average growing conditions during these years or below average conditions in 1962-63.

There was no real mat or mulch present at the start of the experiment. After 2 years, mat had increased considerably, even in untreated areas.

**TABLE 2 shows how the amount of mat increased directly with the increase in fertilizer.**

The amount of grassy weeds present greatly declined during the 2 years of the experiment. The 600 and 900 lb. fertilizer rates decreased the amount of grassy weeds, especially during the first year.

First year results from the fertilization treatments applied in 1964 showed about the same results as the 1963 work. From the 1963 work it had appeared that the top of the response curve had not been reached. But the two higher rates in the 1964 application did not produce any extra benefits and so the 900 lb. rate appears to be about the best.

**The bromegrass plants in the unfertilized plots seldom produced seed heads. At the higher fertilizer rates, most all plants produced profuse seed heads. This seed fell into the bare and gullied areas and germinated, tending to heal these areas.**

Though the data collected failed to show any added effects at higher rates, 1,200 and 1,500 lb., it was possible the spring after application to stand across the road and pick out the treatments precisely. In some cases the only important element rate involved might be that of nitrogen (0, 36, 72, 108, 144, and 180 lb. per acre).

This roadside turf had not been fertilized previously and both the plants present on the sites and soil tests showed a lack of phosphorus and potassium.

**Fertilization tended to control weeds to some extent and limit the volunteering of undesirable legumes, such as sweet-clover. It also decreased active erosion, bare ground and improved the general appearance.**

Overseeding on the 1963 experiment failed. This was probably due to loamy sand texture of the non-vegetated areas, lack of any protective mulch or mat to moderate the environment near the ground, and a rather extended hot, dry period after over-seeding.

The over-seeding in 1964 was successful to a small degree, being best at the 300 lb. fertilizer rate. Over-seeding was a failure at any higher rates.

The partial success of the 1964 over-seeding was probably due to the inclusion of hairy vetch and red clover species with greater seedling vigor in the over-seeding mixture and the presence of more mat (mulch) on these plots.

**Over-seeding and heavy fertilizer treatments should probably be separate operations on poorly-turfed highway roadsides. Over-seeding and heavy fertilizer treatments might be successful when combined if the areas had less than 50% living cover.**

**THE END**

cattle feeder. Feeder cattle will cost more and be harder to get. **Why not produce more feeder cattle in the Midwest with beef cow herds which can utilize the stover from millions of acres?**

Corn and sorghum stover are good roughages for wintering a dry and pregnant beef cow. Stover is inexpensive and available on most farms. TABLE 1 shows expected yield of dry matter and energy (TDN) from a 120 bushel corn crop harvested by different methods. Many growers are exceeding this yield.

Grain accounts for nearly 50 percent of the dry matter and 60-70 percent of the TDN. The other half of the dry matter and 30-40 percent of the TDN are left in the cobs, stalks, and leaves. Normally, most of this is plowed down.

**HARVESTING METHODS** include grazing, ensiling, or chopping and baling.

**Graze** any time after the grain is harvested. About one-third of the total forage will be used and a cow will consume about 22 lbs. per day.

**Ensile stalks** after harvest of grain at 25-30 percent moisture for high moisture handling. At this stage, stover is about 50-60 percent moisture. If the grain is combined at a lower moisture content, you may need to add water to insure satisfactory ensiling and preservation.

Expect silage harvesting and storage losses to run about 20 percent and daily consumption about 45 lbs. of silage.

**Chop and bale stalks** at 25 percent moisture or less to avoid spoilage. About 75 percent of the stover will be harvested and about 20 lbs. roughage consumed per day. Weather at this time of year does not encourage drying stover. Look out for machinery and harvesting problems, as well as poor keeping quality of bales. This method is probably best for stalks to be used for bedding.

**A FINE CUT** is important.

- **Grain sorghum** stands up well after grain harvest. Harvest it with a field chopper equipped with a sickle bar head.
- **Cornstalks** are often flattened during grain harvest. You can use flail type choppers with a recutter screen or a flail type chopper with a recutter at the silo.
- **Load husklage**—loose husks, stalks, cobs—into trailing forage wagon by a special blower attached to the combine.

Good ensiling will usually demand further grinding of cobs and stover with a recutter at the silo.

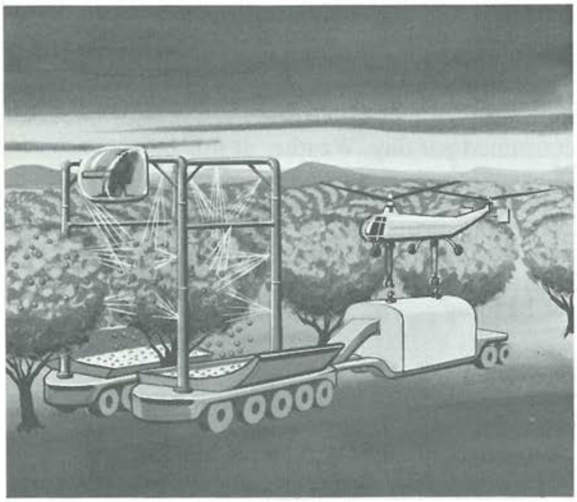
**WHICH METHOD** is best—grazing or harvesting? You should consider many things when selecting a harvest method:

**Grazing** rules out fall plowing. It may mean late corn planting next year and income gained from grazing may be more than offset in lower corn yields on some soils. It ties in with no-plow tillage operations, but requires an open winter with little snow cover. The fields require fence for cattle to glean leftover corn. Guard against cows getting too fat when field losses are high. It's least

(TURN TO PAGE 21)

**Table 1. Approximate yield and TDN from a 120 bushel corn crop (No. 2 shelled corn).**

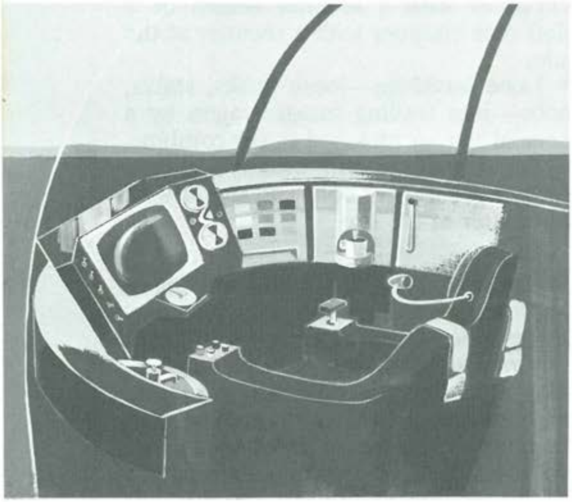
| Roughage | Yield (Dry wt.) | TDN |
|---|---|---|
| | Tons | lbs. |
| Stover (cobs, stalks, leaves) | 3.2 | 2956 |
| Shelled corn | 2.8 | 5264 |
| Corn silage | 6.0 | 8220 |



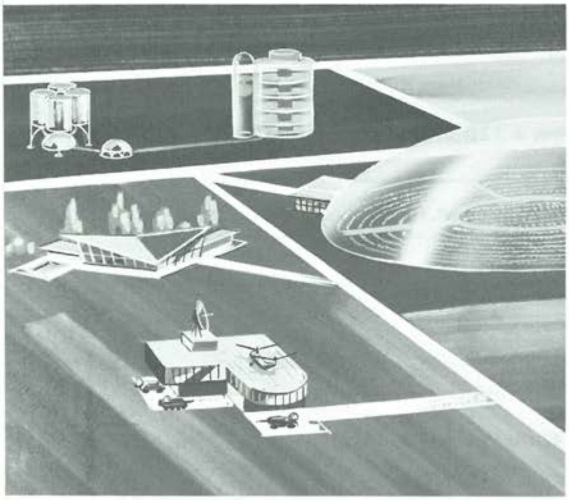
**HARVESTING** will be a simple operation requiring electronic eyes, computerized fingers, and ultrasonic sound waves. A farmer, sitting in his control unit atop such a rig, may move down an orchard to strip trees of their fruit, which moves into the trailer at the rear to be sorted and packaged. The helicopter then lifts the entire trailer and flies it on its way to market while another helicopter replaces it.

# 2,000 A. D.

## (VIEWED BY FORD COMPANY'S

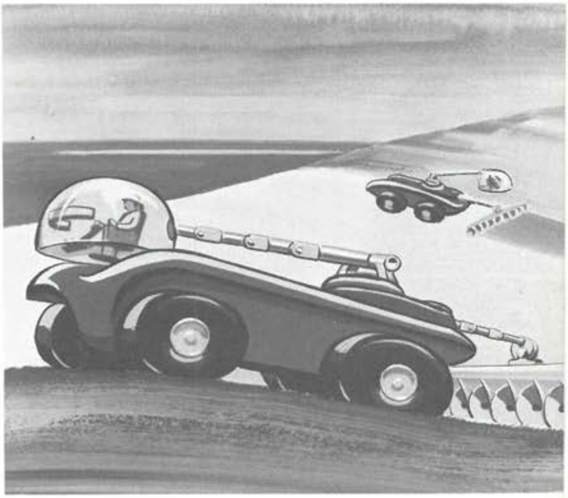


**TRACTORS WILL** be distant cousins of today's farm vehicles and their cabs just as advanced. Starting at the driver's right, and moving left, are a refrigerator, coffee maker, food warmer, a television set connected either to the farmer's headquarters or to other vehicles, and even a sink. All controls are within arm's length of the driver so he can perform his jobs quickly and easily.



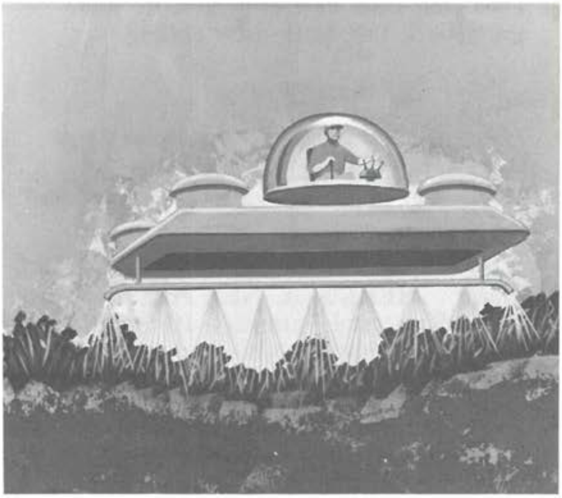
**THE FARM** of 2000 may have a high-rise cattle barn, right background, with completely controlled environment. At left background, a warehouse complex and refinery will purify waste from the barn and recirculate it to the barn. At right, a huge plastic dome covers ten acres or more to grow crops with computer-controlled environment for top production. In front of his home, the farmer has a control center from which he will direct an array of equipment and personnel by electronic machines just now being developed.

**POTENT CROPS** will demand powerful equipment now in planning stages. Tractors will run on four- or six-wheel drive or on pneumatic tracks, powered by electric drive, fuel cells, or efficient storage batteries. This model puts the driver up front in a mobile cab unit for full visibility. Or he can propel the cab to the rear, as on the tractor in the background, for a closer look at his implements performing.

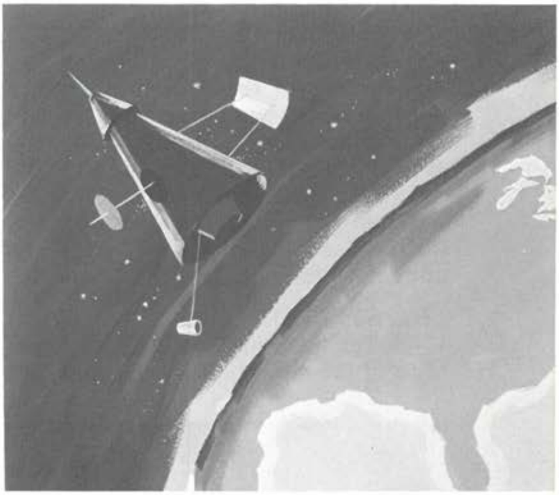


# FARMING

## "AGRICULTURE 2000" STUDY)



**FROM THE AIR** farmers may do some of their most important jobs, with equipment such as this combination helicopter-hovercraft. Engineers already have built one machine which lifts off the ground by low air pressure to spray cranberry vines on rough ground.



**SPACE CONQUEST** will provide future farmers with invaluable facts and tools to help meet expanding food needs. Insects and diseases will be spotted long before they damage crops. Space ships with sensing devices will circle the earth and report the condition of crops on a nationwide—even worldwide—basis, according to the kind and amount of light the earth reflects. The idea is in experimental stages now.


**Use the new high-yielding alfalfa varieties that start new growth early and grow back fast after each cutting.**

**Neutralize soil pH before planting to boost yields. A soil test will tell you exactly what your soil requires.**

# SUCCESSFUL FARMING'S New 8

CHARLES E. SOMMERS, CI



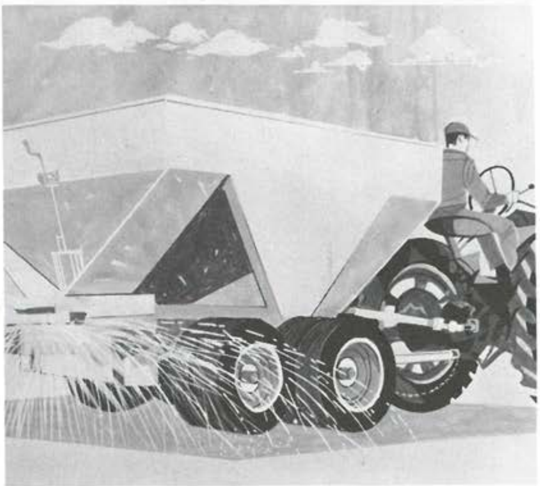
**HERE'S A NEW** challenge from Successful Farming—10-ton alfalfa on nonirrigated soils—and the system to do it with. Nothing extravagant involved, either—just the same modern-day management you use to get 150-bushel corn, 70-bushel wheat, or 50-bushel soybean yields. It's similar to the SUCCESSFUL FARMING 5-Star High Yield Corn Growing System we introduced 2 years ago and have kept you up to date on since.

The 8-Star High-Yield Forage System consists of the important production factors that influence forage yields. It's a system backed up by positive experiment station, research results and practical farmer experience. Put it to work on your farm this year—the results will be higher forage yields and more net profit per acre.

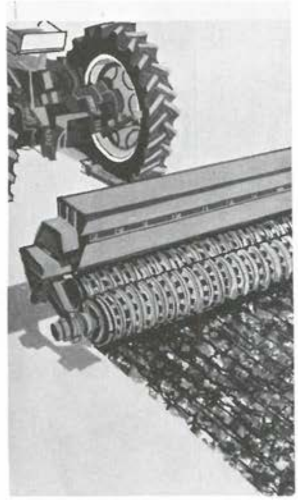
**THE SYSTEM:**

**1—Select new, high-yielding varieties.** Most of the new alfalfas are easily capable of producing yields in the 9-10 ton or more range. The Flemish varieties have the highest yielding potential, start growth early, bounce back fast after cutting. The American strains are more hardy, yield nearly up to Flemish levels, and will persist better in long rotations.

Grass-legume mixtures are preferred by some. Properly managed, they can outproduce pure alfalfa stands. But best cutting time of grasses and legumes doesn't coincide and frequent cutting doesn't encourage the grass to maintain itself in the mixture. When grass-



Build up fertility before planting. Topdress often to maintain vigorous growth, top yields, high quality.



A good stand is important, so take extra care. Prepare a good seedbed, inoculate, sow carefully, control weeds.

# -Star High-Yield Forage System

:OPS AND SOILS EDITOR



legume mixtures are used, you may need to include nitrogen in the topdressing to keep the grass competitive.

**2—Neutralize soil pH.** Alfalfa prefers near neutral pH. When the soil is below 6.5, the addition of lime will boost yields. Neutralizing buffers soil chemical reactions, supplies secondary elements such as calcium and magnesium, makes other micronutrients more readily available, reduces toxic levels of iron, manganese, and aluminum, favors the development of nodular bacteria and helpful soil microorganisms.

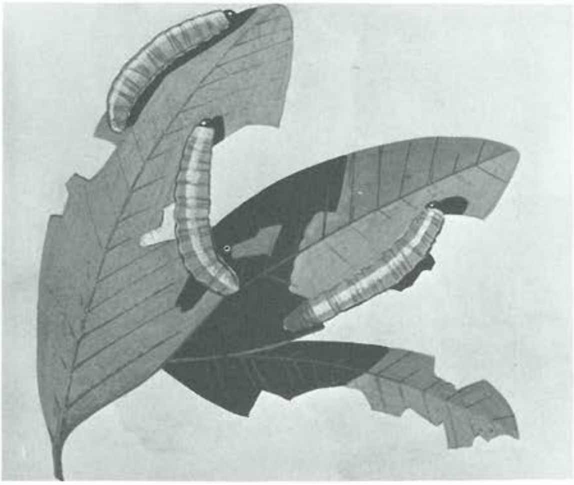
Test the soil first to determine pH and if below 6.5, apply the recommended amount of lime as far ahead of planting as possible.

**3—Establish and maintain high fertility.** Alfalfa is a heavy feeder of nutrients, so when you're shooting for high yields, you can't afford to take a chance on low or questionable levels.

An analysis of the subsoil as well as the topsoil is desirable to determine the nutrient level. Tests should rate medium to high in available phosphate, high to very high in potash. In most cases, it would be wise to apply several hundred pounds of these nutrients at plowdown.

Topdress after each cutting to keep nutrient levels high. Potash and calcium will be depleted fastest. In some areas sulfur, boron, or molybdenum may be deficient. Apply the micronutrient if your soils have a history of deficiency or if deficiency symptoms are showing. But remember excessive

Cut early and frequently. It increases yields, improves quality, reduces losses. Four to 5 cuttings are possible.



Control insects with chemicals as soon as signs of infestation are evident. You can't afford to miss this step.

levels can be toxic so don't apply unless analysis shows they're needed.

**4—Establish a good stand.** You can get several extra tons of high-quality forage the seedling year. Eptam, incorporated before planting, Dowpon, or 2,4-DB applied when seedlings are 2-3″ tall, will control weeds. If you don't use an herbicide, an occasional clipping may be enough to keep down weed competition.

If you start the seeding with a grain crop, use a variety that's short, early maturing, stiff-strawed, and nonlodging. Sow it thinly to reduce competition, remove it early. Oats is considered to be one of the best cover crops to use.

Plow as far in advance of planting as possible. The seedbed should be fine, firm, and mellow, but don't overwork as this tends to dry out the soil and cause crusting.

Watch planting depth. ¼-1″ is best —shallow on heavy soils, deeper on light soils. Roller-type seeders work best for seeding on trash-free soils. Where crop residues are a problem, a press-wheel drill does a good job of uniform planting. Band seeders that place seed shallow and directly over a fertilizer band also do a good job. If seed is broadcast, follow up with a corrugated roller to insure good coverage.

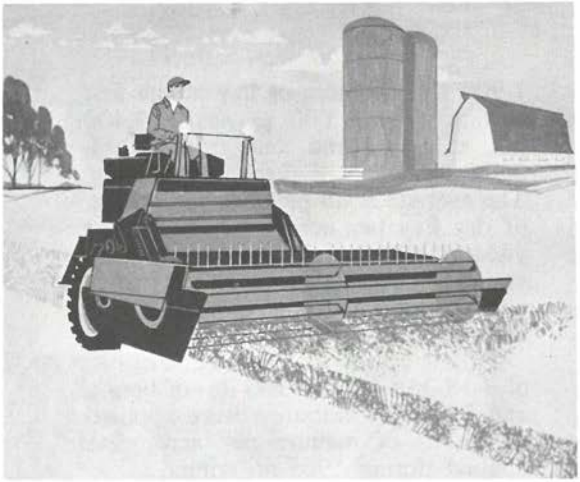
Use a high-quality seed, preferably certified, with high germination and purity. Inoculate the seed with a fresh bacterial culture.

Twelve to 20 lbs. of seed per acre is adequate for proper stands. Yields are not depressed by high plant counts, even under drought conditions, stands thin naturally.

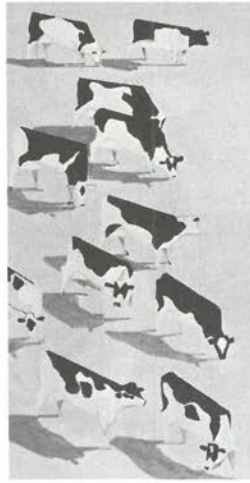
Alfalfa seeding can be done in spring, summer, or fall. Fall seedings need 5 weeks to become established to survive winter.

**5—Early and frequent cutting.** Cutting is based on plant maturity—you cut when the crop is highest in feed value and before field losses due to weather, insects, or lodging can occur.

Make first cutting at early-to-mid-bud stage, then every 35-40 days thereafter. If you farm in the more northern areas you can modify this schedule and make cuttings at the first flower stage instead. These schedules will provide 4 cuttings in most areas. Don't cut alfalfa during that 4-6-week period prior to average date of first killing frost—when plants must rest and build up their root reserves.



**Minimize field losses. Use a system that enables you to harvest without reducing quality or causing field losses.**



**Harvest in late fall if practical. Late season's growth can be harvested as hay, haylage, silage, or as pasture.**

**6—Control insects.** Insects will chew up a lot of alfalfa but they can be controlled with chemicals. You'll need to inspect fields often (at least once a week) and use the recommended insecticides as soon as an infestation is found.

**7—Minimize harvest losses.** This is the payoff. Get the machinery you need to get the crop out of the field and into storage with a minimum of loss. Greatest losses occur when the crop is harvested as dry hay. Cutting as haylage or silage will allow you to recover the crop with little or no loss. Conditioners speed up curing time, cut exposure time, and allow for better scheduling of harvest operations.

**8—Late fall harvest.** In many seasons, a fifth cutting, taken after the fall rejuvenation period, can add another ton or more feed. If it's hard to cure for hay, make into haylage; or graze it.

## THESE FARMERS GROW 10-TON ALFALFA

Donald and Charles Price of Brazil, Indiana, harvested their 4th cutting last October 5, and rang up yields of over 10 tons on 3 trial plots, proving that high forage yields are possible in actual on-the-farm situations. Here's formula:

The field, as described by Don Price, was rolling, with medium to fine-textured surface soil, heavy and well-drained subsoil. It tested medium in phosphate and potash, with a pH of 6.5. Wheat was grown on the field in 1962, alfalfa in '63, and alfalfa followed by sorghum-sudangrass in 1964.

Their preplant preparations consisted of a disking in early March of '65. 400 lbs. of 6-12-18 fertilizers was broadcast and worked in at that time. It was seeded on May 8 without a nurse crop. 2,4-DB was applied at the rate of 2 quarts per acre in 10 gals. of water when the alfalfa was 5-7" tall. Don reported weed control was good.

The Prices were cooperating with a seed company, so the field was divided into 8 9/10-of-an-acre plots. They actually planted 4 formulations: a pure alfalfa; an alfalfa, orchardgrass, timothy blend; an alfalfa, red clover, alsike, orchardgrass, timothy blend; and an alfalfa, Ladino clover, orchardgrass blend, each at 15 and 30 lb. rates.

Three cuttings were made during the seedling year. Yields ranged from 700-

**Early and frequent cutting is one of the factors that make the forage growing system work.**


**The Price brothers proved that 10-ton forage yields are possible with sound management.**

1,900 lbs. per acre of hay at the first cutting, from 1,600 to nearly 3,400 lbs. at the second, and from 1,300-2,400 lbs. per acre at the third cutting. The average of all plots was 5,500 lbs. of dry hay per acre with the highest yield 7,900 lbs. Cuttings were harvested without rain damage and averaged as high as 20% protein and as low as 26% fiber (dry weight basis).

Following the first cutting, 200 lbs. of 0-18-36 fertilizer, 100 lbs. of borax, and 3 tons of limestone were applied. Five tons of manure per acre were applied during 1965-66 winter.

In 1966, all forage was conditioned at cutting and harvested as haylage. The first cutting was made May 25 and yields varied from 4,473 lbs. to 9,342 lbs. per acre (12% moisture basis). Crude protein ranged as high as 22% and fiber between 29 and 32%. The second cutting was made July 9 and yields ranged from 3,837 lbs. to 7,872 lbs. per acre. Protein ranged up to 20%, fiber 26 to 30%.

Soil moisture conditions, Price reported, were adequate for maximum yields through the second cutting but a drought set in just ahead of that cutting and no appreciable rain fell until after the third cutting was made on August 24. Yields at the third cutting ranged from 2,121 lbs. to 2,651 lbs. per acre. Protein tested as high as 23%, fiber content ranged from 25-31%.

The fourth cutting was made October 2 with yields ranging from 1,071 lbs. to 2,283 lbs. per acre.

Both seeding rates of the alfalfa, red clover, alsike, orchardgrass, timothy blend yielded over 10-tons total for the 4 cuttings, as did the alfalfa, Ladino clover, orchardgrass blend at 15 lbs.

The 1966 fertilizer applications consisted of 400 lbs. per acre topdressing with 6-12-18 after the first cutting, an additional 5 tons of manure after second cutting, and 200 lbs. of 0-46-0 and 200 lbs. of 0-0-60 after the third cutting.

**THE END**

FROM PAGE 13—USE THOSE STALKS

expensive but uses lower percentage of stover.

**Harvesting**—storage costs are higher than grazing costs. It requires machinery and feeding facilities, but permits fall plowing and early planting next spring. It decreases risks of crop disease and insect carryover in the stover. It does not require fence or open winter and insures greatest use of roughage.

**BALANCED RATION** is necessary. Fed to dry and pregnant beef cows, the stover is inexpensive and provides energy for maintenance. A mix should be fed free choice. It may also be necessary to supply protein through a protein block or with 4 to 5 pounds of good quality legume hay per day.

Fibrous feeds, such as corn stover, are valuable in maintenance rations since they produce considerable heat during digestion. FIGURE 1 shows how well stover ranks with other forages in percentage TDN.

Iowa work shows beef cows do well on corn stover. Ten cows and ten first-calf heifers successfully wintered on a 40-acre cornstalk field for 112 days. They were supplied a salt-mineral-vitamin A mix free choice and no protein or energy feed. But 3 to 5 bushels of corn per acre was left in the field after harvest. Birth weight of calves was above average and the cows had no calving problems and milked well.

**PLANT FOOD REMOVAL** increases with a silage or stover harvest operation. For example, potash needs may increase 3 to 5 times.
FIGURE 2 shows how the whole plant removes much more nutrients than grain alone. Although fertilizer rate must be increased, the added cost is small beside the added value of the crop.

Stover from one acre of good corn if ensiled will furnish nearly enough roughage to winter a cow from fall to spring pasture. **Two or three acres of stover properly supplemented could**

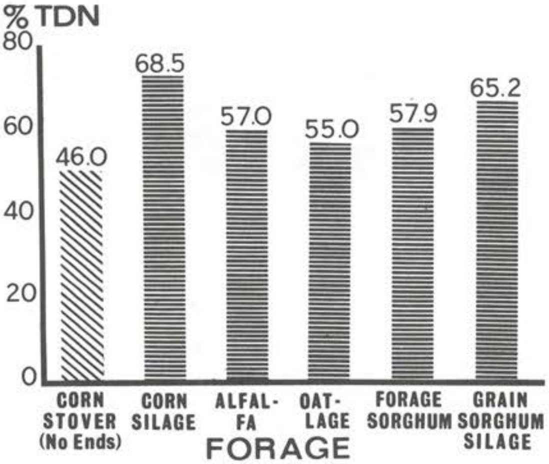



**Figure 1—Stover holds its own in nutritional value-dry weight basis.**

**carry a cow all year.** Of course perennial and annual pastures should be used when available.

Since more than 50 percent of the annual feed cost for beef cows is due to hay and other roughage fed during winter months, stover can **(a) reduce winter feed costs, (b) supplement present supplies and increase the size and number of beef cow herds.**

Even "cash grain" farms might find a place for the beef cow herd to utilize resources more fully and increase farm profit. **THE END**

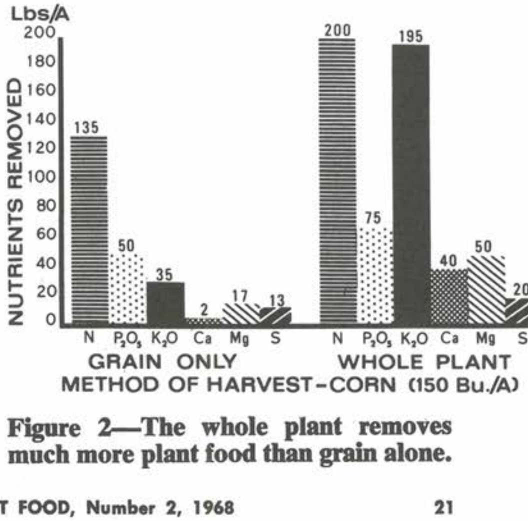



**Figure 2—The whole plant removes much more plant food than grain alone.**

# NO LOOTING

**A BETTER CROPS Magazine interpretation of a success story in Green Mountain Dairying Newsletter, University of Vermont Extension Service, from Essex County Agent, Earl Clark.**

**ON A HOT** summer day, farmer Lee Colby suffered a heart attack and died in 1961.

He left Mrs. Colby with 5 children and 55 tillable acres in Vermont's more rugged hills of Essex County, west of the Connecticut River. The oldest child was 15, the youngest 5.

Lee and Margaret Colby had taken over the Colby family farm of 930 largely untillable acres in 1946.

Now the father was gone. But the Vermont mother and her children wanted to stay together—if they possibly could. They knew farming—its rewards and drudgeries. They knew little of urban life, beyond the daily pills for its multiple tensions featured daily on TV and in newspaper columns.

They felt that farming was the way for them to try to live. They knew it was the only way they could stay together as a family.

Margaret Colby had always helped her husband feed and care for the dairy herd. Maybe—just maybe they could make it, if. . . .

She called her three oldest children about her—Lee, Jr., 15; Calvin, 13; Shannon, 12. The two youngest—Craig, 9, and Brian, 5—were not burdened with the decisions to be made at that juncture in their lives.

In a sense, this family of minds in the green hills of Vermont was a very important Board of Directors meeting to decide which way six lives should try to go now that their Chairman had been taken from them.

Lee, Jr. and Craig would help their mother manage the dairy herd. Shannon, the one daughter among four brothers, would manage much of the household work and help care for the two younger boys.

They had four assets going strong for them: courage, determination, faith, and 26 milking cows averaging 11,930 lbs. milk (433 lbs. fat).

By 1962, two of their cows led the association with 21,540 lbs. milk (816 lbs. fat) and 20,080 lbs. milk (796 lbs. fat). By 1964, they were milking 36 cows, averaging 12,767 lbs. milk (491 lbs. fat).

And by 1966, their herd of 43 milking cows contained the champion of the association. She averaged 23,674 lbs. milk (806 lbs. fat).

**"During the past two years, they**

# HERE

**have bought 100 acres more land and improved 30 acres of it,"** Essex County Agent, Earl Clark, explains.

Last year they built their herd to 50 milkers. And they are now raising 20 two-year-old heifers, 14 yearlings, and 13 calves.

**"In addition,"** Clark emphasizes. **"the boys have cut over 200 cords of pulp. And last fall they were up to their chins in plans to build a freestall barn to house 80 milkers, all but one home-grown."**

The Colby hands have been busy since their father died on that hot July day in 1961.

The Colby minds have also been busy—Lee, Jr. graduating from high school in 1964, Calvin from St. Johnsbury Trade School in 1965. Shannon recently completed her second year at Lyndon State College, Craig his second year at St. Johnsbury, and Brian the 7th grade.

County Agent Clark sums up this study in personal industry with the startling fact that **"they did it all without a single hired hand."**

**THE END**

# LONELY ROAD

**J. R. TURNER, LOS ANGELES**

**HAVE YOU** ever stopped to think how lonely the top farmer usually is—that top 5 percent of the agricultural community? Why is he lonely? Because he is an innovator, always out front setting and breaking new records that demand more than average know-how.

**Others peer across the road or fence to see what "the nut" will try next—or what will happen to the crop or livestock dilemma he seems to be creating for himself.**

His results often shock them. They stumble home mumblin' something about chasing the guy out of the country before he ruins the reputation of long-time farmers. But he doesn't lose his cool. You'll see him on the front row of county and state meetings, at all field days and winter meetings, and on annual tours of his state's experiment station—seeking facts for new goals.

**He works long hours. He figures with pencil and paper. He reads. He thinks. He questions other top farmers, scientists, advisers. He volunteers to conduct demonstrations of new practices. He tells his story for others to benefit—if they will!**

The doubtin' Toms see their superior neighbor make more profits than they do. They join the bandwagon. For a time he has much company. But soon he must move on—to new goals, to new dreams, to be alone out front again, always trying to improve his crop, his livestock, his efficiency, his profit.

**We need more superior farmers—and more pace-setting information to feed their insatiable appetite for progress. They will get pace-setting facts from university and industry advisers—or go where they can get facts for new goals!**

# TURFGRASS

## America's "Growingest" Crop

**R. W. SCHERY, DIRECTOR**
THE LAWN INSTITUTE

**FROM CASUAL** field seed sideline to a top "agricultural" enterprise in a generation—that's the turfgrass industry.

Surveys in many states show planting and care of lawns and other turfgrass acreage today ranks at the top or very near it among all agricultural activities.

Imagine how many Kentucky bluegrass plants are being carefully nutured on the most expensive "cropland" in the nation, the suburban yard. There are literally quadrillions, with something like 100 trillion planted each year—50 million pounds, 2 million seeds to the pound.

For perhaps 90% of the population, this is the crop closest to their lives. The total "outdoor living" market amounts to some 6 or 7 billion dollars annually, based on turfgrass or intimately associated with it. Indeed, turfgrass need take a backseat to no crop, considering both its economic and esthetic importance.

As with agriculture generally, the search goes on for ever higher quality. The scalped lawn of rough grasses, commonplace to my boyhood, today is an eye-sore.

No wonder hundreds of special turfgrass selections have been uncovered or bred, adapted to particular tastes, climates, and growing conditions. No wonder whole new facets of commerce have sprung up dedicated to convenient care of the reigning lawn favorites.

Quality has been pursued along two routes: (1) Genetic selection and (2) better management or specifically designed products. Let's take a quick glance at both.

**THE TURFGRASSES.** The map shows the major climatic turfgrass zones in the United States. Grasses that typify the zones are mainly of the elegant "fine-textured" species as modern seed labeling characterizes them, in contrast to the rough field grasses ("coarse kinds").

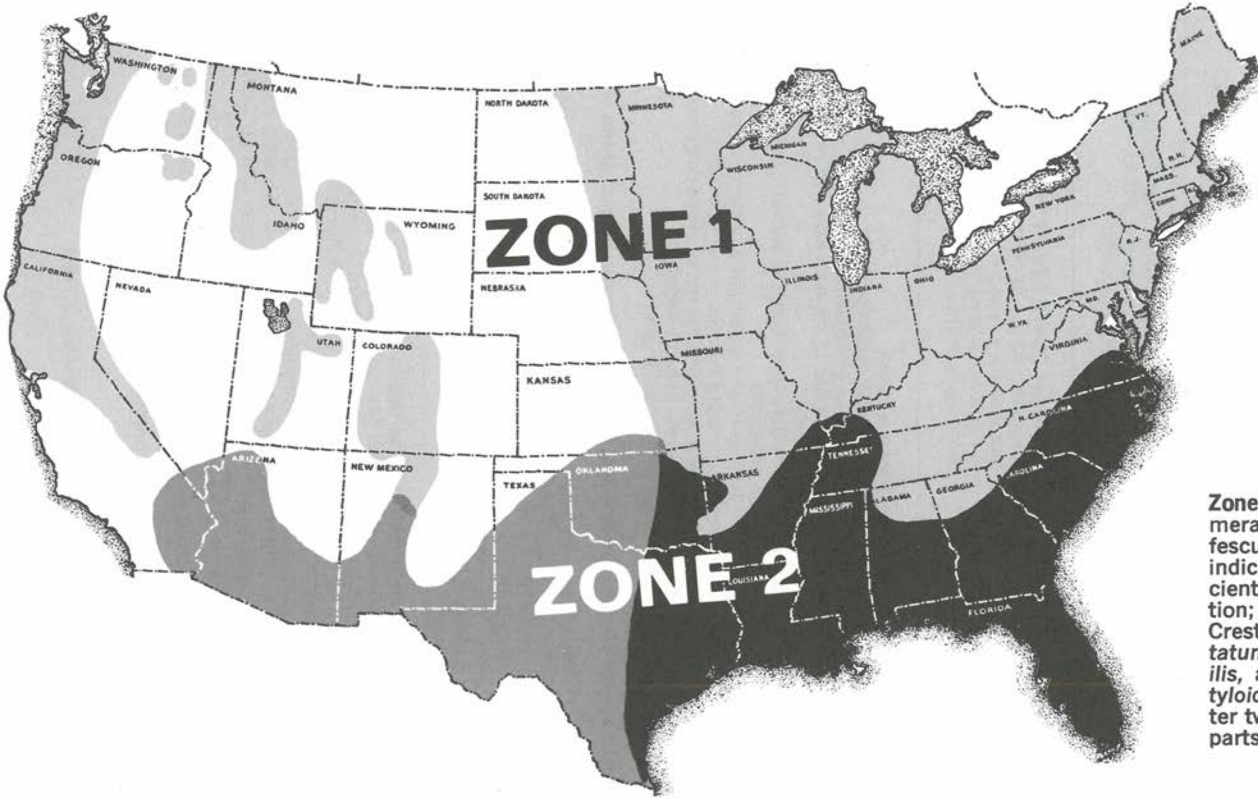
There are so many special selections today that we can no longer epitomize them zone by zone as we did in the American Potash Institute handbook of only a few years ago, "You Can Grow a Good Lawn."

Rather, I have tried to update the listings by a simplified map and separate tables, which at best have room only for cultivars of some general availability. There are scores of additional selections of which commercial seed supplies have not yet been built up. And others are under test at research centers around the nation. Listing does not imply endorsement so much as a reflection of "the current state of the art."

**THE PRODUCTS.** Potentiality for quality comes from choice of grass. Full fruition depends on the care this grass receives. Care can be more laxly dealt with in climatic zones where the grass of choice is perfectly adapted.

Move the variety to a marginal climate, or subject it to stringency, and care assumes vastly greater importance —management must then be tailored precisely to local conditions.

On the map, management becomes an increasing concern where the northern and southern, eastern and western zones merge. It may be easy to grow Kentucky bluegrass in Milwaukee, difficult in Memphis. And, of course, in the desert or semi-arid prairies you




Zone 1—**Northern Grasses,** as enumerated in text (primarily bluegrass, fescue and bent). Lighter shading indicates natural rainfall is insufficient for their survival without irrigation; where watering is not possible Crested Wheatgrass, *Agropyron cristatum;* Bluegrama, *Bouteloua gracilis,* and Buffalograss, *Buchloe dactyloides,* roughly substitute, the latter two mostly in the more southerly parts.

# GRASS ZONE MAP

**Zone 2—Southern Grasses,** as enumerated in text, especially Bermudagrass. Lighter shading as for zone 1, with Lovegrasses, *Eragrostis spp.*, an added dryland possibility.

must irrigate to have fine turfgrass at all.

There is not space to say much about irrigation and mowing, two fundamental concerns. Irrigation should match the soil. And too little is better than too much.

Except for trailing species such as the bentgrasses and bermudas, or especially low-growing varieties such as Fylking Kentucky bluegrass, high mowing usually benefits the grass, especially in difficult climates and under such adversities as shade, shallow soil, and seasonal diseases.

**THE END**

## ZONE 1

### Kentucky Bluegrass, Poa pratensis

| | |
|---|---|
| "Wild" types or mixed populations with broad genetic base | Natural (Kenblue, South Dakota), "Common"; Arboretum, Cougar, Park. |
| Selections similar to natural, often with improved vigor, color, etc. | Arista, Campus, Delta, Delft, Fjord, Geary, Newport (C-1), Nudward, Prato, Primo, Silverblue, Windsor, etc. |
| Selections for specific purposes, especially low-growth and disease-resistance, often for sod-growing. | Anheuser Dwarf, Belturf, Fylking, Merion, Pennstar, Sodco (a composite), Warren's sod numbers (such as A-10, A-20, A-34); various experimentals not yet released or thoroughly tested (viz. Alaskan Nugget). |

### Fine Fescues, Festuca rubra

| | |
|---|---|
| Chewings | Tufted variety originally from New Zealand. |
| Cascade Chewings | Newer Oregon selection out of Chewings. |
| Creeping Red | Unselected, more susceptible to disease and summer loss. |
| Golfrood | Salt tolerant Dutch variety. |
| Highlight | Dense, attractive selection from Europe, winter hardy. |
| Illahee | Oregon workhorse selection. |
| Jamestown | New dark-green Rhode Island selection from a seaside location. |
| Oasis | European selection seeming to endure summer well. |
| Pennlawn | Cross of three Pennsylvania selections, disease resistant. |
| Rainier | Similar to other improved Oregon varieties. |
| Ruby | Bright selection of European origin. |

**Prominent Bentgrasses, Agrostis spp., from seed. (There are scores of golf green varieties planted vegetatively).**

| | |
|---|---|
| Highland colonial | Workhorse, economical for overseeding. |
| Astoria colonial | Much like Highland but supplies not as reliable. |
| Exeter colonial | A colonial type selected in Rhode Island. |
| Holfior colonial | European with less spreading tendencies. |
| Kingstown velvet | Very fine textured and harder to manage than colonials. |
| Penncross creeping | Excellent for golf greens; proven, more disease resistant than Seaside. |

**Zone 1—Important Turfgrasses.** In southern reaches, types with broad genetic base may be preferred, often persisting better in partial shade. Tall Fescue, **Festuca arundinacea** (Kentucky-31 is the most used variety), a coarse grass, is often planted in border states in spite of poor looks because of ruggedness in difficult sites. Possibly useful also is **Agrostis alba,** Redtop, usually as a nurse species or for damp, poor-soil locations; **Lolium,** Ryegrass, the annual **L. multiflorum** only in small percentage as a nurse, the perennial **L. perrene** (in special varieties such as Brabautia Manhattan, NK-100, Norlea, Pelo) as a minor component of blends especially in coastal environments; Rough Bluegrass, **Poa trivialis,** for damp shade; clover, **Trifolium repens,** if a permanent legume is desired, Korean Lespedeza, **L. stipulacea,** if only summer cover is needed sure not to be competitive with autumn bluegrass plantings; seeded Bermuda, **Cynodon dactylon**, for summer cover, in southern portions hardy Bermuda in varieties such as U-3 Tufcote and Sunturf **(C. magennesii)** vegetatively planted where poor winter color and short season not of consequence; ibid. Meyer Zoysia, **Z. matrella (japonica).**

## ZONE 2

| Types | Adaptation | Care | Representative Varieties |
|---|---|---|---|
| **Bahiagrass, Paspalum notatum** | For the deep South, especially useful for utility lawns that can receive only average care; colonizes sandy coastal soils well. Fairly coarse, establishing economically from seed. | No special problems, although its loose growth permits weed encroachment when mowed close. Does not need a great deal of fertility, and usually not pesticide treatment. Tolerant to 2, 4-D weed killers, but not to arsonate crabgrass killers. | Pensacola is a smooth variety; Argentine and Paraguay are more hairy and often slightly coarser. These are the only varieties currently practical for turf. |
| **The Bermudagrasses, Cynodon sp.** | Fast-growing, spreading by rhizome and stolon, not true to type from seed. Seeded bermuda is widely used in the upper South, vegetative varieties (finer textured) for golf greens and other specialty turfs throughout the South. | Requires a high level of maintenance, with generous fertilization and frequent mowing much like bentgrass. Will not stand shade. Quite tolerant of the usual herbicides. | There are many vegetative selections of which Tif-green and Tifdwarf hybrids are well known for golf greens. Sunturf, Tufcote, and U-3 are fairly cold-hardy for middle latitudes. Scores of other selections but, of course, no named varieties from seed. Santa Ana for Southwest and smog. |
| Centipede, Eremochloa ophiuroides | A "poor soil" grass, especially in the upper coastal plain, tolerating shade reasonably well, but temperamental about soil and fertility conditions. | Survives and even thrives under low maintenance, but usually resents alkalinity. Phenoxy herbicides should be used with care, and arsonate weed killers avoided. Live starts can receive Simazine-type weed prevention. | OKlawn is the only named variety; the grass is propagated either by live starts or from seed. |
| **St. Augustine, Stenotaphrum secundatum** | Much used in the deep South, noted for shade tolerance. More recently afflicted with chinchbug and many diseases. Inexpensive. | Becoming costly to care for, requiring frequent preventive sprays, especially for chinchbug in Florida and along the Gulf. Can't stand arsonates and phenoxy herbicides, but tolerant of Simazine (new sprigging). | Not available as seed, Floratine, Bitter Blue, and a few new varieties becoming available. |
| **Zoysia, Z. matrella** | A widely tolerant group, some varieties winter-hardy in the North, but mainly used throughout the South for better quality turfs that can receive moderate attention. Very slow growing. | Maintenance is not onerous, but mowing is difficult (requiring heavy-duty equipment). Occasional thinning helpful. Tolerates usual lawn pesticides; weeds are serious only with new plantings (tight sod takes 2-3 years). Billbug in Florida. | Varieties do not come true to type from seed, so all seeded zoysias are regarded as "japonica." Meyer is a hardy vegetative "japonica" for middle latitudes. There are many local selections of the finer-textured "matrella" sort, and the hybrid Emerald is "matrella" X "tenuifolia." |

**Zone 2—Important Turfgrasses.** In the Upper South, Bermuda is perhaps best adapted, although Zoysia is reliable but slow. Others are mainly used in the Deep South, as may be certain clovers and lespedezas where a legume is wanted, and Dichondra in the Southwest.

# SERVE As Well As KNOWLEDGE SELL The Farmer

**J. FIELDING REED**
PRESIDENT
AMERICAN POTASH INSTITUTE

**FROM AN ADDRESS TO THE FERTILIZER INDUSTRY**

**THE FARMER** is the world's most versatile customer—and a real challenge to the average fertilizer sales team.

The biggest mistake a fertilizer representative can make is to stump his toe on the idea that the farmer is a hayseed living on heavy doses of early morning radio fiddlin' and philosophizin' that belittle more than they entertain.

Anyone with that idea had better take another look—today. He'll see that today's farmer is a remarkable creation:

Businessman, scientist, engineer, personnel manager, budget director, and a truly great philosopher—when he installs irrigation to save an expensive crop only to have soaking rains flood its rows the morning after.

No ordinary man can mass-produce quality food in the face of insects, diseases, droughts, rains, weeds, winds, poor soil, low stands, etc. But the American farmer can do it.

No one-gallus Elmer can schedule a corn seed to burst out of the soil the morning after the last spring frost. But many American farmers do it

No clodhopper can repair a tractor transmission one day, build a new fence another, operate a corn harvester another, audit financial records another, and take scientifically sound soil samples another. But many American farmers do such things time after time.

And by sundown today, each one of them will have fed himself and nearly 40 other Americans. Proud to be selling him your product? You should be. And you should SERVE him as eagerly as you SELL him.

How?

A plant food sales team can serve the farmer right up to his topmost harvest:

**1—Basic Services**—To provide grade requested, type of material (granular, uniform, etc.), solid or liquid, and custom spreading for the grower.

Most firms stop with these services. But some offer additional services.

**2—Diagnostic Services**—To provide field observations during the previous

## ENERGY

## FAITH

year . . . then soil sampling, soil testing, tissue testing, plant analysis, and a full diagnostic approach—the works.

**3—Other Chemical Services**—To advise on such matters as herbicides and insecticides.

Finally there is another service that puts you on the farmer's team— to sweat it out with him! We might call this:

**4—Money-Maker Services**—To shoot for yields that will put customers in the top 10% of growers in their area . . . to use more than barely enough . . . to plan off-season fertilization . . . to try narrow rows . . . to make a go of it.

Does your company go beyond Service 1? You'd be surprised how few producers are willing to go into Services 2, 3, and 4. I rode all over one southern state last December—in beautiful weather, through flat fields, and I didn't see a single spreader applying one pound of fertilizer in the state.

"It won't work."

Who says it won't work? It works in Minnesota, where 1,000 people turned out in below zero weather to hear the year-round fertility idea discussed in a plant food association meeting.

One dealer said he had been out with four spreaders the week before putting fertilizer on in the snow. He welcomed below zero weather because it gave him a chance to get out in the fields with his spreaders.

The industry in other areas is getting this Minnesota spirit. They must have knowledge, energy, faith. But, above all, they must help the farmer make a **profit.** This means fighting for him in the political-economic struggle, where today's farmer is taking a terrific beating.

It costs 5 cents to mail a "penny" postcard today, at the same time that the farmer gets less for chickens, orange juice, potatoes, corn, hay, and cabbages than he did 40 years ago.

After the President's National Advisory Committee on Food and Fiber said the U. S. has too much invested in agriculture, they predicted we will need 30% fewer farm manhours in 1980. They're probably right. But why?

In 1920 one farmer produced enough to feed only 8 people. Today he produces enough for nearly 40 people. And in the past 7 years, his productive capacity has increased 25%, far outstripping the productivity increase in factories.

To serve your farm customer you must **know** his problems and **fight** for his interests. He must make a fair profit. If he doesn't, he won't survive and neither will the industries serving him.

Service is the key. But service goes beyond fancy slogans and catchy gimmicks, beyond soil testing and custom spreading.

It means getting on the team with your farm customer and sweating out every crisis with him. Those who believe the farmer's profits are no concern of the fertilizer industry are like a baseball catcher without a mitt. They may last two or three fast balls behind the plate, but no longer.

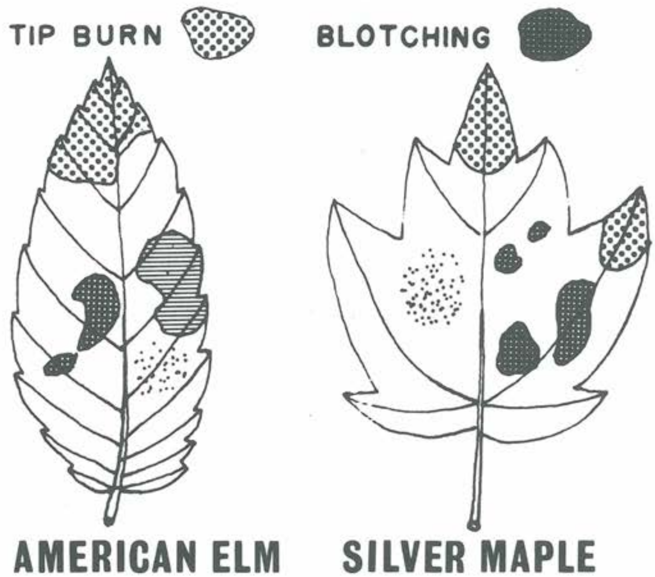
The farmer's prosperity affects every dime in every industry serving him. To serve him better is to serve industry and all America better.

**THE END**

**FIGURE 1**

**POTASH HUNGER SIGNS**

**ON LOWER LEAVES**




# DIAGNOSE K

**BY EDWARD SUCOFF**

**GREENHOUSE** experiments and field samplings were used to help diagnose potassium (K) deficiency in American elm, silver maple, Russian olive, hackberry, and box elder, five species important in shelterbelt and shade tree plantings.

Deficiency symptoms were produced by growing one-year-old seedlings of the 5 species in nutrient solutions. Seedlings that had recently broken dormancy were grown at all possible combinations of +K and −K (310 and 0 ppm), +Na and −Na (180 and 0 ppm), with all other elements supplied in sufficient quantities. The pH was kept between 4.0 and 6.0. The seedlings were harvested after 38 days when growth of −K plants had almost ceased.

The leaves were divided into "old" and "young" leaves. The "old" leaves had reached ¾ or more of final size. They were always from the lower ⅔ of the plant. After description, the plants were weighed and measured and the leaves analyzed for Na and K.

**K HUNGER SIGNS** clearly appeared with the −K treatment. All species showed leaf symptoms developing these ways:

1—Four days after treatment, edges of the older leaves began to fade and brown.

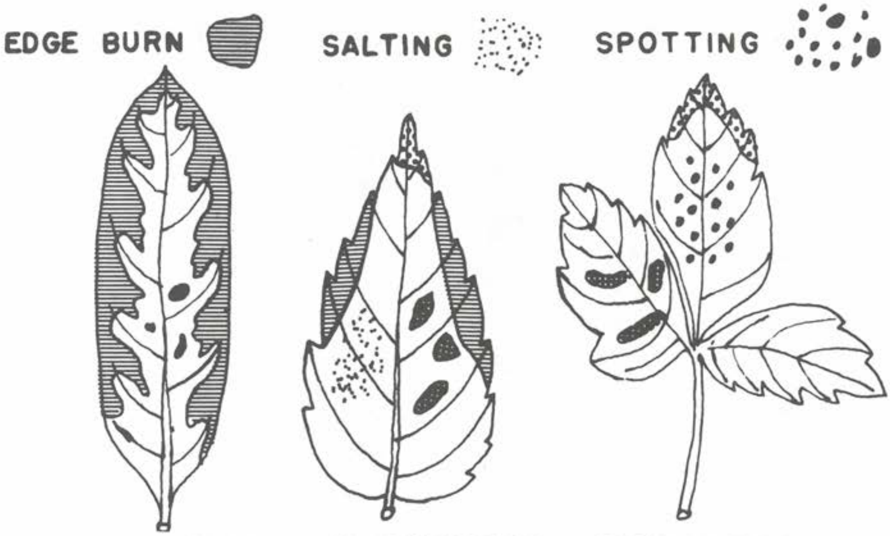
2—Eight to ten days later growth differences became clear as young leaves on many plants started to pale.

3—During the next three weeks before harvest, the older leaves of −K plants developed edge burn, edge fade, leaf curling, salting, and blotching, the patterns varying with species—shown in **FIGURE 1.** Also, the immature leaves of many plants developed a distinct interveinal chlorosis of the type associated with iron (Fe) deficiency in other species.

Differences in height, dry weight, and leaf size between +K and −K plants were apparent soon after starting—shown in **FIGURE 2.**

Table 1 gives K concentrations associated with poor height and leaf dis-

[1] University of Minnesota, School of Forestry, St. Paul, Minnesota. Published as Minnesota Agricultural Experiment Station Journal Series No. 6273. A more detailed presentation may be found in a paper with the same title published in Forest Science (1965) 11:349-352.




# HUNGER IN 5 TREE SPECIES

AND DONALD PERALA[1] UNIVERSITY OF MINNESOTA

colorations for the five species in this study. The breaking point between deficiency and sufficiency falls somewhere between high values given for deficient plants and low values given for normal plants. Somewhere in this range, growth might decline without deficiency signs showing on the leaves, a condition sometimes called "hidden hunger."

Concentration of K associated with deficiency is consistent among all species but hackberry. This shade tree, resembling American elm and considered

**Table 1. Range of K concentrations (percent dry weight) in old and young leaves from seedlings showing leaf K symptoms.**

| SPECIES | OLD LEAVES | | YOUNG LEAVES | |
|---|---|---|---|---|
| | Deficient | Normal | Deficient | Normal |
| | %K | %K | %K | %K |
| American elm | .06–.70[a] | 1.2–2.4 | .09–1.55[a] | 2.2–3.2 |
| Silver maple | .30–.72 | 1.4–3.9 | .25–.95 | 1.6–2.9 |
| Russian olive | .12–.62 | 1.4–4.0 | .32–.82 | 1.2–2.9 |
| Hackberry | .02–.06 | .6– .9 | .08–.15 | 1.2–1.5 |
| Box elder | .49–.51 | 3.1–3.2 | .56–.69 | 2.6–2.9 |

[a] Second highest figure was .20 for old leaves and .46 for young leaves.

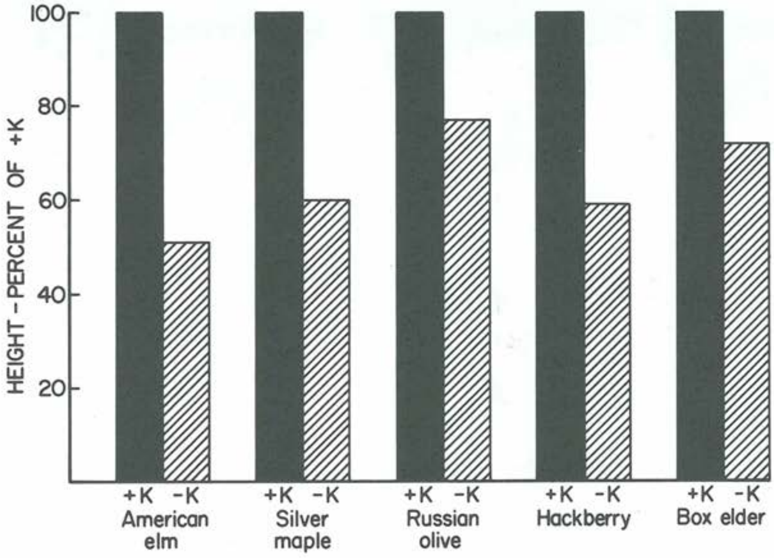



**FIGURE 2 shows potassium in action on plant growth.**

one of its replacements, appears to require less K.

Sodium concentrations in the solution or in the leaf did not affect K deficiency symptoms or leaf concentrations. But sodium added to the solution did increase growth of both +K and −K Russian olives.

In summary, the five species showed distinct leaf symptoms and grew less without K. Both reduced growth and leaf symptoms were associated with definite low levels of leaf K. Sodium did not affect this relation.

**UNUSUAL K. SYMPTOMS**—The first experiment on unusual K symptoms compared symptoms of high pH-induced chlorosis with signs on −K plants. American elm seedlings were grown on 75 ppm phosphorus (P) and 310 ppm K, with pH 6.4 to 7.8.

The terminal leaves developed an interveinal chlorosis like the one on −K plants. The chlorotic areas on these high pH, +K plants greened when spotted with iron.

In the Second Experiment, elm seedlings were grown in nutrient solution at all possible combinations of 0 and 310 ppm K and 1, 22, and 75 ppm P with pH kept between 3.8 and 4.3. Terminal chlorosis developed only on −K plants grown at the higher two levels of P. Spotting the chlorotic leaves with Fe chelates and/or K did not cause greening.

Earlier reports on birch and potato noted terminal chloroses with low K and high P supplies. Low concentrations of Fe were found in the chlorotic leaves, suggesting low K increased P concentration which immobilized Fe in the plant.

These reports also suggested K increased efficiency with which Fe was used. While our results also show higher leaf P at low K supply, they show enough overlap in P concentration between the chlorotic −K elms and the green +K elms to suggest a more complex origin to the chlorosis—that is, failure of −K chlorotic plants to respond to spotting may mean iron is not involved.

The Third Experiment examined whether terminal chlorosis induced by K hunger was a field phenomenon. Samples with terminal chlorosis were collected from mature American elm, cottonwood, box elder, and green ash trees in Minnesota's Red River Valley.

Analysis of older leaves showed no clear differences in K concentration between trees with yellow and green leaves. For American elm, the most heavily sampled species, K concentrations in older leaves of plants with interveinal chlorosis ranged from 0.53 to 3.25% with most values exceeding 1.15%.

**THE END**

## A SERVANT THE MASTERS COULD NOT DO WITHOUT

**JOURNALISM,** like agronomy, has its share of nervous-tongued ambitionists. They float from one conference to another, shedding "publicity themes" with currently catchy titles. The themes seem fresh around a conference table. But when working writers probe them for substance, melting tinsel exposes arthritic roots.

In a Madison, Wisconsin nursing home, American agriculture recently lost a journalist who never sired "publicity themes" from arthritic roots. But he did help create a junior section of 4-H work which he called Future Farmers before the title was hatched in Virginia.

For 35 years Elwood R. McIntyre wrote the "Jeff McDermid" column for BETTER CROPS magazine. In this venture alone, he created nearly 1,000,000 words—of information, of entertainment, of some wisdom and hope—attracting responses from many states and nations around the world.

Mr. Mac called himself "a small town product, a high school graduate only" with some university courses under his hat. He had natural writing talent spurred by a gnawing modesty that kept him polishing his skill for a half century. He called himself a "steady member" of AAEA (American Agricultural Editors Association) since almost its beginning, though he never held an office in the group.

"My community contacts and contributions were few . . . I usually cooperated but was not a civic leader," he once explained. "I'm not able to say that people profited by work I have done. But I hope they did."

Veteran editors will tell you many people did profit from Elwood McIntyre's life. They profited when he produced the first press releases on the McCollum vitamins in the early 1900's, as assistant in Wisconsin University's pioneer agricultural journalism department.

They profited when he dug his editorial teeth into the bovine TB test battle of that era, plugging the tests stubbornly in a day when science and politics could get all mixed up to threaten a man's career.

They benefitted from his editorial efforts to build harmony among Wisconsin's scrapping farm groups of the mid-20's. This led to the Council of Agriculture now promoting all agri-business through 100 member groups.

They profited from his early columns and cartoons in the **Wisconsin State Journal** of Madison, from his work as editor of the **Wisconsin Agriculturist** and associate editor of **Wallace's Farmer**. They gained from his speech writing for Henry Wallace in the AAA days and from his farm relations work at USDA.

They benefited from the official history he wrote of Wisconsin Extension in his twilight years. Perhaps the largest profits went to agricultural scientists, a dedicated breed who could spend a happy lifetime lecturing and impressing each other without 1% of the world understanding what they were doing or why.

To such scientific masters, Elwood McIntyre was a simple servant. His job was to lift their high-toned research from technically exclusive plots, sometimes jealously nursed, and serve it to working farmers in a language they could use to feed a growing nation.

Ironically, the masters needed the servant far more than the servant needed the masters. The American Potash Institute will miss him, too.

—s.m.

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