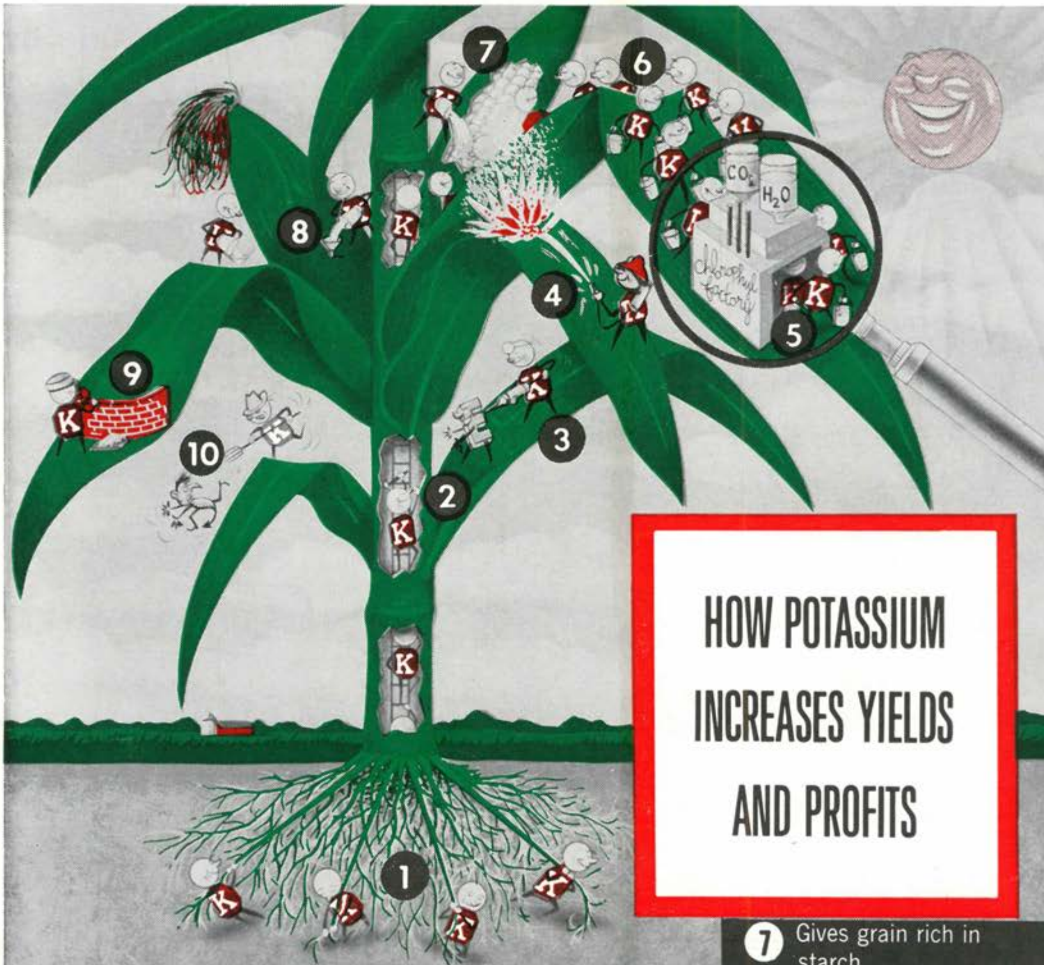
Better Crops WITH PLANT FOOD

January-February, 1964 20 Cents



HOW POTASSIUM INCREASES YIELDS AND PROFITS

1. Increases root growth and improves drought resistance
2. Builds cellulose and reduces lodging
3. Aids many enzyme actions
4. Reduces respiration, preventing energy losses
5. Aids in photosynthesis and food formation
6. Helps translocation of sugars and starch
7. Gives grain rich in starch
8. Increases protein content of plants
9. Maintains turgor; reduces water loss and wilting
10. Helps retard diseases

Better Crops WITH PLANT FOOD

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

Vol. XLVIII Washington, D. C. No. 1

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

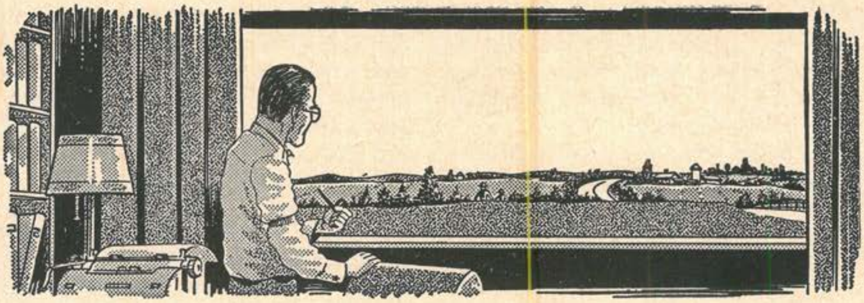
Published by

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

CONTENTS

ON THE COVER

. . . we see potassium (K) at work in plant life—in this case a corn plant. Have you ever thought how these physiological processes—photosynthesis, enzyme action, protein building, respiration, etc.—compare to the operation of the family auto? Recent Potash News Letters (Eastern and Southern Regions) draw this vivid analogy to explain the role K plays in plant life. Order a sample copy from the coupon on page 19.



History—or anything to do with the past—seems to bore many agricultural scientists. They consider themselves too hot on the trail of tomorrow to be concerned with yesterday. This is interesting, since the record shows that all people indifferent to history are doomed to repeat it. Is this generation an exception? If it is, it will be the first. In the meantime, Jeff cracks the door on some pitfalls he faced while writing the official history of Wisconsin Extension which he was commissioned to do.

—the editor

If you have stamina . . .

Do An Extension History

By Jeff McDermid
(Elwood R. McIntyre)

The idea that reporting years of current events fits anyone to do some scholarly historical job is a booby trap.

This you must understand before friendly flattery makes you agree to write a history of your college, your lodge, your business, your town, or your church.

Pause and take mental inventory of your experience, memory, and endurance.

Such a task demands a person who is somewhat sophisticated, deaf to critics, ready for disillusionment, and willing to pore over fine print in reference books, old transactions, newspaper files, and faded correspondence.

You will be lucky if you are not too much bothered with details and avoid tempters who insist that your work must recite the *complete* story—*concerning the part played by them at any rate.*

An author who dwells overlong on such matters may need sleeping pills to keep fit enough to function.

Retired writers are usually in an exposed spot in historical lore. They have less excuse for taking things easy as the grind proceeds. Also, the virus of verbosity gnaws hard at a retired man's exposed ego. As a community elder, you are supposed to have more idle time to dig into research.

They often expect you to do most of the masterpiece from memory. Weren't you a pen pal of the old-timers who lived through the eras when all were young and hopes were high.

Kindly meant as these beliefs of the

"history committee" are, they can sink you into quicksands of redundancy, chummy notes, and dried up anecdotes, as well as needless droves of figures to get askew.

To begin with, you face a General Advisory Committee, appointed by the town chairman or mayor, the king-pin of your lodge, or the dean of your college.

These persons often fail you. Many of them think of current affairs and future problems—not things of the past. They vote for a book or circular about the style and size of something mislaid and nearly forgotten. They have weird ideas about the pictures needed in such a book.

They end the planning session by washing their hands—to rid them of a too-generous use of printer's ink that could run into excessive expenditures, unless buyers cheerfully subscribed.

And then a minority report always comes to the author from some ultra-modern authority. He questions whether we should spend valuable time and funds over the embalmed dead past. Why follow some mordant outline plan, for example, like confining an essay on advances in transportation to the ox cart, the palanquin, and the one-horse shay?

Procedure in historical writing is fairly easy to come by. Several books on dissertation writing are helpful—if you don't try to follow all the instructions they contain.

And if you have a real tolerant history professor to consult, your future looks bright. But you must not rely on him completely when he is surrounded with importunate students, from freshmen to graduate doctors.

Before pounding out the first page of your yarn, you must bury yourself in the subject and steep your creative mind in the text—experts advise. This helps you interpret things, but it never prevents you from *losing* things—this being the worst that can befall you. To mislay notes is the bane of historical ventures.

In my first attempt, I bought four or five sizes of bristol index cards, several reams of copy paper, and built a shoddy reference file out of a cardboard shoe box. These I toted to my indulgent professor and laid the armful on his cluttered desk.

He was just catching up on some blue books. When he saw me, his usual calm vanished. He said I seemed to be tightly manacled to materials and almost lost in a litter.

"Use reasons and conviction secured from extensive reading," he prescribed.

I was told to get some personal notes and quotes to support my thesis and underwrite my conclusions. But here again we hit trouble. No two or three living persons would come to my terms, with all their firsthand knowledge of what action was taken, and why.

Of course, I could not treat them as freely as I did the deceased persons—unlikely to rise and refute me. But when the present spokesmen actually disagreed with the dead, I really began to taste the rancid gall of frustration.

Maybe it was then up to the author—up to me—to do as I pleased. Being a retiree, I could hide out until the book's worst mistakes and disagreements were forgiven.

At last, the final line is tapped out. With doubt, you scan some of your sketches of by-gone friends, coaxed to ride again in a *Cooperative Extension History*.

Yet, how dull and inadequately they seem when transplanted to your book. How far short of the glowing enthusiasm these fellows brought to farmers they had visited. How eager they were 50 years ago to help a new daring educational institution to establish warm, purposeful connections with all that was truly rural.

How hard the task becomes—even for an old acquaintance—to focus the camera of memory on those tanned, rugged faces in a way that will make the younger generation say: "Yes, we have felt we really knew them."

Difficult because these early workers were human characters—ready to teach or tussel, smile or scrap.

Many of these incidents and observations lie as letters in the archives, where the best formative seeds of history are taken out and treated for sowing.

History is a fabric of endless threads. So, one who writes it should mention materials used. The history writer should not forget that in these threads of the past he has acted as a weaver only, and not as a spinner as well.

In that way, readers can judge the quality of the material—whether it is long-fibered wool or merely shoddy.

Not to know when to stop and what to leave out are the common failures of authors. I'll practice what I preach right now.

THE END

Sideline Income

Horse boarding is bringing in income for a few Forsyth County, North Carolina, citizens, according to John W. Etchison, assistant agricultural extension agent.

Several people are running stables for a major portion of their income.

"We also have some farmers who are considering this for a sideline for extra income," Etchison said, noting the interest in horses in the county.

One dairyman in the Lewisville community is planning to provide space for six horses. He figures that the returns per hour of work will be much better than his hourly income from the dairy.

N.C. Ext. News

FISH and HORSE . . . or MODERN CORN METHODS

BY W. L. COLVILLE

Corn production is no longer geared to the fish and the horse. Days of fish fertilizer and horse-fitted tillage tools are gone.

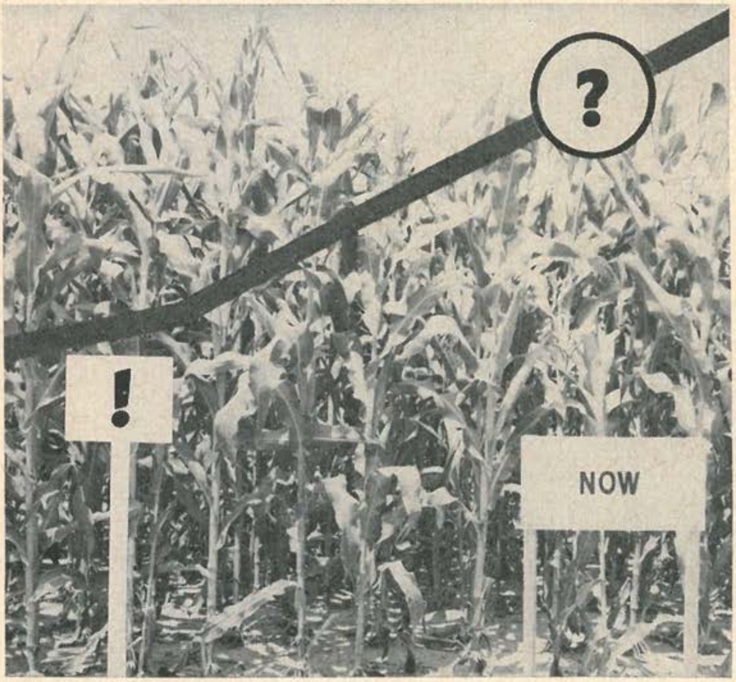
But many remnants of the past seem to linger. Are wide row spacings (40-42 inches) fact or fancy? Are 200 bushel yields considered possible only at bankrupting costs?

The corn producer cannot stay with the 70-80 bushel yields. He must think and plan for 125 to 200 bushels per acre, if he wants to stay in the game.

Modern agriculture is complex because all production aspects must be balanced to get maximum yields and returns.

IS A CORNFIELD A FIELD OF CORN?

No! A cornfield is a biological community with its *Zea* maize plants, its insects, weeds, diseases, birds, animals, micro and macro climates, and its soil nutrients, water and microflora.



What next . . . 300, 400, 500-bushel corn?

Can data from experiments yielding 75, 100, or 125 bu/A apply to areas where yield potentials exceed 150 bu/A?

How Far Along Have YOU Come?

NEBRASKA UNIVERSITY

Of course, *MAN* is right in the middle where he can control many of these interlacing factors. *His management can determine his profit or loss.*

Man, his thinking mind and his agricultural research, has contributed greatly to increasing our per acre production:

1 Research has provided chemicals to assist in weed, insect, and disease control.

2 Low cost chemical fertilizers have replaced the fish.

3 Cross and 4 cultivations per season have been largely eliminated by herbicides and/or timely rotary hoeing.

4 Tractors are drawing 4 to 12 row equipment across our fields 5 to 10 times faster than Old Dan could.

And Dan, not us, needed the 40 inches between the rows to get his behind from one end of the field to the other—didn't he?

Likewise, research has given us a wealth of genetic material for new hybrid combinations. Hybrids are now built for specific sets of conditions.

New innovations in mechanized

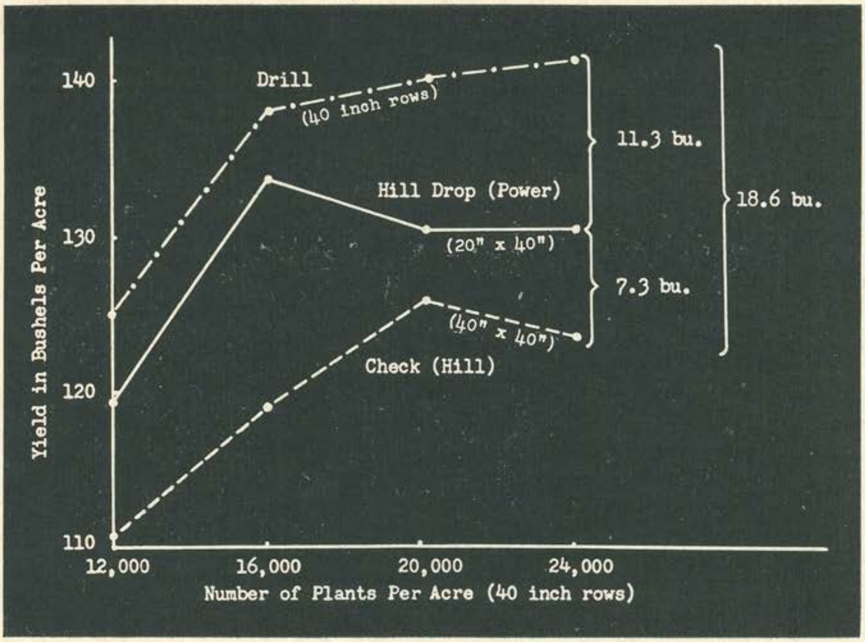


Figure 1—Planting method and population influence grain yields on five irrigated corn experiments. 1958-60.

agriculture, allowing fewer tillage operations, and new types of cultural practices enter the corn community constantly.

Producers have even learned to bend the environment to their desires: through plant spacing and numbers, plant nutrients, planting date, hybrid selection, species variety, irrigation, etc.

When farmers on the western fringe of the cornbelt went from "dryland" to irrigated agriculture, many took with them the practices of yesterday: too-low plant populations and fertilizer rates.

The grower was working in a totally unfamiliar corn community, with problems not unlike those in the more humid east.

POPULATION & METHOD IMPORTANT

8,000; 16,000; 24,000 plants per acre?

Drilled, hill-dropped, or checked?

Figure 1 shows how plant population and planting method influence corn yields.

Seeding rates that end, after 15-20% fatality, with 16 to 20,000 plants per acre generally result in maximum yields of an adapted full season hybrid.

Other research has shown early maturing hybrids can be planted at higher plant populations than hybrids requiring nearly the full season for maturity.

Nebraska irrigated tests show that grain yields in drilled plots (evenly

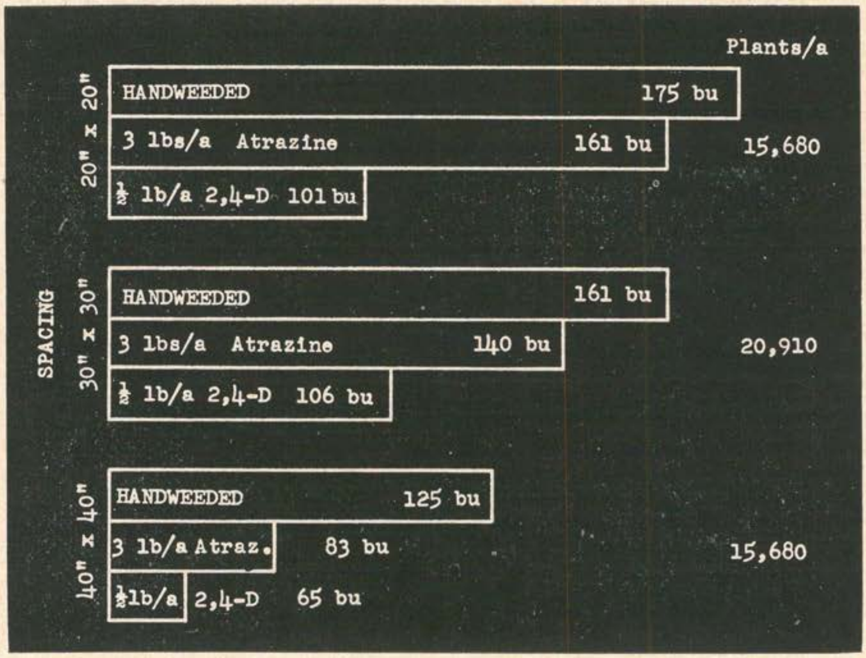


Figure 2—Equidistant spacing and weed control treatments influence grain yields of irrigated corn. Footnote with Table 1 gives further facts.)

spaced in 40" rows) were increased 18.6 bu/A. over checked (40x40 inches) and 7.3 bu/A. over hill-dropped (20x40 inches) planting methods.

Yield advantage of drilled corn was largely due to fewer barren plants, and at the lower populations, by a greater number of double eared plants.

Lodging and broken plants were greatest in the higher populations and also in drilled plantings. The lack of mutual support found in a hill and the presentation of a solid barrier of taller corn caused lodging increases found in drilled corn.

Despite these disadvantages, drilled corn consistently produced more corn than the checked and hill-dropped populations. When all ears that could have been conceivably lost in mechanical picking were discounted, the above yield relationships were not appreciably changed.

ROW SPACINGS

20-, 30-, or 40-inch?

Corn row spacings have stimulated many a debate. Narrow rows (20 to 30 inch) have been fine for soybeans and sorghum—but corn seems hitched to the horse.

Most corn research shows a yield advantage to narrower rows. The degree depends on hybrid, nutrient supply, and environmental factors.

Narrower rows have shown surprising results in irrigated Nebraska tests. Figure 2 shows this. The mythical lid of 125 bushels per acre from 15,680 plants checked (40x40

HOW EQUIDISTANT SPACING AND WEED CONTROL TREATMENTS AFFECTED WEEDS IN IRRIGATED CORN STANDS. NEBRASKA, 1961–62

Within-row between hill spacings	Plants [1] per hill	Pounds of oven-dry weeds per acre: Hand-[2] weeded	Atrazine [3] 3 lbs/A.	2, 4–D [4] ½ lb/A.
in.				
20	1	55	1280	4210
30	3	60	1640	3100
40	4	205	4295	4590

[1] Plants per acre 20″—1 = 15,680; 30″—3 = 20,910; 40″—4 = 15,680.
[2] Hand-weeded = hoed until between-row areas of the 40-inch rows were shaded.
[3] Atrazine, 3 lbs/A. applied pre-emergence as a broadcast treatment.
[4] 2, 4–D amine at ½ lb/A. applied when corn was 1 foot tall and no further weed control.

inches) was at least sprung with yields of 175 bushels per acre when equal populations were planted in 20-inch spacings. The 30-inch spacings, at slightly higher population, got 161 bushels per acre.

The number of barren plants increase when plants are crowded together in wider row spacings. In the 20-inch spacing, 99% of the plants bore ears; 79% in the 30-inch spacing; 74% in the 40-inch spacing.

The second factor contributing to higher yields in 20-inch spacings was a 0.75 lb. ear—to about 0.10 lb. more weight per ear than the 30- and 40-inch spacings.

NARROW ROWS FIGHT WEEDS

Narrow row spacings contributed to the biological control of weeds. By shading the area between the row some 3 weeks earlier, 20-inch spacings held weed growth in check until late in the season.

With 3 lbs. of atrazine per acre, the 20- and 30-inch spacings maintained relatively high yield levels. But light penetration in the 40 inch spacings prevented much weed control.

Despite obvious yield advantage for 20-inch rows, few producers are probably equipped to make this shift. Such a shift is possible. Harvesting equipment and irrigation are the largest unsolved problems. There are more.

Twenty-eight to 30-inch row spacings are possible since most planting and cultivating equipment can be modified to handle these widths, with little or no cost. Current population recommendations for full season hybrids would stay at 16 to 20,000 plants per acre regardless of row spacings.

Why use one set of equipment for soybeans and sorghum and another for corn? It doesn't make sense when properly planted 30-inch rows do not reduce yields and have even increased yields over the wider spacings.

Remember: a balanced fertilizer program, adapted hybrid, and correct population are only a few items in corn production. Uniformity in plant spacing with less shading is more important in 150 bu. corn than at the 100 bu/A. level.

300, 400, OR 500-BUSHEL CORN?

One-level answers obviously will not pop the "mythical lid" to higher corn yields.

As the "lid" is pushed higher, the production factor interaction no longer holds an airtight position—for example: "Is 200 lbs. of N enough for hybrid B planted 20,000 plants per acre, irrigated in 20-inch rows? It may have been too much for hybrid A planted at 20,000, irrigated in 40-inch rows."

Can data from experiments yielding 75, 100, or 125 bu./A. apply to areas where yield potentials exceed 150 bu/A.? Several researchers now believe fertilizer needs have been holding down yield differential between row spacings.

The challenge and need for a team approach to balanced production research is at an all time high.

THE END

ROWS NARROWED—YIELDS UP

. . . TO MEET EXPLOSION IN CORN PLANT POPULATIONS

Narrower corn rows may be a necessary companion of other modern corn growing practices, a University of Minnesota agronomist says.

James Sentz says narrower spacing between rows may be required to get the full benefit of high corn plant populations.

Field data from the Waseca station indicates that with corn plant populations of about 25,000 per acre, yields went up as rows were narrowed: 104 bushels per acre in 40-inch rows, 116 in 30-inch rows, and 128 in rows 20 inches apart.

In the past, corn rows have been about 40 inches apart and plant populations have ranged from 12,000 to around 20,000 plants per acre.

A HISTORICAL ACCIDENT

The width of corn rows is something of a historical accident. Forty inches was about the width required to allow a horse pulling a cultivator to walk between the rows. For the most part, this width has been retained even though the work is now done with tractor-drawn equipment.

Sentz emphasizes that these data are preliminary, and the trials are being repeated. But he said the results also suggest that the narrow rows have their biggest advantage at populations up to 25,000, but not beyond that point.

When research men planted 31,000 plants per acre, yields at all row spacings went down, and the 20-row width was no better than 40. At extremely high populations—over 60,000 per acre—the 20-inch rows had lower yields than the wider ones.

Sentz says the advantage of narrower rows at populations up to 25,000 per acre is probably due to evening out the plant competition for moisture. But with extremely high populations, the narrower rows may shut out light to the lower parts of plants, thereby reducing growth and cutting yields.

Fertility level was not varied in these studies. At each population level, fertilizer was applied at rates sufficient to satisfy plant and soil needs.

MINNESOTA NEWS

Traits Of A Good Soil Fertility COMMUNICATOR

Someone recently asked me: "What are the characteristics of an effective communicator in soil fertility?"

Answering that question isn't easy, but I have formed some opinions.

An effective communicator must have a deep feel for people—the ability to develop close relationships with and between people. He must be able to say: "I know and understand these people—their wants—desires—attitudes——and values!" But "feel" alone isn't enough. He must add meaning and relevance to his message.

Meaning behind words is what really counts—not words themselves. How do you put more meaning into a message? Knowledge of soil fertility is a must, but it isn't enough!

A communicator is more than fac-

SOME BASIC CHARACTERISTICS

- Understand People
- Put Meaning Into Messages
- Consider Farmer Emotions
- Use Action Language
- Be Specific
- Plan Effectively
- Be A Man Of Action

By Ralph L. Wehunt
Office of Director, Division of Agricultural Development
Tennessee Valley Authority, Wilson Dam, Alabama

tual—he's factual plus! He's an interpreter of life itself.

An effective communicator probably said this at an early stage: "Wake up! Live at the level of your time! Crawl out of the talent-trap you refer to as your field and look around. You may learn something about the only era you will ever live in; and, even more important, you might become better acquainted with the only species you will ever be a member of."

Let me repeat! An effective communicator understands and believes in people. He isn't dealing with abstractions, statistics, crop results, and soil chemistry. He's dealing with people!

Another important factor: The effective communicator must analyze himself constantly as he relates himself to his audience. He knows that "communicating with" is different from "talking at" . . . "down" . . . "over" . . . "or to impress."

Many of us don't "communicate with" because we don't take time to make our messages meaningful. It's not too hard to select our audience—but it isn't so easy to get our audience to select us. Farmers aren't our audience until they select us themselves.

We must deal with farmers as they really are—not as we think they should be to fit our image or beliefs. We can seek their interest in our messages—we cannot demand it!

Planners unwilling to start from "where their audience is" are major yokes to modern educational programs. Until your audience understands ABC, don't waste their time (or yours) with XYZ.

Communication is much more complex than learning a few rules or opening a bag filled with magic tricks. The real test is: Did anything tangible happen? Suppose your message was: "Increase the use of high-analysis fertilizers." Were more high-analysis fertilizers *used?*

We too often try to "educate" without considering farmers' attitudes, values, or emotions. Don't we too often plan our messages to fit our own concepts?

SAD BUT TRUE

Attitudes! Values! Emotions! We don't fully appreciate the significance of these words. It's sad, but too often true, that advanced graduate training decreases our communication skill. Such training usually creates in us a strong belief in symbolic language. But, the plain fact is this: Most human behavior is *emotional.*

Symbolic communication is used most often to present reasonable excuses for our actions. Symbolic language must be tied to a bridge of reality before it becomes effective. *Farmers believe what they want to believe!* Facts that don't fit their beliefs or values are rejected or explained away.

A communicator takes advantage of this knowledge. He knows that passions, illusions, and seemingly magical promises sway people. He also knows that stupidity, habits, and just plain stubbornness keeps them from moving forward. But—wait! Play on farmers' emotions? Try to change their value systems? That's below our dignity. We may lose our status! What will our co-workers say?

You want to communicate, don't you? Let's see, then, how such knowledge of human nature can promote reason and be used with dignity.

Like angry children, we smash knowledge we don't understand. And knowledge without feeling is a sure road to failure. "Pure reason" won't conquer the world. The inescapable synthesis of educational planning, therefore, is to reinforce knowledge with intelligence, feeling, and emotion.

We're competing with professionals for farmers' time. They are familiar with the world of unreason and irrationality—the world of tricks and ruses—the world of colorful materials on everything from "How To Burp Baby" to "Essays on Making Goldfish More Golden."

A good communicator uses the same skills, but he uses them in the service of reason. He asks himself: "What motives will awaken farmers to action?"

Commenting on Pareto's *General Sociology in the Economic Forum,* Richard J. Worthington says:

> **"There are (in this book) certain ideas and discoveries which may be of considerable value to those who wish to modify society. Many men have tried to change the conduct of people by reasonings, or by passing certain laws. Their endeavors have often been peculiarly barren of results. Pareto shows how their failure is associated with the importance of the non-logical. People must be controlled by manipulating their instincts and emotions rather than by changing their reasonings."**

WON'T PULL PUNCHES

A good communicator won't pull his punches. He spells out the realities and essentials of a situation. He uses simple language that hits the mark, convinces logically, interprets realities visually and touches the inner motives of farmers.

A skilled communicator also has a "sixth sense." Like a boy courting a pretty girl, he knows when "no" means "yes." So, he times his actions accordingly. Skilled, imaginative timing has determined the success of more public relation movements than any other factor.

A good communicator can't help farmers overcome all problems at one time. He must concentrate time, energy, and funds on those problems of greatest possible benefit that can be solved in a reasonable period of time.

In other words, he must see it big—but keep it simple. He must be able to accurately simplify the general conditions that exist in a social situation and identify what is important and what is trivial.

A good communicator is specific. He seeks answers to: *What are the causes of low yields? What do the facts mean? Who will do what and when? How many will be needed?*

He doesn't use meaningless terms like "total economic development" or "balanced soil fertility." He knows that the people helping him run a program are more effective if their responsibilities also are specific enough to provide a definite challenge and measurable enough to permit them to assure their own performance over reasonably short periods.

Also, he is aware that team effort will be strengthened by each individual's identification with simple, short-term goals. "Blue-sky goals" are too difficult for most people to understand. Individuals always move toward objectives from which they themselves can obtain an emotional identification.

In *The Symbols of Government* Thurman Arnold describes the earnest but unrealistic program planner who wants to solve all of mankind's problems with limited funds and manpower. He said:

> "They usually bungle their brief opportunities in power because they are too much in love with an ideal society to treat the one actually before them with skill and understanding. Their conduct and futile cry is reiterated throughout the ages: 'Let us educate the people so that they can understand and appreciate us!' "

ON CLEAR-CUT TARGETS

A good communicator knows the futility of a meeting here on nitrogen—a bulletin there on lime—a news article today on fertilizer placement. He knows the frustrations associated with this *segmental approach.*

He focuses all forces—meetings, news articles, bulletins, personal contacts, etc.—on specific, well-defined targets. He interlocks all elements of a carefully planned strategy, complementing them by tactics timed to the moment of maximum effectiveness.

Quite a mouthful—but it's not too difficult. An effective educational program will reach its peak only when it becomes an intricate operation capable of accommodating itself to minute detail. A successful program requires continuous planning of detailed character related to *who, what, where, when how, and why.*

Such an organization is developed by planning—more planning —and planning again and again.

Planning characterizes the major differences between modern and old-time educational programs. But, planning is only the beginning—not the end.

Here's where a communicator faces his greatest challenges. He faces well-meaning co-workers and administrators, most of whom have little knowledge or even appreciation of communication procedures.

Being scientifically trained, they are inward-and-thing directed rather than outward-and-people directed. They too often don't accept advice from specialists in public relations and communications. To them, $2 + 2 = 4$; but, to a communicator, $2 + 2 = 4$ *plus* human nature.

This is our paradox:

Why devote large sums of money to a research project and only two-bits to publish the results?

Why collect survey information and never put the data into action?

Why have a meeting, involving hundreds of people, and prepare cheap slides or crude charts no one can see?

Why build a multimillion dollar plant to manufacture a new product with no organized plan to introduce it?

How CREATIVE Is Your Conference?

. . . . most conferences are non-creative. Their usual purpose is to consider whether THIS is better than THAT. Such "juries" work well because everyone likes to be a critic.

Truly creative conferences are rare. Jim wants to impress, so he talks big and echoes: "In other words . . ." But he springs no ideas of his own?

Joe hangs back until someone suggests: "Why not do so-and-so . . ?" Then Joe proceeds to pin his ears back with: "That's interesting, but it won't work. You don't understand . . ." Joe then demonstrates his encyclopedic mind, but offers no ideas of his own.

Proper preparation helps to prevent situations such as this. Success depends, too, upon each member of the group understanding fully the ground rules. The group or discussion leader should explain at the start that he will:

1—*Rule out all comments or criticism of ideas.* All ideas developed will be analyzed later, or in a special session called for that purpose.

2—*Welcome wild ideas, the wilder the better.* In later sessions, it will be easy to tone down ideas considered too radical.

3—*Encourage lots of ideas.* Quantity of ideas is the target. The more ideas you get, the better your chance of discovering some original ones with real significance.

4—*Permit chain-thinking.* In other words, build on the ideas of others as well as contributing new ideas of your own. Put ideas together.

—From National Project In Agricultural Communications, Michigan State University

These questions must be answered if an organization survives in this rapidly changing world.

This world needs men with knowledge. But, knowledge isn't enough. Know-how must be put into action. This requires communication! Also, a big portion of humanistic philosophy is needed.

Farmers are thinking, doing, feeling, and appraising beings. Intellectual, emotional, esthetic, and ethical knowledge must all be pulled together. One without the other won't work—$2 + 2 = 4$ plus human nature.

What is a good communicator? The characteristics are many. These words of Peter F. Drucker in his interesting book, *Landmarks of Tomorrow,* are worth remembering:

"Communication—it is the whole of speech, including not only the words left unsaid, but the atmosphere in which words are said and heard that alone communicates. It is only this whole that has any existence at all in communication. One must not only know the whole of the message, one must also be able to relate it to the patterns of behavior, personality, situation and even culture in which communication takes place."

THE END

HOW WELL DOES IT USE IT

AND WHEN DOES A PLANT DEMAND MOST MOISTURE?

HOW well does a plant use water in the soil—and when in its life does the plant require the most moisture?

Some answers to these and other questions on plant growth and moisture use are being uncovered by University of Tennessee research.

The extent to which plants use moisture from the soil depends on several things, reports Dr. W. L. Parks, agronomist, and H. B. Smith, assistant in agronomy. Some of the most important factors are (1) The kind of root system, (2) characteristics of the soil, (3) the amount of moisture present as the plant is growing.

For example, they found that corn uses most moisture when it is at the tasseling and kernel formation stage, Dr. Parks reports. Cotton's greatest demand for water is during the first three weeks following first boll set; and for soybeans the greatest demand for moisture is during the sixth to tenth week of growth.

To determine soil moisture, and the uptake by plants, the researchers used what is called the neutron method. The radiation measurements made in these studies were in cooperation with the U-T AEC research laboratory and the USDA.

Regarding water use as related to yields, records showed that one acre inch of water (27,154 gallons, or water one inch deep over an acre) produced 7.1 bushels of corn, 51 pounds of lint cotton, or 1.7 bushels of soybeans.

They also found that cotton grown with adequate moisture used soil moisture to a depth of only 18 inches. But under scarce moisture conditions cotton used soil moisture to a depth of 54 inches.

Tennessee News

These fertilizer results—alternating strips of orchard grass showing striped effect from wide swaths of fertilizer truck—were obvious a half mile away on the Ray Freeman farm near King City, Missouri, after the pasture had received 350 lbs. per acre of 12-12-12 in Gentry County's stepped up program to get more acres of grass fertilized. (Missouri Ruralist Picture)

big PASTURE push

By Cordell Tindall

In *Missouri Ruralist*

Pasture yields are not keeping pace with grain crop yields. Corn, especially, has responded to generous treatment with commercial fertilizer.

Livestock men in Gentry County, which is in Northwest Missouri, were concerned when they learned the figures presented by Bob Mason, county extension director. Checking the census figures Mason noted that in 1949, 4.2 acres were required to graze each animal unit (equivalent to a mature beef cow).

In 1959 little progress had been made—4.1 acres still were required.

In 1963, a special effort was made to get more acres of grass fertilized. The county ASCS committee lent a hand, giving approval to a practice known as "8 C," which has to do with improving "partial stands" of grass.

In the past the county committee had offered cost sharing on applications of 20-20-20. This year they agreed to share the costs on full treatment, based on soil tests. And "full treatment" is comparable to application for 100-bushel corn yields.

The fertilizer can be applied as topdressing, and it is not required to work the ground.

The practice also calls for additional seeding—although in some cases results would indicate that farmers merely were complying with the rules. In many cases seed was mixed with the fertilizer by bulk blending plants, and seed and fertilizer were applied in one trip over the field.

This offers a handy way to seed such grasses as orchard grass. It does call for more driving over the field with the truck—and unless the driver does a conscientious job uneven strips result.

It is estimated that some thousand acres of pastures were topdressed this last winter and spring. The ASCS office reports 87 farmers took advantage of cost sharing.

The results? Well, it's hard to come up with specific figures. Earl Martin applied 66-33-33 to a bluegrass field—at a cost of $12.33 an acre. He figures he saved considerably on hay purchases because the fertilizer gave the grass a good early start. But there's no way to know just how much hay the cows would have eaten.

On the Ray Freeman farm near King City the fertilizer truck made some wide swaths through a field of orchard grass, applying 350 pounds of 12-12-12 to the acre. The results were obvious a half mile away—alternating strips of light and dark green.

A more intangible result of the program was the widespread interest shown in improving grass. Gentry County has four bulk blending plants, and operators report the busiest season ever. THE END

PLANT FOOD HELPS BOY WIN

Tennessee News

Proper fertilization based on soil test recommendations helped Earl Vickery, Jr., produce 3,970 pounds of seed cotton and 1,155 pounds of lint on his one acre he has had for a 4-H Club project.

Earl, a freshman at Hall's high school in Lauderdale county, produced the highest cotton yield among Lauderdale 4-H members by following fertilizer recommendations.

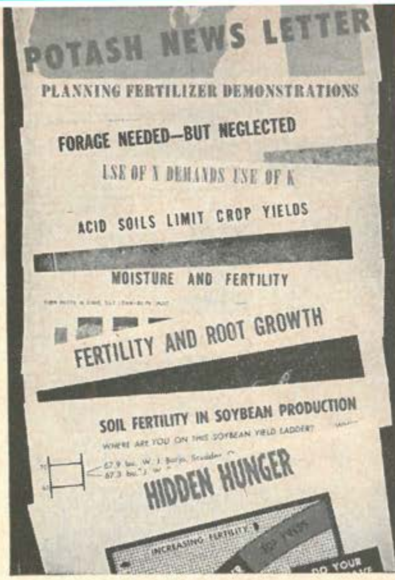
According to Charles T. Peal, Lauderdale assistant county agent, the 4-H'er used 350 pounds of 15-15-15 plus sidedressing with 200 pounds of nitrate of soda.

Earl harrowed his cotton land four times and disked it three times which gave him an excellent seedbed preparation.

He used Pope variety, planting the seed on May 15 at the rate of 300 pounds per acre. Earl chopped the cotton twice and cultivated four times.

YOUR EASY-ORDER CATALOG

CURRENT EDUCATIONAL AIDS



FROM: THE AMERICAN POTASH INSTITUTE, INC.
1102 16TH ST., N. W., WASHINGTON 36, D. C.

Please send me:

NEWSLETTERS

	Single Free Copy	Additional Copies 2¢ per copy Quantity	Payment
FOR EASTERN STATES			
High-Yielding Grass Demands High Potash—E-108	______	______	$______
Why Liming First—E-114	______	______	$______
Corn Silage—E-116	______	______	$______
Winterize Your Crops—E-117	______	______	$______
➡ Roles of Potassium in Plants—E-118	______	______	$______
FOR SOUTHERN STATES			
Preparing for the 1970 Farmer—S-122	______	______	$______
Interpreting Soil Tests—S-131	______	______	$______
Potassium in Man and Animals—S-133	______	______	$______
Forage News Items—S-134	______	______	$______
FOR MIDWESTERN STATES			
Plant Testing—M-93	______	______	$______
Soil Fertility in Soybean Production—M-98	______	______	$______
Need Long-Time Experiments—M-107	______	______	$______
Tissue Testing—A Valuable Field Tool—M-115	______	______	$______
Vegetable Crop Fertilization—M-116	______	______	$______
Fertilize Where it Counts—M-119	______	______	$______
Interpreting Soil Tests—M-120	______	______	$______
Stretch Water with Fertilizer—M-121	______	______	$______
Nitrogen-Potassium Teamwork—M-122	______	______	$______
FOR FAR-WESTERN STATES			
Forages and Pastures—W-29	______	______	$______
Cotton—W-30	______	______	$______
FOR CANADA			
Swing to Legumes—C-4	______	______	$______
Potassium in Animals and Man—C-7	______	______	$______

Total Payment: $______

AIDS

OFFERED

ON ALL

FOUR PAGES

MAGAZINE REPRINTS

	Single Free Copy	**Additional Copies 2¢ per copy** *Quantity*	*Payment*
ON CORN			
Basic Principles of Corn Fertilization—J-10-61	______	______	$______
Row and Broadcast Potassium at Work on Corn—A-1-62	______	______	$______
Fertility Level and Balance Can Affect Corn Production—C-3-62	______	______	$______
Role of Fertilizer on Corn Diseases—D-3-62	______	______	$______
When Corn and Soybeans Need Potash—E-3-62	______	______	$______
Dark Green and Fat—F-3-62	______	______	$______
ON FORAGES			
Soil Tests Spotlight Turf Needs—P-8-57	______	______	$______
Team Tall Fescue with Ladino Clover for Profit-Building Forage—Y-10-57	______	______	$______
Band Seed Alfalfa in Summer—U-6-58	______	______	$______
High Nitrogen Increases Potash Needs of Grasses—DD-11-58	______	______	$______
More Potash for Grain and Legume Seedings—L-10-59	______	______	$______
Growing Alfalfa Successfully—B-5-60	______	______	$______
Yield and Uptake in Alfalfa Fertilization—H-7-62	______	______	$______
Nitrogen-Potassium Teamwork on Forage Composition—B-6-63	______	______	$______
Quality Alfalfa Management—G-6-63	______	______	$______
Pasture Problems Into Profits—I-6-63	______	______	$______
Winterize Your Alfalfa Roots—O-8-63	______	______	$______
Potassium Use on Turf—Q-10-63	______	______	$______
ON ORCHARDS			
Peach Nutrition: A High Demand—L-10-61	______	______	$______
Fertilizing Western Orchards—M-10-61	______	______	$______
Why Citrus Needs Nutrition—N-10-61	______	______	$______
ON SOIL FERTILITY PRINCIPLES			
Consider Plant Food Content of Your Crops—EE-12-57	______	______	$______
How To Get Good Soil Samples—JJ-12-58	______	______	$______
Know What's In Your Fertilizer Bag?—Q-11-59	______	______	$______
Improving Soil Test Calibrations—M-8-63	______	______	$______
More Corn Profits From Right Fertilizer Application—R-12-63	______	______	$______
ON SPECIAL TOPICS		**5¢ per copy**	
Agriculture: An Industry Alive With Future!—P-10-63	______	______	$______
		7¢ per copy	
Dr. Writer & Mr. Talker: Guide To Writing—S-12-63	______	______	$______
		Total Payment:	$______

FOLDERS

	Single Free Copy	Additional Copies 2¢ per copy *Quantity*	*Payment*
Profitable Fertilizer Placement—E-59	______	______	$______
How Proper Fertilization Can Pay—on Grasses & Legumes—B-60	______	______	$______
Know the Plant Food Your Corn Removes While It Grows—B-63	______	______	$______

HANDBOOKS

		10¢ per copy	
Limiting Factors in Crop Production—A-1-60	______	______	$______
Forage Fertilization—F-12-60	______	______	$______
Orchard Fertilization—G-8-61	______	______	$______
Plant Testing—G-5-62	______	______	$______
Moisture and Fertility—A-1-63	______	______	$______

NEWSPAPER MATS

		10¢ per copy	
Corn Silage—How Much Plant Food—M-1	______	______	$______
Don't Let Your Corn Run Out of Gas—M-2	______	______	$______
Balance Your Soil Bank Account—M-3	______	______	$______
Winterize Your Alfalfa—M-6	______	______	$______
Don't Treat Your Soybeans Like a Red-Headed Stepchild—M-7	______	______	$______
Know Your Hay-rithmetic—M-8	______	______	$______

WALL CHARTS

		15¢ per copy	
Plant Food Content of Crops	______	______	$______
Corn Starvation Symptoms	______	______	$______
Potash-Starved Legumes	______	______	$______
Cotton Rust is Potash Starvation	______	______	$______

Total Payment: $______

SLIDE SETS

Slide Set Titles	No. Slides	Cost (Check choice)		For 10-day free loan: Date desired
Making Forage Fertilization Pay	46	$6.75		
Fertilizing both Small Grains and Legume Seedings	41	$6.00		
Successful Alfalfa - You Can Grow It	40	$5.85		
Soil Fertility and Soybeans	42	$6.15		
Safe and Efficient Fertilizer Placement	40	$5.85		
Potassium Deficiency Symptoms	22	$3.30		
What's Wrong With My Corn?	45	$6.60		

Total Payment: $______

MOVIE

—WITH TWO SHORTS

IN COLOR AND SOUND

THE TWO SHORTS ARE CONDENSED VERSIONS OF THE MASTER MOVIE

I would like to book the movie checked below for the date indicated:

	Date	Alternate
Growing Alfalfa Successfully **16mm 975 Ft. 25 Mins.**	________	________
Alfalfa, Queen of Forages (Extract) **16mm 368 Ft. 10 Mins.**	________	________
Good Alfalfa Requires Good Fertility (Extract) **16mm 365 Ft. 10 Mins.**	________	________

ENCLOSED is $________ to pay for the total quantities of materials ordered above the single copies.

Name ________________ Address ________________

City ____________ Zip Code ________ State ____________

Organization ____________________________

NEW, FAST LIME TESTS

Via New York

A CORNELL University scientist has developed a new and fast method for determining lime requirements of soils. Prof. Michael Peech said the new method accurately measures the maximum amount of limestone that can react with an acid soil.

"Many soil testing laboratories are now making liming recommendations on the basis of the pH test, which is inaccurate because it does not measure the exact amount of limestone that can react with a given acid soil," Prof. Peech says.

Because of its accuracy, the new method could lead to more intelligent and better use of lime. Time needed to complete the new test is only ten minutes.

"This is fast enough to permit its use in routine soil testing," Prof. Peech states.

Farm Store Merchandizing

Via Ohio

A RAPID test for determining the lime requirement of soils, developed at Ohio State University, shows promise of being adapted in widely scattered areas of the country.

The Ohio State University soil testing laboratory has been using the test since 1959 and has reported good results. Now scientists from other states, including Michigan, Wisconsin, Washington, and California, claim the Ohio test is well adapted to soils in their areas. Results in these states also tend to add support to the validity of the Ohio work.

The new test is based on the principle of change in pH of a buffer solution by the acidity in the soil, according to soil chemists Harold E. Shoemaker, E. O. McLean, and P. F. Pratt. Dr. Shoemaker is an agronomist with the Ohio Agricultural Extension Service. Dr. McLean is professor of agronomy at Ohio State and Dr. Pratt, formerly of Ohio State, now is an agronomist at the University of California.

Former tests for lime indicated only about half the actual lime needed, especially on the most acid soils which contain large amounts of soluble aluminum, according to the Ohio scientists.

Not only does the new test measure the lime requirements more accurately, but it also is well adapted to large-scale soil testing operations such as the one at Ohio State, which last year handled over 70,000 soil samples.

Ohio Farm & Home News

Fit LIME To PLOWING DEPTH

BY
HAROLD SHOEMAKER

The Ohio Lime Requirement Test was designed to determine the tons per acre needed to bring the plow layer of an acid soil up to a desirable pH range.

An average acre plow layer of soil is considered to run 6⅔ inches in depth and 2,000,000 lbs. in weight. Lime recommendations are based on this depth and weight.

A deeper or shallower furrow slice, of course, would contain more or less soil volume and weight. Such variations mean the amount of lime recommended for 6⅔″ of soil could be too little or too much.

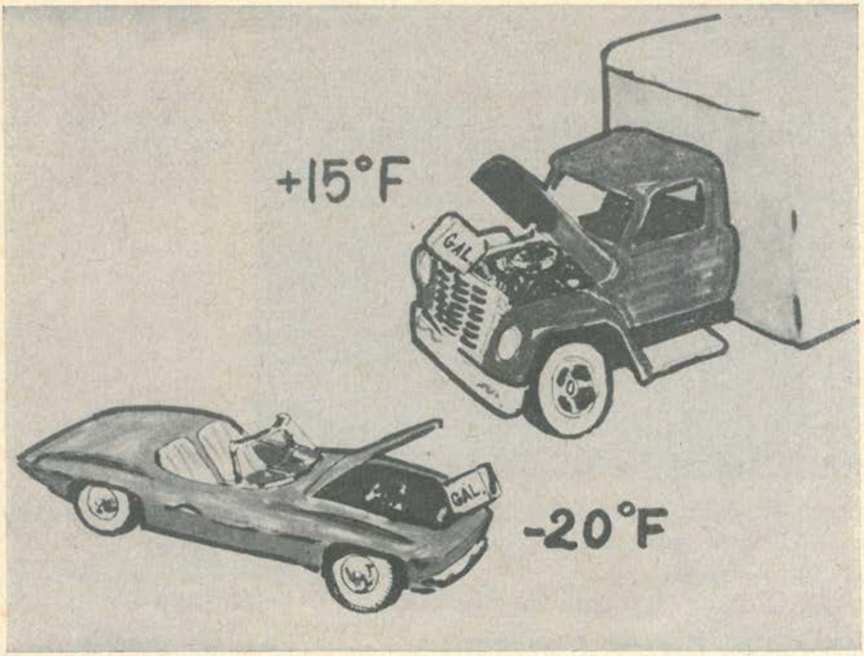
It depends on how deep the farmer plows. With today's powerful tractors and larger plows, the tendency is toward deeper plowing, especially on bottom land and other level soils. Most hill land is still plowed to between 6″ and 7″ depths.

TABLE 1—HOW SOIL DEPTH INFLUENCES THE AMOUNT OF SOIL TO BE LIMED

Soil Depth (Inches)	Approximate Weight of Average Soil to Indicated Depth	**Pounds Lime To Use Per 2000# Recommended	% of Lime Requirement Needed for Indicated Depth
3	1,000,000 (lbs.)	1000	50
5	1,500,000	1500	75
6⅔*	2,000,000	2000	100
8	2,400,000	2400	120
9	2,700,000	2700	135
10	3,000,000	3000	150
11	3,300,000	3300	165
12	3,600,000	3600	180

* Base depth upon which the soil test recommendation is made.

** Amount of liming material to apply for each 2,000 pounds (ton) of lime recommended, according to the plow depth of the soil.



. . . using the same amount of lime on a 9″ plowing depth that is recommended for 6 2/3″ soil depth is like using the same amount of antifreeze on a small sports car and a large truck. One gallon of antifreeze might protect the little car down to 20° *below* zero but a truck only to 15° *above* zero. Dilution is the problem: the larger the cooling system the more diluted a single gallon becomes. The same principle of dilution applies to soils that receive a lime recommendation to 6 2/3″—and are plowed to 9″. That extra 2 1/3″ of soil adds 35% more soil to dilute your recommended supply of liming material.

OHIO
STATE
UNIVERSITY

SOME ADJUSTMENT NEEDED

We should adjust our Lime Requirement Recommendation to specific soil depths, as we depart from the standard 6⅔″ depth or 2,000,000 lbs. weight.

Table 1 shows how soil depth influences the amount of soil to be limed.

For example, an acre of soil 9″ deep averages 2,700,000 lbs. This *extra* 2⅓″ of soil (weighing 700,000 lbs.) adds 35% more soil to dilute the liming material recommended for 6⅔″ of soil.

This 9-inch example represents 135% of the soil test "base," so it requires 135% of the soil test lime recommendation. This means only 74% as much soil acid would be neutralized in the 9″ plow layer as in the 6⅔″ plow layer, if we follow the Lime Requirement Recommendation based on 6⅔″.

LIKE DILUTED ANTI-FREEZE

This is like trying to get the same

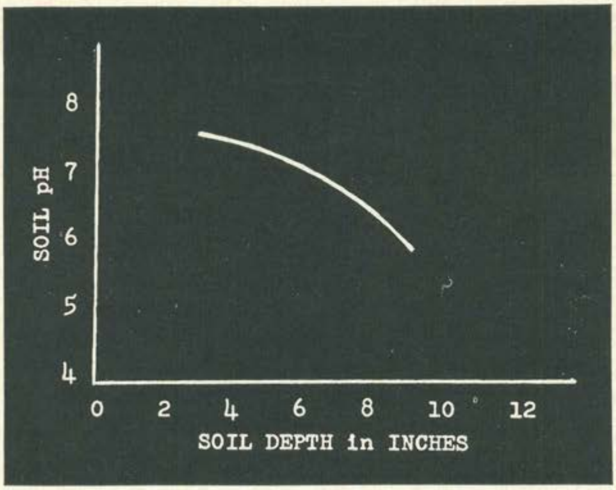


Figure 1. How depth of mixing a given amount of lime influences the soil pH. (Fincastle Silt Loam pH 4.7)

protection from the same amount of anti-freeze in two cooling systems of different sizes.

For example, one gallon of anti-freeze might protect a small sports car down to 20° *below* zero but a large truck only to 15° *above* zero. Why? Dilution is the problem. The larger the cooling system the more diluted a single gallon becomes.

The dilution factor will not correct for a wrong lime requirement caused by a difference in acidity and lime requirement of the soil below the regular plow layer.

Take a case where you plow your soil deeper than normal for the first time and turn up soil which is more acid and has a greater lime requirement than the original plow layer. You would need more lime than even the dilution effect of the extra soil depth and weight demands.

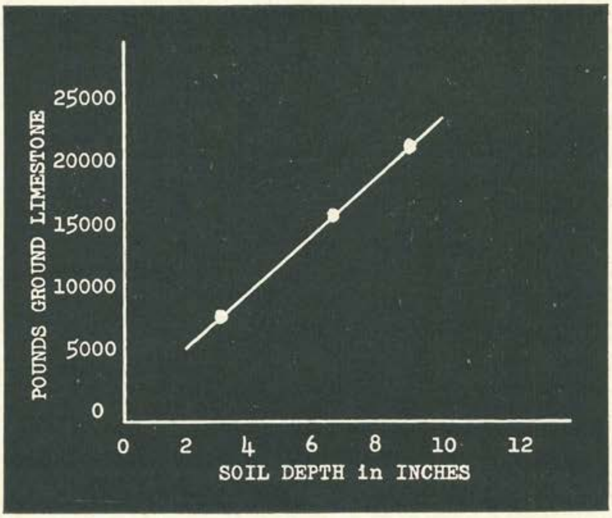


Figure 2. How depth of mixing influences the amount of lime required to bring the soil to pH 6.8. (Fincastle Silt Loam pH 4.7)

If you turn up soil less acid than your original plow layer, you would need less lime than normal dilution demands.

SAMPLE TO INTENDED PLOWING DEPTH

Sampling your soil to the depth you intend to plow will result in a lime requirement which is greater or smaller than that of the original plow layer . . . what lime you need or don't need. But such sampling does not eliminate your need to compensate for the dilution that deep plowing causes.

Figure 1 shows how dilution or depth of mixing a given amount of lime can influence the soil pH. When lime recommended for 6⅔″ of soil (8 tons) was mixed to a 3″ depth, the soil pH was 7.5. Mixing the same amount of lime to a 9″ depth brought the soil to pH 6.0. The pH 6.8 goal was reached when the lime was mixed to 6⅔″ depth.

Figure 2 shows how mixing depth can influence the amount of lime needed to bring the soil to pH 6.8: 8,040 lbs. of liming material at the 3″ mixing depth, 16,079 lbs. at 6⅔″, and 21,707 lbs. at 9″.

When we plow deeper than the 6⅔″ soil depth on which lime recommendations are based, dilution of our liming material may partially explain why the desired pH level has not been reached when retested at a later date.

THE END

DOUBLE CROPPING

BY CHARLES ELLINGTON
UNIVERSITY OF MARYLAND

More farmers are double cropping their land than ever before: from New Jersey to Texas. Some vegetable farmers have followed the practice for many years, but now it is spreading to field crop production and, to some extent, to dairy and livestock farms.

WHAT IS IT?

Double cropping is growing two or more crops a year on the same piece of land. Commercial grain producers in Maryland have double cropped barley and soybeans for years.

For example: the barley is seeded in October or November. When it is harvested in June, a short-season variety of soybeans is planted immediately. The soybeans mature in time for barley to be seeded on the land again in the fall.

Vegetable farmers have long used such combinations as cucumbers *followed* by snap beans, canning peas *followed* by tomatoes,

DOUBLE CROPPING IN ACTION . . .

ON MONDAY, JUNE 24, barley is combined on the Maurice Collins farm . . .

. . . and the straw is baled.

ON TUESDAY, JUNE 25, the land is worked and planted to soybeans. (Fertilizer tank to right for sidedressing adjacent corn field.)

ON OCTOBER 17, County Agent Roscoe Brown looks over the field of lush soybeans: a product of double cropping.

white potatoes *followed* by sweet corn, and early snap beans *followed* either by soybeans or sweet corn. Various combinations are possible, and farmers have found most of them. Some even follow sweet corn with soybeans.

Dairy and livestock farmers are using double cropping, too. Quite often a piece of land is used for rye or oat pasture in the winter and for sudan or millet pasture in the summer.

Rye, or wheat and vetch, or oats and crimson clover are often cut for silage in the spring and the land planted to corn a few hours later.

WHAT MAKES IT POSSIBLE?

Double cropping in this area is made possible by:

1 A long, frost-free growing season.

A long growing season—180 days or more—allows more time for crops to grow and mature. It also adds flexibility to the farming operation. A farmer can choose crops to fit different seasons and market demands.

2 Soils with texture that can take intensive tillage.

Many Coastal Plain soils are sandy textured and do not have severe structure problems. They can be worked when it is too wet to get on heavier silt or clay soils that often break into clods. If worked too wet, heavier soils may show the effects for 5 to 10 years.

3 Better Machinery.

Better, more powerful machinery allows today's farmer to work very quickly. For example, he can combine his barley crop, bale the straw, plow the land, and plant soybeans in less than 48 hours. Such speed is important for high yields from the second crop.

4 Improved weed, insect, and disease control practices.

Today's modern tillage machinery, teamed with new and improved herbicides, insures better weed control than ever before. Improved varieties, seed treatment, and spray programs help hold down disease and insect problems.

5 Intensive fertilization to meet intensive cropping need.

Let's look at some typical double cropping operations in Maryland.

Maurice Collins: 700 lbs. Per Acre Per Year

. . . has been double cropping for about 10 years on some of the 900 acres he farms in Talbot County.

In addition to cash grain farming, he milks about 60 cows and needs straw for bedding.

The average yield from Talbot County's 15,000 acres of soybeans runs 23.3 bushels per acre. Collins averages 25 to 27 bushels per acre in his double cropping program.

The county barley yields average 36.3 bushels per acre. The Collins farm averages 68 bushels per acre.

In 1963, Maurice combined 67 acres of Wong barley in June, baled the straw, plowed the land, and immediately planted Ogden soybeans.

His barley crop had received 200 lbs. 10-10-10 per acre at seeding and an additional 300 lbs. as an early spring topdressing. The soybeans received 200 lbs. 2-12-12 per acre in the planter. Total: 700 lbs. of fertilizer per acre per year.

In addition, Maurice follows a soil testing program and maintains a lime level at pH 6.0 or above.

Out of Talbot County's 500 commercial farms, about 150 are dairy farms, the other 350 largely grain farms. At least half, probably two-thirds, of the grain producers now double crop.

Irvin Guy: 1350 lbs. Per Acre Per Year

. . . has been double cropping for 20 years on some of his vegetable land in Wicomico County.

In a typical year, he will follow about 90 acres of snapbeans with soybeans. He will also have 5 to 6 acres of cucumbers, 15 acres of watermelon, 20 acres of tomatoes, and 60 acres of sweet potatoes.

All his planting and cultivating equipment is set for 32 inch rows.

Tomato yields on the Guy farm will be high every year and the snapbeans and cucumbers will be well above the county average. His soybean yields will range from 25 to 30 bushels in a county where the average is 18 to 22 bushels per acre.

Mr. Guy follows soil test recommendations and maintains the soil pH at 6.0 or above. He fertilizes the rye cover crop with 350 to 400 lbs. of either a 5-10-10 or a 4-8-16.

In addition, the snap beans receive 500 lbs. of 5-10-10 at planting and another 500 lbs. just before blossoming. Total 1350 to 1400 lbs. of fertilizer per acre.

Gaither Aydelotte: 30 Bu. Soybeans On Sandy Soil

. . . has double cropped one forty acre field continuously for 6 years near Salisbury in Wicomico County.

In five of those years, he followed barley with soybeans. In the other year, he followed sweet corn with soybeans.

Gaither applies fertilizer only to the barley crop but topdresses the field with broiler house manure every other year.

Gaither sells both the barley and the soybeans for seed. He has averaged 50 to 60 bushels of barley and 25 to 30 bushels of soybeans per acre; not bad for the sandy soils he farms.

Wicomico County has about 1,000 farms. Most of them produce fruits and vegetables, but there are a few commercial grain producers. Probably 10 to 15 percent of the farmers in Wicomico County now double crop with either barley or rye and soybeans.

TO MEET NPK REMOVAL

A successful fertilizer program in double cropping must provide for large removal of N, P, and K contained in the two crops.

For example, a 60 bushel crop of barley, one and a half tons of straw, and a 30 bushel crop of soybeans will remove about 176 lbs. of N, 56 lbs. of P_2O_5 and 109 lbs. of K_2O per acre.

Contrast these removal figures with the average fertilization program. Too often we apply far less fertilizer than our crops need. This shortage sharply reduces yields in double cropping.

Don't forget many coastal soils have a low base exchange capacity and are subject to leaching. So, their "reserve" fertility is very limited.

Unless we apply enough fertilizer to meet the demands of each crop, it will likely suffer. The soil can supply only a small amount of NPK from its storehouse.

TO MEET A TIME TABLE

When fertilizing for double cropping, remember the crops must often mature on a time table schedule.

Sometimes they are planted and harvested within 50 to 60 days. There is no time for error in fertilization. To insure high yields, NPK must be present in the right amount and in the right ratio *at the start of the crop.*

If a deficiency stunts growth, the crop rarely has time to recover even if the deficiency is corrected right after detection. You must follow a pre-planned fertilizer program based on soil tests and expected crop removals.

WHY DOUBLE CROPPING INCREASES

A sure way to reduce production costs is to make full use of land, labor, and capital. Double cropping does that! Look at it this way:

Double cropping seldom affects barley yields if the crop is seeded early enough in fall. Barley will yield the same whether harvest stubble is left standing or the land is plowed and planted to another crop.

Double cropped soybeans are usually expected to yield lower when planted after barley and wheat. Actually they compare to beans planted in normal manner, except in very dry years. If the land is real dry at planting, soybean yields sometimes suffer.

But take returns from both barley and soybeans and you get more than from either crop alone. For example, 100 acres of soybeans will yield 2,500 bushels of beans—at 25 bushels per acre. The same 100 acres double cropped may yield

4,000 to 5,000 bushels of barley PLUS the 2,500 bushels of soybeans.

And the same harvesting, storage, and transporting equipment can be used for both crops.

Perhaps that is why 7 Maryland counties now follow double cropping to some extent: probably adding $1 million a year to crop values in those counties.

And it will continue to increase as surely as land values and the cost of labor and machinery increase.

Successful double cropping depends on:

1 Getting the job done on time.

2 The use of crop varieties best suited to the area.

3 A vigorous program of weed, insect, and disease control.

4 A sound "pre-planned" fertility program.

Double cropping may be hazardous on many soils, not very profitable on others.

But with suitable soils and efficient farmers mastering details, it is now profitable in many areas.

THE END

Good Soils Thrive On Work

. . . WHEN PROPERLY MANAGED!

From a Minnesota soil scientist comes the opinion that agricultural land is not necessarily improved by leaving it idle or "giving it a rest."

He points out that high-yielding crops, properly fertilized, will start a chain reaction of adding more and more organic matter to the soil and thereby improving both its structure and fertility.

The bigger the crop, the more roots there are working through the soil and the more residue there is to plow down.

This is a point we have been making all along in PRAIRIE FARMER. Good soils, like ambitious people, like to work hard and produce well.

When you take a big harvest from the land, it is of course necessary to replace the nutrients that have been hauled away. But when this is done the land can actually improve under full load if the methods of husbandry are the right ones.

It is good stewardship to keep our good land busy with abundant crops and to shift our poorer land to the kinds of production for which it is best suited.

This new idea need not hamper or change our ideas of conservation. It is the essence of good conservation to use land, as well as other resources, efficiently and intelligently.

We should remember this as we ponder our farm programs and the changes they may need.

Prairie Farmer

34 Straight Years In Corn and the Yields Still Climb

. . . WITH 500 LBS. 0-25-25 & 400 LBS. OF AMMONIUM NITRATE PER ACRE

Many Virginia farmers still think corn should not be grown on the same land year after year. But agronomists today believe otherwise.

In many parts of the Old Dominion good corn land is at a premium—as it is in the southwest Virginia county of Grayson.

J. C. Fields agrees with the agronomists. He has an eight-acre piece of bottom land that has been in corn for 34 years straight. Over this time Fields has seen yields increase because of *better seed, better fertilization,* and *more effective weed control.*

"WE DIDN'T KNOW . . . IN THOSE DAYS"

Back in the 1930's this Grayson farmer was using an old open-pollinated variety, Pamunkey, on this soil.

He says, "In those days we didn't know we were growing corn for the ears and the old Pamunkey gave us a lot of tonnage, but few ears. It lodged badly, too. We used something like a 2-8-2 fertilizer and 16 percent superphosphate to grow corn."

This year Fields and his brother, D. H. Fields, who operate as the Field Manufacturing Company, planted a hybrid, VPI 646. The stand is a little thicker than they desired because the seed corn had finer grains than usual. County agent W. R. Cassell of Grayson estimates there are about 25,000 stalks per acre.

Fertilizer was about 500 pounds of 0-25-25 and 400 pounds of ammonium nitrate per acre. In addition, manure was used following a cover crop. Fields uses a cover crop on this land each year.

GOOD CROP IN DRY SEASON

In spite of a poor growing season—Grayson was dry along with other parts of the state—this bottom land corn is a respectable looking piece of forage. It will be cut for silage and fed to about 100 Hereford steers and 20 cows with calves. A cover crop of rye and wheat will be seeded later on.

Yields last year from this 8 acres was 170 tons, or a little better than 20 tons per acre.

VPI agronomist Bill Lewis says, "Corn silage is one of our best forage crops for beef and dairy cows in Virginia. On good corn soils, where erosion is not a hazard, and good production practices are followed, corn can be produced successfully year after year. This corn plot is an excellent example of this practice. Such a practice need not be limited to mountainous areas of the state."

County agent Cassell adds, "Mr. Fields has made efficient use of his production facilities by planting corn year after year on land that is well adapted for growing corn. More total digestible nutrients (TDN) can be grown per acre with corn silage than with any other forage crop. It is a fine feed for wintering cattle.

"Farmers are well advised to protect their hillsides by using them for purposes to which they are better adapted. If too steep for corn, they should be left in pasture or hay crops."

VPI News

MICRONUTRIENTS

. . . a growing need in the South

By Jim Turner

BORON

ZINC

IRON

MANGANESE

MOLYBDENUM

COPPER

Micronutrient fertilization will become more important for crop production, southern research workers predict.

The reasons? Higher crop yields, increased use of high-analysis fertilizer, and wider recognition of crop deficiencies—PLUS growing evidence that lack of one or more micronutrients may frequently limit crop response to the major plant nutrients.

A survey of the Agronomy and Horticulture Departments in 12 southern states recently answered some basic questions about the growing importance of micronutrients and their future.

1 How widely are micronutrients now recommended?

For one or more crops, boron is recommended in 11 states, zinc in 10 states, iron in 7, manganese in 5, molybdenum in 5, and copper in 3 states.

With expanded research and exploratory trials, scientists continue to report new crop uses: boron for cotton; zinc for corn, peaches, and pecans; copper for wheat, oats, and barley; iron for ornamentals and some grasses; and molybdenum for soybeans.

2 Which soil areas are most likely to be deficient?

Although micronutrient deficiencies are widely scattered over each state, major soil areas most likely deficient are the Coastal Plains, Sand Hill, Sand Mountain, and the coarse textured, acid leached soils.

As higher fertilization and better management increase crop yields, response to micronutrients can be expected on other soils, also.

3 What helps increase their usage?

According to the survey, five factors are most likely to contribute to increased micronutrient usage: (1) use of high analysis fertilizer, (2) increased fertilizer rates, (3) liming of acid soils, (4) higher crop yields, (5) improved varieties.

A combination of these factors at work can often create unsuspected micronutrient deficiencies—that is, a shortage where deficiencies have not been demonstrated.

4 How do you determine micronutrient deficiencies?

The most common methods for determining micronutrient deficiencies in the 12 southern states are: (1) visual deficiency symptoms, (2) field experiments, (3) response to survey demonstrations, (4) soil and plant tests.

So far, research workers have pinpointed deficiency patterns of several micronutrients for many crops of economic importance. And Table 1 shows soil conditions and crops most susceptible to micronutrient deficiencies.

5 Will micronutrient fertilization become more important?

Research workers in 11 of the 12 southern states say yes. They indicate a great economic potential for the farmer in the neglected field of micronutrients. Such shortages can seriously reduce crop yield and quality. The hunger signs speak volumes. A crop is like an animal. By the time you *see* it starving, it has been hungry a long time—and proportionately retarded.

Many farmers now know how important it is to correct—or better prevent—all plant food deficiencies. Maximum crop yields and profits per acre demand it.

6 Is anything being done about micronutrients?

Research is going on in all 12 southern states. Research agronomists are not taking the micronutrient problem lightly.

ALABAMA

ARKANSAS

FLORIDA

GEORGIA

KENTUCKY

LOUISIANA

MISSISSIPPI

NORTH CAROLINA

SOUTH CAROLINA

TENNESSEE

TEXAS

VIRGINIA

TABLE 1—SOIL CONDITIONS AND CROPS MOST SUSCEPTIBLE TO DEFICIENCIES OF MICRONUTRIENTS

Micronutrient	General Soil Type and Conditions	Crops Most Likely Susceptible
Boron (B)	Acid leached soils, coarse textured sandy soils, peats and mucks, drouth conditions, overlimed acid soils	Alfalfa, apples, beets, clovers, citrus, cotton, cauliflower, celery, corn, sweet potatoes, tomatoes, tree crops, sugar beets
Chlorine (Cl)	Unknown in field soils	Beets, tomatoes
Copper (Cu)	Sandy soils, peats and mucks, overlimed acid soils	Small grains, vegetables and tree fruits
Iron (Fe)	Alkaline soils, particularly calcareous when cold and wet; excess phosphate	Beans, soybeans, corn, sorghums, tree fruits, ornamentals
Manganese (Mn)	Sands, mucks and peats, alkaline, particularly calcareous, overlimed soils	Soybeans, small grains, tree fruits, cotton, leafy vegetables
Molybdenum (Mo)	Highly weathered acidic leached soils, acid soils	Cauliflower, citrus, all legumes
Zinc (Zn)	Calcareous soils after leaching and erosion, acid leached soils, after heavy phosphate, coarse sands	Beans, soybeans, citrus corn, sorghum, onions, potatoes, tree fruits, flax, sugar beets

They are emphasizing two areas: (1) the element most likely limiting crop yields, (2) the soil areas most likely to be deficient.

Our college and experiment station scientists in the South will provide us with the right facts about the role of micronutrients for top crop production.

THE END

3 TO 1 ODDS

WESTERN farmers who irrigate and fertilize have about a three-fold better chance of making a higher income than those who don't. These advantageous odds were found as a result of a survey supported by the National Plant Food Institute. The survey showed that in the West, 96 per cent of the high level fertilizer users irrigate as contrasted to 48 per cent of non-users, and that 91 per cent of high level users grossed over $10,000 per year as compared to 36 per cent of non-users. A deficiency of either fertilizer or water jeopardizes the effectiveness of the other. Fear of dry weather and lack of rainfall are barriers to fertilizer use by large numbers of farmers over the United States who do not irrigate. Sprinkler irrigation should be a natural solution to this problem for many growers since it permits maximum irrigation flexibility and may be used on unlevel land.

—Richard Bahme
In Agricultural Ammonia News

Boron-Hungry Cotton Makes Dramatic Comeback

. . . IN ALABAMA

Evidence continues to mount showing crop needs for minor elements.

First field response of alfalfa to molybdenum in Alabama was observed in 1962 at Thorsby and reappeared in 1963. Increased growth and longer lasting stand were noted when molybdenum was included in research treatment at Foundation Seed Stocks Farm of the Agricultural Experiment Station at Auburn.

First severe symptoms of boron deficiency in Alabama cotton showed up on farm of Charles Storrs, Wetumpka. In late July, cotton stopped blooming or blooms were tiny, squares began falling off and bolls were misshaped or broken off at base.

Dr. John Wear, Auburn soil chemist, diagnosed the trouble as boron deficiency and prescribed spraying. The 60 acres were sprayed three times at weekly intervals with 0.2 pound of boron per acre from Solubor. The boron material was mixed with insecticide and sprayed by aircraft. Recovery by mid-August was "dramatic," Wear says.

Current Experiment Station minor element recommendations for Alabama are given by Wear.

Alfalfa—2 pounds of boron per acre per year.

Corn—3 pounds of zinc on sandy soils with pH 6.0 or above.

Cotton—3/10 to ½ pound of boron on sandy soils.

Crimson and white clover for seed —1 pound of boron.

Cauliflower, broccoli, turnips, rutabagas, beets and carrots—1 to 1½ pounds of boron.

Pecans—3 to 4 pounds of zinc per tree on 20-year-old tree showing rosette; 1 pound per tree per year for maintenance.

Alabama Farmer

Boron-Hungry Vegetables Easily Corrected

. . . IN GEORGIA

Boron deficiency which often is detected in winter vegetable crops produced in the Coastal Plain area of Georgia can easily be prevented, according to research results recently published by the Coastal Plain Experiment Station at Tifton.

Associate Plant Pathologist Curtis R. Jackson points out that while boron deficiency is not limited to winter vegetables, it is a more serious problem with vegetables produced in south Georgia during late fall, winter, and early spring.

Affected vegetables include *turnips, cauliflower, cabbage, collard, kale, broccoli* and *spinach*.

A good guide for determining the need for boron in a particular field is the performance of previous crops on that field. The need for boron can be detected by certain symptoms which appear in the growing plants:

1 IN TURNIPS, the first visible symptom is a glassiness or water soaked appearance of the flesh of the root. Affected portions gradually develop into brown or black punky flecks, spots, or streaks.

2 IN CAULIFLOWER, watch for distortion of the leaves surrounding the curd and brown discoloration of the curd which extends internally into the stem. This may be accompanied by internal disintegration resulting in hollow stem.

3 IN CABBAGE, COLLARD, KALE, AND BROCCOLI, early signs are development of brown flecks or streaks in the center of the stem. As the deficiency becomes more acute, the internal stem tissue disintegrates, leaving a cavity surrounded by dark brown or black tissue.

4 SPINACH PLANTS may become pale green, stunted, and tend to lose their upright growth habit.

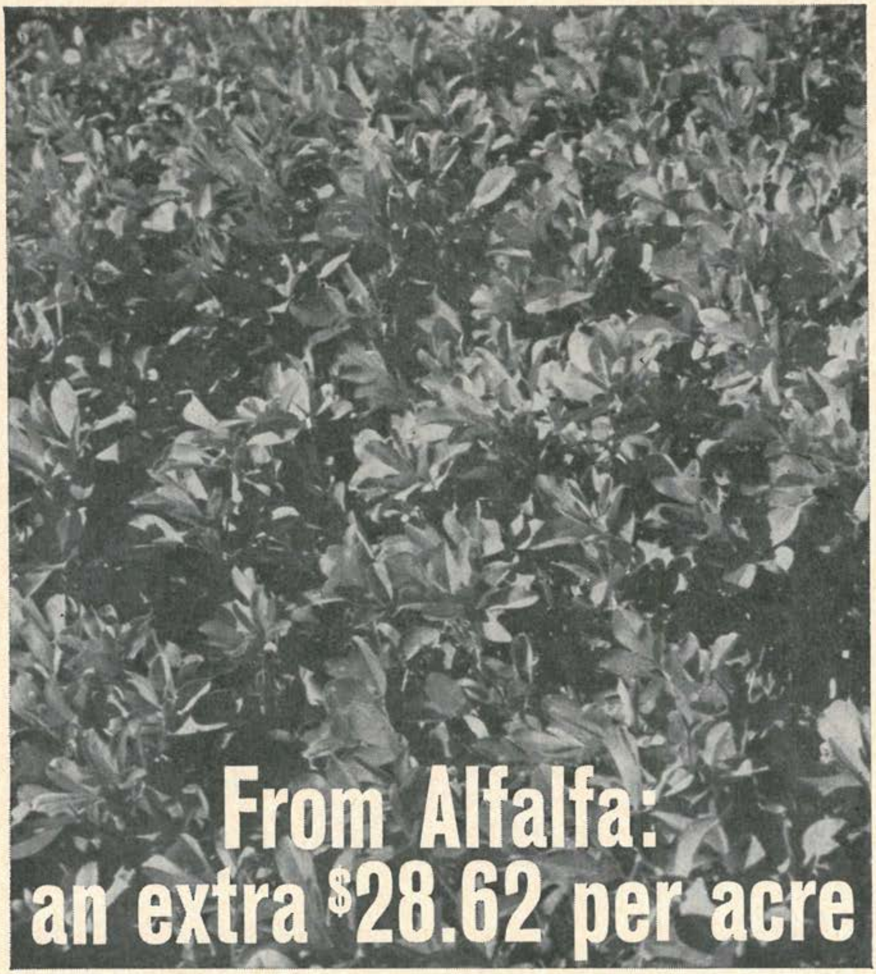
When recognized in early stages, boron deficiency in a growing crop may be corrected by applying one or two foliar sprays of borax at the rate of two to four pounds per acre in 50 to 100 gallons of water. But tests show that advanced boron-deficiency cannot be corrected by sprays.

A second treatment is to apply 8 to 10 pounds of borax per acre to the soil before planting, either with fertilizer or broadcast separately. Sidedressing growing crops with borax is not effective because the boron becomes available too slowly.

Borax should not be applied to the soil unless previous crops or other information indicate a boron deficiency. Plant toxicity may result from applying borax to soils already rich in boron.

Where borax is applied for winter vegetables, a sensitive spring crop should not be planted immediately following a winter vegetable.

Georgia News



Top-dressing alfalfa with borated fertilizer pays for itself—better than 3 times over! In Wisconsin alone, averages for 316 alfalfa demonstrations (with borates added to the mix) harvested from 1955 through 1959, gave these dramatic results:

Treatment	Fertilizer Acre Rate	Acre Yield Dry Matter	Increase Per Acre	Increased Value	Fertilizer Cost Per Acre	Net Profit Per Acre
Top-dressed with 0-10-30B	480 lbs.	8368 lbs.	2970 lbs.	$37.12	$8.50	$28.62
Not top-dressed		5398 lbs.				

Source: Mimeo report, C.J. Chapman, Soils Dept., University of Wisconsin

Millions of acres of alfalfa need applications of the trace element, boron, every year. We offer 4 economical sources of boron—each product designed for special needs. Consult state agricultural authorities for specific amounts of boron to use.

U.S. BORAX®

3075 Wilshire Blvd., Los Angeles 5, California

Outstanding RICE Yields

DUE MAINLY TO INCREASED POTASH RATES AND TIMING OF NITROGEN, FATHER-SON TEAM BELIEVES

Increased potash rates and timing of nitrogen were the main factors Alfred Heeb and his son, Jimmy, Poinsett county rice growers, believe were responsible for their outstanding rice yields last year.

From their 102 acre rice allotment, these men produced an average of 132.9 bushels of Nato rice per acre with an average of 18 percent moisture.

Their total acreage was divided into three fields.

According to soil tests, field 1, consisting of 33 acres, called for a 90-0-60 fertilizer recommendation and had a very low phosphate availability reading. This field had received 40 pounds of phosphate per acre on the two preceding soybean crops.

Field 2 consisting of 65 acres called for a 90-0-60 recommendation based on soil tests also, but the available phosphate range was low rather than very low in this field. On the remaining field with only four acres a 50-0-0 application was recommended.

When Heeb and his son discussed their rice fertilization program for 1962, it was decided that they would handle each field somewhat differently but they would go a little heavy on potash.

Field 1 received 200 pounds and Field 2 received 150 pounds of 60 percent potash. Field 3 did not receive an application of potash.

Field 1, since it tested very low on P_2O_5 received 200 pounds of 16-20-0 applied just ahead of the first flood. Field 2 received 100 pounds of 32 percent Uran before the first flood and Field 3 did not receive any nitrogen. The first flood was applied 2 weeks after emergence.

A second application of nitrogen was applied just ahead of the second flood approximately 50 days from emergence. At this time Field 1 received 150 pounds, Field 2 received 120 pounds and Field 3 received 150 pounds of 45 percent Urea.

Separate yields were recorded from each of these fields. Results from them are as follows:

Field 1—127 bushels, Field 2—135 bushels, and Field 3—132 bushels.

In computing an average fertilization for the 102 acres of rice produced on the Heeb farm in 1962, it is found that an average of 96 pounds of potash was applied preplant.

Considering the 16-20-0 applied to the 33 acre field this would average 14 pounds of phosphate for the total acreage. Nitrogen was applied at an average rate of 31 pounds in the first flood and a 58 pound average in the second flood.

Chemical weed control was planned for these fields, but was not needed. Good emergence and well timed flooding eliminated the need of using chemicals.

Arkansas Farmer

In this state . . .

YOUR $1 BUYS 5 TESTS

. . . for better soils results

THE dollar you spend for a soil test buys five tests, a permanent record, and a lime and fertilizer recommendation. Here's what happens when your soil sample reaches the University of Minnesota Soil Testing Laboratory.

Each sample receives a permanent file number which is stamped on the information sheet and on the bag to which the sample is transferred. The sample is then air dried for about one week and crushed and sieved in a soil grinder. It is then ready for the five individual tests each sample receives.

FOR pH VALUE

According to John Grava, Soil Testing Laboratory supervisor, the pH test, which measures soil acidity or alkalinity, probably tells more about soil fertility than any other single measurement. For this test, a small portion of soil is measured and placed in a paper cup. An exact amount of distilled water is added. After half an hour, the mixture is stirred, electrodes are immersed in it, and the pH value read from a meter.

FOR PHOSPHORUS NEED

The phosphorus test extracts phosphorus from the soil. Solutions are added to the extraction which combine with extracted phosphorus and develop a blue color. Solutions from soil containing little phosphorus is nearly colorless. Soils well supplied with phosphorus produce dark blue extracts. Color differences are compared with a colorimeter, an electronic instrument, to measure phosphorus availability.

FOR POTASSIUM NEED

For the potassium test, soil extracts are passed through a flame photometer. This instrument is so sensitive that a trace of potassium from cigarette smoke causes the meter needle to jump—a reason why no smoking is permitted while testing is underway.

FOR SOIL TEXTURE

The laboratory technician determines soil texture by rubbing moist soil between his fingers. It is the only test which relies on man's judgment and experience rather than an instrument.

As a precaution against any possible error, every 24th sample in the line is a check sample with known test readings. Results of each test are machine punched on a permanent file card, printed on a test report form, and with the sample information sheet, returned to the county agent, who is trained to make fertilizer recommendations.

Average time required for sample drying, testing and reporting is 10 to 14 days.

Minnesota News

FOLLOW THE ARROW

➡

TO ROLES OF POTASSIUM

IN PLANT LIFE

EASY ORDER: PAGE 19

Better Crops WITH PLANT FOOD

AMERICAN POTASH INSTITUTE, INC.
1102—16th St., N. W., Washington 36, D. C.