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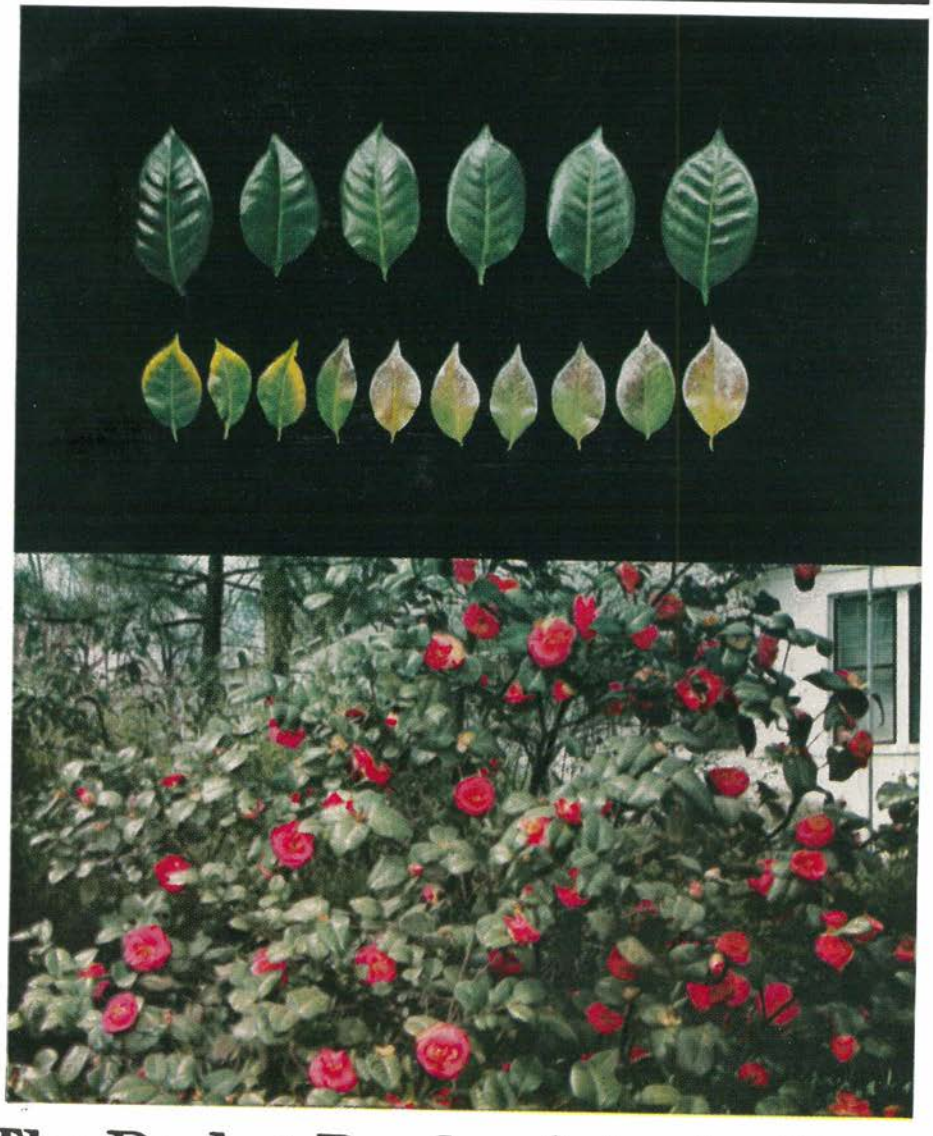

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Better Crops with PLANT FOOD

The Whole Truth—Not Selected Truth

SANTFORD MARTIN, JR., *Editor*

Editorial Office: 1102 16th Street, N. W., Washington 6, D. C.

VOLUME XLI APRIL 1957 NO. 4

ON THE COVER THIS MONTH . . .

. . . Potash hunger in the camellia plant develops often through failure to use one of the recommended camellia fertilizers, discussed by Henry J. Smith in his article starting on page 8. In the top picture, the top row of leaves came from a plant well fed with proper camellia plant food. The bottom row of leaves shows striking signs of potash hunger—very similar to potash deficiency symptoms in other broadleaf evergreens. The leaves first lose their green coloring along the margins and between the veins. Later, marginal firing occurs, a typical step toward advanced potash hunger. These leaves, from a plant grown in Mississippi, were also smaller than those from the properly fed plants.

Some plants growing 8 to 10 feet high develop advanced potash starvation —with stunted leaves and burned margins—due to improper fertilization. In the bottom picture, a healthy camellia bush shows the results of proper fertilization—having been fed by a thin band under the spread of the limbs, with the fertilizer kept away from the trunk and the plant well watered after the plant food was spread. In this issue, Henry Smith interprets the camellia for what it really is—a bush of beauty serving the landscapes of many homes today.

The American Potash Institute, Inc.

1102 16th Street, N. W., Washington 6, D. C.

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". . . won't be long now."

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VOL. XLI WASHINGTON, D. C. APRIL 1957 No. 4

Heroic sources of . . .

Easter Inspiration

Jeff McDermid

(ELWOOD R. MCINTYRE)

WHAT inspiring message does the Easter seal bring to *your* home? Do you know what is being done to make the human flowers of our family garden withstand sad blight—and to help them bloom again?

Too few of us dig deep into the real meaning of Easter and its eternal returns. Many of us just mark it on the calendar as the time we can resume our customary self-indulgence—feeling a bit smug and saintly because of a short spell of petty self-denial.

For most of us, Easter means a fashion parade, a mess of "rabbit eggs" to tickle the toddlers, another frenzied baseball pennant race opener—or the signal to head the "super-six" northward again, after that seasonal surcease from snow and sinus spent in glamorous Florida or the sunny Southwest.

Probably we've overlooked both the happy bluebird of spring and the lily-pure message of Eastertide. Maybe we've quit looking around us to find folks who have built Easter right into their very lives, folks who do not rely upon dime-store decorations or new clothes and cars to keep the Easter spirit with them always.

Keeping a mainspring of courage when the present and the future are murky and "the clouds return after the rain" is notably the heart and

symbol of Easter faith and devotion. Some of our own neighbors—many of them little ones like "Tiny Tim"—confront us with a brand of bravery which congressional medals and 24-gun salutes almost never recognize.

It is reassuring to believe, however, that when disaster strikes and maims us, we, too, may suddenly find we possess a strange undreamt-of spark of that same glorious hope and courage. Yet we need to define it in everyday examples, each one confirming the truth of the Easter seals, for the solace of crippled bodies that hold unconquerable souls! It is good to be in America, where such gracious and rewarding work is being done.

In my hometown—and it could happen in yours—two people who were afflicted since birth with cerebral palsy are happily married, earn their own way, maintain a home and family life and have the respect and good will of their community.

They have two little girls, 6 and 4½, lively youngsters, full of fun and normal chatter. The older girl spent three months in the State University hospital for crippled children and was unable to walk for seven months because of polio.

Earning a living is not usually an easy task for spastic cerebral palsy victims. Their neurological injuries and lack of muscular control generally rule out getting into very many professions and trades. This crippled father takes pride in being able to work a full shift as a maintenance man at the study halls of the University. His work shift is from 4 o'clock in the afternoon to midnight. This enables him to help his wife with some of her household duties and the care of their two daughters.

The brave mother—who doesn't admit she's brave—does all her own cleaning, washing, ironing, and baking; disciplines and trains her daughters in a firm and gentle way. She realizes that the girls can be of great help to her in running the household as they grow older. She has started to teach them the simple chores which make all the difference between an enjoyable home and a mere shelter from the elements.

But these duties are not enough for this remarkable woman to assume. She has always possessed a secret charm of manner that wins the love and confidence of little folks. She found a widower in the vicinity who had a small daughter, so while he is away at his teaching job every day in the work week, this mother keeps his daughter in her home. The little girl remains from 8 o'clock until 5 o'clock p. m. with her daddy bringing her and picking her up at nightfall. So, extending the helping hand for a small compensation means that this handicapped family not only runs its own menage but can "take in" extra duties to benefit others.

Devoted parents, these people spend all their spare time being companions and guides to their daughters. The father happens to have less speech difficulty than his wife, so he takes over much of the reading aloud from favorite juvenile thrillers, and answers the telephone calls.

These disadvantaged people met first at a state recreation and training camp for physically handicapped adults and children. It is maintained by the State Association for the Disabled, by money received from the sale of Easter seals. Do you know of any better way to spend some extra change?

Behind that calm, unruffled spirit facing adversity, as evinced by these capable adults, lies a wealth of training provided for them as children by agencies dedicated to procuring the latest equipment for the handicapped. It's not a program that ends in one generation—this salvage operation for body and soul.

Walter Bill Cash of Clear Lake, Iowa, aged about 5 years, wants to be a "tall corn" farmer. He wants to farm where three generations of the Cash family have, like Hiawatha, wrestled and conquered the green, tasseled maize god, Mondamin.

But for the moment, he's waiting awhile. It's not because his father and mother object to such plans; but rather to the handicap of a paralyzed left leg. It all began with that acute attack of polio, which left him weak and crippled.

His family had been used to accidents and economic reverses. But they were glad their laddie was left alive, and to them the future is a challenge, not a hopeless frustration. They took him to the Easter Seal Center at Mason City.

Here in a bright, colorful, comfortable room, the young hopeful "future farmer" got his first "leg upward" to better health and greater strength. Highly specialized services and devices under sympathetic and skillful physical therapists treated Walter Bill to a course in "come back" science.

Exercises were given to rebuild strength in the sound right leg, maintain muscle nutrition in the paralyzed left leg, prevent spinal curvature, and develop shoulders and arms to make crutches easier to manipulate for such a little fellow. These and the whirlpool baths and stretching stunts were miracles of restoration.

He and 25 other children suffering weakness from polio, cerebral palsy, spina bifida, and muscular dystrophy, were patient patients at the Center.

Mrs. Cash was an intent witness of the treatment, so she might follow up with part of the routine at home. She watched the hip flexions, hip adductions, knee extensions, crutch technique, and some helpful tricyle riding.

Physical treatment was supplemented with social activities at the Hoover School where the disabled kiddies were quartered. You see, children after treatment must be ready and willing to go right back to school and be "good fellows" in community affairs. Those who feel sorry for themselves and shrink from joining the crowd do not develop normally.

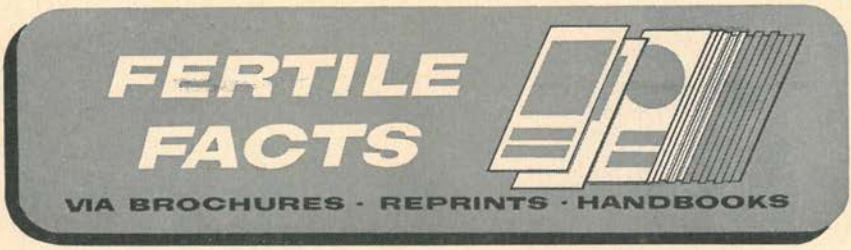
Today, Walter Bill Cash is well on the road to a reasonably normal life, except for activities which require running and high skipping. But, you see, these days a successful farmer seldom has to run very fast to keep up with his work. So this boy's hope of carrying on the family farm tradition is fairly sure to be realized. Already, he feeds orphaned lambs and stock sheep, a large flock of hens, and cheerfully gives Dad a hand with the hogs. There's naught ails his mental capacity, and that's a big factor in farming.

Through it all, come what may, his parents and the Easter Seal Center will always stand by to see that he gets professional treatment and further training, free of charge.

And he's famous besides. As the 1957 National Easter Seal Child, Walter Bill Cash will be an Easter inspiration—a continual reminder of the good work that God has given men the will and the skill to do for the welfare of others.

A BLESSED RATIO

AMERICANS occupy only seven per cent of the world's total land area and comprise only six per cent of the population. But they consume 40 per cent of the world's electric power, three fourths of its automobiles, talk through 60 per cent of its telephones and use up two thirds of its newsprint.



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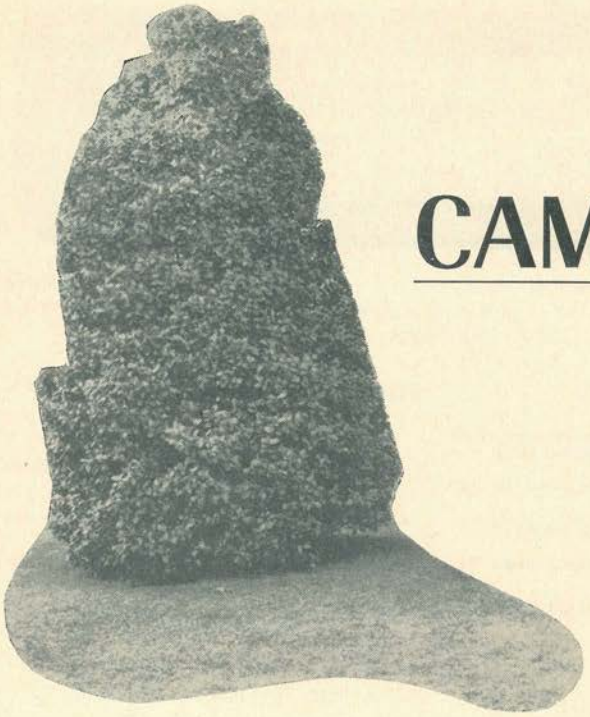

CAMELLIA

...the Bush of Beauty

By Henry J. Smith

Agricultural Extension Service • Mississippi State College

The camellia, named for the Jesuit priest (Kamel), was introduced to America about 1800. It was a popular greenhouse subject in the East, before its widespread use in the South. The plant has come to be associated with gardens of the Old South, often being called the aristocrat of Dixie's shrubs. Camellia japonica, with its many varieties and forms of blooms, is the most popular species. Camellia sasanqua is coming to be a popular shrub, especially for hedge and foundation plantings, since it is somewhat less demanding in culture and a bit more cold resistant. Sasanquas often are used as rootstock for varieties of japonicas. Sasanquas are more tolerant of soils in low areas which stay fairly damp throughout the year. They produce blooms in the early fall.

With their different shades of white, pink, red, and variegated blooms, camellias are considered by many to be the most beautiful of all flowers. The glossy evergreen leaves and handsome profile forms of the plants make them choice landscape subjects. Camellia japonicas are popular choices for the all important corner-accent shrubs

at homes in the lower South. Sasanquas sometimes are used in like manner, as well as for hedges and background screens. To the landscape gardener, the permanent shrubs are far more valuable than the temporary beauty of the blooms. The year-round interest of rich evergreen foliage and cone, semi-cone or rounding shape of the plant are landscape assets.

They are native to woodland areas in which they grow under or among trees. Many experienced growers feel that camellias are most "at home" beneath tall pine trees. In such locations they receive broken sunlight, filtering through the pine needles. The needles also make a natural mulch around the shrubs.

In selecting plants at the nursery, be sure to look for those which are free of insect and disease damage—especially scale. Avoid plants which appear to be stunted, or container-grown plants which have roots that are badly matted in the container. Leaves should be a rich, healthy green. There should be no dead wood, and plants should be compact in growth. If your soil is sandy, wash the clay from around the roots before setting the camellia. Syringe leaves frequently after planting.

When you plant camellias primarily for use as cut flowers, you will probably want to select several of the peony and double types. Semi-doubles, singles and the open or loose-peony types are good choices when the plants are to be used as landscape specimens. The blooms are more showy from a distance. If you are making a hobby of camellias, or if you plan to sell the blooms, choose a succession of varieties of different periods of bloom. There are over 1,300 varieties listed in nursery catalogues, according to H. H. Hume, noted camellia expert. You will want some single, double, semi-double, peony and open-peony varieties.

Plants are roughly grouped according to their blooming periods: early, mid-season, and late. There are varieties that bloom in the fall, some that bloom in the winter, and others that bloom in the spring. For the upper part of the South, varieties that bloom in the fall and spring should be most satisfactory; although, in mild winters, the winter-blooming varieties may produce fine flowers. In the Lower Coastal areas, many of the winter-blooming

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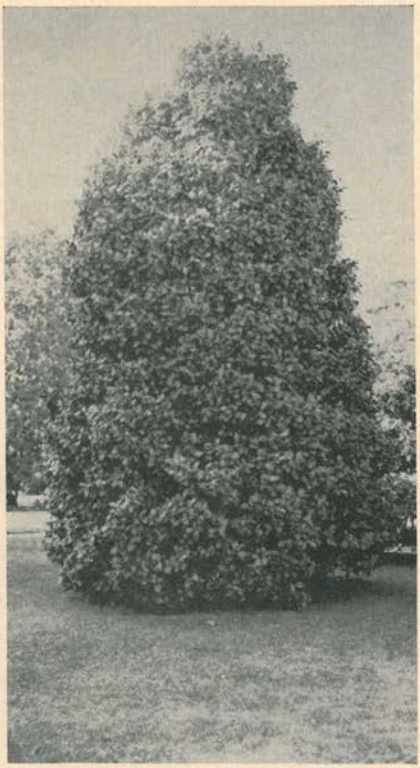


Fig. 1. On well-adapted soils, under ideal growing conditions, some old varieties will grow into camellia trees. This is Cheerful, about 35 years old and approximately 35 feet in height.

and more tender varieties may be grown with success.

Among those varieties which are considered to be hardy are: Sarah Frost, C. S. Sargent, Govenor Mouton, Prince Eugene Napoleon, and William S. Hastie. However, during severe winters, these will suffer cold damage.

Camellias, like azaleas, require an acid soil. It should be well drained, and high in organic matter. The pH should be between 4.5 to 6.0. Well-rotted leaves, (especially oak), leaf mold, peat, and well-decayed stable manure are good materials to mix in the soil for organic matter. At new homes, take care the plants are not placed in soil which contains mortar, concrete, or bricks. Camellias will not tolerate alkaline soil.

If soil is neutral or alkaline, a relatively safe *mixture* for changing the soil to the acid side is a mixture of the following, in equal parts by weight:

Sulphur (325 mesh or "super-fine")
Aluminum sulphate
Iron sulfate
Ammonium sulphate

This mixture may be used at the rate of one to two pounds per 100 square feet. On planted areas, apply mixture to surface and lightly work into soil. On unplanted areas, work mixture deeply into soil. Repeat applications at intervals, until soil reaches the desired pH as determined by testing. Soil for testing should be taken from the zone of root growth about one month after application of acidifying mixture.

No camellia will be better than the hole in which it is set. If possible, dig holes several months ahead of transplanting and fill with rich topsoil and organic matter. The holes should be about three times the size of the root ball to be set in them. You'll need to check ahead and decide on the size plants you plan to buy.

When B & B (balled and burlapped) plants are purchased from a nursery, take care to lift and handle by the ball—never by the stems. To do so may cause damage to the roots. Many camellia collectors advise the transplanting of plants in late fall or early winter.

Fig. 2. Camellias are ideal shrubs for use in accenting corners and doorways, especially at homes of formal architecture. Azaleas are used beneath the windows.

Take care to set plants at the same level at which they were growing in the nursery. This can be learned by examining the bark on the stems in order to determine that section which was beneath the soil line. If the planting hole has not had time to settle, raising the ball about an inch will allow for settling. Do not remove the burlap, but you may loosen it around the top. It will rot away in a few months. As you fill in around the ball with soil, apply plenty of water to drive out air pockets and to insure a close contact between the burlap and soil.

In the upper South, where winter cold often is a drawback to camellias, plants should be set where they will have shelter against winter winds. Often, a permanent windbreak is advisable. When the weather forecast is for severe cold, you can help camellias by building a frame around them. Cover this with old blankets or similar material or weave evergreen branches about the plant. If it is a choice plant near the house, you might run an extension cord to a heat lamp. A red bulb is preferred, since it will not crack in the sleet and rain as will a clear bulb. Place the bulb at a distance from the camellia so that it casts warmth over the entire plant. A step-ladder makes a good stand for the heat lamp. I once saved a heavy crop of flower buds on a Jarvis Red in this way.

When azaleas and camellias die in the winter, we generally blame it on "winter kill." But most of the time it isn't the cold that kills them—it's the lack of water from August on through the fall. They enter the winter low in vigor. If you have some prized plants, be generous with the water in late summer.

Soon after camellias have finished blooming, they should be well fertilized with special camellia-azalea fertilizer, or a commercial mixture of about 4:8:8 ratio. This should consist of some materials of organic source. Many growers like to add a small amount of aluminum sulphate to help maintain the soil acidity. This spring's fertilization is important, as next year's flower buds are set at that time.

Fig. 3. Camellias vary in this form and habit of growth, as can be seen in this hobby collection.

FACTS ON SOME POPULAR CAMELLIAS *

Variety	Bloom Color	Hardiness	Bloom Period	Form of Bloom
Herme	Pink, red and white, variegated	Average	Midseason	Semi-double
Lady Campbell	Red	Very hardy	Midseason	Large, rose form
Alba Plena	White	Tender	Early	Double
Pink Perfection	Light Pink	Average	Midseason	Double
Chandleri	Red-pink and white variegated	Hardy	Midseason	Peony-type
Lady Clare (Empress)	Rose pink	Very hardy	Midseason	Semi-double
Candidisima	White-double	Tender	Midseason	Double
Debutante	Pink	Double-peony	Early-midseason	Peony
Gigantea	Variegated	Average	Midseason	Rose-peony
Purple Dawn	Deep Scarlet	Average	Midseason	Rose
Ville-de-Nantes	(Improved red-white variegated Donckelari)	Tender	Midseason	Semi-double to rose (slow growth)
Professor Sargent	Dark red	Tender	Midseason	Peony (rapid growth)
Victor Emmanuel (Blood of China)	Red	Average	Late	Peony Semi-double
Eugene Napoleon (Pope Pius)	Red double	Hardiest	Midseason	Double
K. Sawada	White-large, flat	Hardy	Midseason	Double
Enrico Bettoni	Pink	Average	Early-midseason	Semi-double
Jarvis Red	Red	Medium	Midseason	Semi-double
Gloire de Nantes	Semi-double cerese	Average	Midseason	Semi-double
Daikagura	Variegated	Fairly hardy	Early	Peony
Col. Firey (C. M. Honey)	Red	Hardy	Late	Double, open center
Sara Frost	Rose	Average	Midseason-late	Double
Lallarabak	Rose, mottled with white	Average	Midseason	Double

* This list is by no means complete. It includes some of the more popular varieties for home growers.

A late feeding will supply plants with food after growth has ceased in the fall. In the upper South, this may be in October; November in the middle South; December in the lower South. This feeding makes food available for roots to take up as they need it in the spring, for the production of heavy growth, and the setting of flower buds for the following season. Many experienced growers now use an incomplete fertilizer for this fall feeding. Such fertilizers as 0-10-10, 0-14-14, 0-20-20, 0-14-7, due to the lack of nitrogen, do not have a growth-stimulating effect.

In theory, the high potash and phosphate of the fertilizer will encourage strong cell structure which strengthens the plants for cold weather. Spring and fall fertilizations should be of about ½ pound for plants which are 2- to 3-feet tall. Plants which are 6- to 8-feet tall will need 4 to 6 pounds per plant. Some growers make a light application, at one-month intervals, following the spring application. This should cease in June.

Apply fertilizer in a thin band under the spread of the limbs. Keep fertilizer away from the trunk and water well after fertilizer is spread.

Dr. Hume recommends the following homemade fertilizer mixture:

10 lbs. sulphate of ammonia
35 lbs. superphosphate
17 lbs. sulphate of potash
28 lbs. cottonseed meal
10 lbs. aluminum sulphate

100 lbs. Total

This formula is approximately a 4-6-8 fertilizer. More than 2½ pounds per 100 square feet should not be applied at any one time.

Camellias have surface-feeding roots which must be protected from drying winds and hot sun. A drought period during summer is a difficult time for camellias. Once roots are injured by excessive drying, it is difficult to bring the plant back to a healthy condition. A mulch tends to warm soil in the winter, and conserves moisture. It helps prevent a crust from forming over the soil. A crust prevents roots from receiving moisture and makes it impossible for them to "breathe."

Materials that pack down into an almost airtight layer should not be used. Perhaps the best mulch is pine straw or needles, as it remains somewhat open for the movement of air. Hardwood sawdust or shavings may be used if nitrogen is added to replace that taken from the soil by such materials. Other popular mulches for camellias are: peat moss, peanut hulls, cotton hulls, vermiculite, and partially rotted oak leaves. Renew mulch each year as it rots. A good covering of mulch around a plant will help to keep out grass and weeds, save time and labor, conserve moisture, and keep the soil in better condition for camellias.

Among the scale insect pests of camellias are: tea, camellia, Florida red, soft-brown, and peony. Tea scale is small but multiplies rapidly; if not controlled, it will cover the underside of leaves. It exudes a waxy material that makes the underside of leaves appear as though they were covered with white fuzz. The upper leaf surfaces have yellow splotches, and the plant is lowered in vitality.

Camellia scale often is mixed with tea scale. It causes devitalized foliage which drops prematurely. Camellia scale is light to dark brown in color and covers a sac-like body which contains the female and her eggs.

Florida red scale appears as round brownish-red scale about the size of a pinhead. When numerous, Florida red scale may be found on the upper and lower surface.

Soft-brown scale attacks both foliage and twigs.

And Peony scale is dark gray or black, almost circular in shape with a high back.

All of the scales can be controlled by thoroughly spraying with a white-oil emulsion, such as Florida Volck, di-

luted at the rate of 2 gallons to 100 gallons of water. An oily spray is needed because of the shield protection of the scale.

The most common disease that attacks camellias is "dieback" or "twig blight." It causes a twig or branch, or even the whole plant, to dry up with leaves intact. Twigs or branches so affected should be pruned back to live green wood and the plant covered with bordeaux or similar spray. It has been observed that healthy plants, in good locations and under proper cultivation, seldom suffer dieback.

Camellia scale is a fungous disease and forms a corky outgrowth on leaves. It is controlled by fungicidal spray. A corky excrescence usually indicates that the root system is suffering from over-fertilization, poor drainage, or a toxic condition caused by some chemical.

During hot, dry weather red spider or mites may attack the foliage of camellias. These pests cause a gray or brownish appearance, particularly along the middle of the leaf. They can be controlled by frequent spraying with water, sulphur dust, or spraying with parathion.

When plant lice or aphids attack new growth, control with a nicotine, pyrethrum, or rotenone dust. Parathion (one tablespoon per gallon of water) is another control.

When using spray or dust on plants, be sure to reach all leaves on upper and lower sides. ◄◄◄

FIVE ADVANTAGES . . . OF A NEW METHOD

AGRONOMISTS report the new band-seeding method for legume-grass crops offers five main advantages:

- **It is generally a sure-fire way of establishing thick, thrifty stands.**
- **Band seeding requires less seed, so farmers can save money.**
- **It provides more effective weed control.**
- **There is greater winter survival of the legume plants.**
- **Band seeding helps promote more complete use of soil fertility by all crops.**

Ohio tests showed band-seeded legumes made a quick, vigorous start in the spring and produced considerably more hay or forage than did conventionally seeded fields.

Band seeding puts every seed directly above a band of fertilizer, where it will be able to take advantage of the plant food soon after germination. Each seedling can grow and develop in an area where the soil fertility is high.

Some farmers report they get best results when they combine band-seeding with plow-down applications of fertilizer. This builds up the soil's overall fertility level and provides nutrients all through the season.

The Editors Talk

OF ORCHARDS AND FERTILIZER

Through the years, this magazine has worked to tell the whole truth—not selected truth—about fertilization. And by the whole truth, we have meant scientific truth—putting the management of soils, of crops, of farm life generally on a scientific basis.

We were glad, then, to learn from a recent *American Fruit Grower* that research in that field "will soon place orchard fertilization on a truly scientific basis." They look forward in the near future to improvements in "ways of determining precisely the tree's needs."

Fruit growers are just now becoming familiar with leaf analysis—to determine how deficient their trees are in nitrogen, phosphorus, potassium, magnesium, manganese, or boron.

"But identifying the troublemaker is not the end," the journal claims. "In fact, it is hardly the beginning."

And then the *American Fruit Grower* lays down some mighty good advice to its orchardmen, steps toward more exact fertilization:

"To make leaf analysis of practical orchard use, a set of standards must be established. The optimum leaf content of each element for best tree growth and production must be determined. Then, too, there may be varietal differences in such levels, or the optimum level may vary from one area to another. These refinements in methods of leaf analysis are being established now.

"Leaf analysis is not the only tool, however, in good fertilization. The grower must combine several guides to get at his specific fertilizer problems. Soil analysis will play a greater role when combined with leaf analysis results.

"Another useful tool is your own experience, or 'sixth sense.' Your observations will tell you where poor color of fruit is chronic, foliage is sparse or 'sickly' in appearance, a good set of fruit rarely occurs, or new growth is short or thin. In other words, you know how your orchard should look. The soil and leaf analyses may then pinpoint the trouble spot."

LIME SURVEY DISCOVERS

BY JOHN FALLOON • EXTENSION SOILS PROFESSOR

UNIVERSITY OF MISSOURI

SEVERAL important questions are asked frequently about the use of lime. Annually, farmers use far less lime (most use ground limestone) than the estimated needs. This is disturbing to producers who seek to find out why. The tonnage used by farmers has leveled off the last few years.

Are they merely neglecting this basic soil treatment? What effect has the quality of limestone (purity and fineness) available to farmers on the results obtained from it's use and the farmer's willingness to buy it? These and many other related questions are hard to answer.

One approach used in Missouri this past fall was a *field survey.* The survey consisted of six steps:

1. The selection of 20 counties scattered over the state. (See Figure 1.)

2. Random selection of 50 farms in each of the 20 counties.

3. Enlisting from 10 to 30 voluntary leaders in each of the 20 counties to make the survey.

4. A one-half day leader training meeting in each of the 20 counties to prepare the leaders to make the survey.

5. The actual survey involved going over every field (cropland and pasture) on each of the 50 farms.

6. Summarization of the information obtained.

STRIKING NEEDS

John Falloon, extension specialist in soils at the University of Missouri since 1945, does general soil fertility work all over the state. He was a county agent in Osage County from 1934 to 1936 when he moved to the state extension office to work in conservation and as a state agent until 1945.

Fig. 1—Twenty counties were chosen, shown here in black, well scattered over the state.

Each field was given a rating using one of four classes—"good," "fair," "poor," or "bad." A brief description of the classes follows:

GOOD—Lime situation satisfactory now and can be expected to remain so for the normal length of life of a limestone application.

FAIR—Lime situation satisfactory for probably two years (particularly for non-legumes) but with heavy use of N, P, K and high yields, an addition of lime will be needed in the near future. Desirable to lime now ahead of legume seedings expected to stay for several years.

POOR—Shows need for lime now for best response to applied fertilizers and efficiency of other plant nutrients. Definitely needs lime for legumes.

BAD—Situation definitely shows lime a limiting factor for any kind of production.

The record form used by the leaders in making the survey is shown in Figure 2. A soil sampling tube was used to take a sample of soil 7-inches deep. Some of the soil from a 1-inch depth was put in a spot plate. Then some soil from a depth of 3 inches was put in the adjoining spot plate depression. This was repeated for the 5-inch and 7-inch depths.

LIME SURVEY

(County)

Made by

(Community)

Name Address

Farm Location No. of Fields

Field No.	Acres	Cropland / Pasture	Description	1"	3"	5"	7"	RATING (Good-Fair-Poor-Bad)	Yr. Limed	Tons/A.	Soil Test (Yes or No.)
	a.										
	b.										
	a.										
	b.										
	a.										
	b.										
	a.										
	b.										
	a.										
	b.										
	a.										
	b.										
	a.										
	b.										
	a.										
	b.										

Figure 2. The record form used by the leaders in making the survey.

Brom Cresol Purple was added from a plastic squeeze bottle to each and read according to a color chart which indicated the pH and base saturation as shown in Table 1.

Table I Soil Acidity and Base Saturation

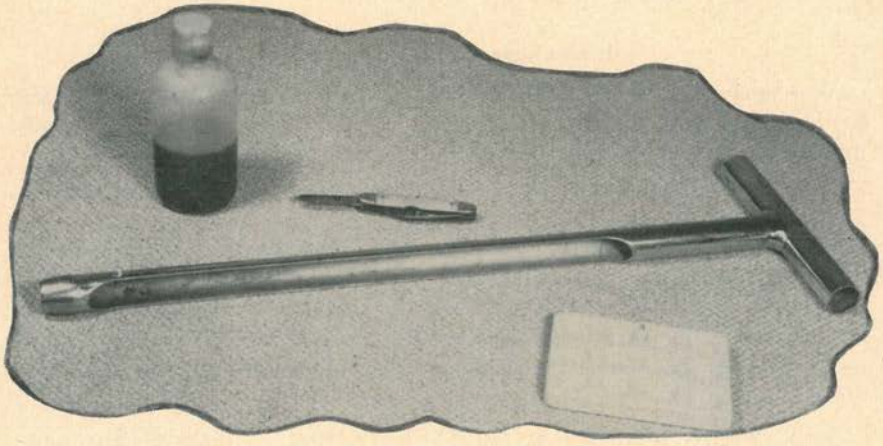
RANGE						
	pH	−5.2	5.2—5.4	5.5—5.9	6.0—6.4	6.5+
	% Base Saturation	−65	65—69	70—79	80—89	90+

The combination of colors at the four different depths was considered in rating the field. Two different soil samples (a. and b.) at different locations were taken in each field. The field was rated on each sample separately. If the two samples gave the same rating, the sampling was considered representative of the field. If the rating was different on the two samples, further samples were taken to determine the true rating of the field.

Previous Treatment

A history of limestone use was recorded whenever possible. This included the year or years limed and the tons applied each time. Another point shown was whether the application rate was based upon a soil test.

In some cases the history was unknown to the present farm operator. This largely accounts for the "unknown" shown in the table giving survey results.



Equipment Used—Soil sampling tube, spot plate, knife to transfer soil from sampling tube to spot plate and plastic squeeze bottle containing Brom Cresol Purple.

Findings

Some of the results of the survey are shown in Figure 4. The various items are reported in three columns. One column gives the average for all counties. Since there is considerable variation from county to county, the low county is shown in one column and the high in another. Of greatest importance is the individual county figures to the farmers of that county and the limestone producers who serve that county.

For all practical purposes, one fourth of the cropland is now in each of the four categories—"good," "fair," "poor," or "bad." Yet one county has only 8% of it's cropland in the "good" class. This in itself may not be so startling, but the shocking thing is to look at the whole picture for this particular county. Also, only 10% rates "fair," but 13% is "poor," and 69% "bad."

The pastureland certainly is worse off for lime than cropland. Only one third of it falls in the combined classes of "good" and "fair" and two thirds "poor" and "bad."

Farmers have limed about two thirds of their cropland and one half of their pasture. In the area of the greatest lime needs, around 80% of the cropland has been limed with one county having limed 91% of it's cropland. The low county with 22% limed is the county referred to above with only 8% rating "good" and 69% "bad." The tendency in that area has been to pay relatively little attention to lime but to use lots of fertilizer.

The most challenging discovery is that one third (39%) of the cropland already limed still needs lime and nearly one half (45%) of the pastureland is in the same shape. Some of these fields were limed many years ago and now need it again. In other cases, the farmer thought he had the job done—but hasn't. Maybe he didn't use enough—even of good limestone. But apparently the big reason is poor-quality limestone—in purity and fineness of grind.

Effect Upon Future Lime Use

Widespread publicity and discussion of the survey findings promise to force quality improvements and stimulate limestone applications greatly.

Of greatest value is the 10 to 30 leaders in each surveyed county who have seen the situation firsthand. They have seen limestone put on top the ground vs. that worked into the soil. They have seen the effect of one lime application as compared to fields limed more than once. They have seen some farms with a few fields limed several times and other fields on the same farm not limed at all. They have seen poor spreading effects. They have seen the influence of coarsely ground limestone and other things.

Some of these leaders were good farmers, some fertilizer dealers, some limestone producers and distributors, and a few were G. I. teachers. This group can and will move the lime program.

SOME RESULTS OF THE SURVEY

SITUATION	PERCENTAGE IN EACH CLASS OF COUNTIES		
Cropland	Average of All Counties	Low County	High County
Good	23%	8%	46%
Fair	24%	10%	32%
Poor	22%	11%	41%
Bad	31%	10%	69%
Pasture			
Good	9%	0%	28%
Fair	24%	10%	48%
Poor	28%	12%	52%
Bad	39%	12%	72%

WHAT HAS BEEN DONE	PERCENTAGE IN EACH CLASS OF COUNTIES		
Cropland	Average of All Counties	Low County	High County
Limed	64%	22%	91%
Unlimed	26%	8%	75%
Unknown	10%	1%	22%
Pasture			
Limed	45%	10%	69%
Unlimed	41%	9%	90%
Unknown	14%	0%	32%

NEEDS LIME NOW	PERCENTAGE IN EACH CLASS OF COUNTIES		
	Average of All Counties	Low County	High County
Previously Limed Cropland	39%	15%	58%
Previously Limed Pasture	45%	13%	78%

Fig. 4

"FROM $2 TO $5 . . . FOR EVERY $1 INVESTED"

THE Middle West Soil Improvement Committee points out that extra profits from fertilizer use can help farmers pay for comforts and conveniences they and their families desire.

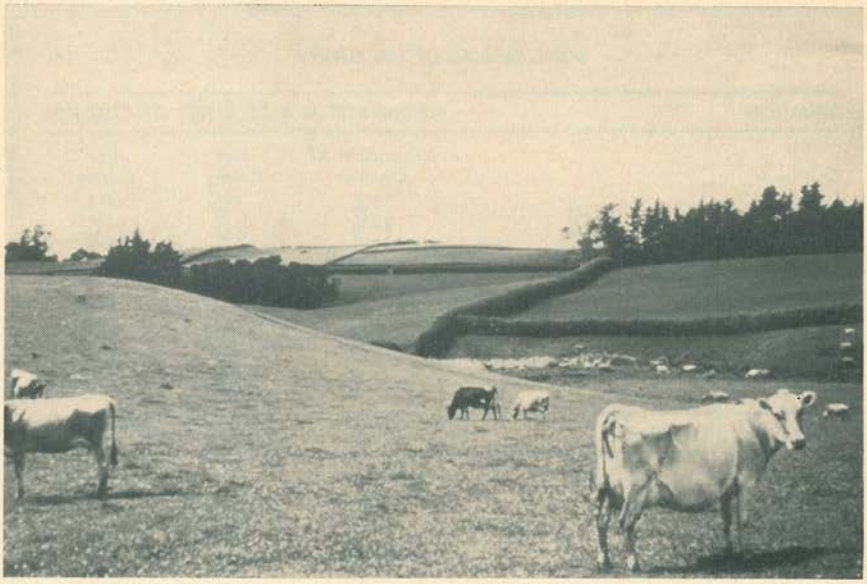
Tests at agricultural colleges and field experience on farms, says the committee, show that fertilizer can return anywhere from $2 to $5 in increased crop production value for every dollar invested in plant food.

The extra dollars can help farmers buy new cars, tractors and equipment, new furniture, rugs and drapes, labor-saving electric kitchens, more plumbing or new refrigerators, the committee declares.

"That makes prosperity for local merchants and for business generally," says the committee, "and it all springs from intelligent use of fertilizer.

"When a farmer invests in crop-boosting items such as fertilizer, he cuts the cost of production for each crop unit and he increases his profit margin.

"Soil building investments usually pay back the very first year in increased crop yields. And after that, the farmer has carry-over profits in future years from bigger crop yields per acre on more fertile soil."



Filled with hedge fences . . .

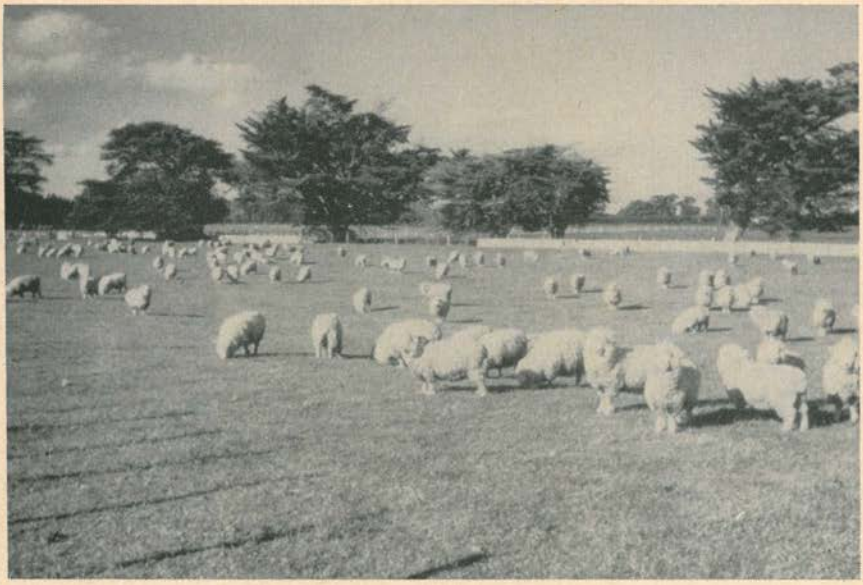
GRASSLAND

GREEN PULSE

OF

NEW ZEALAND

R. E. Wagner, head of Agronomy at the University of Maryland, is a native of Kansas . . . earned his B.S. at Kansas State . . . his M.A. and Ph.D. at Wisconsin . . . and before Maryland, headed the Western Pasture and Range Project of the Agricultural Research Service at Beltsville, Md.



. . . and high stock density

BY R. E. WAGNER DEPARTMENT OF AGRONOMY

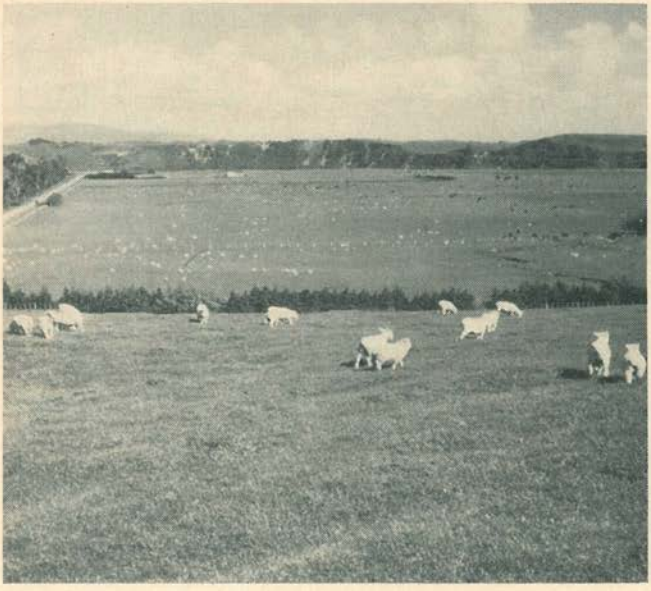
UNIVERSITY OF MARYLAND

For anyone interested in grassland farming, a trip to New Zealand can fulfill a long sought ambition. This good fortune came to about 35 individuals from the United States along with grassland workers from other countries. The occasion was the Seventh International Grassland Congress held in November of 1956 at Palmerston North, New Zealand. Most of those attending toured the country following the Congress.

Grasslands Basic To Entire Economy

No other nation in the world depends so heavily on grasslands for its total economy as New Zealand. Farming, largely a grassland agriculture, produces 97 per cent of the value of all exports. The importance of this external trade to New Zealand's prosperity is emphasized by two facts: that there is little industry in the country, that few mineral resources have been discovered apart from some coal and gold.

New Zealand has only 2 million people, roughly the number in the Washington, D. C. metropolitan area. The two main islands, the North and the South, cover an area equal to New York, Pennsylvania, and New Jersey. Of the 43 million acres oc-



New Zealand is the world's largest exporter of dairy products and of carcass meat . . . second largest exporter of wool . . . grown largely on grasslands that cover the nation like a carpet.

New Zealand dairymen dividing their pastures into of 2 to 4 acres each . . . two on each area.

cupied, 31 million are in pasture of various types and only 1 million acres are in annual crops.

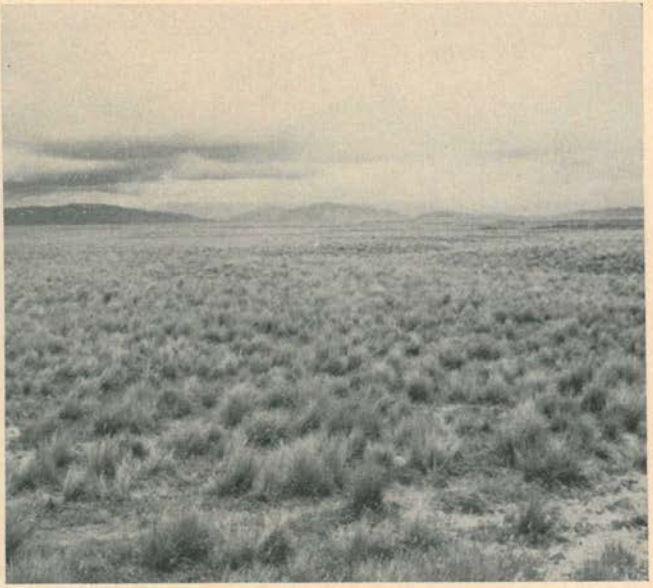
Small though it is, New Zealand has become the world's largest exporter of dairy produce and of carcass meat, and the second largest exporter of wool. It is populated with nearly 40 million sheep, 2 million milking cows, and 4 million other cattle. For every man, woman, and child in New Zealand, there are about twenty sheep, a milking cow each, and two other cattle for every person. Compare this to the United States where there are just a little over 30 million sheep for a human population of approximately 170 million.

In a country where agriculture is so all-important, it is not too surprising to find nearly everyone can talk farming. The cab driver, the grocery clerk, the barber, the hotel manager, the man on the street, all, are deeply interested in grassland farming—and usually very conversant with the subject. To one arriving by air in Auckland of the North Island in the spring, New Zealand looks literally like a carpet of green grass dissected with hedge fences and supporting high stock density. This impression is essentially correct of much of the North Island and parts of the South Island. The higher, drier tussock or bunch grass country is not so green and is less productive.

Meat, Milk, and Wool from Grassland Alone

The most amazing feature of New Zealand agriculture is that meat, milk, and wool by the millions of pounds are produced on grasslands—and

control their grazing . . . subten or more individual paddocks with cows grazing only a day or



Tussock or bunch grass covers over 13 million acres . . . where wider extremes of rainfall and temperature, higher elevation, and less desirable species affect the pasture picture.

grasslands alone. Only rarely is grain fed to livestock, even to high producing milk cows.

New Zealanders are making very effective use of their grasslands. Some farmers in the North Island report year-round carrying capacities of one dairy cow per acre and butterfat production from 350 to 400 pounds per animal—or per acre. Carrying capacities of 6 to 8 sheep per acre were observed on several occasions.

This production is being obtained without a bit of concentrate supplement in most cases. Indeed, it is quite thought-provoking to see firsthand 350 to 400 pounds of butterfat per acre or per cow being produced without so much as a mouthful of grain. Very few livestock in New Zealand would know what grain is if it were placed before them.

New Zealanders, of course, have several things working in their favor, including favorable climate and soil which produce a relatively uniform growth of nutritious forage throughout the year. Rainfall in the North Island, generally, is distributed uniformly at three to five inches a month. Combined with this are temperatures favorable for grass-legume production. Most dairying is carried on in the North Island. Winter housing of stock is unnecessary.

The Tussock Grassland

But all of New Zealand is not so fortunately endowed with this favorable combination of rainfall and temperature. The so-called tussock or bunch grass country totals over 13 million acres and is characterized by relatively low rainfall, higher eleva-

Saving surplus growth as hay or silage is considered good insurance for days when grazing alone will not provide adequate feed in certain months. The acreage cut for hay or silage has grown five-fold during the past 30 years. The most amazing feature of New Zealand argiculture is that meat, milk, and wool, by the millions of pounds are produced on grasslands—*and grasslands alone.*

tion, wider extremes in rainfall and temperature and less desirable species. Considerable effort is being devoted to improve this type of country, primarily in the South Island.

By New Zealand standards, problems in these areas are considered quite difficult. However, compared with much of the range in the United States where considerable progress has been made and a good deal of effort is being expended for further improvement, there is good potential for increasing production of the New Zealand tussock grassland country.

Much of this tussock region receives from 20 to 25 inches of rainfall. Only at the higher elevations is the range of the western United States blessed with this much precipitation. Averages of 10 to 15 inches or less are much more common.

Nevertheless, there is still a great deal of hill land and other country in New Zealand with even greater potential than the tussock grassland offers. It would seem logical to concentrate first on these areas, and then as pressure for more land increases, to give greater attention to the tussock.

Controlled Grazing for Efficient Utilization

Now let's turn again to these nearly 18 million acres of sown pasture, the heart and core of the productive grasslands of New Zealand. In these areas, climate and soil are favorably com-

Topdressing rough terrain, too rough for land machinery, often requires airplane application. It has been said the coming of topdressing in 1949 marked the most important milestone in New Zealand's grassland history . . . the practice of topdressing started around the turn of the century . . . in 1930, the total area topdressed covered just over 3 million acres . . . by 1950, 5 million acres . . . by last year, nearly 10 million acres.

bined. What other factors may account for this high output from grassland alone?

New Zealand dairymen are unusually conscious of the importance of grazing management. Their system is to utilize the maximum of herbage by grazing and to reduce to a minimum the need for conserved forage, such as silage or hay.

It is common practice to subdivide pastures and to closely control grazing. By so doing, it is possible to graze efficiently and to save growth from the late autumn and early winter for grazing in the late winter and early spring. Many dairymen have from ten to thirty individual paddocks. About twenty would probably be close to an average number. Size of paddocks vary somewhat, but two to four acres are rather common. Cows are normally grazed only one or two days at a time on any one area and then rotated to fresh grass—a system commonly referred to as paddock grazing or strip grazing.

Hay and Silage for Insurance

Saving of surplus growth as hay or silage is well recognized as good insurance for the time when grazing alone will not provide adequate feed during all twelve months of the year. The acreage cut for hay or silage has grown five-fold during the past 30 years.

To find such great silage losses in

a well-developed grassland country like New Zealand surprised many of us. Trench silos are used primarily with stack silage not uncommon. Losses are frequently as high as fifty per cent.

The factor primarily responsible for such losses is the failure to pack the silage effectively. One could walk on a trench silo after the filling job had been completed and sink in nearly to his knees. Much of the silage is so loosely packed that high losses would be expected. Great improvement can be made in this field. Undoubtedly, less attention has been given to silage making in New Zealand than in other countries where prolonged winter feeding periods are frequently necessary.

Ryegrass-White Clover Most Common

Another thing that impresses the visitor to New Zealand is the almost universal use of ryegrass-white clover mixture in improved pastures. For most situations it is doing a good job, but many New Zealanders feel other species should be more fully investigated. In some areas, interest is growing in such species as orchardgrass, Phalaris tuberosa, subterranean clover, and alfalfa. In the sub-tropical northern region of the North Island, dallis grass is noted for its excellent summer production. Research on superior strains of grasses and legumes has been under way for several years and is being pursued with increased vigor.

Aerial Topdressing—An Important Milestone

Very little potash or nitrogen is used on grasslands of New Zealand. Presumably, potash is not yet a critical need except in a few instances. Nitrogen is expensive—just about twice its cost in the United States—and every effort is made to have white clover produce the needed nitrogen.

The usual recommendation is two to three hundredweight per acre annually of superphosphate. This, together with some lime, is the basis of nearly all fertilizer recommendations. This recommendation *with little deviation* is so common throughout much of the country that the question arises: have pasture fertilization practices become over-standardized in New Zealand? It is true more lime is recommended in some areas than in others, and in certain local situations sulphur, molybdenum, and cobalt are recognized as needs. As in our own country, effective research programs on pasture fertilization, soil fertility, and soil chemistry seem in order.

The rise of topdressing from a minor to a major factor in grassland farming has stimulated increased production in New Zealand. The practice started just before the turn of the century. In 1930, the total area topdressed amounted to a little over 3 million acres. By 1950, the acreage had reached more than 5 million. During the past year, nearly 10 million acres were topdressed.

Using the airplane has nearly doubled the acreage topdressed annually during the past six years. It has been said the coming of aerial topdressing in 1949 marked the most important milestone in New Zealand's grassland history. Many areas that formerly were impossible to fertilize because they were too rough for land machinery operation, can now be fertilized. Last year about half the total area topdressed was by airplane. New Zealand is currently in a leading position in the use and development of aerial topdressing.

Let's Take a Page from Their Book

Can we profit by heeding the examples set in grassland farming by our New Zealand friends? Without question much can be learned from them. Foremost among the lessons is that we in the United States should make more

and better use of our grasslands.

Some of us have held this feeling for quite a time. Making greater, more efficient use of grasslands than is now commonly practiced would cut the cost of so much expensive concentrate feeding. To have seen firsthand such a thing working so effectively is most convincing.

We, of course, need not and should not ever expect to go as far in this direction as the New Zealanders. Grain is more readily available in the United States to supply the energy that high protein forage sometimes lacks. It would be expecting entirely too much to think that we could divorce all of our milking cows from grain and turn them entirely on grass throughout their life span. This can be and is being done in New Zealand.

Nevertheless, in the United States far too many dairymen are feeding relatively high amounts of grain even when high quality pasturage is available in abundance. Pasturage is cheap and it is high quality feed. It should be used to its maximum with grain feeding reduced to a minimum, especially when pasture is available in quality as well as quantity.

This is probably the best opportunity at the disposal of the livestock man to introduce more efficient, more economical production in his operation. More milk, meat, and wool produced on grasslands can mean greater net profit to the producer and a product at less cost to the consumer.

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DUE TO LUXURY INTAKE

Frequent potash treatments on ladino and orchardgrass are much better than infrequent heavy applications, according to tests at the University of Connecticut. This is true mainly because of luxury intake—ladino and orchardgrass take up more potash than they can use.

SOIL TESTING

A

Guide to Fertilizer and Lime Needs...

By Clarence M. Wilson

Agronomy and Soils Department • Alabama Polytechnic Institute

THE job of the fertilizer manufacturer and of those people engaged in teaching proper use of fertilizers is made easier when the number of ratios offered for sale is kept to a minimum for a state or a region.

Based on data from field experiments and from soil tests, the Alabama Polytechnic Institute Experiment Station recommends the following ratios and minimum grades for Alabama farmers:

Ratio	*Minimum grade*
1:1:1	8-8-8
1:3:3	4-12-12
1:4:2	4-16-8
1:2:4	4-8-16
0:1:1	0-14-14
0:2:1	0-16-8
0:1:2	0-10-20

In addition to the above, grades recommended for special purposes include:

4-12-12 (For tobacco with majority of potash as potassium sulfate and containing not more than 2.5% chlorine)

8-8-2 (For fish ponds)

14-0-14 (Sidedressing material where both nitrogen and potash are desired.)

Because of the soil and climatic conditions in Alabama, much of the nitrogen is applied as a sidedressing. Thus, the ratio of P_2O_5 to K_2O is the major concern in mixed fertilizers. Field experiments for the various crops grown on the major soil types of the State have shown that P_2O_5:K_2O ratios of 1:1, 2:1, and 1:2 will meet all needs.

Soil tests correlated with field-crop response indicate which of these ratios is needed for each field. A summary of soil-test data from over 19,000 soil samples tested during the period 1953-55 indicates the relative need for the various ratios in each soil region and for the State average. (See Table I.)

In spite of the fact that soil tests show a need for even P_2O_5:K_2O fertilizers in 75% of the cases tested, only 16% of the mixed fertilizer sold in Alabama during 1954-55 was of that type. Fertilizers with high P_2O_5:low K_2O ratios made up 82% of the sales.

Clarence M. Wilson, Alabama native, earned his B.A. and M.A. degrees from the Alabama Polytechnic Institute in 1940 and 1942. After Army service, earned Ph.D. in soil chemistry from N. C. State . . . to go on and become soil chemist in charge of the Soil Testing Laboratory in the Agronomy and Soils Department of Alabama Polytechnic Institute.

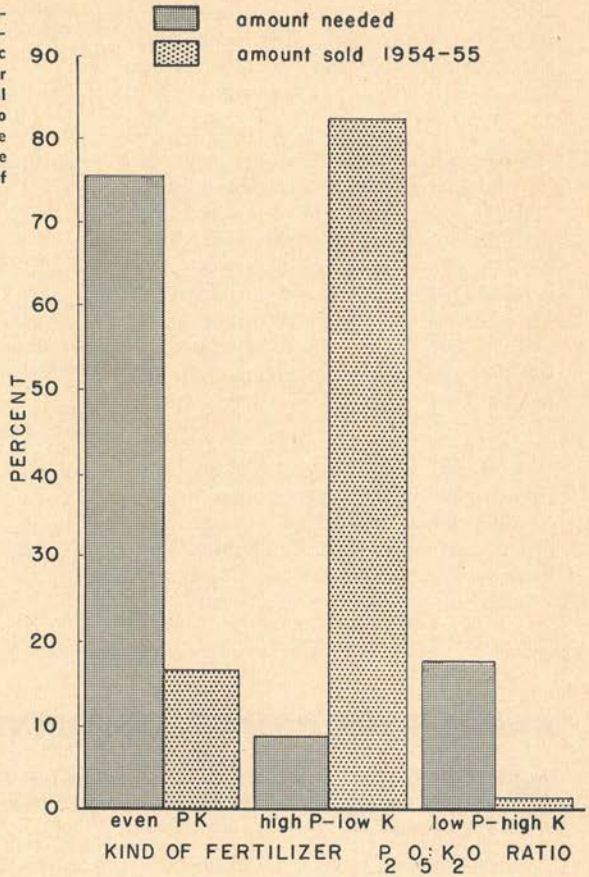

Fig. 1. Comparison of fertilizer needs according to soil tests and fertilizer use according to 1954-55 fertilizer sales.

The major portion of these sales were 4-10-7 and 6-8-4. As long as low-analysis goods selling for a low price per ton are on the market, they seem to make up the bulk of sales regardless of how well they fit the need for plant food. This would seem to indicate that the public has not been taught to think in terms of pounds of plant nutrients rather than simply pounds of fertilizer.

When Alabama soils are first cleared, soil tests generally show very low amounts of available phosphorus but medium to high amounts of potash. Hence, the high P_2O_5:low K_2O fertilizers fit the soil need. However, over a period of years of fertilization, phosphorus continues to build up in the soil while potash is being depleted. This change in fertility brings a need first for even P_2O_5:K_2O fertilizers and eventually for low P_2O_5:high K_2O goods. Periodic soil tests are the only practical means of keeping track of fertility requirements.

In addition to measuring the fertility level of soils, soil tests are a necessity for determining lime needs. A summary of soil-test data for the period 1953-55 showed a pH of 5.5 or less for 34% of the samples tested, 6.0 or

less for 75%, and greater than 6.0 in only 25% of the cases. For most crops the desirable pH range is from 6.0 to 7.0.

The annual use of liming materials in Alabama amounts to approximately 200,000 tons, while the estimated annual need is about 1,000,000 tons. The use of soil tests to demonstrate this need should do much toward increasing the use of lime. Without such tests farmers have no way of knowing whether lime is needed for an individual field.

A sound soil-testing program has come to be an important factor in increasing farm production through the proper use of fertilizers and lime, and more and more farmers are taking advantage of this service each year.

TABLE I.—SUMMARY OF SOIL TESTS ACCORDING TO P_2O_5:K_2O RATIOS NEEDED

Soil Region	Percentage of tests according to P_2O_5:K_2O ratios		
	Even PK*	High P–Low K**	Low P–High K***
Limestone Valleys	79	10	11
Sand Mountain	79	6	15
Highland Rim	83	9	8
Piedmont	75	12	13
Black Belt	71	25	4
Coastal Plains	73	6	21
State Average	75	8	17

* Examples of recommended grades are 4-12-12, 8-8-8, or 0-14-14.
** Examples of recommended grades are 4-16-8 or 0-16-8.
*** Examples of recommended grades are 4-8-16 or 0-10-20.

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CARRY-OVER POWER...RETURNS EXTRA PROFITS

MIDWESTERN agronomists report that fertilizer's carry-over power can return extra profits for several years after the plant food has boosted crop yields and income the first year.

In Minnesota tests, fertilizer boosted corn yields 18 to 21 bushels per acre the first year and then its carry-over power increased oat yields from 15 to 40 bushels per acre the second year.

In Wisconsin, a 60-bushel increase in grain yields the first year from fertilizer use was followed in the next two years by increases in hay yields of 2 tons per acre.

Iowa agronomists report that there is a considerable carry-over of nitrogen, phosphate and potash when the amounts of each nutrient applied the previous year are about 40 or more pounds per acre.

The average carry-over of nitrogen applied to corn can run about 25 per cent on silt loam and heavier textured soils, the Iowa specialists say.

Phosphate carry-over can be as much as 40 to 60 per cent on many soils from an application of 40 to 70 pounds of phosphate to corn the previous year.

The carry-over of potash from corn and small grains can average up to 60 per cent when crop residues are not removed from the soil. The Iowa soils men figure the removal of the straw cut the carry-over to about 40 per cent. Removal of the stover in corn reduces the carry-over to about 30 per cent.

FOUR WAYS OF KEEPING

YOUR SOIL

IN TOP PHYSICAL SHAPE

FOUR ways to keep your soil in top physical and chemical shape for high crop yields are recommended by agronomists serving mid-western agriculture:

- **Provide the soil with well-balanced supplies of plant nutrients to feed the growing crops. Mixed fertilizer can supply the needed nutrients.**

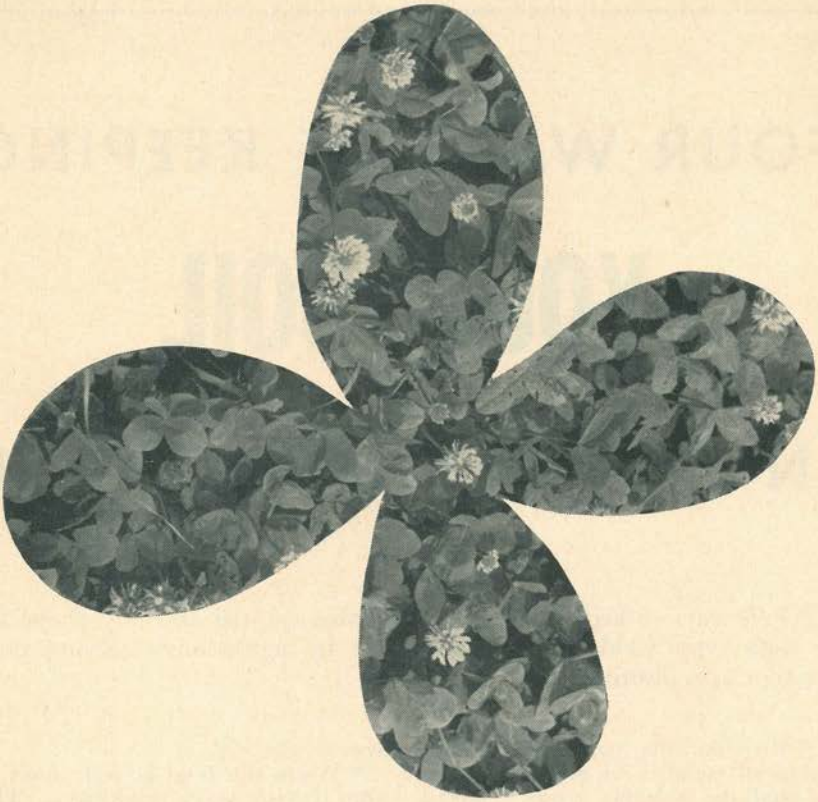
- **Build and maintain the soil structure and improve its drainage by regularly adding active organic matter. You can do this by plowing under well-fertilized legumes and putting back manure and crop left-over in the soil.**

- **When the land is wet, don't go onto it with heavy machinery. This will make the soil tight and compact and choke off air and moisture.**

- **Don't work the soil too much. Too much discing and harrowing can tighten the soil. If you do a good plowing job in the first place, once-over tillage can often produce the best crops.**

When your soil is in top physical shape, crop roots will have an easier time foraging for nutrients, the agronomists say. A well-aerated soil, too, will increase the release of nutrients—particularly potash—from the soil.

The soil will soak up more water from rains and snows in the fall and winter when you improve the soil structure. This is particularly important, because fall and winter are the seasons when subsoil moisture reserves are replenished.



By R. C. Wakefield

Department of Agronomy • University of Rhode Island

LADINO clover is recognized by farmers as one of the most desirable pasture plants. The superior feeding qualities of the crop are well known. It is high in protein, minerals and vitamins, remains highly palatable throughout the growing season, and recovers rapidly after mowing or grazing.

The spread of this legume over the humid regions of the country during recent years reveals its value. The problem of maintaining productive stands of ladino clover, particularly in mixtures with grasses, has been an important factor in limiting even wider use of this legume.

Performance of ladino clover is affected by many imposed or natural factors that influence the growth rate. Among these factors are cutting or grazing management, fertilizer use, soil and climatic conditions. Legumes are particularly sensitive to adversity and ladino clover is no exception.

Recent research has resulted in a

MODERN PLANT FOOD AFFECTS LADINO CLOVER ITS YIELDS & PERSISTENCE

better appreciation of the role of cutting or grazing management on the persistence of ladino clover in pasture mixtures (4), (14), (16). Additional research has demonstrated the necessity of supplying sufficient quantities of needed fertilizer elements throughout the growing season (3), (8), (9), (10), (15). To maintain productive stands of ladino clover, a combination of careful grazing management and adequate fertilizer usage is generally needed.

A review of grassland fertilization experiments in the Northeast (12) reveals that response to lime, phosphorus, and potassium varies greatly. This is understandable because of wide variations in organic matter, pH value, and available minerals necessary for plant growth in soils of the Northeast (13). Data from the Midwest (9) show phosphorus is generally the first limiting factor in growth of pasture legumes. Response to potassium was greatly increased when plant requirements of phosphorus had been met.

Applying lime is generally recognized as the first step in pasture improvement. Lime needs of the various crops differ widely but legumes in particular require relatively large amounts of calcium for thrifty growth (3), (9), (12). Minor elements, particularly boron, are occasionally found to be lacking.

Whether readily available in the soil or supplied in commercial fertilizer, potassium is reported to be a key element in maintaining successful stands of legumes (3), (5), (9), (10), (12), (15).

In an experiment recently completed at the Rhode Island Agricultural Experiment Station, the effect of various rates of phosphorus and potassium on establishing and producing ladino clover was investigated. The soil, a Bridgehampton fine sandy loam, was very low in pH and fertility, having been recently reclaimed from brushland.

In preparing the seedbed, 3 tons of ground limestone per acre were required to raise the pH from 4.6 to approximately 6.2. Various amounts of phosphate and potash ranging from 0 to 240 pounds of each per acre were applied prior to seeding.

As shown in Figure 1, a substantial increase in yield was obtained with 30 pounds per acre of P_2O_5 when potash was also supplied. An additional 30 pounds of P_2O_5 resulted in a highly significant yield response. No increase in yield was obtained with 120 pounds. The high rate of 240 pounds resulted in a small increase although this must be considered uneconomical.

The value of large infrequent applications of phosphate versus small annual increments each year has received some attention (10), (11). Results with pasture grass in particular have favored the infrequent use of phosphate. Results with legumes are less conclusive. To determine the residual effect of a large initial application of phosphate on yields of ladino clover, a comparison was made with small increments applied each year. Results showed 120 pounds of P_2O_5 applied only at seeding was considerably less effective than 60 pounds per year for 2 years or 30 pounds per year for 4 years (see Table I).

Ladino clover, it may be concluded, requires annual applications of phosphate for best performance, particularly on soils of high phosphorus fixing capacity.

Additional research on this problem showed that drilling of superphosphate in bands 7 inches apart

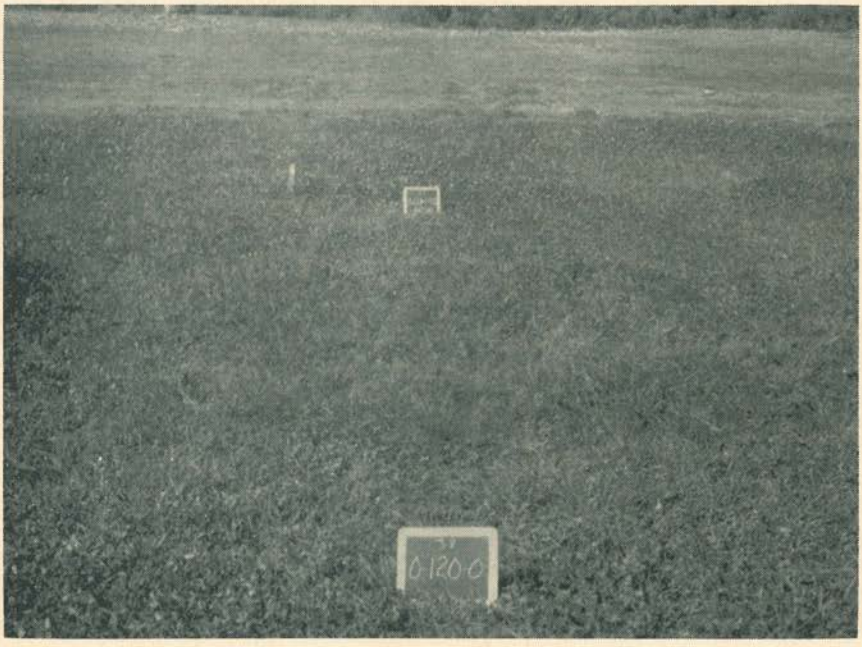


Fig. 1. Second harvest year. 120#/a P_2O_5, 0#/a K_2O. Ladino clover needs both phosphate and potash.

Table I. Yield of ladino clover. Phosphate applied in 1, 2, and 4 increments and by 3 methods at seeding. Rate—120 lbs. P_2O_5 per acre.

P_2O_5 lbs./A	No. of Applications	Year of Stand	
		2nd	4th
		Tons/A—Dry Matter	
30	4	.....	2.17
60	2	3.41	.....
120	1 (Surface)	2.54	1.46
120	1 (Mixed)	2.53	1.62
120	1 (Banded)	2.75	1.60

and 2 inches deep increased the effectiveness of initial phosphate applications. Ladino clover seedlings over the bands were markedly stimulated and dominated plot growth during the seeding year of 1951.

Other treatments compared were (1) broadcasting superphosphate with the seed on the surface and (2) mixing superphosphate into the surface. However, no subsequent applications of phosphate were made and the initial advantage of banding was lost. A refinement of this technique, bandseeding, is becoming widely used for better establishment of forage seedings, particularly on lower fertility soils.

Results of potash treatments, shown in Figure 1, demonstrate the value of adequate potassium for maintaining productive stands of ladino clover. Applications were made in split annual increments. This reduces excessive, wasteful uptake of potassium by plants and may reduce leaching losses and fixation into relatively unavailable forms (2), (6).

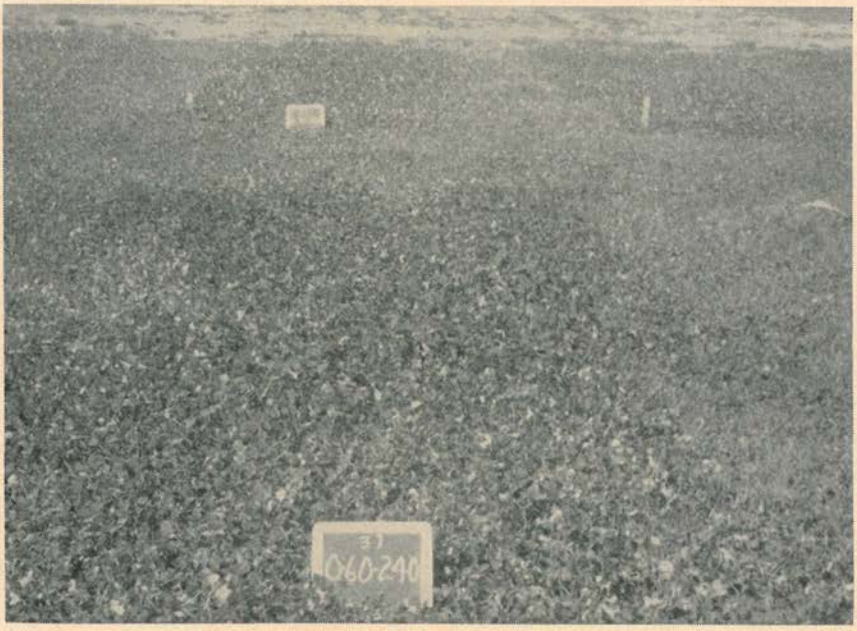


Fig. 2. Second harvest year. 60#/a P_2O_5 240#/a K_2O. Adequate phosphate and potash aids in maintaining productive stands of ladino clover.

Applications of 30, 60, and 120 pounds of K_2O caused a successive yield increase with each increment. Additional potash failed to increase yields in this experiment. Ladino stands were maintained satisfactorily over the four-year period with at least 120 pounds of K_2O per acre per year. At this rate ladino clover was more persistent, more vigorous. At lower rates more winter injury was apparent, with stands containing considerably more weed growth.

Additional studies were conducted to determine the efficiency of potassium utilization. Chemical analysis of ladino clover from plots fertilized with various rates of potash revealed that uptake of potassium by the crop considerably exceeded amounts applied at lower levels of 0, 30, and 60 lbs. of K_2O (see Figure 3). The amount of soil potassium utilized was nearly identical for each level, but decreased each year. After three years, only a very small supply was either available to or utilized by the crop. Subsequent soil analysis showed the level of exchangeable potassium remained very low over the experimental period. The non-exchangeable fraction was reduced, indicating potassium was utilized either directly or indirectly from this source.

At the 120-pound (K_2O) level, uptake of K approximately equaled the amount applied, while uptake

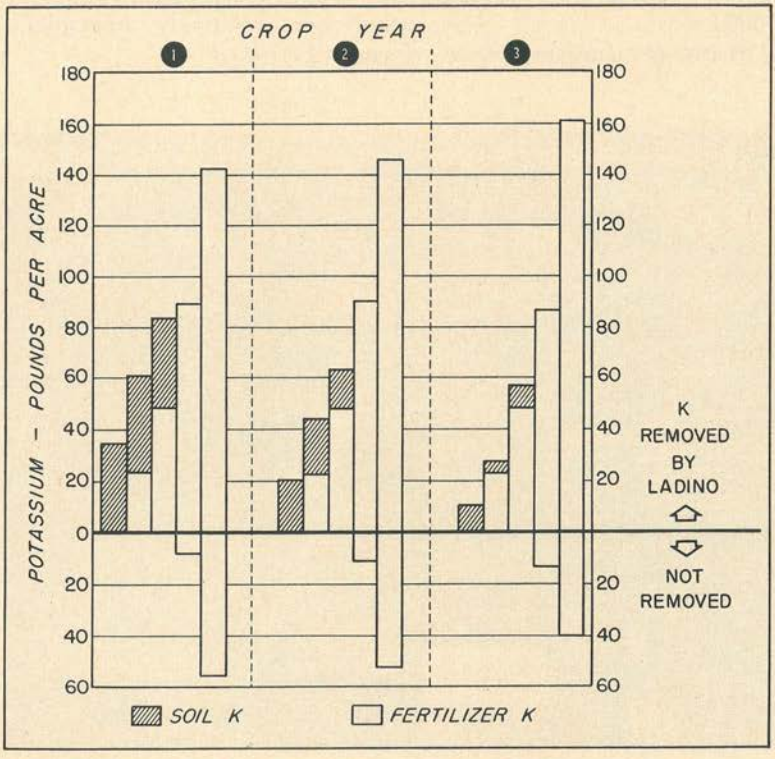


Fig. 3—Potassium utilization by ladino clover during 3 harvest years when 0, 25, 50 and 100 and 200 pounds of K were supplied in split applications each year.

was considerably less than that applied at 240 pounds. Soil analysis showed an increase in exchangeable potassium at both levels and a considerable increase in non-exchangeable potassium at the high (240 pounds) level.

Results show a minimum of 120 pounds of K_2O are required not only to maintain satisfactory stands of ladino clover, but to maintain soil levels of potassium. Exchangeable and non-exchangeable fractions of soil potassium, it appears, are essentially in equilibrium. The levels of either may change to restore the balance as potassium is added or removed from the soil (1) (6).

Several factors may change the efficiency of potassium utilization. Losses through leaching, luxury consumption and fixation, if any, have not been considered here. Additions of potash were made in split applications. Single applications would probably reduce efficiency and require higher rates for comparable results.

In addition, a greater proportion of grass in the mixture would increase potash needs of the crop. Recent research shows grasses are superior competitors for many nutrients, notably potassium (5), (7), (8). Natural and imposed factors favoring the growth of grasses will increase this competition. Cutting management of mixtures, designed to control overly vigorous growth of grasses will reduce competition for light, water, and nutrients and thus help maintain stands of ladino clover.

This demonstrates the value of sound grazing management along with adequate fertilization to maintain well-balanced mixtures.

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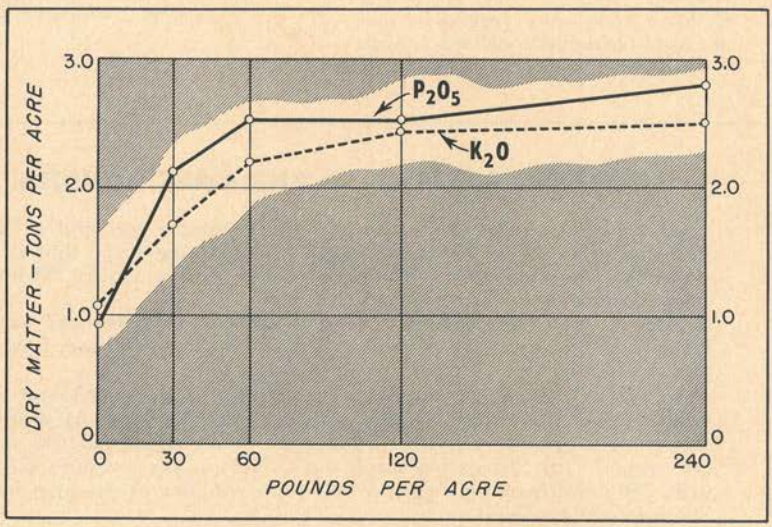

Fig. 4—Yield of ladino clover in tons of dry matter per acre following various applications of phosphate and potash. (Average of 4 harvest years.)

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* The author is indebted to the Department of Agricultural Chemistry for chemical analysis of plant material.

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BOOSTING ALFALFA . . . AND CALF POUNDS

ALFALFA yields were boosted more than a ton and a half per acre when lime, fertilizer and manure were added in Minnesota tests, reports Wallace Nelson, University of Minnesota agronomist.

Nelson says the fertilized alfalfa yielded 3½ tons per acre, compared to only 1.9 tons when the field received no lime, fertilizer or manure.

In other tests at the University's Duluth experiment station, renovation, lime and fertilizer increased summer gains by almost 60 per cent in dairy calves. Total gain on fertilized pasture was 395 pounds for 282 calf-grazing days, Nelson says, compared to only 250 pounds of total gain in the same number of grazing days on the non-fertilized areas.

"IDEAL LEGUME"

ALFALFA, grown in combination with grasses, has proved to be an ideal pasture legume in experiments at Pennsylvania State University, reports Win Way, Vermont Extension Agronomist.

Used by eastern farmers in the past almost exclusively as a hay crop, alfalfa has proved to have a number of advantages when grown with grasses for pasture. If properly managed, it withstands pasture traffic well, gives better seasonal distribution of grazing, and provides a good supply of high quality feed in the mixture. Its deep root system makes it resistant to drought, and it quickly resumes growth after cutting or grazing.

Fenwick Estey of Bristol, last year's Green Pasture Winner in Addison County, Vermont, has known this for some time. His herd of 33 Holstein milkers and 27 head of youngstock obtained all of their roughage from an alfalfa-brome grass mixture on 70 acres atop Bristol Mountain.

A well-planned rotational system of grazing in two-acre plots provided pasture throughout the grazing season. The forage not used for pasture was put up as grass silage and chopped, mow-cured hay.

Sixty-five tons of lime in the last two years and 600 pounds of 0-15-30 help hold the stands for five or more years. The fertilizer is applied in the fall and again after the first and second cuts. Yields of more than four tons per acre and a grain milk ratio of 1 to 6.5 last year are benefits which Estey derives from his system.

Thus research points out a technique which a Vermont farmer has been using to make his roughage program among the best in the State, concludes Way.

Abstracts

1102 16th STREET, N. W. WASHINGTON, D. C.

FROM THE AMERICAN POTASH INSTITUTE LIBRARY SERVICES

The American Potash Institute announced this month that its library has launched a new abstracts service, summarizing the important findings on the role of potash in good soil management and balanced soil fertility.

This program abstracts the important potash information from each article that is summarized.

The abstracts are available on request to professional agricultural workers of the United States and Canada. Beginning with this issue, BETTER CROPS will feature a small portion of the abstracts available in the current issues. So far, two issues of the abstracts have been assembled.

Issue number 1 covers the general field of efficient soil management and fertilization. It features 32 summaries—ranging from "factors influencing the mineral content of snap beans, cabbage, and sweet potatoes" to the "effect of soil management practices on soil and leaf analyses in a peach orchard."

Issue number 2 covers forest fertilization. It features 67 summaries—ranging from the "effect of fertilizer treatment on field-planted spruce" to "potash and frost resistance."

If you are interested in receiving this service regularly, you might write Abstracts, American Potash Institute, 1102 16th Street, N. W., Washington, D. C.

K-Clover Longevity

Rouse, R. D.

Behavior of potassium in soils. (3) The effect of mineral plant nutrients on the maintenance of clover in pastures on Black Belt soils. Ala. Agr. Exp. Sta. 64th and 65th Ann. Repts. 1953-54, p. 6-7. June 1956.

A 5-year study has been made to explain the disappearance of clover in clover-grass pastures in Black Belt soils. These studies indicate, and this was borne out by field observations, that when pastures were first established on these soils and weather conditions are favorable, P fertilization alone may produce good clover growth on all Black Belt soils except the high lime soils where K is needed for establishment. However, continued applications of only P can create K deficiency as a result of forage removal even on the least K-deficient soils of this area. Since grass is able to grow at lower levels of available K than clover, it continues to thrive after the clover stands are largely lost. On the lime soils, clover failure may also be hastened by the application of P even with adequate K application because of the tie-up of Fe in the surface soil.

K-Fixation and Release

Rouse, R. D. and Stickney, E. M.

Behavior of potassium in soils. (1) Effect of moisture content and temperature of drying on certain exchange characteristics of Vaiden clay. Ala. Agr. Exp. Sta. 64th and 65th Ann. Repts. 1953-54, p. 7. June 1956.

A study was made of the effect of moisture content and temperature of drying on some exchange characteristics of Vaiden clay to obtain a clearer insight into the phenomena of K release and fixation of soils. The cation exchange capacity decreased on drying and exchangeable K and Na increased. At present no theory of soil chemistry explains this increase in exchangeable K and Na on drying. However, these findings emphasize the need for uniform drying of samples of these soils before making a correlation analysis for soil testing purposes.

K-Na Relationship

Rouse, R. D., Ernest, A. B., Selman, F. L., et al.

Behavior of potassium in soils. (2) Effect of sodium, cationic ratios, and aeration on early fruiting and yield of cotton. Ala. Agr. Exp. Sta. 64th and 65th Ann. Repts. 1953-54, p. 7. June 1956.

In 2 field experiments, one conducted on Norfolk loamy sand and the other on Kalmia sandy loam, no value from the application of Na was found when K was adequate. At inadequate K levels, however, Na was found to

substitute for some of the K needs of the cotton plants.

Soil Test Summary—Alabama
Wilson, C. M.
Soil testing studies. Ala. Agr. Exp. Sta. 64th and 65th Ann. Repts. 1953-54, p. 12. June 1956.

The soil testing laboratory was put into operation Feb. 1, 1953. A summary of the results of analyses for the 2-year period for all samples (except unusual samples such as for gardens) showed that 50 to 60% of the samples were low in available P as compared with 80 to 90% for K. This indicates that K is more often a limiting factor in crop growth than is P.

Peaches—Soil Management
Hitz, C. W., Gilligan, G. M. and Amling, H.
Effect of soil management practices upon soil and leaf analyses in a peach orchard. Del. Agr. Exp. Sta. Bul. 316, p. 4-12, 16-19. June 1956.

The soil and foliage response from peach soil-management procedures in continuous operation for 10 years are described in this report. The soils of the 5 cover-crop treatments showed over 70% greater K content in 1951 than those under clean cultivation. The failure of peach trees fertilized with nitrate or poultry manure—but under clean cultivation—to grow well was a response to nutritional status. Leaf samples of trees grown under manure fertilization showed high K and P contents but low N, whereas the nitrated trees showed high N content but low P and K. These unbalanced conditions probably accounted for the low growth rates of trees under these treatments.

Rotational Fertilization
Barber, S. A.
Fertilization practices studied. Ind. Agr. Exp. Sta. 68th Ann. Rept. 1955, pp. 20-21.

This project was designed to study the effect of amount and method of fertilization on crop yields. The rates of fertilizer application are correlated with soil tests for available P and K in a corn-soybean-wheat-hay rotation. Starting at this level of soil fertility where the P test is 100 lb. and the K soil test is 160 lb. the highest net returns for the rotation were obtained by building the P and K levels to 200 and 500, respectively.

Organic Matter—K Availability
Reuszer, H. W. and Frederick, L. R.
Study microbial action in greenhouse tests. Ind. Agr. Exp. Sta. 68th Ann. Rept. 1955, pp. 93-94.

Previous studies have shown that under laboratory conditions the addition of organic matter and consequent microbial activity tended to increase exchangeable K in soils where non-exchangable K had a relatively high availability to plants but not in soils where non-exchangeable K had a low availability to plants. An attempt was made to determine if such effects could be detected by plant growth in greenhouse experiments with alfalfa. Addition of readily decomposable organic matter did not produce increased yields and in some cases actually depressed yields below those found in treatments with no organic matter added to the soil. Presumably K uptake paralleled yield, although analyses for K have not yet been made upon the plants. Experiment results do not give an unequivocal answer as to the effect of organic matter upon K availability to plants.

Soil Test Methods
Fitts, J. W., Hanway, J. J., Kardos, L. T., et al.
Soil tests compared with field, greenhouse and laboratory results. N. C. Agr. Exp. Sta. Tech. Bul. 121, pp. 3-4, 15-16. April 1956.

Soil samples from 74 P experiments were tested for P, K and pH by 55 state commercial soil testing laboratories. The soils were from a wide variety of soils in the U. S. and Canada. Neubauer values for P and K were also obtained. The correlation of the soil test results for K with (1) exchangeable K determined by the ammonium acetate leaching procedure and (2) Neubauer values are summarized in Table 8. These correlations have been grouped according to the cation used for extraction of K in the soil tests. For most of the laboratories the correlation between soil test values and exchangeable K were highly significant.

Peanuts Need Potash
Perry, A., York, E. T., Jr., Gregory, W. C., et al.
Peanut production guide for North Carolina farmers. N. C. Agr. Ext. Serv. Cir. 257, pp. 5-6. Rev. Dec. 1955.

Peanuts have long had a reputation for being "hard on the land." Recent studies at N.C. Agr. Exp. Sta. have indicated that where diseases and nematodes are not problems the harmful effect of peanuts on soil productivity is due primarily to the removal of large amounts of K. A summary of soil analyses made by the Soil Testing Div. of the N.C. Dept. of Agr. indicated that almost ⅔ of all the soil samples from the 9 principal peanut producing counties were "low" or "very low" in K. On soils low in K, peanuts may respond to direct application of K fertilizers. On such soils it is desirable to apply 100-150 lb. per acre KCl to soil with high P level or 300 lb. per acre 0-10-20 to soils with a low P level. Adequate levels of K can be maintained for peanuts, and better yields of all the crops are produced, if larger than normal rates of K are applied to the other crops in rotation. Tables are given.

TERRACES

SAVE NEEDED MOISTURE

ALTHOUGH terraces are most often thought of as a means of controlling erosion, they are also important in saving moisture, says R. P. Beasley, University of Missouri agricultural engineer.

At the Christy Experimental Farm in Andrew County last year, a terraced field had a corn yield twice as large as that produced on an unterraced field.

Corn on an unterraced acreage made 22 bushels an acre while the yield on a terraced acreage was 48 bushels. The two corn rows in each terrace channel made 90 bushels. Beasley attributes the 26-bushel difference in yield to moisture conserved by the terraces.

According to the engineer, the two 10-acre fields were side by side on the Christy farm. Both were handled the same in all respects.

During early July last year, approximately two inches of rain fell in a relatively short time at the Christy farm. Terraces held most of this moisture and allowed it to soak into the soil—a large percentage ran off the unterraced area.

Not only did terraces increase the yield but there was a corresponding improvement in grain quality. And, Beasley says the 1956 yield increase was more than enough to pay terracing costs.

According to Beasley, there are other advantages to terraces. He lists the following:

• One—terracing makes land reclamation possible. Fifty million acres in the United States have been stripped of topsoil or are so riddled with gullies as to be virtually useless. If this land is to be returned to production, erosion must first be controlled.

First step in reclamation is to fill gullies and destroy the drainage pattern that has developed. The second step is to terrace the land to control erosion and prevent re-establishment of the previous drainage pattern. Costs are high but, in hundreds of cases, returns have been enough to more than justify the investment.

• Two—terraces preserve good land. Fertile land subject to erosion needs to be terraced to prevent loss of topsoil. Reclamation of eroded field can wait without serious additional loss.

• Three—terraces furnish continuous protection. Many crops furnish erosion protection when fully established. However, there are times during seedbed preparation, early

. . . WHILE RECLAIMING LAND

. . . PRESERVING THE LAND

. . . PROTECTING THE LAND

. . . INSURING INVESTMENTS

. . . PROVIDING MORE LIBERTY

. . . REDUCING DRAIN NEEDS

. . . BUILDING PRODUCTIVITY

. . . CONSERVING WATER

stages of growth, and after harvest when protection is limited and terraces are needed.

In the midwest, most hard rains occur between May 1 and September 30 with the majority coming in June and September. Spring-planted, intertilled crops and fall-seeded grain crops are therefore in danger of large soil loss unless other protection is provided.

• Four—terraces protect soil improvement investments. Considerable expense is often involved in soil improvement needed to maintain high production and terraces protect these investments.

• Five—terraces provide more liberty in selecting farm enterprises. Corn and soybean are the midwest's high-income crops as are cotton and tobacco in southern states. When attempts are made to grow these crops on rolling land, serious soil losses occur and it's difficult to maintain production economically.

These high-income crops can be grown and soil productivity maintained on terraced acreages. If terraces aren't used, crops grown should be limited to those that give more protection. These include small grain, pasture, and hay crops that aren't as economically productive as corn and soybeans.

• Six—terraces reduce drainage needs and improve productivity of bottom land. In many cases, water from hill land discharges onto flat land below. This causes overflow and deposition problems and increases drainage needs on these fields.

If drainage ditches are built to remove water from the bottom land, they must be made large enough to carry excess water. In many cases, they will be clogged with silts washed in from eroding hillsides.

• Seven—terraces may solve a combined drainage and erosion control problem. A combination erosion and drainage problem exists in many areas where topsoil is underlaid with a relatively impermeable subsoil and slopes are long and flat, Beasley notes. These soils dry out slowly, delay seedbed preparation and planting, cause machinery miring, drown out crops, and often delay harvest.

The runoff rate will be high and, even though slopes are relatively flat, serious erosion will result. Drainage type terraces, where the channel is somewhat deeper and the ridge less pronounced than in the ordinary terrace, provide drainage and prevent concentration of runoff on the lower part of the slope. Soil from the channels not needed to build the ridge is spread further down the slope or moved to fill low areas.

• Eight—terraces contribute to water conservation. They slow the runoff rate. This delay gives time for increased water infiltration and on deep, open soil, an appreciable saving is possible.

Missouri Farm News Service, University of Missouri.

This section contains a short review of some of the most practical and important bulletins, and lists all recent publications of the United States Department of Agriculture, the State Experiment Stations, and Canada, relating to Fertilizers, Soil, Crops, and Economics. A file of this department of BETTER CROPS WITH PLANT FOOD would provide a complete index covering all publications from these sources on the particular subjects named.

SOILS

"Irrigating the Prairie Home Garden," Dept. of Agr., Ottawa, Ont., Can., Pub. 851, Dec. 1956, H. C. Korven and R. M. Blakely.

"Soil Management Practices in the Upper Peace River Region," Dept. of Agr., Ottawa, Ont., Can., Pub. 985, Dec. 1956, C. H. Anderson and E. C. Stacey.

"Ontario Flue-cured Tobacco Soils and Their Fertilizer Requirements," Dept. of Agr., Ottawa, Ont., Can., Pub. 987, Sept. 1956, J. M. Elliot and L. S. Vickery.

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An Indian petitioned a judge of an Arizona court to give him a shorter name. "What is your name now?" the judge asked.

"Chief Screeching Train Whistle," said the Indian.

"And to what do you wish to shorten it?" asked the judge. The Indian folded his arms majestically and then grunted, "Toots."

* * *

They don't come any smarter than the guy who managed to talk his wife into being sorry for the girl who lost her hairpins in the backseat of his car.

* * *

Sven: "In Skona, var aye vas born, vas such fine echo ve could stand on mountain top and yell, 'Yonson,' and in tventy minutes back comes such strong echo, 'Yonson,' ve nearly fall off mountain."

Oley: "You call dat fine echo? Vy, right har in Minnesoota ve can stand on shore of lake and yell, 'Yonson,' and in vun minute back come ten tousand echoes, 'Vich Yonson?' "

* * *

Two drunks were staggering across a bridge one night and one of them fell in the river. The other peered uncertainly over the side, saw nothing and finally yelled: "Are ya drowned, Tom?"

"No," came the sputtering reply from below, "but I'm d'luted."

The six sweetest phrases in the American language: I love you; Dinner is served; All is forgiven; Sleep until noon; Keep the change; and Here's that five.

* * *

Passing by a small negro church recently, a traveler was attracted by the organ-like tones of the parson's voice coming from within. He paused to listen to the morning prayer, and learned a new term to describe sin, which was expressed in the following:

"Oh Lord, dis yere little flock ob mine am prone to gossip! Oh Lord, dis yere flock ob mine am prone to bear false witness! Oh Lord, dis yere flock ob mine am prone to steal! Oh Lord, dis yere flock ob mine am prone to do things which ain't fitten to mention in de house ob de Lord! Oh Master, deliver dem from de prone!"

* * *

Abe Goldstein's boy Ikey was in the outer office when the telegram came. The stenographer called out, "A wire from the salesman, Mr. Bernstein."

"Read it to me," Abe called back from the inner room. So she started: "Was in Dallas Monday stop be in Houston Wednesday stop be in New Orleans Thursday stop—"

"Ikey," interrupted the boss, "leave that girl alone and let her read the telegram."

PUNCH FOR THE MONTH: Speeches are like the horns on a steer—a point here, a point there—with a lot of bull in between.

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